

**APPROVED MINUTES¹
OPEN SESSION
388TH MEETING
NATIONAL SCIENCE BOARD**

The National Science Foundation
Arlington, Virginia
September 28-29, 2005

Members Present:

Warren M. Washington, Chair
Diana S. Natalicio, Vice Chair
Steven C. Beering
Ray M. Bowen
G. Wayne Clough
Kelvin K. Droegemeier
Delores M. Etter
Kenneth M. Ford
Nina V. Fedoroff
Elizabeth Hoffman
Louis J. Lanzerotti
Alan I. Leshner
Douglas D. Randall
Michael G. Rossmann
Daniel Simberloff
Jon C. Strauss
Kathryn D. Sullivan
John A. White, Jr.
Mark S. Wrighton
Jo Anne Vasquez

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

Members Absent:

Dan E. Arvizu
Barry C. Barish
Daniel E. Hastings
Jane Lubchenco

¹ The minutes of the 388th meeting were approved by the Board at the November-December 2005 meeting.

The National Science Board (NSB, the Board) convened in the Open Session at 1:30 p.m. on Thursday, September 29, with Dr. Warren Washington, Chairman, presiding (Agenda NSB-05-122, Board Book Tab 12). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 5: Approval of Open Session Minutes, August 2005

The Board unanimously APPROVED the Open Session minutes of the August 2005 Board meeting (NSB-05-105, Board Book Tab 12D).

AGENDA ITEM 6: Closed Session Items for November-December 2005

The Board unanimously APPROVED the Closed Session items for the November 30-December 1, 2005 meeting (NSB-05-114, Board Book Tab 12E).

AGENDA ITEM 7: Chairman's Report

Dr. Warren Washington, NSB Chairman, reported on several items.

a. 2006 Annual Retreat, Visit, and Meeting

Dr. Washington asked Dr. Michael Crosby, NSB Executive Officer, to report on the status of the Board's 2006 annual retreat, visit, and meeting at Boulder, Colorado on February 9-10, 2006. Dr. Crosby stated that he and the NSB Office staff are working on the planning, logistics, and agenda taking into consideration suggestions from NSF staff. Specifically, Dr. Crosby was in contact with the National Center for Atmospheric Research (NCAR), the University Cooperation for Atmospheric Research (UCAR), and the University of Colorado, Boulder, which will provide facilities for NSB activities. The events will include information briefings and informal visits of NCAR and UCAR, a meeting with university students working on NSF-funded programs, a closed retreat for Board Members, and the Board's formal committee and plenary meetings. Additional activities for Board Members will likely be arranged for February 8, 2006.

b. Commission on 21st Century Education in Science, Mathematics, and Technology

A draft document, "NSB Commission on 21st Century Education in Science, Mathematics, and Technology," was distributed to Board Members (Board Book Tab 9B). At the request of Congress, the Board was asked to establish a Commission to examine science, mathematics, and technology education in the U.S. and to advise Congress on the role of the NSF and the Federal Government in those areas. Dr. Washington asked Dr. Elizabeth Hoffman, chair of the NSB Education and Human Resources Committee, to report on that committee's discussion on the Commission. Dr. Hoffman stated that she and Drs. Washington and Crosby met with Members of the House and Senate to discuss priorities for this Commission. Dr. Steven Beering agreed to

serve as the NSB lead for a series of Board hearings and roundtable discussions to facilitate Board interaction with interested stakeholders and possibly previous authors of reports on this subject, before the Board finalizes a formal charge to the Commission. Upon the recommendation to move forward with the process of establishing a Commission on education, the full Board acted as follows:

The Board unanimously APPROVED the process for establishing an NSB Commission on 21st Century Education in Science, Mathematics, and Technology. (NSB-05-133) (Appendix A)

c. Dr. Delores Etter Nominated as Assistant Secretary of the Navy for Research Development and Acquisition

Dr. Washington informed the Board that on September 6, 2005 the President announced his intention to nominate Dr. Delores Etter to be Assistant Secretary of the Navy for Research, Development, and Acquisition. Dr. Etter is presently a professor for the Electrical Engineering Department at the U.S. Naval Academy. Dr. Etter stated that it had been an honor and privilege to be part of NSB, and thanked Board Members and NSF staff for the opportunity to work with them. She stated that she perceived her present and future positions as complementary. Dr. Etter explained that she was privileged to be able to participate in national security and higher education, and that the U.S. is fortunate to have the freedom to pursue education.

d. Dr. Dan Arvizu Recognized by *Science Spectrum* Magazine

Dr. Washington also recognized the accomplishments of Dr. Dan Arvizu, whom *Science Spectrum* magazine named one of the “Most Important Hispanics in Technology in Government and Academia.”

e. Board Member Discussions on Science and Education Projects and Programs Supported by NSF

The Chairman reported that Board Members had expressed interest in having more discussion about the science and education projects and programs that NSF supports, as well as learning more about how each directorate operates and interacts with the external community. He asked Dr. Crosby to work with Dr. Kathie Olsen, NSF Deputy Director, and the assistant directors to structure periodic half-day briefings that will take place the day before future Board meetings. Dr. Crosby will also arrange periodic lunchtime briefings for Board Members, focusing on a single NSF directorate, and will consider poster presentations by NSF-funded principal investigators and student researchers during Board receptions. Dr. Washington asked that these activities begin on a trial basis at the November-December Board meeting.

