

**APPROVED MINUTES<sup>1</sup>  
OPEN SESSION  
391ST MEETING  
NATIONAL SCIENCE BOARD**

The National Science Foundation  
Arlington, Virginia  
March 29-30, 2006

Members Present:

Warren M. Washington, Chairman  
Dan E. Arvizu  
Barry C. Barish  
Steven C. Beering  
Ray M. Bowen  
G. Wayne Clough  
Kelvin K. Droegemeier  
Kenneth M. Ford  
Nina V. Fedoroff  
Elizabeth Hoffman  
Louis J. Lanzerotti  
Alan I. Leshner  
Jane Lubchenco  
Douglas D. Randall  
Daniel Simberloff  
Jon C. Strauss  
John A. White, Jr.  
Mark S. Wrighton

Arden L. Bement, Jr., *ex officio*

Members Absent:

Diana S. Natalicio, Vice Chair  
Daniel E. Hastings  
Kathryn D. Sullivan  
Michael G. Rossmann  
Jo Anne Vasquez

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<sup>1</sup> The minutes of the 391<sup>st</sup> meeting were approved by the Board at the May 2006 meeting.

The National Science Board (NSB, the Board) convened in Open Session at 1:10 p.m. on Thursday, March 30, 2006 with Dr. Warren Washington, Chairman, presiding (Agenda NSB-06-24, Board Book Tab 13). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 7: Approval of Open Session Minutes, February 2006 2005

The Board unanimously APPROVED the Open Session minutes of the February 2006 Board meeting (NSB-06-20, Board Book Tab 13D).

AGENDA ITEM 8: Closed Session Items for March 2006

The Board unanimously APPROVED the Closed Session items for the May 2006 meeting (NSB-06-36, Board Book Tab 13D).

AGENDA ITEM 9: Chairman's Report

Dr. Washington, NSB Chairman, reported on several issues.

**a. Board Response to Senator McCain**

Dr. Warren Washington, Board Chairman, reported that, as approved at the February 2006 meeting, Senator John McCain was notified that the Board will examine the existing policies of Federal science agencies concerning the suppression and distortion of research findings and the impact on quality and credibility of all future Government-sponsored scientific research results.

Dr. Michael Crosby, Executive Officer, reiterated the contents of Dr. Washington's initial response to Senator McCain on February 17, 2006 stating that, at the request of Senator McCain, the Board will conduct a review of the organic legislation, executive orders, and public policies for any directions related to the issue of scientific openness, ensuring the credibility of research results, and insulating research results from suppression or distortion of data at key science agencies. Dr. Washington's response further explained that, as Chairman of the Board, he would also discuss, as needed, on a followup basis, the policies and procedures of those agencies with their chief scientists. Based on those reviews and discussions, the Board would then develop specific conclusions with recommendations for possible new legislation, executive orders, agency policies, or other necessary responses. Dr. Washington sent letters to the chief scientists of the Forest Service, Departments of Energy, Health and Human Services, National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), U.S. Geological Survey (USGS), Fish and Wildlife Service (FWS), Environmental Protection Agency (EPA), and the National Institutes of Health (NIH). He requested that copies of the

agencies' written policies, specific legislation, executive orders, and related materials be forwarded to the Board Office by March 23, 2006.

At the time of the meeting, Dr. Crosby reported that the Board received responses from the Forest Service, Department of Energy, USGS, NASA, and NOAA. The remaining agencies had contacted the Board Office and would also send materials.

Dr. Crosby added that the agencies were responding favorably to this project.

Additionally, the Board Office had contacted the Office of Science and Technology Policy (OSTP) and Hill staff for this activity.

Dr. Crosby further reported that the Board Office staff was collecting relevant information on public access research findings from the database of the last 10 years of Congress as well as a search of executive orders and the current version of the Code of Federal Regulations to identify data sharing initiatives required or encouraged by statute. Although agency data release policies are generally not codified and not readily retrievable from electronic databases, the Board Office had collected information on various Federal agency's data sharing policies, in addition to materials from agency Web sites, congressional press statements and correspondence, with the U.S. General Accounting Office (GAO) and congressional committee chairs, Congressional Research Service reports, and the like. Board Members also contributed relevant materials and articles. Dr. Washington requested that Dr. Christina Boesz, NSF Inspector General, poll the inspector general community of the other science agencies for any information to contribute. The Board's report on openness in scientific communications in 1988 would also be reviewed. Dr. Crosby also noted that NSF policies articulated in grants publications for open scientific and engineering communication and its expectation that significant research findings should be promptly submitted for publication.

