

**APPROVED MINUTES¹
OPEN SESSION
425TH MEETING
NATIONAL SCIENCE BOARD**

National Science Foundation
Arlington, Virginia
May 3-4, 2012

Members Present:

Ray M. Bowen, Chairman
Mark R. Abbott
Dan E. Arvizu
Bonnie L. Bassler
Camilla P. Benbow*
John T. Bruer*
France A. Córdova**
Kelvin K. Droegemeier
Patricia D. Galloway*
José-Marie Griffiths**
Alan I. Leshner**
W. Carl Lineberger
G.P. “Bud” Peterson**
Douglas D. Randall
Arthur K. Reilly
Anneila I. Sargent
Diane L. Souvaine
Arnold F. Stancell
Claude M. Steele
Thomas N. Taylor
Richard F. Thompson***

Subra Suresh, *ex officio***

Members Absent:

Esin Gulari, Vice Chairman
Robert J. Zimmer

¹ The minutes of the 425th meeting were approved by the Board at the July 2012 meeting.

* Absent on May 3, 2012

** Absent on May 4, 2012

*** On May 4, 2012, attended the Plenary Open Session at 10:45 a.m., but absent from the Plenary Open Session at 12:45 p.m.

The National Science Board (Board, NSB) convened in Open Session at 11:00 a.m. on Thursday, May 3, 2012, with Dr. Ray Bowen, Chairman, presiding. (Agenda NSB-12-18, Board Book page 109). 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

The Board heard a presentation by Dr. Scott Aaronson, a recipient of the 2012 Alan T. Waterman Award. Dr. Aaronson is Associate Professor of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. (Brief Biography, Board Book page 140)

Dr. Robert Wood, another a recipient of the 2012 Alan T. Waterman Award, also gave a presentation to the Board. Dr. Wood is an Associate Professor of Electrical Engineering at Harvard University. (Brief Biography, Board Book page 141)

Dr. Bowen adjourned this portion of the Open Session at 12:00 Noon.

The Board reconvened in Open Session at 10:45 a.m. on Friday, May 4, 2012 with Dr. Bowen presiding. (Agenda NSB-12-18, Board Book page 109) In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

Prior to the start of the meeting, Dr. Bowen administered the Oath of Office to Dr. Bonnie Bassler, who was recently confirmed by the Senate.

AGENDA ITEM 9: Presentations by Honorary Award Recipients

Dr. Lawrence Krauss, the recipient of the 2012 Public Service Award – Individual, gave a presentation to the Board. Dr. Krauss is a Professor in the School of Earth and Space Explorations and Physics Department, and Director of the Origins project at Arizona State University. (Brief Biography, Board Book page 142)

NPR Science Desk received the 2012 Public Service Award – Group. Dr. Joe Palca, one of the many award-winning correspondents on NPR's Science Desk, gave a presentation to the Board on behalf of that group. (Brief Information, Board Book page 143)

[Note: Dr. Leon Lederman, recipient of the 2012 Vannevar Bush Award, did not give a presentation to the Board. (Brief Biography, Board Book page 139)]

Dr. Bowen adjourned this portion of the Open Session at 11:35 a.m.

The Board reconvened in Open Session at 12:45 p.m. on Friday, May 4, 2012 with Dr. Bowen presiding. (Agenda NSB-12-18, Board Book page 109) In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 10: Recognition of the Class of 2012

With this meeting, the NSB Class of 2012 completed its term of service. On behalf of Dr. Subra Suresh, NSF Director, Dr. Bowen expressed appreciation for their dedication and willingness to work with complex issues of all kinds during the past 6 years. He added that their service on behalf of the science and engineering enterprise and the Nation had been extraordinary. The following Members of the Class of 2012 received award plaques honoring “achievements in promoting the progress of science and engineering.”

- Dr. Mark Abbott
- Dr. Camilla Benbow
- Dr. John Bruer
- Dr. Patricia Galloway
- Dr. José-Marie Griffiths
- Mr. Arthur Reilly
- Dr. Thomas Taylor
- Dr. Richard Thompson

Dr. Bowen briefly summarized the activities of the outgoing Board Members, with thanks for their contributions.

Dr. Abbott served as chairman of the Committee on Programs and Plans (CPP), and Dr. Benbow served as chairman of the Committee on Education and Human Resources (CEH), which produced the report on STEM Innovators. Both Drs. Abbott and Benbow served on the Executive Committee.

Dr. Bruer also served as chairman of the CEH as well as chairman of the Task Force on Merit Review (MR), and most recently, as chairman of the *ad hoc* Committee on Nominating for NSB Elections (NOMCOM). Dr. Galloway served as the Board’s Vice Chairman as well as the chairman of the Task Force on the NSB 60th Anniversary (60ANN). Additionally, Dr. Galloway twice served as the lead for the selection process for the Board’s Legal Counsel.