AGENDA ITEM 8: Director's Report

Dr. Arden Bement, NSF Director, reported on staff introductions, NSF issues, and congressional items.

a. NSF Staff Announcements

Dr. James P. Collins will begin serving as Assistant Director for Biological Sciences on October 15, 2006. Dr. Collins would come to NSF from Arizona State University (ASU) where he serves as Virginia M. Ullman Professor of Natural History and Environment and Faculty Leader of Ecology, Evolution, and Environmental Sciences at the ASU School of Life Sciences. He received his Ph.D. in Zoology in 1975 from the University of Michigan.

Dr. Adnan Akay began serving as Director, Division of Civil and Mechanical Systems on July 1, 2005. Dr. Akay joined NSF from the Carnegie Mellon University where he served as Lord Professor of Engineering and Head, Department of Mechanical Engineering. He received his Ph.D. in Mechanical Engineering in 1976 from North Carolina State University.

Dr. Ann Carlson joined the Office of the Director as the Senior Staff Associate for Policy and Planning on September 6, 2005. Dr. Carlson joined NSF from the White House Office of Science and Technology Policy (OSTP) where she worked with the National Science and Technology Council (NSTC), and served as the National Air and Space Administration (NASA) agency representative. She received her Ph.D. in Aerospace Engineering in 1990 from North Carolina State University.

b. NSF - Best Places to Work in Federal Government

Dr. Bement announced that NSF had once again been ranked the second best place to work in the Federal Government by the Partnership for Public Service and the American University's Institute for the Study of Public Policy Implementation. The rankings were based on the results of the 2004 Federal Human Capital Survey conducted by the Office of Personnel Management.

c. NSF Support to Institutions Affected by Hurricane Katrina

The Director reported that the entire staff at NSF was saddened by the devastation and suffering of the people in the areas affected by Hurricane Katrina on September 7, 2005. NSF issued a notice to presidents of universities, colleges, and other NSF awardee organizations, assuring them of NSF's support, flexibility, and willingness to assist in the transfer of awards for faculty and students who temporarily changed institutions. NSF also placed a notice on the NSF Web site to offer automatic extensions for awards in the affected region that were due to expire before October 1, 2005. Additionally, NSF established a hotline and e-mail address specifically dedicated to researchers and educators with questions related to Hurricane Katrina. Dr. Kathie Olsen, NSF Deputy Director, established a working group of deputy assistant directors to develop a set of frequently asked questions and answers for researchers and educators, which were posted on the NSF Web site along with links to other resources for students and faculty. These efforts are now an interagency activity and coordinated with OSTP and the Office of

Management and Budget (OMB), with steps being published on the OSTP, OMB, and agency Web sites. Dr. Bement commended the efforts of Dr. Fae Korsmo and Ms. Jean Feldman, from the Budget, Finance, and Award Management office, for coordinating the activity for NSF.

d. Congressional Update

Appropriations Update

On September 15, 2005 the Senate passed the Commerce, Justice, and Science Appropriations bill that included FY 2006 funding for NSF. A Continuing Resolution was anticipated by NSF through November 18, 2005, and NSF worked with the Office of Management and Budget (OMB) and Appropriations Committee staff to minimize the inevitable disruptions of operations caused by Continuing Resolutions.

Hearings

Although there were no hearings involving NSF witnesses since the August NSB meeting, NSF was visited by Congressman Bob Inglis, Chairman of the Research Subcommittee of the House Science Committee on September 20, 2005.

Science and Engineering Legislation

Dr. Bement reported that two provisions in the Senate NASA authorization bill would affect NSF. The first would allow NSF to include an item on the American Community Survey, which replaces the Census Bureau's decennial census. This item will ask individuals the field of their degree, and thus will allow NSF to gain insight into such areas as the country of origin of science, engineering, mathematics, and technology degree holders and to track their career patterns across time. The Division of Science Resources Statistics has been working with the Census Bureau and Congress during the past year to have this language included in the American Community Survey.