In terms of next steps, the Board Office will review all collected materials and schedule followup conversations for Dr. Washington with agency officials as necessary. A draft report will be prepared under the direction of Drs. Washington, Wayne Clough, Louis Lanzerotti, and Alan Leshner for Board review about mid-April 2006. A final report will be prepared for Board approval at the May meeting, as requested in the timeline from Senator McCain.

## **b. Congressional Testimony**

The Chairman reported that on March 2, 2006, he testified before the Committee on Appropriations, Subcommittee on Science, State, Justice, and Commerce, and Related Agencies (Board Book Tab 13F). He discussed the FY 2007 NBF budget request, the Board's budget for FY 2007, and an overview of Board activities during the last year. The subcommittee asked the Board to participate in a broad outreach effort to counter cavalier treatment by several prominent commentators of the serious problem for the U.S. with respect to rapidly increasing global competition in science and technology research and education. The subcommittee also requested that the Board respond to negative comment and seek to educate major news sources on the importance of investment in scientific research and education for the Nation. Additionally, the Board was asked to look into

ethical issues of nanotechnology, and to coordinate with other Federal agencies involved in nanotechnology on this matter.

Dr. Washington opened the floor for Board Members to discuss the nanotechnology ethics issue. Dr. Bement, NSF Director, indicated that the President's Council of Advisors on Science and Technology (PCAST) has oversight for nanotechnology and that NSF would provide information to the Board on an NSF-funded center at the University of South Carolina that deals with ethical and moral issues of nanotechnology. The Chairman suggested that the Board gather facts on this topic and that he would specify a Board committee at a later time to lead this effort.

#### **c. Request from Senator Bingaman**

On another congressional issue, on March 17, 2006, the Board responded to Senator Jeff Bingaman's request to review and provide comment on "Protecting America's Competitive Edge" Acts, commonly referred to as PACE. The Board had issued a number of reports and policy statements over the last decade that address many of the issues highlighted in the proposed PACE legislation. Dr. Washington's letter to Senator Bingaman was provided to Board Members. The letter included comments offered by the Board on the PACE Education Act, the PACE Energy Act, and the PACE Finance Act.

#### **d. Committee Announcements**

In the Executive Closed Session, the Board elected the *ad hoc* Committee on Nominating for NSB Elections. This committee was charged with creating a slate of candidates for the election of Board officers in May. Members of the committee were Drs. John White, chair, Jane Lubchenco, Daniel Simberloff, and Mark Wrighton. The committee would meet by teleconference before the May 2006 meeting.

Dr. Washington established the *ad hoc* Committee on NSB Nominations for the Class of 2008 – 2012. This committee will consider and recommend a slate of candidates to fill the eight NSB Member vacancies that will occur on May 10, 2008. The Board will transmit a final slate of candidates to the President in early 2007. Dr. Washington would appoint Board Members in May to serve on the committee.

Lastly, Dr. Washington discharged the *ad hoc* Task Group on Vision for NSF, with special thanks to Drs. Kathryn Sullivan, chair, and Drs. Barry Barish, Nina Fedoroff, and Douglas Randall. The Board appreciates their efforts and those of the Board Office staff for producing the publication, *National Science Board 2020 Vision for the National Science Foundation*.

#### **e. Approval of Honorary Awards**

In the Executive Closed Session, the Board approved honorary awards for the Vannevar Bush Award, Alan T. Waterman Award, and the NSB Public Service Awards. The awards will be presented at the annual awards dinner on May 9, 2006 at the Smithsonian's National Museum of Natural History.

#### **f. Board Member Honors**

Dr. Washington acknowledged the accomplishment of Dr. Jane Lubchenco who was awarded the Public Understanding of Science and Technology Award from the American Association for the Advancement of Science (AAAS) in February 2006. The award recognizes Dr. Lubchenco's commitment to communicating science and technology to such diverse audiences as civic groups; school children; local, national, and international leaders; as well as religious leaders and captains of business and industry.

He also announced that the American Chemical Society (ACS) will honor Dr. Arden Bement in April 2006 when he would be one of three distinguished recipients of their Public Service Award for contributions to the advancement and development of chemistry and science through public policy.

