NSB-05-166

APPROVED MINUTES[1]
OPEN SESSION
389TH MEETING
NATIONAL SCIENCE BOARD

The National Science Foundation
Arlington, Virginia
November 30 - December 1, 2005

Members Present:

Warren M. Washington, Chairman
Diana S. Natalicio, Vice Chair
Dan E. Arvizu
Barry C. Barish
Steven C. Beering
Ray M. Bowen
Kelvin K. Droegemeier
Kenneth M. Ford
Nina V. Fedoroff
Daniel E. Hastings
Elizabeth Hoffman
Louis J. Lanzerotti
Alan I. Leshner
Douglas D. Randall
Michael G. Rossmann
Daniel Simberloff
Jon C. Strauss
Kathryn D. Sullivan
Jo Anne Vasquez

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

Members Absent:

G. Wayne Clough
Jane Lubchenco
John A. White, Jr.
Mark S. Wrighton

[1] The minutes of the 389th meeting were approved by the Board at the February 2006 meeting.

The National Science Board (NSB, the Board) convened in Open Session at 1:30 p.m. on Thursday, December 1, 2005 with Dr. Warren Washington, Chairman, presiding (Agenda NSB-05-154, 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, September 2005

The Board unanimously APPROVED the Open Session minutes of the September 2005 Board meeting (NSB-05-140, Board Book Tab 12E).

AGENDA ITEM 6: Closed Session Items for February 2006

The Board unanimously APPROVED the Closed Session items for the February 9-10, 2006 meeting (NSB-05-145, Board Book Tab 12F).

AGENDA ITEM 7: Chairman's Report

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

a. 55th Anniversary of the National Science Board and NSF

Dr. Washington, NSB Chairman, noted that on December 12, 1950, the National Science Board held its first meeting in the Cabinet Room of the White House with President Harry Truman. There they discussed the appointment of the NSF Director and budget for NSF. As an independent Federal agency, NSF does not fall under a cabinet department, and its' activities are guided by the National Science Board. The Board and NSF have shared a rich and productive relationship over this 55-year period.

b. 2006 NSB Retreat, Visit, and Meeting

Dr. Washington asked Dr. Michael Crosby, NSB Executive Officer, to provide an update on the NSB retreat, visit, meeting, and other NSB activities planned for February 2006 in Boulder, Colorado. Dr. Crosby summarized the planned activities that include a likely NSB-sponsored Workshop on Hurricane Science and Engineering on February 7; a series of briefings from the National Center for Atmospheric Research (NCAR), NSB Retreat, and evening reception at the NCAR's HIAPER (High-Performance Instrumented Airborne Platform for Environmental Research) aircraft hangar facility on February 9; and a breakfast with the board, faculty, and students of the University of Colorado, Boulder followed by NSB committee meetings and Plenary Sessions, and a second hearing on the NSB Education Commission in the afternoon on February 10. Dr. Crosby stated that efforts would be made to allow as much time as possible for the retreat session.

c. Task Force on International Science

At the September 2005 meeting, the Board approved the establishment of an NSB Task Force on International Science. Dr. Washington appointed Dr. Jon Strauss to chair the task force, with Drs. Dan Arvizu, Steven Beering, Ray Bowen, Alan Leshner, Jane Lubchenco, Diane Natalicio, Kathryn Sullivan, and Warren Washington as members. Dr. Crosby thanked the task force members for agreeing to participate in this important activity.

AGENDA ITEM 8: Report of *ad hoc* Task Group on Vision for NSF

The *ad hoc* Task Group on Vision for the NSF held a teleconference on November 22, 2005 to discuss a draft vision document and nearly 400 public comments on that document.

> The Board unanimously APPROVED the teleconference minutes of the *ad hoc* Task Group on Vision for NSF held on November 22, 2005.

Dr. Sullivan, task group leader, reported on the development of the *2020 Vision* document. Dr. Sullivan stated that the Board was pleased with the content and intentions of the document and suggested some revisions to reflect the Board's "vision" for America as well as NSF. She encouraged Board Members to offer further comments for the text and cover art. After discussion:

> The Board unanimously APPROVED the *National Science Board 2020 Vision for the National Science Foundation* (NSB-05-142), subject to final edits by the NSB Chairman and the task group leader.