The second provision was included at the request of supporters of the Giant Segmented Mirror Telescope project. It would allow funds from the Major Research Equipment and Facilities Construction (MREFC) account to be used for preliminary design of large-scale projects. This congressionally-mandated policy change would encourage other disciplines to circumvent the initial commitment of resources for the planning of large projects. The current policy provides constraints on the proliferation of large numbers of projects that cannot be sustained, and insulates the process from congressional intrusion. NSF is working with the House Science Committee to have this provision removed.

Dr. Bement also reported that information on other legislation affecting NSF was distributed. (Board Book, Tab 12F)

AGENDA ITEM 9: Committee Reports

a. Executive Committee (EC)

Dr. Bement, EC chairman, reported that the Board formally notified Congress that no delegation of MREFC authority was made by NSB during the last year. The committee also heard an update by Dr. Crosby on plans for the 2006 NSB retreat, visit, and meeting in Boulder, Colorado.

Mr. Ronald Branch, NSF Director for Equal Employment Opportunity (EEO), gave a brief presentation on NSF sexual harassment policies, and distributed materials on this subject. Committee members discussed mandatory versus voluntary training on sexual harassment, which would be reviewed by NSF. Although NSF has had a low number of sexual harassment complaints compared with other agencies, NSF will continue to improve the program.

b. Audit and Oversight (A&O) Committee

Dr. Mark Wrighton, chairman of the A&O Committee, reported that the Committee discussed the most recent draft, *Report of the National Science Board on the National Science Foundation's Merit Review System*, requested by Congress and due September 30, 2005.

Dr. Dan Arvizu was a key contributor to the development of the report, along with Dr. Crosby and the NSB Office staff in close consultation with NSF management. Dr. Wrighton stated that NSF deserves credit for maintaining the credibility of the merit review process, while handling a tremendous increase of proposals in a constrained financial environment. The report emphasizes the Board's full support of the current NSF system of merit review, and its endorsement of discretionary authority exercised by NSF's program officials. The NSF merit review process incorporates peer review and considers other attributes of a proposal such as risk, multidisciplinary nature, and novelty, which are essential to identifying the most innovative proposals. The report also offers recommendations for enhancements to the system. The A&O Committee approved the report and recommended full Board approval. Following this recommendation:

The Board unanimously APPROVED the report to Congress, *Report of the National Science Board on the National Science Foundation's Merit Review System*. (NSB-05-119)

Dr. Delores Etter led a discussion of the draft "NSB 2020 Vision for NSF" document with specific emphasis on the coverage of NSB's roles and responsibilities. Dr. Kathryn Sullivan will co-chair this effort with Dr. Etter to ensure continuity, in the event that Dr. Etter's new appointment requires her to leave the Board before the work is completed. Dr. Ray Bowen will work with Dr. Sullivan on language to clarify the role of the Board in assisting the NSF with its mission.

The committee discussed and approved the September 29, 2005 draft of the "NSB Policy Statement on the Respective Roles of the NSF and OIG (Office of Inspector General) and in the Settlement of Administrative Investigatory Matters." As part of that approval, the committee recommended that Dr. Washington implement one aspect of the policy by requesting Congress to

provide NSF authority under the Program Fraud Civil Remedies Act. This would give NSF authority, comparable to other OIG Act agencies, to execute civil settlements under \$150,000 that would otherwise need to be handled by the Department of Justice. Upon recommendation from the committee, the Board acted on the policy statement and the follow up recommendation to support the amendment of the Program Fraud Civil Remedies Act of 1986 to include the NSF.

The Board unanimously APPROVED the policy statement, “Respective Roles of NSF and OIG in the Settlement of Administrative Investigatory Matters.”
(NSB-05-132) (Appendix B)

Mr. Thomas Cooley, NSF Chief Financial Officer, provided updates on the status of the financial statement audit and end-of-year spending. Mr. William Harrison, a senior OIG audit manager, presented a summary of the FY 2006 audit plan.

c. Education and Human Resources (EHR) Committee

Dr. Hoffman, EHR chair, reported that Dr. Jo Anne Vazquez suggested that the committee prepare a letter encouraging IBM’s efforts to support selected employees who want to make a career change to become precollege teachers in math and science. The draft letter will be brought to the Board at the next meeting.

The EHR Committee heard a presentation from Dr. Robert Lichter, Chairman of the Committee on Equal Opportunities in Science and Engineering (CEOSE). CEOSE was established by an act of Congress and reports to Congress biennially, and it provides advice to NSF on programs and activities, and broadening participation in scientific, engineering, professional, and technical fields.

Dr. Donald Thompson, Acting Assistant Director of the EHR Directorate, addressed current practices in integrating research and education in EHR, interactions and linkages with the NSF research directorates, tools for evaluating progress, and next steps for improvement of the integration of research and education. The committee asked Dr. Thompson to provide examples of noteworthy programs in linking research and education for the November-December meeting.