Dr. Mark Wrighton announced that Dr. Washington was recently granted the special designation of "Honorary Member" of the American Meteorological Society (AMS). The honor is given to people with an acknowledged preeminence in the atmospheric, oceanic, hydrological, or related sciences. Also, Dr. Washington would be awarded an honorary doctorate from Oregon State University during their commencement in June 2006. This honor is awarded to distinguished individuals who have made significant contributions to their professions and to our society.

#### **g. Board Commission on 21<sup>st</sup> Century Education in STEM**

Dr. Washington called on Dr. Steven Beering to report on the Board-approved process to consider the value of a new Board Education Commission. He stated that during September 2005, the Board undertook an effort to obtain broad public input on the value of a proposed new Board Commission on Education through a series of public hearings across the country.

At the request of the Board Chairman, he and Drs. Elizabeth Hoffman and Jo Anne Vasquez initiated a series of three public hearings across the country on behalf of the Board--one in Washington, DC (December 2005), in which Drs. Washington, Dan Arvizu, Ray Bowen, Hoffman, and Beering participated; one in Boulder, Colorado (February 2006) in connection with the Board meeting and retreat in which the majority of the Board members participated; and finally a third hearing in Los Angeles, California (March 2006) in which Dr. Jon Strauss participated along with Drs. Vasquez, Hoffman, and Beering.

Hearing participants represented major stakeholders in the K-16 system for science, technology, engineering and mathematics education, including students, teachers and faculty; principals and superintendents from different school system contexts; industry and professional association representatives; government at the state, local and national levels; representatives of academic institutions; and advocates for educational interests. Hearing participants were especially urged to focus on how a new Board Commission could contribute toward implementation of effective solutions to the problems of U.S. STEM education.

Dr. Beering noted that the Board has continued a dialog with the Department of Education, which recently appointed a new commission of its own to address U.S. education, to work together with them toward common objectives. Mr. Thomas Luce, Assistant Secretary, Office of Planning, Evaluation and Policy Development at the Department of Education, participated in the first public hearing on Capitol Hill.

Dr. Beering further reported that the Board was pleased that others are drawing attention at the highest levels to our crisis in science, technology, engineering, and mathematics (STEM) education including the President in his State of the Union address, industry, and Congress in its efforts to pass legislation to build a stronger foundation for American Competitiveness. He expressed the hope that this high level of attention and concern from many sectors can mobilize our society to take the necessary actions to deal with the intractable national problem of poor U.S. student performance in STEM.

Following these hearings, he and Drs. Hoffman and Vasquez concluded that the Board should establish a new Commission on 21st Century Education in Science, Mathematics and Technology. A draft charge for a new Board Commission was provided to Board Members. Given that the Board will ask the Commission to address preK-16 education, Dr. Beering suggested the word "Engineering" be added as part of the title, and recommended that the Board establish a new Commission on 21st Century Education in Science, Technology, Engineering and Mathematics.

Dr. Hoffman reported, as chair of the Board committee on Education and Human Resources (EHR), that the committee took a vote at its March 29, 2006 meeting strongly supporting the charge and recommending that the Board adopt it.

The Board unanimously APPROVED the establishment of a Board Commission on 21<sup>st</sup> Century Education in Science, Technology, Engineering, and Mathematics and approved the charge to the Commission. (NSB-06-39) (Appendix A)

Dr. Washington thanked Drs. Beering, Hoffman, and Vasquez for all their efforts. He noted that the Board should refine the list of possible members of the Commission between the March and May 2006 Board meetings.

## **h. National Medal of Science**

The National Medal of Science transitioned from the Board Office to the NSF Director's Office. The Board recognized and thanked Mrs. Susan Fannoney, Board Office staff, who had been the principle coordinator for that activity for 17 years, for her outstanding work.

### AGENDA ITEM 10: Director's Report

Dr. Arden Bement, NSF Director, reported on the following items.

#### **a. NSF Staff Announcements**

Dr. Thomas Weber began serving as Director, Office of International Science and Engineering on February 12, 2006. Since beginning his career at NSF in 1987, Dr. Weber held a number of positions, most recently as Director, Division of Materials Research, Directorate for Mathematics and Physical Sciences. He received a Ph.D. in Chemical Physics in 1970 from Johns Hopkins University.

Ms. Mayra N. Montrose began serving as Program Manager, National Medal of Science Committee and NSF point of contact with the Office of Science and Technology Policy for all Presidential awards in January 2006. Most recently, Ms. Montrose served as the Program Manager, Energy and Water National Applications in the Applied Sciences Program. She received a Masters Degree in Computer Engineering from the University of South Florida.