AGENDA ITEM 8: Director's Report

Dr. Arden Bement, NSF Director, announced the retirement of Dr. Bruce Umminger who served as Regulatory Biology Program Director, Division Director in the Biology Directorate, and most recently as Senior Scientist in the Office of Integrative Activities. Dr. Bement then reported on several topics.

a. 2005 Presidential Rank Awards

Dr. Bement announced the NSF recipients of the Presidential Rank Awards to Senior Executive Service who were selected for their strong leadership and consistent demonstrations of strength, integrity, industry, and relentless commitment to public service: Dr. Jarvis Moyers, Division Director, Atmospheric Science received the Distinguished Executive Rank Award; and Dr. Judith Sunley, Deputy Assistant Director, Mathematical and Physical Sciences received the Meritorious Executive Presidential Rank Award.

b. NSF's Merit Review System

The NSF Director reported that the Chairman submitted the *Report of the National Science Board on the National Foundation's Merit Review System* (NSB-05-119) to Congress on September 30, 2005. The report acknowledged the efforts of the Board and NSF to ensure that NSF's merit review system remains an international gold standard for review of scientific and engineering research and educational proposals. Although the report was supportive of NSF's merit review system and use of expert judgment exercised by NSF staff, the Board recommended areas for continued process improvement. During FY 2006, NSF staff will focus on issues concerning the transparency and quality of the NSF merit review system. Dr. Bement stated that he would be reporting to the Board on progress at future meetings.

c. Congressional Update

Appropriations Update

Dr. Bement stated that on November 22, 2005, the President signed into law the Science, State, Justice, Commerce and Related Agencies (SSJC) appropriations bill which contains NSF's 2006 appropriation. Total NSF funding for FY 2006 is $5.653 billion – a 3.3 percent increase over last year.

Hearings

On November 8, 2005, Dr. Joseph Hennessey, Senior Advisor for the Office of Industrial Innovation, Directorate for Engineering, testified on behalf of NSF before the House Small Business Committee on the Small Business Innovation Research Program.

Science and Engineering Legislation

Dr. Bement reported that NSF sent a letter to the House and Senate Conferees on the National Aeronautics and Space Administration (NASA) authorization bill requesting that two provisions mentioning NSF be deleted from the bill. The first would allow design and development work for large projects to be funded out of the Major Research Equipment and Facility Construction (MREFC) account instead of the Research and Related Activities (R&RA) account. The second provision would require the Bureau of the Census to include an item on the field of degree in the American Community Survey. In lieu of this latter provision, NSF will work with the Bureau of the Census to determine how best to meet the need to obtain regular information on field of degree. Since the last update, no new legislation having a significant impact on NSF was identified.

AGENDA ITEM 9: Committee Reports

a. Executive Committee (EC)

Dr. Bement, EC chairman, reported that the NSB Chairman recommended modifications to the Board's process for electing members of the *ad hoc* Committee on Nominating for NSB Elections (Elections Committee).

Dr. Crosby was asked to explain the process and recommended modification. He stated that current elections are done by first electing an NSB Elections (or Nominating) Committee at the meeting immediately preceding the one at which the election of Board officers takes place. There are six elected Board positions; four on EC as well as the Board's Chair and Vice Chair. By tradition, the Board's Chair and Vice Chair are also elected to fill two EC positions in even-numbered years for a 2-year appointment. Electing the Elections Committee is by a ballot process where individuals receiving three or more nominations are elected to the Elections Committee to develop a slate of nominees for election to a Board officer position. The proposed change would allow the NSB Chair to appoint Board Members to the Elections Committee for EC membership elections in odd-numbered years or when one of the selected members of EC is unable to complete his/her term of office, as in the case of Dr. Delores Etter. There would be no change to the process for electing Elections Committee members for developing a slate of nominees for the Board Chair and Vice Chair. Following this recommendation:

> The Board unanimously APPROVED the modification of the NSB process for electing the *ad hoc* Committee on Nominating for NSB Elections.

Dr. Washington announced that he established an *ad hoc* Committee on Nominating for NSB Elections, also known as the Elections Committee, for the vacancy on EC created by Dr. Etter. She resigned in November 2005 to be confirmed as the Assistant Secretary of the Navy for Research, Development, and Acquisition. Dr. Etter's EC term would have expired in 2007. Dr. Douglas Randall agreed to be the committee chairman with Drs. Alan Leshner and Jo Anne Vasquez as members. The committee would prepare a slate of candidates for consideration and election at the February 2006 meeting.