Dr. Bowen stated that the Board owed a debt of gratitude to Dr. Griffiths, who served as chairman of three committees that each produced a publication in recent months: the Committee on Science and Engineering Indicators (SEI), the Committee on Strategy and Budget (CSB) Task Force on Data Policies (DP), and the CSB Subcommittee on Facilities (SCF). Additionally, Dr. Griffiths stepped forward to serve as the interim Vice Chairman of this Board during the absence due to illness of Dr. Esin Gulari.

Mr. Reilly served as chairman of two standing committees – the Committee on Audit and Oversight (A&O) and earlier the Committee on Strategy and Budget (CSB). Dr. Taylor served as chairman of the Subcommittee on Polar Issues (SOPI), and Dr. Thompson participated on several committees from which the Board benefited greatly.

Although not a member of the Class of 2012, Dr. Bowen extended formal thanks to Dr. Louis Lanzerotti, who served as a Board Consultant for two years. He expressed appreciation for Dr. Lanzerotti's special perspectives on issues and problems, and the enormous amount of effort as SEI chairman for two rounds of *Science and Engineering Indicators*.

Lastly, Dr. Bowen expressed great appreciation to the NSF leadership. He thanked Dr. Suresh; Dr. Marrett, NSF Deputy Director; NSF Assistant Directors (ADs); and NSF staff who provided support to the Board. He mentioned that the Board especially enjoyed the good rapport that existed between the Board and NSF, and that he was confident that the positive relationship will continue to grow. He expressed appreciation for the sage advice from Dr. Esin Gulari, who served as Vice Chairman. On behalf of the entire Board, he also thanked the Board Office staff for all its support. On a final note, Dr. Bowen stated that he looked forward to serving on the Board for the next 2 years.

AGENDA ITEM 11: Approval of Open Session Minutes, February 2012

The Board unanimously APPROVED the Open Session minutes of the February 2012 Board meeting. (NSB-12-15, Board Book page 127)

AGENDA ITEM 12: Chairman's Report

In the Chairman's Introduction on Thursday, May 3, 2012 and during the Chairman's Report in the Plenary Open Session on Friday, May 4, 2012, Dr. Bowen announced and reported on several items.

a. Results of Board Elections

Dr. Bowen announced the results of the Board Elections, which took place in the Plenary Executive Closed Session. The Board elected Dr. Dan Arvizu, as Chairman, and Dr. Kelvin Droegemeier, as Vice Chairman for the 2012 - 2014 terms. Both were elected to serve as members of the Executive Committee (EC) from 2012 to 2014, along with Dr. Carl Lineberger who was elected to that committee to fill the 2011-2013 term of Dr. Droegemeier.

b. Board Member Confirmation and Nomination

Dr. Bowen made the following announcements:

- Dr. Bonnie Bassler was confirmed by the Senate on April 25, 2012, and replaced Dr. Steven Beering, for the Class of 2016.
- Dr. Arthur Bienenstock was nominated by the President on March 12, 2012, to replace Dr. Louis Lanzerotti, for the Class of 2016.

c. Annual Awards Ceremony and Dinner

The Board held the annual Awards Ceremony and Dinner at the Department of State's Diplomatic Reception Rooms on May 3, 2012. Dr. Bowen stated that the event was one of the few

opportunities the Board had to recognize the distinguished contributions of individuals and organizations to the advancement of science and engineering. The Board was also honored to receive a message from President Obama.

The following 2012 honorary awards recipients were recognized for their distinguished contributions:

- Dr. Leon Lederman, Director Emeritus, Fermilab, received the Vannevar Bush Award for outstanding contributions toward the welfare of mankind and the Nation through public service in science and technology.
- Dr. Scott Aaronson, Associate Professor of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology, received the Alan T. Waterman Award.
- Dr. Robert Wood, Associate Professor of Electrical Engineering at Harvard University, also received the Alan T. Waterman Award.

The Waterman Award recognizes outstanding capability and exceptional promise for significant future achievements.

The following received the 2012 Public Service Award for contributions toward increasing public understanding of science and engineering.

- Dr. Lawrence Krauss, Professor in the School of Earth and Space Exploration and Physics Department, and Director of the Origins Project at Arizona State University, received the individual Public Service Award.
- NPR Science Desk received the group Public Service Award.

Dr. Bowen stated that it was both a privilege and honor to present these awards to talented people and a distinguished organization. He added that an event such as the annual Awards Ceremony and Dinner requires an enormous amount of planning. On behalf of the Board, he thanked the Board Office and NSF staff who contributed to the efficient operation of this event, particularly Ms. Ann Ferrante, Ms. Mayra Montrose, and Ms. Betty Wong, who managed the awards programs and orchestrated the ceremony and formal dinner in an exemplary way.

d. Congressional Testimony

Dr. Bowen reported that on February 28, 2012, he and Dr. Suresh testified before the House Committee on Science and Technology, Subcommittee on Research and Science Education on the NSF FY 2013 Budget Request. (Testimony, Board Book page 145). Additionally, on March 8, 2012, Dr. Griffiths testified before the same subcommittee regarding NSF's Major Research Equipment and Facilities Construction (MREFC) management. (Testimony, Board Book page 152).