A draft statement on education issues that may be included in the “NSB 2020 Vision for NSF” document was discussed. Members expressed concern that more emphasis is needed on preparing a well-educated citizenry and populace with broad scientific education, and the need to restructure the document more in line with a strategy plan.

In the absence of Dr. Daniel Hastings, Dr. G. Wayne Clough briefed the committee on the progress of the NSB “Workshop on Engineering Workforce Issues and Engineering Education: What are the Linkages?” to be held on October 20, 2005 at the Massachusetts Institute of Technology.

d. EHR Subcommittee on Science and Engineering Indicators (SEI)

Dr. Beering, SEI chairman, reported that *Science and Engineering Indicators 2006* is on schedule and will be published and ready for White House review. Dr. Beering thanked Mr. Rolf Lehming and Dr. Alan Rapoport, Science Resources Statistics (SRS), for their extraordinary work. SEI heard presentations from contractors with views toward automating indicator publications in content and presentation in the future.

Dr. Beering also thanked Board Members, Drs. Jo Anne Vazquez and Louis Lanzerotti for their insights and edits of the Companion Piece, and Ms. Jean Pomeroy, NSB Office, for all her special efforts. The subcommittee approved the draft Companion Piece to *Science and Indicators 2006* and recommended approval by the full Board. Following this recommendation:

The Board unanimously APPROVED *America's Pressing Challenge – Building a Stronger Foundation*, a Companion Piece to *Science and Engineering Indicators 2006*, for inclusion and mailing with the *Indicators* report in 2006.

Dr. Washington thanked SEI for an excellent job and Dr. Beering for his leadership.

e. Joint Session of Committee on Programs and Plans (CPP) and Committee on Strategy and Budget (CSB)

Dr. Daniel Simberloff, CPP chairman, reported on the Joint Session of CPP and CSB, which dealt with the continuing discussion on draft NSB guidance for NSF centers programs. Dr. Simberloff explained that draft NSB guidance for NSF centers programs had been revised since the August Board meeting to incorporate changes discussed at that meeting, with the key change being a statement that clearly endorses the general practice of NSF recompeting centers. Additional items for consideration are the reexamination of the definition of “center” and the classification of various centers’ programs. The joint committees agreed to revise the draft guidance based on discussion and review it again at the November-December meeting.

Dr. Simberloff asked Dr. Bowen, CSB chairman, to continue the joint reports. Dr. Bowen reported that the joint session also discussed the draft NSB guidance for NSF average award size and duration, and proposal success rate. The draft guidance gives NSF flexibility by providing an exception to general NSB emphasis or increased average award size and duration, to accept raising proposal success rates as appropriate short-term priority in some areas. The importance of addressing the variation of average award size among directorates was raised and the joint session agreed to take this into account in the next version of the guidance.

In response to an earlier NSB request, the joint session heard an informative presentation from Mr. Vernon Ross, Chief of the Budget Operations and Systems Branch, NSF Budget Division. He analyzed 25 years of NSF records and reported that in FY 2004 nearly a third of principal investigators on research grants had been supported by NSF for 11 or more years, but there is considerable variation in these numbers across NSF.

f. Committee on Programs and Plans (CPP)

Dr. Daniel Simberloff, CPP chairman, reported that the CPP Committee recommended that the Board approve the establishment of a formal Task Force on International Science under the Committee on Programs and Plans, and recommended that the Board approve the draft charge to the Task Force. Following these recommendations:

The Board unanimously APPROVED the establishment of a Task Force on International Science.

The Board unanimously APPROVED a charge to the Task Force on International Science. (NSB-05-134) (Appendix C)

The committee announced the release of two reports, which will be widely distributed. The first report, *Long-Lived Digital Data Collections: Enabling Research and Education in the 21st Century* (NSB-05-40), was distributed to Board Members. The committee acknowledged and thanked Dr. Anita Jones, former CPP chair, who initiated and led this project while serving as a Board Member; Dr. Michael Rossmann, who continued to lead this project; and Dr. Chris Greer, Division of Biological Infrastructure, who contributed greatly to this publication. Additionally, the Joint NSB-NSF Management Report, *Setting Priorities for Large Research Facility Projects Supported by the NSF* (NSB-05-77) was released. The committee also acknowledged Dr. Joseph Bordogna, former NSF Deputy Director, and Dr. John Hunt, Office of the Director, for their hard work on the *Setting Priorities* report.

Dr. Simberloff announced that the NSF released the *National Science Foundation Facility Plan* for 2005 and that the next version will be released in March 2006. He noted that Dr. Bement brought to the committee's attention that the Advanced Technology Solar Telescope (ATST) had passed into the Readiness Stage.