Dr. Bement reported that the committee reviewed and discussed the revised NSB meeting attendance guidelines. He asked Dr. Crosby to explain the corrections and changes. Dr. Crosby responded that the revisions now accurately indicate the limited attendance in Executive Closed meetings to Board Members and Consultants, the NSB Executive Officer, and other staff as designated by the Board Chair or committee chair. The NSF Deputy Director generally attends the Board's Executive Closed meetings except where the discussion involves Board elections, Member proposals, or other especially sensitive matters at the discretion of the Board Chairman or committee chairman. The revisions also specify exemptions used to close an NSB meeting to make the guidelines more consistent with the statutory language that allows for the closure. The revised guidelines make it clear that, by default, NSB meetings are open, as required by law, unless certain specific exemptions apply. Dr. Bement offered a motion for approval of the revised meeting attendance guidelines. Following this recommendation:

The Board unanimously APPROVED the revised Attendance Guidelines for the National Science Board and its Committees and other Subdivisions (NSB-05-161) (Attachment A).

Dr. Bement stated that the committee heard a report on the NSB retreat, visit, meeting, and other NSB activities planned for February 2006 in Boulder, Colorado.

b. Audit and Oversight (A&O) Committee

Dr. Steven Beering reported for Mark Wrighton, A&O chairman. Dr. Beering reported that Mr. Thomas Cross, Deputy Inspector General, Office of the Inspector General (OIG), discussed the *Semiannual Report to the Congress*, September 2005, and related the NSF management response and data tables (Board Book Tab 11B). The committee approved the management response and cover letter for transmittal. Following this recommendation:

The Board unanimously APPROVED the transmittal letter and NSF management response to the OIG *Semiannual Report to the Congress*, September 2005.

Mr. Dan Kovlak, KPMG, presented the results of NSF's FY 2005 financial statement audit. NSF received its eighth consecutive unqualified or "clean" opinion. The auditors found no material weaknesses but identified two reportable conditions. First, improvements in the areas of grantee risk assessment and monitoring of high-risk awards ("high risk" in this context refers to the business risks of awards, not scientific frontiers). Second, contract monitoring was cited for deficiency pertaining to the adequacy with which NSF reviews quarterly expenditure reports submitted by contractors.

Mr. Thomas Cooley, NSF Chief Financial Officer, commented on the financial statement audit, which is part of NSF's *FY 2005 Performance and Accountability Report.* He noted the importance of high quality post-award monitoring and the considerable effort and progress NSF has made towards the goal of being the "gold standard" in this area.

Mr. Joseph Burt, Director, Division of Human Resource Management, provided an update on the status of the NSF Business Analysis project, a comprehensive and integrated review and assessment of the agency's business processes, human capital, and information technology. The project began in July 2002 and would conclude in September 2006.

c. Education and Human Resources (EHR) Committee

Dr. Elizabeth Hoffman, EHR chair, stated that Members reported on recent EHR-related activities.

Dr. Wayne Clough briefed the committee on the Innovation Summit he helped organize at the Georgia Institute of Technology on October 30-31, 2005. The Council on Competitiveness in cooperation with the Georgia Institute of Technology and the Georgia Research Alliance launched the first regional summit of the National Innovation Initiative at Georgia Institute of Technology. The Summit participants included chief executive officers, university presidents,

and labor leaders who discussed how to promote innovation in the Southern region's economy, institutions and culture in the 21st century. Drs. Bement, Crosby, and Hoffman also attended the conference.

Dr. Vasquez briefed the committee on an NSF-sponsored workshop she attended at the National Academies on October 28-29, 2005. The workshop was the final one in a series held by the National Academies and NSF grantees of the Mathematics and Science Partnership (MSP) program through the National Research Council Center for Education and the National Science Resources Center (NSRC), an organization that assists MSP grantees. The series of MSP workshops were designed to support and encourage MSP grantees to implement evidence-based research in their individual projects. She observed that (1) frequent administrative turn-over leads to disconnects between MSPs and local districts, (2) teacher retirements result in loss of needed leadership, (3) release time is difficult to obtain, and (4) finding support after NSF funding terminates is a concern.

Dr. Daniel Hastings briefed the committee on the NSB "Workshop on Engineering Workforce Issues and Engineering Education: What are the Linkages?" held at the Massachusetts Institute of Technology (MIT) on October 20, 2005. He noted that engineering provides many exciting opportunities (nanotechnology, biotechnology, information technology) and offers challenges with large-scale systems for modern engineers. Major issues raised at the workshop included: how to produce value given cost discrepancies between U.S. and foreign engineers, how to attract and retain the best and brightest, how to produce a more technologically literate workforce, and how to address outsourcing. The workshop participants recognized that the engineers of the future need a new set of skills, and many institutions are introducing innovative approaches to inject new thinking in engineering education. Young people need to have a positive perception of the engineering workplace and more opportunities for hands-on engagement. Dr. Hastings acknowledged the contributions of Drs. Clough and Louis Lanzerotti, and stated that they would be suggesting next steps at the March EHR meeting.