Dr. Bement also announced the completed tenure of Dr. Michael Turner, Assistant Director, Directorate for Mathematical and Physical Sciences, who has served NSF with distinction since his appointment in October 2003. As Assistant Director, Dr. Turner provided invaluable scientific and policy guidance as well a strong direction for the research and education programs in mathematical and physical sciences. Dr. Bement further noted that Dr. Turner served as an eminent theorist with deep understanding of the physical sciences, a polished public speaker with widely anticipated appearances, and quick-witted humorist that lubricated intellectual discussions.

#### **b. NSF Gets an "A"**

The House Committee on Government Reform recently graded 24 Federal agencies on how well each agency met the requirements in the Federal Information Security Management Act. In this annual report, NSF's score rose from "C+" to "A."

Dr. Bement reported that NSF's improvements in computer security would bolster its reputation and help demonstrate to the Administration, Congress, the research and education community, and the public at large that NSF is worthy of their trust and capable of leading the country forward into an innovative new future. NSF's improvements were the result of the consistent hard work, dedication, and foresight of many individuals and reflect an NSF-wide commitment to excellence.

## **c. Congressional Update**

### Hearings

The NSF Director reported on the following congressional hearings held since the last Board meeting that involved NSF. On February 15, 2006 Dr. Bement testified before the House Science Committee on NSF's 2007 budget request.

Also on February 15, 2006 Dr. Richard Buckius, Acting Assistant Director for Engineering, testified before the Senate Science, Commerce, Science and Transportation Committee, on the latest developments in nanotechnology research.

On March 1, 2006 Dr. Bement also testified before the Education and Early Childhood Subcommittee of the Senate Health, Education, Labor and Pensions Committee, on the subject of the Protecting American's Competitive Edge (PACE) bill (S. 2198).

With Dr. Washington, on March 2, 2006 Dr. Bement testified before the House Committee on Appropriations, Subcommittee on Science, State, Justice, and Commerce and Related Agencies hearing on NSF's budget request.

On March 29, 2006 Dr. Bement testified at the hearing for the Technology and Innovation Subcommittee of the Senate Commerce, Science and Transportation Committee, on a bill (S. 2109) to establish a national innovation initiative.

Lastly, the House Science Committee held a hearing on March 30, 2006, K-12 Science and Math Education Across the Federal Agencies, at which Dr. Bement also testified.

### Appropriations

Senator Edward Kennedy introduced the 'Right TRACK Act' (S. 2357) on March 2, 2006. The bill authorizes funds for NSF Research and Related Activities, starting at \$4.826 billion for FY 2007 and escalating to \$8.55 billion for FY 2013. S. 2357 also authorizes funding to double NSF's Education and Human Resources Directorate budget, beginning at \$887 million for FY 2007 escalating to \$1.5 billion for FY 2011.

### AGENDA ITEM 11: Committee Reports

(Note: The Executive Committee did not meet in March 2006.)

#### **a. Audit and Oversight (A&O) Committee**

Dr. Mark Wrighton, A&O chairman, reported Clifton Gunderson LLP, the 12<sup>th</sup> largest accounting firm in the U.S., received a contract to audit NSF's financial statements starting in FY 2006. Mr. Salvatore Ercolano, a partner with Clifton Gunderson, introduced the new financial statement auditors to A&O. The new accounting firm will take a fresh look at the status of past accounting issues in all major systems and operations.

Dr. Fae Korsmo, Office of the Director, and Dr. James Lightbourne, Office of Integrated Activities with the Office of the Director, presented highlights of the *Report to the National Science Board on the National Science Foundation's Merit Review Process, FY 2005* (NSB-06-21) (Board Book Tab 12B). This report includes a summary of the number of people supported by NSF research awards (e.g., graduate students, postdoctoral associates, principal investigators, and co-principal investigators), which has increased by 18 percent since FY 2000 along with an important increase in the number of graduate students supported, a 31 percent increase from FY 2000 to FY 2005. It also provides an update of NSF actions underway in response to recommendations made in the September 2005 *Report of the National Science Board on the National Science Foundation's Merit Review System* (NSB-05-119). Actions to be taken include increased communications, clarity about expectations, more training of NSF staff and panelists, improved electronic tools (e.g., reviewer database enhancements), increased recognition of merit review successes, and explicit accountability requirements in each executive's performance plan. The committee members reviewed portions of the report and noted that there was a significant fraction of outstanding proposals submitted that earn substantial accolades in the review process. It was also noted that in FY 2005 almost \$1.8 billion was not funded for proposals that received at or above the average review score of those that were funded, representing missed opportunities.