The committee was updated on the process for NSF to send information to CPP and the Board to receive items for action in a timely manner. The draft, "Transmitting Director's Review Board Packages to the National Science Board," was distributed to Board Members (NSB/CPP-05-29) (Board Book Tab 8C). To minimize an overflow of last-minute actions prior to Board meetings, one of the changes would have NSF provide an annual calendar, updated quarterly that estimates all NSB actions. The committee approved the new guidelines for sending information and actions to CPP and NSB.

The committee discussed the annual timeline for integration of NSB large facility items with the NSF budget process. CPP approved a proposal by the NSF Director to shift the annual reprioritization meeting from May to August every year.

Dr. Deborah Crawford, Acting Director, Office of Cyberinfrastructure (OCI), updated the committee on NSF's continuing cyberinfrastructure (CI) vision statement, and the search for a director for the OCI. The new draft of the CI vision document was posted for public comment. NSF will submit the final chapters to the CI vision document to NSB at the November-December and February meetings.

The committee also approved a recommendation by several Board Members to create an *ad hoc* Task Group on Hurricane Research. It was proposed that the Board convene a series of workshops to review hurricane science and how it could be used to improve the Nation's ability to predict, mitigate, and react. Following this recommendation:

The Board unanimously APPROVED a recommendation to convene a series of workshops, drawing from key members of the research community and relevant Federal agencies to capture the current state of knowledge and research activities about hurricanes from multiple perspectives.

Dr. Simberloff reported for the Task Force on Transformative Research. The task force held a Workshop on Transformative Research, "Understanding Transformative Research Programs at the National Science Foundation" on August 12, 2005 at NSF. The task force also discussed plans for a workshop at Santa Fe, New Mexico, in December 2005 to focus on key factors in identifying transformative science. A final workshop, which will focus on input from foundations and other non-Governmental organizations, is tentatively scheduled for early 2006.

g. CPP Subcommittee on Polar Issues (SOPI)

Dr. John White, SOPI chairman, reported that the Office of Polar Programs (OPP) secured a contract for use of the Russian icebreaker, *Krasin*, for the upcoming Antarctic season. The U.S. Coast Guard ship, *Polar Star*, will be on stand-by and will be deployed on an as-needed basis. NSF is in the process of developing a response to the lack of funding for icebreakers within the NSF budget under the Continuing Resolution. The NSF response will be reported shortly to the Executive Committee.

SOPI also heard informative presentations on two research projects: the Antarctic geological drilling program, by Dr. Thomas Wagner, Program Director, Antarctic Geology and Geophysics; and a community collaboration project involving Oregon State University and the King Island Inupiaq community by Dr. Anna Kerttula, Program Director, Arctic Social Science.

h. Committee on Strategy and Budget (CSB)

Dr. Ray Bowen, CSB chairman, reported that the committee discussed the CSB input to the "NSB 2020 Vision for NSF" document. He stated that the document should integrate the Section 22 Report to Congress, *Fulfilling the Promise, A Report to Congress on the Budgetary and Programmatic Expansion of the National Science Foundation (NSB-03-151)*. Dr. Bowen announced that the committee would be holding a public teleconference on October 11, 2005 to provide committee members with an additional opportunity to discuss the CSB contribution to the "NSB 2020 Vision for NSF" document.

Dr. Bement presented a report on the status of the NSF FY 2006 budget request to Congress.

i. *ad hoc* Task Group on Vision for NSF

Dr. Delores Etter, *ad hoc* Task Group on Vision for NSF chair, thanked members of the task group and Dr. Crosby for the initial draft of the report, *National Science Board 2020 Vision for the National Science Foundation*. Further revisions of the report will be made before the “draft for comment” version will be posted on the NSB Web site on or about November 1, 2005. As indicated in the A&O Committee report, Dr. Sullivan will co-chair the task group with Dr. Etter to ensure continuity of this project.

Dr. Washington adjourned the Open Session at 2:40 p.m.



Ann A. Ferrante
Writer-Editor
National Science Board Office

Attachments

Appendix A: [NSB-05-133](#)

Appendix B: [NSB-05-132](#)

Appendix C: [NSB-05-134](#)

THE NATIONAL SCIENCE BOARD COMMISSION ON 21ST CENTURY EDUCATION IN SCIENCE, MATHEMATICS AND TECHNOLOGY

PREAMBLE

There is a growing dependence on science and technology around the world, and a growing investment in science and engineering workforce skills by governments of both developed and developing economies. In the U.S., the Federal Government has a long history of support for science, mathematics and technology education for two fundamental purposes: to advance the individual in our democratic society through the acquisition of knowledge and skills useful in the labor market and for full participation in American life; and to advance the Nation's economy, national security, and quality of life through investment in national capabilities in science and engineering fields. As other governments have emulated successful U.S. strategies in science and engineering higher education, effective Federal strategies to support U.S. education in science, mathematics and technology have become more critical to sustaining our Nation's preeminence in science and technology.