Dr. Donald Thompson, Acting Assistant Director, Directorate for Education and Human Resources, provided the committee with a few examples of NSF investments in the integration of research and education projects that have worked well to establish meaningful collaborations and broaden participation. The committee found the presentation informative and requested additional presentations from Dr. Thompson on the integration of research and education at the February EHR committee meeting. EHR would also schedule a presentation by the National Science Digital Library (NDSL). Funded by NSF, NDSL is the Nation's free online library for education and research in science, technology, and mathematics.

Dr. Beering addressed the committee on progress made with the NSB Commission on the 21st Century Education in Science, Mathematics and Technology. Three hearings were scheduled: December 7, 2005 Cannon House Office Building, Washington, DC; February 10, 2006, University of Colorado, Boulder; and early March 2006, University of Southern California, Los Angeles. Dr. Beering remarked on the enthusiastic response of the congressional panelists for the December hearing, and gave a special note of thanks to the extraordinary support of Congressman Frank Wolf and the assistance of his staff in organizing the hearing. The February and March meetings would include an invitation to the public to address the Board

directly with their concerns. Dr. Hoffman noted the contributions of Drs. Vasquez, Washington, and herself to this effort.

At the September 2005 NSB meeting, Dr. Vasquez identified an activity established by IBM that provides financial support to selected employees to become mathematics and science teachers. The committee recommended a letter be sent to the IBM Foundation management from the NSB Chairman, encouraging IBM in this effort (Board Book Tab 10B). Upon this recommendation:

> The Board unanimously APPROVED the letter from the NSB Chairman to the IBM Foundation President, commending the IBM Corporation.

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

Dr. Beering, SEI chairman, reported on the status of the *Science and Engineering Indicators 2006*. The final versions of all the *Indicators* chapters were approved, and work was completed on the Companion Piece. Dr. Beering thanked Dr. Alan Rapoport, Mr. Rolf Lehming, and Ms. Jean Pomeroy for their enormous efforts. The transmittal letter and publications would be delivered to the White House on January 13, 2006.

Dr. Pam Ebert Flattau, Institute for Defense Analysis, Science and Technology Policy Institute (STPI), made a presentation to the subcommittee on ideas and models for the future evolution of the *Indicators* report, as background for the subcommittee's consideration for modernizing the *Indicators* presentation.

Dr. Hoffman thanked Drs. Washington and Beering for their careful reviews of the final versions of *Indicators*.

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. The first item concerned the role of centers in the NSF portfolio. Dr. Nathaniel Pitts, Director, Office of Integrative Activities, responded to questions posed by the Board regarding the reclassification and redefinition of centers and the role of centers with the NSF portfolio. NSF senior management recently reviewed the portfolio of NSF and provided Principles of National Science Foundation Research Centers (Board Book Tab 6B), which includes information on reclassified centers and a general report on the amount of NSF budget devoted to centers. The Joint Session also discussed NSB Guidance for National Science Foundation Centers Programs (Board Book Tab 6C). The committees approved the new NSB guidance for centers with one change to the section titled Endorsed Practice of Recompetition, where the clause "although subject to mid-course external review" was added to the end of the third sentence. Upon this recommendation:

> The Board unanimously APPROVED the National Science Board Guidance for National Science Foundation Centers Program (NSB-05-166) (Attachment C), as revised, subject to final edits approved by the CSB, CPP, and NSB chairmen.

Dr. Ray Bowen, CSB chairman, also reported for the Joint Session. The second item was the

discussion of average award size and duration, and proposal success rate (Board Book Tabs 6D and 6E). Mr. Thomas Cooley, NSF Chief Financial Officer, described NSF strategies to increase proposal success rates and discussed 10-year trends for proposal submissions, awards, and funding rates for two institutional categories; the top 100 Ph.D. granting institutions and all other institutions. The joint committees expressed concern about the tradeoffs of increasing the size of each award, and the associated reduction in the absolute number of awards and potential loss of researchers and students to the science and engineering workforce. NSF Deputy Director, Dr. Kathie Olsen initiated a thorough analysis of the various activities and policies in the different parts of NSF relevant to the NSB goal of producing guidance. The director agreed that the analysis would include an estimate of the cost to NSF of issuing proposal solicitations, especially in situations with expectations of low funding rates, and consideration of issues related to the use of pre-proposals. The joint committees withheld final decision on issuing NSB guidance until after Dr. Olsen has completed her work and reported to the committees at the March 2006 meeting.

f. Committee on Programs and Plans (CPP)

Dr. Simberloff, CPP chairman, reported on behalf of CPP task forces and task group.