Mr. Thomas Cooley, NSF Chief Financial Officer, updated the committee on the progress in remediation of the FY 2005 audit reportable conditions and the additional resources that will be provided to address them. The "reportable conditions" were based on findings of the previous auditor, KPMG; and the new accounting firm will make an independent assessment. Mr. Cooley also reported on efforts to meet the requirements of the Office of Management and Budget (OMB) Circular A-123, "Management's Responsibility for Internal Control." Key agency managers serve on an Accountability and Performance Integration Council that will report to the Chief Operating Officer, NSF Deputy Director, and the Senior Management Roundtable on the A-123 efforts.

#### **b. Education and Human Resources (EHR) Committee**

Dr. Elizabeth Hoffman, EHR chair, stated that Board Members and the Board Executive Officer reported on recent EHR-related topics.

Dr. Crosby noted that discussions had been taking place with the Sloan Foundation and the Council of Graduate Schools (CSG) on the topic of Professional Master of Science degrees. Dr. Hoffman suggested that it would be valuable to hear from CSG on the programs they are undertaking that dovetail with the interests of EHR, including professional science masters and degree completion.

Dr. Hoffman reported that Dr. Donald Thompson, Acting Assistant Director, NSF Education and Human Resources (NSF/EHR) Directorate, provided background to the committee on the unique role of NSF in STEM education and the evaluation of NSF's education investments. Dr. Thompson reviewed the various evaluation tools used by NSF/EHR as it builds capacity in the evaluation of its programs. The committee focused on what works in STEM education, and how evaluations provide information that enable EHR to set new strategies for those programs, especially in light of the PACE initiatives.

Dr. Hoffman introduced two reports summarizing recent evaluations of NSF/EHR programs. One report, *Revitalizing the Nation's Talent Pool in STEM*, 2006, Urban Institute, critically analyzes the impact of the Louis Stokes Alliances for Minority Participation (LSAMP) Program. The report contains striking data on the program's impact on participating institutions and educational and career outcomes for participating LSAMP students, indicating that LSAMP programs produce students who outperform national comparison samples and are retained in STEM disciplines at a rate exceeding that of a national sample of underrepresented minority students and of white and Asian STEM baccalaureate degree recipients. Over the next several years, the committee would like to subject other programs to the same degree of consideration and analysis. NSF could then determine which of the programs in EHR should be enhanced and strengthened and which programs should be phased out or brought together with a successful program.

The second report was a brief document summarizing the results of a 10-year evaluation of the impact of teachers, classroom practices, and use of instructional materials, *Lessons from a Decade of Mathematics and Science Reform: A Capstone Report for the Local Systemic Change through Teacher Enhancement Initiative*, updated February 2006. Local Systemic Change was an initiative funded by NSF's Division of Elementary, Secondary, and Informal Education designed to address the professional development of all teachers responsible for teaching science and/or mathematics within educational systems. The report provides a snapshot of some of the programs that had been funded by NSF in the K-12 arena that have had significant positive impacts on improving math and science education at that level.

On behalf of Dr. Daniel Hastings, Dr. Lanzerotti briefed the Board on next steps for the Board's Workshop on Engineering Workforce Issues and Engineering Education: What are the linkages? held at the Massachusetts Institute of Technology (MIT) in October 2005. The workshop addressed many issues about retention of engineering students. Drs. Lanzerotti, Hastings, and Clough reviewed the presentations and breakout group findings from the workshop and will be meeting with leadership in the Directorate for Engineering and the National Academy of Engineering to discuss various related issues. They will then determine the course of this *ad hoc* group.

### **c. EHR Subcommittee on Science and Engineering Indicators (SEI)**

Dr. Beering, SEI chairman, reported that *Science and Engineering Indicators 2006* (NSB-06-1) was transmitted by the President to Congress on February 14, 2006, which was the earliest date that it had been released by the White House—within a month of the statutory submission date. He expressed thanks to Dr. Kathie Olsen, NSF Deputy Director and former OSTP Associate Director and Deputy Director for Science in the Executive Office of the President. He also noted that the media rollout was held on Capitol Hill on February 23, 2006. Dr. Beering further reported that he and Dr. Vasquez initiated the media event with presentations on data and trends of interest and on the Companion Piece, *America's Pressing Challenge – Building a Stronger Foundation* (NSB-06-2). For the next *Indicators* in 2008, the Board will produce three versions: printed version, electronic version, and a “*Reader's Digest*” version with flashcards to make the volumes readily available and easy to use. Dr. Beering thanked Dr. Crosby; Dr. Alan Rapaport, Science and Engineering Indicators Program and SEI Executive Secretary; Ms. Jean Pomeroy, Board Office; and the SRS staff for their extraordinary team effort.