The National Science Board (NSB, the Board) was established with the National Science Foundation (NSF, the Foundation) by Federal statute in 1950 and assigned two broad areas of responsibility: (1) establishing the policies for and guiding the Foundation; and (2) serving as an advisor to the President and Congress on issues in science and engineering research and education. As part of the latter role, in 1982 the NSB established The Commission on Pre-college Education in Mathematics, Science and Technology that provided a "plan of action ... directed toward the Nation's achieving world educational leadership (as measured by student achievement and participation levels and other non-subjective criteria) in mathematics, science and technology in elementary and secondary schools by the year 1995."² This report was coordinated with the 1983 report of the U.S. Department of Education's National Commission on Excellence in Education report, *A Nation At Risk*, which raised national concern about the quality of pre-college education. Despite these two reports from two decades ago, one sounding the alarm the other focused on recommended solutions, we continue to slip further behind.

Subsequent 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 continued to sound alarms concerning the condition of K-12 and K-16 education in science and technology areas. These included the U.S. House of Representatives Science Policy Study, *Unlocking Our Future*, 1998; the National Science Board, *Preparing Our Children*, 1999; the National Commission on Mathematics and Science Teaching for the 21st Century report to the Secretary of the Department of Education (the "Glen Commission" report) *Before It's Too Late*, 2000; the Commission on National Security/21st Century, *Road Map for National Security—Imperative for Change*, 2001; and the President's Council of Advisors on Science and Technology, *Sustaining the Nation's Innovation Ecosystem: Maintaining the Strength of Our Science & Engineering Capabilities*, 2004; among others.

² September 12, 1983 cover letter from The National Science Board Commission on Pre-college Education in Mathematics, Science and Technology to Lewis M. Branscomb, Chairman, National Science Board, *Educating Americans for the 21st Century—A plan of action for improving mathematics, science and technology education for all American elementary and secondary students so that their achievement is the best in the world by 1995.*

However, the 21st century is upon us and questions continue as to why the goals, recommendations and strategies provided by over 20 years of study and reports are yet to be fulfilled. Not since the Soviet Union's launch of Sputnik satellite – 47 years ago – has the need to improve science and mathematics education in America been as clear and as urgent as it is today. The converging trends and stresses within our Nation's system for educating students in mathematics, science and technology are clearly documented in the soon to be published NSB Report, *Science and Engineering Indicators 2006*. The rise of high technology economies around the globe—both developed and developing—underscores the urgency of finding solutions to what appears to be the intractable problem of raising U.S. student achievement to world class levels. We are becoming increasingly aware that the U.S. performance in science, mathematics and technology is not merely an issue of financial and physical resources but also of cultural factors. Among the poorest and the most affluent alike, cultural factors inhibit student interest in acquiring the base of knowledge and skills necessary to achieve and excel in science, technology, engineering and mathematics (STEM) fields, even while growing demand for technical skills by U.S. employers is evidenced by the absorption of a large number of foreign-born and foreign-educated S&T workers and the growing phenomenon of outsourcing of S&T work to other countries.

During recent congressional hearings, the Board was asked to re-constitute its 1982-83 Commission. A number of spokespersons for the science and engineering education communities have also urged the Board to undertake an effort similar to the 1982-1983 Commission. Congressional Appropriations report language for FY 2006 stated that they strongly endorse the Board taking steps to "... establish a commission to make recommendations for NSF and Federal Government action to achieve measurable improvements in the Nation's science education at all levels", and "expects the Board to provide an interim report by September 30, 2005, on the establishment of the commission, and to report the commission's findings and recommendations to the Committee at the conclusion of the commission's work" (H.R. Report 109-118).

The National Science Board is, therefore, initiating the process for establishing an NSB Commission on 21st Century Education in Science, Mathematics and Technology to formulate a national strategy for implementing an effective long-term approach to the well-known problems and opportunities of U.S. K-16 STEM education. This strategy must place special emphasis on educational transition points—in pre-college education and between high school and college, and during the college career, with special focus on the role of community colleges in STEM education. As part of its charge, the Commission will be asked to explicitly call out the role for NSF in the context of the larger, national K-16 STEM education system.

To guide the development of a final charge to the Commission, the National Science Board will undertake a series of hearings involving all stakeholder groups, in diverse locations throughout the Nation. These hearings will include spokespersons for employers, school systems, parents, students, academe, State and local government, professional organizations, and Federal agencies and policymakers with an interest in STEM education and the workforce.