e. Committee Announcements

Dr. Bowen discharged the CSB Task Force on Data Policies (DP) with thanks to Dr. José-Marie Griffiths, chairman, and Drs. Mark Abbott, Camilla Benbow, John Bruer, Bud Peterson, Thomas Taylor, and Mr. Arthur Reilly, members. [Mr. Robert Pennington, Executive Secretary; Mr. Blane Dahl, Board Office Liaison]

He also discharged the *ad hoc* Committee on Honorary Awards with thanks to Dr. Bud Peterson, chairman, and Drs. Camilla Benbow and Arnold Stancell, members. [Ms. Ann Ferrante, Executive Secretary]

Lastly, he discharged the *ad hoc* Committee on Nominating for NSB Elections, with thanks to Dr. Bruer, chairman, and Dr. Galloway, Dr. Griffiths, and Mr. Reilly, members. [Ms. Ann Ferrante, Executive Secretary]

f. Board Member Recognition

Dr. Bowen recognized Dr. Suresh, who was elected to the National Academy of Sciences – the society of distinguished scholars dedicated to the furtherance of science and technology – on May 1, 2012.

He also recognized Dr. Peterson, who was recently selected as an Outstanding Alumni of the Look College of Engineering at Texas A&M University on April 12, 2012.

g. Board Office Staff Introduction

Dr. Bowen welcomed Dr. Jacqueline Meszaros who joined the Board Office in March 2012 on a detail. She will be supporting several standing committees. “Jack” came to NSB from the Directorate for Social, Behavioral, and Economic Sciences (SBE), where she was a Program Director. She has served as an Advisor to the National Research Council (NRC) and the National Aeronautics and Space Administration (NASA). Dr. Meszaros was previously a faculty member at the University of Washington, and, before that, at Temple University. She received a Ph.D. in Management and her post-Doctoral work was in Behavioral Economics, both at the Wharton School, University of Pennsylvania.

h. Board Office Staff Departures

Dr. Bowen announced departures of two Board Office staff.

Mr. Blane Dahl will be leaving on May 11, 2012 to relocate to Wiesbaden, Germany. Mr. Dahl joined the Board Office in January 2010 as a Science Policy Analyst, and served as a Board Office Liaison to CSB, SCF, and DP. He was instrumental in the efforts to prepare the Board’s response to Congress under the America COMPETES Reauthorization Act regarding mid-scale instrumentation at NSF and the Board’s report on digital research data sharing and management.

Ms. Beverly “Bev” Sherman retired on March 31, 2012 from the Federal Government after almost 24 years of service. She joined the Board Office in 2008 as a Program Coordinator and supported Board events and Board off-sight meetings, as well as working on the NSB Web site.

i. Webcast of Board Meeting

For the fourth time, the Board meeting held in Arlington, Virginia, was Webcast and simultaneously available to viewers through the Internet. The Webcast included all Plenary Open Sessions of the full Board as well as Open Sessions of its committees, subcommittees, and task force.

The Webcast link, <http://www.tvworldwide.com/events/nsf/120503/>, is available from the NSB and NSF Web sites.

AGENDA ITEM 13: Director's Report

In the absence of Dr. Subra Suresh, NSF Director, Dr. Cora Marrett, NSF Deputy Director, reported on the following items:

a. NSF Staff Introductions

Dr. Alan Townsend joined NSF on March 19, 2012 as Division Director, Division of Environmental Biology (DEB), Directorate for Biological Sciences (BIO). Dr. Townsend came to NSF from the University of Colorado at Boulder where he is Director of the Institute of Arctic and Alpine Research and Director of the Environmental Studies Program. Dr. Townsend received his Ph.D. in Biological Sciences from Stanford University in 1994.

Dr. Jinliu (Grace) Wang was appointed Division Director, Division of Industrial Innovation and Partnerships (IIP) as of February 12, 2012. Dr. Wang came to NSF in 2009 as a Program Director, Small Business Innovation Research and Small Business Technology Transfer (SBIR-STTR). Prior to joining NSF, Dr. Wang served as Senior Development Scientist/Engineer at IBM/Hitachi Global Storage Technologies. Dr. Wang received her Ph.D. in Material Science and Engineering from Northwestern University in 2001.

Ms. Mary Santonastasso, Division Director, Division of Institution and Award Support (DIAS), Office of Budget, Finance, and Award Management (BFA), was selected to receive the 2012 National Council of University Research Administrators' Joseph F. Carrabino Award. This award, named after the late Joseph Carrabino, a Grants and Contracts Manager at NSF, recognizes current or former Federal partners who work diligently to foster and maintain Government-university relations. Ms. Santonastasso was recognized for her significant contribution to research administration.

b. Congressional Update

Since the February 2012 Board meeting, Dr. Suresh testified at five congressional hearings. The topics ranged from NSF's Budget to advanced manufacturing to forensic science. Dr. Suresh also had the distinct pleasure of testifying twice in the same day on two different occasions. Additionally, Dr. Marrett testified before the House Science Committee on the NSF's MREFC process on March 8, 2012.