Dr. Nina Fedoroff, chair of the Task Force on Transformative Research (TR), reported that TR reviewed the program for the second workshop on December 15, 2005 at the Santa Fe Institute, "Key Factors in Identifying and Fostering Transformative Science." The task force also discussed options for a third workshop.

Dr. Jon Strauss, chairman of the Task Force on International Science, reported that the task force held its first meeting and discussed potential topic areas for the task force to address. The task force had been charged with analyzing the following issues: facilitating partnerships between U.S. and non-U.S. scientists and engineers in the U.S.; facilitating these partnerships outside the U.S. in both developed and developing countries; use of science and engineering partnerships for improving relations between countries; and use of science and engineering partnerships for improving quality of life and environmental protection in developing countries. The task force would continue discussions on topics by phone and e-mail and would likely meet again at the March meeting.

Dr. Kelvin Droegemeier, co-chair of the Task Force on Hurricane Science and Engineering, summarized recent activities of this task force. This effort would include discussion with and input from various appropriate agencies with a focus on fundamental research and engineering and identifying a specific role for NSF. The task group proposed three tentative dates for workshops and has developed questions to frame a first workshop on January 24, 2006 in Arlington, Virginia. An ambitious timeline was proposed that would produce a draft report by August 2006 and a final report for NSB approval in September 2006. Dr. Droegemeier and Dr. Kenneth Ford would co-chair the task force with Drs. Hastings, Hoffman, and Leshner as members. The committee approved a charge for establishment of a CPP Task Force on Hurricane Science and Engineering (Board Book Tab 8B) and recommended it to the full NSB.

> The Board unanimously APPROVED the establishment of a CPP Task Force on Hurricane Science and Engineering (NSB-05-167) (Attachment B).

Dr. Simberloff reported that CPP held further discussions on the process for getting information for Board meetings to CPP and to the Board from NSF. The key aspect for developing a timely process is the 6-month rule that requires Board action at least 6 months before the expiration of an existing award. Nonetheless, there is flexibility for actions that require a short time frame.

Dr. Margaret Leinen, Assistant Director, Directorate for Geosciences, reported to the committee on the linkages between the United Nations Millennium Ecosystem Assessment (MEA) report and NSF's environmental activities. She noted that the NSF environmental community was involved in the MEA effort and that NSF documents anticipated the findings of the MEA report. Dr. Leinen noted some gaps between the MEA report and NSF environmental research and education funding, and pointed out that NSF does not fund applied research, such as applied fisheries research, which is a feature of the MEA report. In response to Member questions regarding interagency coordination, Dr. Leinen described strong interagency connections through the Committee on Environment and Natural Resources at the National Science and Technology Council of the Office of Science and Technology Policy (OSTP).

The committee considered several items related to major research facilities and discussed the recently released Guidelines for Planning and Managing the Major Research Equipment and Facilities Construction (MREFC) Account. At the last meeting, the Director informed the committee that the Advanced Solar Technology Telescope (ATST) had been advanced into the Readiness Stage. The committee reviewed the documentation provided at the last meeting and formally concurred that the ATST has achieved the Readiness Stage. The committee concurred with this status and recommended that the Board also concur. Upon this recommendation, the Board acted as follows:

> The Board unanimously CONCURRED that the ATST attained Readiness Stage status by the appropriate process as described in *Setting Priorities for Large Research Facilities Projects Supported by the NSF* (NSB-05-77).

NSF presented a draft of Chapter 3 of the Cyberinfrastructure Vision document – "Data, Data Analysis & Visualization." The committee agreed to schedule a CPP teleconference in mid-December to provide comments on the chapter, and asked NSF to provide CPP members with all three chapters that exist and outlines of the remaining two chapters well before the teleconference.

Finally, CPP heard a report on the search for a Director for the Office of Cyberinfrastructure.

g. Committee on Strategy and Budget (CSB)

Dr. Bowen, CSB chairman, reported that NSF started updating its Strategic Plan (FY 2003 - 2008) as required by the Government Performance and Results Act (GPRA). Dr. Kathie Olsen, NSF Deputy Director, gave the committee an overview of the process and timeline. The *National Science Board 2020 Vision for the National Science Foundation* will serve as the basis for the new NSF Strategic Plan. As the Strategic Plan develops, NSF would provide drafts of this plan and meet regularly with CSB. The second item was a discussion of the congressionally approved budget for FY 2006.