### **d. Committee on Programs and Plans (CPP)**

Dr. Daniel Simberloff, CPP chairman, reported on the status of a subcommittee and several task forces.

Dr. John White, chairman of the Subcommittee on Polar Issues (SOPI), provided an update on International Polar Year (IPY) activities, a report on the 2006 solicitation for proposals as part of IPY, a 2007 budget for \$62 million for IPY, and participation in IPY. The subcommittee also discussed the issue of tourism regulation by the Antarctic Treaty Consultative Parties, which involves both NSF and the State Department, and heard a report on icebreaking issues.

Dr. Nina Fedoroff, chair of the Task Force on Transformative Research, reported that the final Workshop on Transformative Research would be held on May 16, 2006 at NSF, after the Board Meeting. Although Dr. Fedoroff will be leaving the Board in May, she will work with Dr. Washington on the transition of a new chair for the task force.

Dr. Jon Strauss, chairman of the Task Force on International Science, updated CPP on a number of meetings held in the Washington, DC area to lay the groundwork for the first hearing on this topic, which was planned for May 11, 2006. The task force also discussed the timeline and future activities to include dates and venues of various meetings. Lastly, Dr. Weber, Director of the Office of International Science and Engineering, presented an update on the progress NSF has made in implementing Board recommendations from *Towards a More Effective NSF Role in International Science and Engineering* (NSB-00-217).

Dr. Kelvin Droegemeier, co-chair of the Task Force on Hurricane Science and Engineering reported that a draft of the task force's report would be ready for committee review in May or August 2006. The task force discussed the dissemination of the report and the challenges involved in reaching the physical science community but also the biological science and social science community. They expect a report and further discussion at the meeting of the Board in May 2006.

As Dr. Simberloff could not participate in the presentation of the following information item due to a potential conflict of interest, Dr. Barry Barish reported on the National Superconducting Cyclotron Laboratory (NSCL) at Michigan State University. Dr. Turner, Assistant Director of the Directorate for Mathematical and Physical Sciences, informed CPP about the astrophysical implications of the superconducting cyclotron, one of three major facilities in the U.S. The laboratory received a \$20 million upgrade in 2001. Dr. Barish reported that after an evaluation the recommendation would be that the management not be recompeted at the time of renewal to be able to exploit the upgrade and, in view of the very high scores the current management is receiving, an action on this item is scheduled for the August 2006 Board meeting.

Dr. Turner responded on the Atacama Large Millimeter Array (ALMA) to the committee, and reported that the largest budget item was resolved with both antenna contracts signed. He also reported that the project rebaselining, which involved four separate reviews, was completed. Another major issue involved a complexity of the ALMA partnership, which included a series of ALMA board reform activities that were being implemented, and a commitment by the ALMA board to continue reform.

Dr. James Collins, Assistant Director, Directorate for Biological Sciences, presented an update on the National Ecological Observatory (NEON). Dr. Collins outlined overarching themes and noted that the unique aspect of the entire work is the network. The turning point in design for NEON came following the National Research Council (NRC) report in 2004. In the past 2 years, there has been significant planning by the science community and NSF involving 66 workshops and over 2,000 participants. Dr. Collins described the structure of the design, instrumentation, and various partnerships.

Lastly, Dr. Deborah Crawford, Acting Director, Office of Cyberinfrastructure (OCI), announced that Dr. Daniel Atkins, Director, OCI, would be on staff permanently in June, and that Dr. James Duderstadt, a former Board Member, was appointed chairman for the Advisory Committee for Cyberinfrastructure. Dr. Crawford also updated CPP on Cyberinfrastructure Vision. CPP was pleased with the progress of the document and made several recommendations. The committee requested that NSF provide another draft of the document before the May 2006 meeting.

#### **e. Committee on Strategy and Budget (CSB)**

Dr. Ray Bowen, CSB chairman, reported that the committee addressed three main issues: strategic planning; budget development; and award size, duration, and success rates.