On April 25, 2012, Dr. Marrett also spoke at the congressional luncheon, "Re-engineering Water for Power." The event was hosted by the Directorate for Engineering (ENG) in conjunction with Senator Majority Leader Harry Reid (NV). She applauded the NSF Office of Legislative and Public Affairs (OLPA) for its work to organize an effective event.

All of the ADs as well as the Head, Office of Polar Programs (OPP) recently met with congressional staff to brief them on their respective areas of the FY 2013 Budget Request.

The Coalition for National Science Funding will sponsor its 18th annual exhibition. This year's theme was "STEM Research and Education: Underpinning American Innovation," which was scheduled for May 15, 2012 on Capitol Hill.

The House and Senate Appropriations Committees passed their versions of the Commerce, Justice, Science and Related Agencies Bill for FY 2013. The House provided NSF \$7.333 billion, an increase of \$299.4 million, or 4.3 percent over the FY 2012 appropriated level. The Senate provided NSF \$7.273 billion, an increase of \$240 million, or 3.4 percent above last year's appropriated level. Reductions from the request in both the House and Senate were taken solely from the Research and Related Activities (R&RA) accounts, and all other accounts were held level with the requested amount. The House was expected to take up the Appropriations Bill on the floor when it returned from recess on May 8, 2012.

Dr. Marrett stated that NSF publicly recognized the tremendous efforts made by Chairman Frank Wolf (VA), and Ranking Member Chaka Fattah (PA) in the House, and Chairwoman Barbara Mikulski (MD), and Ranking Member Kay Bailey Hutchison (TX) in the Senate, to help secure funding for NSF in this Bill.

Dr. Marrett also reiterated NSF's profound appreciation to the outgoing Class of 2012, knowing that NSF will be able to call on each of them for advice. She echoed Dr. Bowen's earlier comments for the Board and NSF to continue to build on their positive working relationship.

On behalf of Dr. Suresh, Executive Committee (EC) chairman, Dr. Marrett reported that the committee approved the 2011 EC Annual Report during a teleconference on April 18, 2012. She recommended that the Board accept the 2011 EC Annual Report, which covered the period from May 2011 to April 2012.

The Board unanimously ACCEPTED the 2011 Annual Report of the Executive Committee. (NSB/EC-12-3, Board Book page 144) (Appendix)

AGENDA ITEM 14: Open Committee Reports

[Note: The Executive Committee (EC) did not meet in May 2012.]

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

Mr. Arthur Reilly, A&O chairman, reported that this was his last meeting as A&O chairman. He stated that he was pleased to see progress made in expanding and improving communication in addressing a broad range of issues between NSF management, especially BFA and the Office of Inspector General (OIG), during the past 2 years.

He reported that Ms. Allison Lerner, NSF Inspector General (IG), briefed the committee on OIG's recent activities. She introduced Mr. Alan Boehm, the new Assistant Inspector General (AIG) for Investigations; and Mr. Kenneth Chasen, the new AIG for Legal, Legislative and External Affairs. Ms. Lerner also discussed the results of three recent audits.

Ms. Lerner and Ms. Martha Rubenstein, NSF Chief Financial Officer (CFO), jointly reported on progress to resolve remaining issues regarding the use of contingency funds in cooperative agreements. Two specific working groups focused on the following issues: (1) mutual understanding of the definition of “contingency,” and how it applies across the proposal and award lifecycle for these large facilities construction projects; and (2) the sufficiency of awardee documentation in this area, with the goal of understanding how the proposal contingency budget line item is developed. The overarching joint OIG-BFA group will also be looking at best practices used at other agencies.

Mr. Sal Ercolano of Clifton Larson Allen, partner-in-charge of NSF's financial statement audit, presented an overview of the audit plan for FY 2012. (Presentation Book page 186)

In addition to noting the progress and challenges of addressing the complex contingency budgeting issue, Ms. Rubenstein updated the committee on the considerable work NSF has undertaken to be responsive to the Administration’s and Congress’ interest on spending on conferences. This is important to NSF, as merit review panels are technically conferences for purposes of these analyses. Pending legislation may have an impact on how NSF’s operations in this area. She also gave an update on how NSF was proceeding on the Administration’s mandate to accelerate the spending of American Recovery and Reinvestment Act (ARRA) funds. NSF has a robust approach and is showing leadership in this area.

Mr. Eugene Hubbard, the new Chief Human Capital Officer, gave an update on a variety of issues in these challenging times for Federal employees. (Presentation Book page 197)

A&O also recognized that the NSF staff is the Foundation’s greatest asset and expressed appreciation for all their efforts.