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

Ann A. Ferrante
Writer-Editor
National Science Board Office

Attachments

Appendix A: NSB-05-161
Attendance Guidelines for the NSB and its Committees and other Subdivisions
Appendix B: NSB-05-167
CPP Charge to the Task Force on Hurricane Science and Engineering
Appendix C: NSB-05-166
NSB Guidance for NSF Centers Programs

Appendix A to NSB-05-166
NSB-05-161
December 1, 2005

National Science Board

Attendance Guidelines
for the National Science Board and its Committees and other Subdivisions

Summary of Attendance Guidelines

The Board meets in plenary session or as committees or other subdivisions. Board Members and Board Consultants[2] may attend any Board meeting (unless the NSF's Designated Agency Ethics Officer determines there is a conflict of interest) and there are no restrictions on the attendance by the general public at the Board's open meetings. Attendance is limited for the Board's closed Plenary, committee, or subdivision meetings, which are designated either as 'closed' or 'executive closed.'

Open Meetings – *General public, media, and NSF staff are permitted to attend.*

Closed Meetings – In addition to Board Members and Board Consultants, attendance is limited to NSF staff and others needed to support the meeting discussions, including the NSB Executive Officer, the Deputy Director, Inspector General, Assistant Directors and O/D Office Heads, any staff who have prepared presentations for the closed meeting or are expected to answer questions from Board or Committee members during the closed meeting, and other staff designated by the Board Chair or Committee Chair.

Executive Closed Meetings – In addition to Board Members and Board Consultants, attendance is limited to the NSB Executive Officer, and other staff only as designated by the Board Chair or Committee Chair. The Deputy Director generally attends the Board's *Executive Closed* meetings except where the discussion involves Board Elections, Member proposals, or other especially sensitive matters at the discretion of the Board Chair or Committee Chair.

Discussion of Attendance Guidelines

Open Meeting Attendance

Most of the Board's meetings are open to the public, media, and NSF staff. The Board invites the general public, the media, and NSF staff to attend its open meetings.

Closed Meeting Attendance

The Government in the Sunshine Act permits the Board to close any portion of any meeting if it properly determines that the portion of the meeting is likely to involve specific open meeting exemptions. The Sunshine Act describes procedures that must be followed when a meeting is closed and requires the public have access to transcripts from the closed meetings (with exempted material withheld). The Board has traditionally designated two types of closed sessions: regular *Closed Sessions* and *Executive Closed Sessions*. The scope of staff attendance depends significantly upon the degree of sensitivity of the matters being discussed.[3]

[2] Board Consultants in this context are outgoing Board Members and Presidential Appointees to the Board not yet confirmed by the Senate.
[3] For closed sessions, this must always include some individual responsible for creating the transcript or electronic recording of the closed meeting as required by section (f)(1) of the Sunshine Act.

1. *Closed Sessions* are primarily devoted to the Board's consideration of proposed grants and agreements. They may also involve discussions of the NSF budget for a particular fiscal year before submission of the President's budget to Congress for that fiscal year. Board Consultants, the NSB Executive Officer, the Deputy Director, Assistant Directors and Heads of O/D Offices, and the Inspector General may routinely attend the Closed Sessions of Board and Committee meetings, unless the Chair determines otherwise. NSF staff who prepared items to be discussed by the Board or its subdivisions should normally be present during the Closed Session to make presentations or to answer questions from the Board or Committee members,[4] along with any other staff the Chair invites.[5] Such staff may attend the entirety of the closed session unless informed otherwise. The Chair may admit or exclude NSF staff as appropriate.

2. *Executive Closed Sessions* normally include discussions involving Board or Executive Committee elections, hiring or other personnel matters involving identifiable individuals, and awards to specific individuals such as Bush or Waterman awardees where there is likely to be a clearly unwarranted invasion of personal privacy, and Board Member proposals to NSF. Plenary *Executive Closed Sessions* of the full Board are normally limited to NSB Members (including the Director) and Board Consultants, the NSB Executive Officer, other staff invited by the Chair, a "court reporter," and, unless instructed otherwise, an NSB staff assistant(s) for administrative support. *Executive Closed Sessions* of Board Committees or other subdivisions will normally include Board Members, Board Consultants, the NSB Executive Officer, the Committee's Executive Secretary(ies), other staff invited by the Chair, a "court reporter," and, unless instructed otherwise, an NSB staff assistant(s) for administrative support. The Deputy Director generally attends Plenary or committee *Executive Closed Sessions*, except where the discussion involves Board Elections, Member proposals, or other especially sensitive matters at the discretion of the Board Chair or Committee Chair.