Dr. Olsen described the process for developing NSF's Strategic Plan for FY 2006-2011. The Plan integrates with the Board's Vision, provides a framework for developing yearly budgets and performance plans, contains information required by law, and follows OMB guidance. A draft plan will be provided to the Board in advance of the May 2006 meeting, and will provide an opportunity for a thorough review before the Board is asked to approve the Plan in August 2006. Advisory committees will be solicited for input, and public comment period will be requested in June, July, and September 2006.

Dr. Bement reported that the NSF budget went to Congress in an information-gathering stage. Two House hearings were held, both with strong congressional support for NSF. Dr. Bement thanked Congressman Sherwood Boehlert, Chairman of the Committee on Science, for his support to NSF over the years. Dr. Bement discussed the development of the FY 2008 budget. The Office of Management and Budget (OMB) guidance level will represent year 2 of a 10-year path to a doubled budget, which represents a 7.1 percent increase over the FY 2007 request as established in the American Competitiveness Initiative. The guidance was for three agencies combined, and there would be no guarantee that each of the three agencies would receive the same amount of percentage increase. The May 2006 meeting will focus on long-range planning, including identifying priorities for the FY 2008 budget. The starting point will be investment areas in the FY 2007 budget: advancing the frontier, broadening participation in the science and engineering enterprise, providing world-class facilities and infrastructure, and bolstering K-12 education. In order to give the budget deserved attention, CSB agreed to hold a special meeting, probably in June 2006. The Board will be asked to approve the budget at the August 2006 meeting, then the budget can be presented to OMB on September 11, 2006 and eventually submitted to Congress on February 5, 2007.

Discussion of the Board guidance on award size, duration, and success rates was continued from previous meetings. CSB has a draft document, which represents NSF guidance from the Board. Essentially, the document indicates that the Board sustains the current practice that originates from a 2003 document, and the current practice is to give priority to award size and duration even at the sacrifice of success rate. CSB had discussions with Dr. Olsen about the complexity of the issue. Dr. Olsen established an NSF working group to investigate proposal and award management mechanisms. It could take about 1 year to complete the study, and CSB will receive working group updates at future meetings.

AGENDA ITEM 12: Presentation – Update on grants.gov

Dr. George Strawn, NSF Chief Information Officer, gave a short presentation on the background and prospects of grants.gov. He discussed Fastlane applications that currently enable NSF to receive proposals electronically; the potential of grants.gov, one Federal e-government projects aimed to consolidate Federal information technology; and Macintosh support under development in grants.gov. He stated that grants.gov would ultimately provide benefits and consistency to the academic community.

Dr. Washington adjourned the Open Session at 2:50 p.m.



Ann A. Ferrante  
Writer-Editor  
National Science Board Office

Attachment

Appendix A: Charge to the NSB Commission on 21<sup>st</sup> Century Education in STEM

## **CHARGE TO THE NATIONAL SCIENCE BOARD COMMISSION ON 21<sup>ST</sup> CENTURY EDUCATION IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS**

### **BACKGROUND**

Over the last two decades, numerous reports and statements from eminent bodies representing the broad range of national interests in science and technology literacy in U.S. society and skills in the U.S. workforce have sounded alarms concerning the condition of pre-K-16 education in science and technology areas. Nevertheless, our Nation's education competitiveness continues to slip further behind the rest of the world. A number of spokespersons for the science and engineering education communities have urged the National Science Board (the Board) to undertake an effort similar to the 1982-1983 Board Commission on Pre-college Education in Mathematics, Science, and Technology. Congressional Appropriations Committee report language for FY 2006 stated that they strongly endorse the Board taking steps to "establish a commission to make recommendations for the National Science Foundation (NSF) and Federal Government action to achieve measurable improvements in the Nation's science education at all levels," and expects the Board to "report the commission's findings and recommendations to the Committee at the conclusion of the commission's work." Subsequently, the Board held three public hearings to explore the merit of establishing a special Commission on Education for the 21<sup>st</sup> Century. By approving this charge, the Board has decided to establish such a Commission to develop a national action plan addressing issues that have inhibited effective reform of U.S. science, technology, engineering, and mathematics (STEM) education.

### **STATUTORY BASIS UNDER THE NSF ACT**

Under 42 U.S.C. § 1862 (d): "The Board and Director shall recommend and encourage the pursuit of national policies for the promotion of...education in science and engineering." 42 U.S.C. § 1863(h) authorizes the National Science Board "to establish such special commissions as it may from time to time deem necessary for the purposes of this chapter." The Board Commission on 21<sup>st</sup> Century Education in Science, Technology, Engineering, and Mathematics (the Commission) will conduct its activities according to the Federal Advisory Committee Act (FACA) and other authorities, including applicable conflict-of-interest laws and regulations.