Dr. Pamela O’Neil and her colleagues presented the 2011 edition of the annual Merit Review Report. This report provides a summary of proposal and award trend data, data on the transition from Small Grants for Exploratory Research (SGERs) to Grants for Rapid Response Research (RAPIDs), and EARly-concept Grants for Exploratory Research (EAGERS), and data on the use of virtual panels. In FY 2011, NSF received a total of 51,562 proposals. This is a decrease of about 7 percent from the number of proposals received in FY 2010, but an increase of over 61 percent from the number of proposals received in FY 2001. NSF made 11,192 awards in 2011, resulting in a 22 percent funding rate. Board Members expressed concern about the decrease in funding rates in 2011. The Board was particularly concerned about how the decrease in funding rates affects early-career Principal Investigators (PIs). (Board Book Addendum; Presentation Book page 206)

Lastly, Mr. Reilly reported that NSF senior staff will be working with the Board on a process for providing information on NSF response to congressional requests.

b. Committee on Education and Human Resources (CEH)

Dr. Arnold Stancell reported on behalf of Dr. Camilla Benbow, CEH chairman. He stated that the committee discussed the topic of scaling-up educational practices and programs that have been shown through research to be effective in improving STEM learning and/or effective in increasing

recruitment and retention of students in STEM disciplines. The discussion was initiated by brief introductory comments from two invited guests.

Dr. Michael Tanner, Vice President and Chief Academic Officer, Association of Public and Land-grant Universities (APLU), discussed the potential of using Adaptive Learning Systems (ALS) to provide rich, personalized learning pathways for students. ALS methods, such as a Textbook Tutor, provide opportunities to continually update content and embed more interactive simulations that enhance the learning experience. Once a high caliber ALS system is in place, the per-pupil costs to scale up are marginal, making scale-up affordable. One important barrier to scaling-up, however, is the need to reach basic agreement about introductory-level learning outcomes across multiple institutions.

Dr. Tanner noted that faculty adoption is critical for success; helping them to redefine their roles in positive ways and preserve opportunities for creative input essential to getting faculty support. It was further noted that the initiative is producing a large volume of data that is available for research studies on how students learn, which should lead to continual improvement.

Hunter Rawlings, President, American Association of Universities (AAU), described AAU's 5-year initiative to influence the way that STEM courses are taught at its member universities. The goal is to foster a change at the department level from using more passive, lecture-style approaches to using more interactive pedagogies. AAU is asking six to eight of its member institutions to serve as demonstration sites, with three to four departments at each institution committing to make changes to the teaching styles being used across their undergraduate sequence, monitoring the results, and building the evidence of what does and does not work.

In subsequent discussion, Dr. Carl Wieman, Associate Director for Science, Office of Science and Technology Policy (OSTP), and Dr. Joan Ferrini-Mundy, AD, Directorate for Education and Human Resources (EHR) focused on the question of incentives that might encourage faculty and departments to make changes to their undergraduate teaching that reflect research-based best practices. Departmental leadership in setting expectations, peer pressure, institutional competitiveness, and pride in effective teaching were identified as important motivators, more so than financial rewards or accolades. The issues of defining learning goals, bridging the gap in preparation between K-12 and higher education, limiting the introductory course content to a manageable size, and promoting transformations among departments engaged in interdisciplinary fields were also raised.

The committee meeting concluded with an acknowledgment of Dr. Benbow's service as CEH chairman, and thanks to the CEH Executive Secretaries, Ms. Kathryn Sullivan and Dr. Jill Karsten, for their support, and special thanks to Dr. Matthew Wilson for his substantial help over the past 2 years as Board Office Liaison.

c. Committee on Science and Engineering Indicators (SEI)

Mr. Arthur Reilly reported on behalf of Dr. José-Marie Griffiths, SEI chairman, and stated that Dr. Griffiths reminded the committee that the Board was in the early phases of planning for *Science and Engineering Indicators 2014 (Indicators)*, and that this would be the best time to make suggestions for the next edition. Board Members were encouraged to review the 2012

volume, look over the reviews of the early drafts of the 2012 chapters, and contact Mr. Rolf Lehming, Director of NSF's Science and Engineering Indicators Program; Dr. Robert Bell, SEI Executive Secretary; and Dr. Wilson, Board Office Liaison, preferably by June 1, 2012, with any suggestions for changes for the 2014 edition.

The first Companion Piece to *Indicators 2012* entitled, *Research and Development, Innovation, and the Science and Engineering Workforce (NSB-12-3)*, was ready for release. Plans were underway for a mid-June 2012 release, featuring a Web-briefing or Webinar and increased emphasis on social media.

An *ad hoc* group is preparing the second Companion Piece to *Indicators 2012*, which focuses on trends in public research universities, including the decline in per student state appropriations and increases in tuition and student debt. Board Members received an early draft. Feedback on all aspects of the draft, especially additional sources of information, analyses and metrics dealing with the economic value of research universities to states and the Nation, and additions to the bibliography, would be most appreciated. To keep on track for Board approval of this Companion Piece at the July 2012 meeting, Board Members were asked to send comments to Dr. Lisa Nichols, Board Office staff, and Dr. Wilson by May 18, 2012.