Procedure

The decision on NSF staff attendance at closed NSB sessions lies with the Chair presiding over a closed meeting of the Board, its Committees, or other subdivisions.[6] The Chairs' decisions, if they differ from the routine attendance guidance above, should normally be made before meetings to give staff adequate notice of permitted or required staff attendance. These decisions can, however, be made or changed during the course of the meeting either to permit additional input from staff, or to exclude staff as determined by the Chair.[7]

Once the agenda for a closed session is final, it is the responsibility of the NSB Executive Officer or Executive Secretary for that entity to discuss attendance with the Chair. The Chair should strive to make a determination sufficiently in advance of a meeting to permit notice to staff, normally through notation on the meeting agendas. When a closed meeting begins, the Chair, with the help of the NSB Executive

[4] For proposed awards and agreements, this will normally include the Program Officer(s), the Division Director(s), and/or the Assistant Director(s). For future budgets, this may include appropriate staff from the Budget Office and/or the Office of Legislative and Public Affairs.

[5] The Chair may have a standing list of invitees to meetings an/or determine those admitted by meeting, or even ad hoc by agenda item, as he or she deems appropriate. Staff in some instances could include NSF contractors, experts, or consultants.

[6] The principles underlying the exemptions in the Government in the Sunshine Act should guide Chairs in making decisions about NSF staff attendance at closed meetings. Attendance at closed meetings may be limited as necessary to protect, e.g., personal privacy, future agency budgets, or ongoing investigations that may be discussed during a meeting. However, this will require balancing the Board's need for information, and for efficient and effective operation, with the need to protect confidentiality.

[7] Where the Board or a subdivision is to discuss especially sensitive issues such as, e.g., a personnel matter involving an identifiable NSF employee, the Chair may restrict staff attendance to only those essential to the discussion, and in some instances to Board members only, provided there is a means of creating the transcript or electronic recording of the closed meeting as required by section (f)(1) of the Sunshine Act.

Officer or Secretary and such others as the Chair may ask, should monitor staff presence in accordance with the meeting agenda and the Chair's decisions.

In accordance with section (f) of the Sunshine Act, the agency shall maintain a transcript of each closed meeting. The Board staff, with the advice and assistance of the NSF General Counsel and staff, shall in accordance with section (f) of the Act and section 45 CFR 614.4 of NSF regulations make a copy of transcripts available to the public upon request with portions involving the Sunshine Act's open meeting exemptions withheld.

Appendix B to NSB-05-166
NSB-05-167
December 1, 2005

Committee on Programs and Plans
Charge to the Task Force on Hurricane Science and Engineering

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)*; *and* "...the Board shall establish the policies of the Foundation, within the framework of applicable national policies as set forth by the President and the Congress." (SEC. 4. (a))

Action Recommended
The National Science Board (NSB, the Board) should take action, in collaboration with NSF management and other organizations in the U.S. and abroad, to accomplish the following for hurricane related science and engineering research exclusive of operational decision making, organized civil response and human health issues: (a) summarize current activities, (b) identify gaps and opportunities, and (c) recommend priorities for action within a national agenda.

The Board will involve relevant Federal science agencies and appropriate organizations to produce a report and recommendations on hurricane science and engineering research for submission to the President and the Congress.

Background
The devastation resulting from hurricanes is significant and widespread, including but not limited to loss of life, dislocation and destruction of families, and economic consequences having national reach and lasting impact. Despite this enormous tragedy, it is important to note that severe, hurricane-related loss of life and property are by no means unique to this year. Given that 90 percent of the U.S. population lives within 200 miles of a coastline, and that the built infrastructure in these regions continues to expand, the U.S. increasingly is vulnerable to hurricanes. However, two important questions have never to our knowledge been adequately addressed: First, to what extent does the Nation understand the hurricane as an integrated science and engineering problem? Second, how can such understanding be used to improve the Nation's ability to predict, mitigate and react? The relevance of these questions transcends U.S. borders as numerous other nations routinely deal with hurricanes and typhoons.

It is appropriate for the National Science Board to engage a multi-agency, multi-disciplinary dialog aimed at answering elements of the questions posed above. This effort is intended to focus on the "hurricane problem" in a more holistic manner than employed to date. Physical, social, behavioral, economic, biological, ecological, information technology and other appropriate

sciences, as well as engineering (e.g., civil, environmental, mechanical) disciplines, will be considered as part of a truly integrative approach to address *deep fundamental science questions regarding hurricanes as natural disasters.* Given its national independent advisory role to the President and Congress, the Board is uniquely and ideally suited to framing this challenge and recommending a national agenda.