AUTHORITY

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 Board "to establish such special commissions as it may from time to time deem necessary for the purposes of this chapter." The NSB Commission on 21st Century Education in Science, Mathematics, and Technology is governed by the NSF Act of 1950, as amended, the Federal Advisory Committee Act and other current regulations, including conflict-of-interest regulations of the National Science Foundation and the Sunshine Act for meetings of the National Science Board.

POTENTIAL PURPOSE AND FUNCTION

The Commission will make recommendations to the Nation through the National Science Board for a bold new approach or approaches to address the Nation's needs, with specific emphasis on the role of the NSF in such approach or approaches. In doing so, it will be necessary to summarize the health of primary and secondary school science, mathematics and technology education in the U.S. and its interconnections in these fields with the higher education system, including community colleges; teacher education; and social and cultural factors. To carry out this mission, the Commission must develop an understanding of the roles and potential of groups, organizations and institutions in the process, 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 and seek to assure their involvement and cooperation during the life of the Commission and concern for science education after the termination of the Commission.

In developing their recommendations, the Commission will determine how NSF can contribute to:

- Improving the quality of K-12 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 students is greatest; and recommend means to assure the most effective education of all U.S. students as well as future scientists, engineers and other technical personnel.
- Improving mathematics and science programs, curricula, and pedagogy as a means of capitalizing 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 which can be employed by all concerned, nationwide, to improve the quality of secondary school mathematics and science education in the 21st 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 Commission on Education in Mathematics, Science, Engineering and Technology will consist of between twelve (12) and fifteen (15) members appointed by the Chairman of the National Science Board, in consultation with the full Board, the Executive Branch, Congress and other stakeholders, and who will include a representative of the pre-college system with in depth experience, such as a superintendent of a major school system. The NSB Chairman will designate a 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, abilities, vision and national stature can promote an objective examination of mathematics, science and technology education in the K-16 system and develop a bold new national strategy for the 21st 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.

Hearings on behalf of the Commission may be held by one or more members with the authorization of the chairperson.

The Commission may establish such working groups as it deems appropriate. Each working group may be composed of such individuals as the Commission deems appropriate, but at least one member of each working group shall be a member of the Commission. Each working group will be chaired by a Commission member. Standing committees will act under policies established by the Commission, in accordance with FACA and other applicable statutes and regulations. Each working group 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 Official) and staff services will be provided by the Board Office under the direct supervision of the Board's Executive Officer.

MEETINGS

The Commission will meet at the call of the chairperson, with advance approval of the National Science Board or the Designated Official, who will approve the agenda and will be present or represented at all meetings. Standing committees will meet as required at the call of their chairperson with the concurrence of the Commission chairperson. Meetings will be conducted, and records of proceedings will be kept, in accordance with applicable laws and regulations.

In accordance with the NSF Act and other applicable laws, Commission members and standing committee members not members of the Commission shall be entitled to compensation equal to that permitted in NSF Bulletin No. 00-13 for official business of the Commission. Their per diem and travel expenses will be paid in accordance to Federal Travel Regulations.

REPORTS

The Commission will develop an action plan that includes a plan for dissemination and outreach over the entire Commission process, with results to appear at 6-month intervals and a final set of findings and recommendations to coincide with an anticipated 18-month active life. The action plan will identify specific responsibilities of the Foundation, other Federal agencies, State government, local school districts, private foundations, business and industry, professional associations, scientific organization, and citizens interested in improving education in mathematics, science and technology for our Nation's children. In addition to its final report, which is expected 18 months from the initial meeting, the Commission will submit to the National Science Board periodic progress reports at a minimum of 6-month intervals.



Warren M. Washington
Chairman

**National Science Board Policy Statement:
Respective Roles of NSF and OIG
in the Settlement of Administrative Investigatory Matters**

The National Science Board (the Board) encourages the Office of Inspector General (OIG) of the National Science Foundation (NSF) and the management of NSF to continue cooperative efforts to resolve and bring closure to OIG investigations involving administrative settlement and/or compliance agreements in accordance with the statutory and fiduciary responsibilities of each. When OIG refers investigations to the Department of Justice (DOJ), and DOJ subsequently proposes the use of such settlement and/or compliance agreements, OIG will consult with NSF representatives on the investigative findings to-date and DOJ's proposed action. OIG will then discuss with DOJ the joint recommendations of OIG and NSF. Thereafter, NSF and OIG will work cooperatively to protect the interests of the government. Therefore, the Board establishes this as Board policy regarding the resolution of such matters. NSF and OIG are urged to collaboratively develop, and incorporate into appropriate internal guidance documents, written procedures that will govern the implementation of this policy statement.