The meeting closed with tributes to two people who have made important contributions for the continued success of *Indicators* as the "gold standard" for data on science and engineering: Dr. Griffiths, SEI chairman, for her outstanding leadership and strong commitment to encouraging wider use of the *Indicators* data and to Mr. Lehming, who would retire in June 2012. Mr. Lehming was part of every edition of *Indicators* since 1991 (11 total, of which he managed the last 6). He also guided the implementation of many improvements to *Indicators*, including the state chapter and the Digest, and he demonstrated an extraordinary ability to identify the main trends in science and engineering and present them in a balanced, accessible way. The committee's standing ovation expressed appreciation to him for a job well done over many years.

d. Committee on Programs and Plans (CPP)

Dr. Mark Abbott, CPP chairman, noted that this was his last meeting as CPP chairman. He thanked Ms. Sonya Mallinoff and Ms. Lisa Lewis, the CPP Executive Secretaries; the CPP members; as well as the NSF leadership and staff and Board Office staff for all their work over the years. He stated that he enjoyed his time in this role, and that it was an enjoyable, challenging experience.

Dr. Abbott called attention to the updated Calendar Year 2012 Schedule of Action and Information Items. (Board Book page 24) Three or four action items and six information items were scheduled for July 2012. In addition, the Business and Oversight Advisory Committee, Subcommittee on Recompensation is working on a report. CPP looks forward to hearing about the report and the next steps for the implementation plan of the Board policy. This item will also be on the July 2012 CPP agenda. Finally, the MREFC timeline graphic was updated to make the process clearer. The updated version was agreed upon by CPP. (Board Book page 29)

NSB Information Item: Large Synoptic Survey Telescope (LSST)

Dr. James Ulvestad, Division Director, Division of Astronomical Sciences (AST), Directorate for Mathematical and Physical Sciences (MPS), presented the item. Dr. Ulvestad described the LSST project, which is a large telescope to be built in Chile and is a potential MREFC project for NSF. He provided an update on the recent technical progress on the project, which will be a collaboration between NSF and Department of Energy (DOE).

In mid-April 2012, a statement of intent was signed between the two agencies. The next step is the Memorandum of Understanding (MOU) process that will begin this month. The MOU declares NSF as the lead agency, and that LSST will be a 10-year commitment for both agencies. The NSF MREFC panel unanimously approved the project with the request for a joint NSF/DOE systems engineering review, a cost update, and a signed MOU with DOE. If these are achieved as currently scheduled, an action item could come before the Board at the July 2012 meeting. A July 2012 action item for inclusion in a future budget request is at the Director's discretion. CPP also asked that information on complete budget implications be included in any Board package including such information as future Operations and Maintenance (O&M) costs, partner expectations, etc. (Presentation Book page 46)

NSB Information Item: National High Magnetic Field Laboratory (NHMFL) (Mag Lab)

Dr. Ian Robertson, Division Director, MPS Division of Materials Research (DMR), talked about several science highlights from the Mag Lab that have great promise in a wide variety of science fields, including the potential for new types of computer and information storage. NSF developed a long-range plan for recompetition of the Mag Lab, which begins with a renewal in January 2013. NSF anticipates bringing the proposal review to a close at the end of this month, and there will likely be an action item before the Board in July 2012. (Presentation Book page 58)

NSB Information Item: Arecibo (formerly, National Astronomy and Ionosphere Center)

Dr. Ulvestad also presented the item on behalf of both the MPS AST and the GEO Division of Atmospheric and Geospace Sciences (AGS). Arecibo is the world's largest single-dish radio telescope, located in Arecibo, Puerto Rico. It has been under NSF purview since 1969. Dr. Ulvestad updated the committee on the recent competition held for the management of the facility. SRI International was selected as the managing organization, and the formal transition occurred in October 2011. Dr. Ulvestad noted that the transition went very smoothly, and that employees have been treated fairly and science has continued without interruption. CPP discussed lessons learned from recompetition and other life-cycle issues. NSF is working to collect these lessons from Arecibo (and other projects, such as the Mag Lab) into a single document. (Presentation Book page 78)

NSB Information Item: National Center for Atmospheric Research (NCAR) Review

Dr. Marge Cavanaugh, GEO Deputy AD, introduced Dr. Michael Morgan, GEO AGS Division Director, who presented the item. Dr. Morgan told CPP about the extensive two-step review process that took place in 2011 that examined both NCAR and University Corporation for

Atmospheric Research (UCAR), which is the managing body for the facility. Dr. Morgan informed the committee that the reviews were extremely positive, both for the work conducted at the facility and UCAR as managing body. He informed CPP that NSF anticipates a recommendation for renewal before the Board in spring 2013. If a new award is made, a full and open competition for NCAR management will be conducted at its conclusion. (Board Book page 30) (Presentation Book page 90)

NSB Information Item: Operations and Management of *JOIDES Resolution* Scientific Drillship - Integrated Ocean Drilling Program (IODP)