### **OBJECTIVES**

The Commission will make recommendations to the Nation through the Board for a bold new action plan to address the Nation's needs, with recommendations for specific mechanisms to implement an effective, realistic, affordable, and politically acceptable long-term approach to the well-known problems and opportunities of U.S. pre-K-16 STEM education. The objective of a national action plan is to effectively employ Federal resources cooperatively with those of stakeholders from all sectors including but not limited to: Federal, State and local government agencies; parents, teachers and students; colleges—including community colleges; universities, museums and other agents of formal and informal education outside the K-16 systems; industry; and professional, labor and public interest organizations to encourage and sustain reform of the national pre-K-16 STEM education system to achieve world class performance by U.S. students, prepare the U.S. workforce for 21<sup>st</sup> century skill needs, and ensure national literacy in science and mathematics for all U.S. citizens.

In developing a national action plan, the Commission will address the following issues and identify the specific role of NSF in each:

- Improving the quality of pre-K-16 education related to both general and pre-professional training in mathematics, engineering and the sciences, including, but not limited to: the availability of competent teachers; the adequacy and currency of curricula, materials, and facilities; standards and trends in performance, as well as promotion, graduation and higher-education entrance requirements; and comparison with performance and procedures of other countries.

- Identifying critical aspects in the entry, selection, education and exploitation of the full range of potential talents, with special attention to transition points during the educational career where loss of student interest is greatest; and recommend means to assure the most effective education for all U.S. students as well as future scientists, engineers and other technical personnel.
- Improving mathematics and science programs, curricula, and pedagogy to capitalize on the Nation's investment in educational research and development and appropriate models of exemplary education programs in other countries.
- Promulgating a set of principles, options and education strategies that can be employed by all concerned, nationwide, to improve the quality of secondary school mathematics and science education in the 21<sup>st</sup> century, as an agenda for promoting American economic strength, national security, employment opportunities, and social progress that will support U.S. pre-eminence in discovery and innovation.

### **MEMBERSHIP AND STRUCTURE**

The Board Commission will consist of up to fifteen (15) members appointed by the Chairman of the Board, in consultation with the full Board, the Executive Branch, Congress and other stakeholders. The Board Chairman will designate a Commission chairperson and vice chairperson from among the members. No more than three Commission members will be appointed from current Board membership. Commission members will be persons whose wisdom, knowledge, experience, vision or national stature can promote an objective examination of mathematics, science and technology education in the pre-K-16 system and develop a bold new national action plan for the 21<sup>st</sup> century.

A quorum of the Commission will be a majority of its members. Terms of service of members will end with the termination of the Commission. The Commission may establish such working groups, as it deems appropriate. At least one member of each working group shall be a member of the Commission. A Commission member will chair each working group, which will present to the Commission findings and recommendations for consideration by the Commission. Timely notification of the establishment of a working group and any change therein, including its charge, membership and frequency of meetings will be made in writing to the Executive Secretary or his/her designee. Management (including Executive Secretary and Designated Federal Official (DFO)) and staff services will be provided by the Board Office under the direct supervision of the Board's Executive Officer. Commission working groups will act under policies established by the Commission, in accordance with FACA and other applicable statutes and regulations.

### **MEETINGS**

The Commission will meet as requested by the chairperson. Working groups will report to the full Commission and will meet as required at the call of their chairperson with the concurrence of the Commission chair. Meetings will be conducted, and records of proceedings will be kept, in accordance with applicable laws and regulations.

### **EXPENSES**

Per diem and travel expenses will be paid in accordance to Federal Travel Regulations.

### **REPORTING**

The future action plan will especially focus on the appropriate role of NSF in collaboration and cooperation with other Federal agencies, State government, local school districts, gatekeepers, business and industry, informal STEM educational organizations, professional associations, scientific organizations, and parents and other citizens interested in improving education in mathematics, science and technology for our Nation's children. In addition to its final report, which is expected 12 months from the initial meeting, the Commission will submit to the Board periodic progress reports at least every 4 months. The Commission will develop an action plan that includes a plan for public dissemination and outreach for Commission activities, recommendations, and reports.



Warren M. Washington  
Chairman