The Board also recognizes that many OIG investigations uncover matters that, when presented by OIG to NSF, could be best resolved by NSF under the authority of the Program Fraud Civil Remedies Act (PFCRA) of 1986, 31 U.S.C. 3801, if NSF were included in that statute's provisions. The Board fully supports the past efforts that both OIG and NSF have undertaken to amend PFCRA to afford NSF the investigative resolution authorities provided other federal agencies. The Board will request that the Congress secure PFCRA authorities for NSF.

Charge to the Task Force on International Science

Statutory Basis

"The Board shall render to the President for submission to the Congress reports on specific, individual policy matters related to science and engineering and education in science engineering, as the Board, the President, or the Congress determines the need for such reports."
(42 U.S.C. Section 1863) SEC. 4. (j) (2)

Action Recommended

The National Science Board (NSB, the Board) will examine the role of the U.S. Government in international science and engineering in response to the changes that have occurred in recent years to the global dynamics for science and engineering (S&E) research, education, politics, and technical workforce.

Background

In September 2001, the Board released a report entitled, *Towards a More Effective Role for the U.S. Government in International Science and Engineering (NSB-01-187)*. Many of the recommendations from this report remain valid, and are largely unfulfilled. Since the time this report was prepared, there have also been considerable shifts in the international landscape. These shifts, along with the unfulfilled recommendations of the 2001 report, warrant a careful reexamination of the role of the U.S. Government in international S&E to address the many changes that have occurred in the global S&E dynamics related to research, education, politics, and technical workforce.

Policy Objectives

The *ad hoc* Task Group on International Science recommends that the Board approve the creation of a formal Task Force on International Science under the Committee on Programs and Plans (CPP). The following issues will be analyzed and discussed before constructive policy recommendations are brought to CPP and the full Board:

- Facilitating partnerships between U.S. and non-U.S. scientists and engineers in the U.S.
- Facilitating partnerships between U.S. and non-U.S. scientists and engineers outside the U.S. in both developed and developing countries
- Utilization of (S&E) partnerships for improving relations between countries.
- Utilization of (S&E) partnerships for improving quality of life and environmental protection in developing countries.

The role of U.S. and international students will be considered throughout all task force activities. As the world of scientific research becomes increasingly global and intensely competitive, it is important to establish an environment for future generations of researchers to perform in a more “globally aware” manner. Future generations of researchers will need to be more cognizant of,

and be able to successfully address, the various international and cultural issues that may influence the development and implementation of S&E partnerships; issues which current generations have been fairly insulated. Even U.S. scientists who have been active internationally in the past, may not be fully aware of the complexity of functioning in a rapidly changing and highly competitive world because they have often been the lead or "controlling" entity in previous partnerships.

U.S. Federal agencies currently fund a wide range of international (S&E) partnerships that support both basic and applied research, with NSF programs seeking to ensure that U.S. institutions and scientists are globally engaged and able to more fully advance their research via international collaboration. The task force will examine the experiences of various U.S. Government supported international S&E partnership programs with respect to their effectiveness in furthering research advancements, and their experience in utilizing S&E partnerships as vehicles for achieving more than research advances (i.e., improved relationships between countries; capacity building; and environmental awareness). While particular interest will be on the level of inter-agency coordination, and more specifically the role of NSF in both facilitating and directly supporting (S&E) partnerships outside the U.S., the task force will also examine international S&E partnership activities as they interplay with science policy, foreign policy and domestic policy objectives.

The task force will consult with science officials from other agencies and around the world as well as representatives of both U.S. and international science communities, to better understand a wide range of perspectives on the role of government in supporting international S&E partnerships that specifically address the issues identified above. The task force will also interact with other Federal agencies to understand how they may or may not have utilized the findings and recommendations made in the Board's 2001 report on international S&E.

Logistics

The task force will seek to bring together NSB Members, members of the international scientific community, U.S. Federal agency representatives, and NSF staff (along with representatives from the NSF Advisory Committee for International Science and Engineering). The NSB Office will serve as the focal point for coordination and implementation of all task force activities.

A series of workshops will be held during 2005-2006 to address the issues identified above. In addition, the task force will convene such working groups, as it deems necessary to obtain relevant information. It is anticipated that the task force will produce a final report that synthesizes the contributions from its own deliberations, workshops, and working groups and present recommendations regarding the role of the U.S. Government in international S&E, with specific recommendations for NSF policy in supporting international science partnerships. Printed copies of a final NSB report will be widely distributed and available on the NSB Web site for the public, universities, the Congress, various special interest groups, and the broad scientific community. However, a regular and pro-active outreach effort to communicate task force activities will be implemented throughout the duration of the task force life. The task force expects to conclude its activities within 2 years from the date that formation of the task force is approved.