Dr. Timothy Killeen, GEO AD, and Dr. David Conover, Division Director, GEO Division of Ocean Sciences (OCE), presented the item. The *JOIDES Resolution* is the U.S. contribution to the IODP, an international program made up of 25 member countries. This ship is by far the most active element of IODP; out of 80 proposals in the system, 54 will require the use of the *Resolution*. Dr. Conover informed the committee that NSF plans to bring a request for a 1-year extension for O&M of the ship to the July 2012 meeting. The current program is authorized through FY 2013. In addition, longer range plans anticipate an action item for the Board in December 2012, which will support ship operations beyond 2014. It was noted that some of the concerns regarding IODP and other facilities, such as allocation of O&M costs across NSF, linkage costs between facilities, science as part of O&M, decommissioning costs, etc., go beyond a single facility or program and can be used to inform the SCF Portfolio review. (Board Book pages 31 and 36) (Presentation Book page 102)

CPP Program Portfolio Planning: Neuroscience

The committee continued an ongoing discussion on Program Portfolio Planning. The goal was to provide advice to NSF on a broader portfolio of programs that were intended to complement the strong involvement of the committee via thresholds and approval of actions. NSF presented a first “prototype” Program Planning process on Cognitive Science and Neuroscience. Dr. John Wingfield, BIO AD, gave an overview of cognitive science/neuroscience efforts at NSF. Several other ADs came to the Board table for the discussion, including Dr. Myron Gutmann (SBE), Dr. Farnam Jahanian (Directorate for Computer and Information Science and Engineering, CISE), Dr. Thomas Peterson (ENG), and Dr. Joan Ferrini-Mundy (EHR). (Presentation Book page 110)

CPP and NSF had a successful discussion about how this NSF research might fit into the larger Federal Government portfolio, and how NSF might create the discussion focal point for this type of research. Dr. Abbott suggested a joint CPP-NSF effort to summarize with possible recommendations and provide feedback on the planning process. Dr. Alan Leshner agreed to work with Dr. Gutmann to create a white paper for review and discussion at the July 2012 meeting. This short paper will cover both the neuroscience portfolio and the presentation process.

A second Program Portfolio Planning process was scheduled for July 2012. Dr. Marrett indicated that NSF would discuss one of three options: (1) Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) workforce development programs, (2) international portfolio, or (3) another option to be determined, for which NSF would report to the committee for the July 2012 meeting.

CPP Subcommittee on Polar Issues (SOPI)

Dr. Mark Abbott reported that Dr. Thomas Taylor, SOPI chairman, opened the SOPI meeting with a statement for the record recognizing Dr. Karl Erb, OPP Director, for his service to NSF and the Nation. Dr. Erb, the long time-head of OPP, retired on March 31, 2012. Dr. Taylor announced the new OPP Acting Director, Dr. Kelly Falkner, and the new OPP Acting Deputy Director, Dr. Fae Korsmo.

Dr. Falkner reported on several topics. (1) CH2M Hill protested the awarding of the U.S. Antarctic Program (USAP) contract to Lockheed Martin; however, this protest was denied by the Government Accountability Office (GAO). (2) The Blue Ribbon Panel is currently developing a report summarizing the results of their review; the report will be delivered summer 2012. (3) OPP recently released a solicitation for Science, Engineering, and Education for Sustainability in the Arctic. Proposals are expected fall 2012. (4) The National Academy of Sciences/National Research Council recently released a report, *Lessons and Legacies of the International Polar Year*, which highlights the outcomes and achievements of the International Polar Year (IPY). NSF played a significant role in the IPY. (Presentation Book pages 142, 144, and 178)

Mr. Brian Stone, OPP Director, Division of Antarctic Infrastructure and Logistics (AIL), informed the committee that resupply of the McMurdo and South Pole Stations was successfully completed, and that the Antarctic logistical support contract was successfully transitioned from Raytheon to Lockheed Martin.

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

Dr. Mark Abbott also reported that Drs. Diane Souvaine and Kelvin Droegemeier, MS co-chairmen, stated that a draft report on the NSF support of unsolicited mid-scale research was circulated to the full Board, and important and valuable feedback was received. (Board Book Addendum) Dr. Wilson, Board Office Liaison, provided a brief description of the changes made in response to the feedback. CPP members agreed these had satisfied their concerns, and thanked the task force for their responsiveness. CPP voted to forward the updated report to the full Board for approval. Based on this recommendation:

The Board unanimously APPROVED the *Report on the NSF Support of Unsolicited Mid-Scale Research (NSB-12-22)*, subject to final edits by the co-chairmen of the Task Force on unsolicited Mid-Scale Research and the Board Chairman.

e. Committee on Strategy and Budget (CSB)

Dr. Diane Souvaine, CSB chairman, reported that NSF provided a status update of the FY 2012 and 2013 Budgets. Dr. Suresh reiterated that, despite the economic challenges faced by our Nation, NSF received a 2.5 percent increase for FY 2012. For FY 2013, Dr. Suresh reported that the current status of the House and Senate processes: the House mark, a 4 percent increase over the FY 2012 level, is slightly higher than the Senate mark, a 3 percent over the FY 2012 level. He noted that the FY 2013 Budget included the 'OneNSF' framework. Within the Senate language, a

decrease of \$100 million was proposed for the R&RA account related to OneNSF activities, but the proposal still reflects a 37 percent increase in funding for the OneNSF portion of the budget.

In light of CSB's recent focus on the NSF merit review process and management of work and proposal loads in the context of a dynamic budget environment, CSB asked BIO to present some of the pilot efforts initiated to tackle some of these concerns. Dr. Wingfield presented an update on BIO's activities. He first highlighted some of the reasons for the changes in BIO activities, both internal to NSF and to the external science community. He then noted some of the changes made to the BIO Division of Molecular and Cellular Biosciences (MCB), BIO DEB, and BIO Integrated Organismal Systems Division (IOS) programs, which included such activities as changing the proposal submission process to an 8-month cycle, limits on PI proposal submissions, and pre-proposals with invitations for full-proposals. BIO will carefully monitor these new measures and document the benefits and problems. CSB members inquired about the efforts including a reading of the initial responses from the community, on these new processes. Although still early in the process, Dr. Wingfield noted that a significant amount of outreach regarding the changes was done, that implementation seemed to be going well, and that benefits would hopefully be gained by both NSF and the scientific community. CSB thanked Dr. Wingfield and BIO for their efforts to address these critical issues that face the scientific community.

Dr. Souvaine also reported that CSB discussed the NSB committee organization. Historical information about previous committee structure and committee charges was provided to CSB members in advance of the meeting. (Board Book pages 51, 73, and 74) Given the historical precedent of Board reorganization approximately every 8-10 years, members seemed in general agreement that it was timely to take a hard look at the Board's current committee structure and/or committee charges. There was an ensuing discussion about the current committee organization, including 'what is missing,' such as more effective procedures for coordinating agendas across committees or the potential need for a 'Risk Committee.' Through discussion, it was highlighted that finding the balance of addressing 'big picture' science policy issues and 'NSF-level-business' was important, if not even more important, than the actual 'Board structure.' A significant part of the discussion focused on the Board's role in working outside NSF to enhance its well being; for example, working with the university communities or with Congress or President's Council of Advisors on Science and Technology (PCAST). Although the timing and process to discuss these topics was not finalized during the meeting, future discussion either at an EC meeting, a pre-July 2012 Board meeting, the July 2012 Board meeting, and/or September 2012 retreat were anticipated.

Dr. Souvaine thanked Ms. Holly Smith and Mr. Darren Dutterer, CSB Executive Secretaries, for their exceptional work during the past 2 years. She also thanks Dr. Meszaros, who recently joined the Board Office, for her background research in preparation for the meeting. She extended particular thanks to Mr. Dahl, who served as Board Office Liaison during the past 2 years, and whose dedication, hard work, and good humor will be missed.

CSB Subcommittee on Facilities (SCF)

Dr. Souvaine reported that Dr. José-Marie Griffiths, SCF chairman, provided CSB with an update on the Annual Portfolio Review (APR). Dr. Griffiths reviewed the background, context, and inputs for the review. Drs. William Miller and Robert Robinson, SCF Executive Secretaries, gave a presentation that defined the NSF portfolio, showed budgetary information on the portfolio, discussed management and oversight of the facilities, and identified risks and attributes. After discussion, Dr. Griffiths requested that comments and suggestions be used to develop recommendations incorporated in the APR report and sent to SCF members for further review prior to the July 2012 meeting. (Board Book Addendum; Presentation Book page 3)

CSB Task Force on Data Policies (DP)

The task force was discharged earlier in the meeting. Dr. Souvaine expressed thanks to Dr. José-Marie Griffiths, DP chairman, and the task force members for their work on this important effort and for the report, *Digital Research Data Sharing and Management* (NSB-11-79).

Before adjourning, Dr. Bowen reminded Board Members to review the summary information on the upcoming retreat in September 2012, and to provide feedback to Dr. Michael Van Woert, NSB Executive Officer and Board Office Director.

Dr. Bowen adjourned the Open Session at 1:40 p.m.

[signed]

Ann A. Ferrante
Executive Secretary
National Science Board

**2011 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 April 18, 2012. This report covers the period from May 2011 through April 2012. I served as Director of the NSF and chairman of the Board's Executive Committee for the entire 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, Chairman
Dr. Esin Gulari, Vice Chairman
Dr. José-Marie Griffiths (Acting Vice Chairman)
Dr. Kelvin K. Droegemeier
Dr. Diane L. Souvaine

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 (February 27, 2012) by teleconference in open session. During this meeting, the Executive Committee approved an increase in the amount and duration of the Waterman Award from \$500,000 over 3 years to \$1,000,000 over 5 years.

On October 10, 2011, the Executive Committee voted electronically to elect Dr. Jose-Marie Griffiths to be Acting Vice Chairman of the Executive Committee while Dr. Gulari was unable to serve.

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.

/s/
Dr. Subra Suresh
Chairman
Executive Committee