The need for understanding hurricanes in a broad context is made clear when one examines hurricane-related research conducted during the past decade. For the most part it has existed as a relatively modest, loosely coordinated enterprise that encompasses topics ranging from basic research in hurricane dynamics and atmospheric and hydrologic numerical prediction to human behavior and economic impacts. Although the quality of this research is quite high, much of it is performed within the boundaries of traditional disciplines whereas in reality, the hurricane is an exemplar multidisciplinary integrative problem.

Recent events have shown us that, although the U.S. possesses the most powerful research enterprise, the largest economy, and the most sophisticated societal infrastructure in the world, it remains notably vulnerable to natural hazards. Future land-falling hurricanes of tremendous destructive potential are inevitable. Thus, the research community owes to its fellow citizens – in this and future generations – a serious effort to maximize scientific understanding of hurricanes and ensure its effective application for the protection of life and property.

Objectives

The *ad hoc* Task Group on Hurricane Science and Engineering recommends that the Board approve the creation of a formal Task Force on Hurricane Science and Engineering (HSE) under the NSB Committee on Programs and Plans (CPP). The HSE Task Force will use a broad-based multi-disciplinary approach to summarize the current status of research relevant to understanding hurricanes as an integrated science and engineering problem. The task force will then develop recommendations to address the following issues and submit a report, through CPP, to the Board:

- Assess how increased understanding of hurricanes as natural disasters can be used to improve the Nation's ability to predict, mitigate, and react to future events.
- Recommend an integrative approach for addressing deep fundamental science questions regarding hurricanes as natural disasters.
- Recommend priorities for meeting critical research needs.
- Recommend an agenda for support of essential hurricane-related research within the Federal government and among research organizations.
- Identify a specific role for NSF to fill in addressing national needs for essential hurricane-related research.

Logistics

The HSE Task Force will convene a series of workshops to define the challenges, frame the issues, and recommend an agenda of appropriate depth and scope. Particularly important to this task will be coordination with mission agencies (especially the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, and the

military), which conduct basic and applied research as well as provide operational infrastructures, along with but not limited to the Office of Science and Technology Policy, the National Science and Technology Council, the President's Council of Advisors on Science and Technology, the National Academies and private enterprise. The series of workshops will be held during winter and spring 2006 to address the issues identified above. The NSB Office will serve as the focal point for coordination and implementation of all task force activities.

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 from the activities of numerous others that are engaging similar topics from largely agency or disciplinary points of view. The report will be produced and broadly distributed during 2006. 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. Briefings will be given as appropriate. The task force expects to conclude its activities during 2006.

Milestones

September 29, 2005 – NSB establishes *ad hoc* Task Group on Hurricane Science and Engineering (HSE) under CPP.

October/November 2005 – HSE Co-chairs and NSB Executive Officer contact appropriate agencies and organizations informing them of HSE and inviting collaborative participation to enhance HSE impacts and mitigate inefficient overlap of efforts.

November 30/December 1, 2005 – *ad hoc* Task Group reports to CPP on progress and recommends creation of Task Force with formal charge.

January-May 2006 – The task force organizes workshops and series of teleconferences.

August 2006 – Draft report to CPP.

September 2006 – Final report to the Board for approval.

National Science Board
Guidance for National Science Foundation Centers Programs

Introduction/Thesis

The National Science Foundation (NSF) is mandated with the broad responsibility that includes both the vitality of the basic research and education base in science and engineering as well as the utilization of science and engineering for the furtherance of national goals. To meet these ends, NSF must support a broad range and balance of alternative support strategies for the conduct and facilitation of research. In a constrained budgetary environment with intense and increasing competition for research dollars, the National Science Board (NSB, the Board) considers the importance of examining the relative balance within the NSF research portfolio, including NSF's investment in centers.

At the March 2005 Board meeting, Dr. Warren Washington, Chairman of the Board, asked the Committee on Programs and Plans and the Committee on Strategy and Budget to examine NSF's relative balance of center-like awards and smaller, more basic principal investigator (PI) oriented grants. At the May 2005 Board meeting, the Board received and discussed a report from NSF on the investment in centers along with other information. At the September 2005 Board meeting, the Director presented the results of a reexamination of the existing classification of awards categorized as NSF centers. Based on the existing Board guidance established in 1988, NSF substantially reduced the number of grants and agreements classified as "centers." This paper reflects the Board's view regarding NSF centers programs and has been prepared based on Board discussions.

The Board maintains that NSF's current investment in centers is appropriate. NSB strongly endorses the practice of recompeting centers, to ensure the best use of NSF funds for supporting research at the frontiers of science and engineering. One of the critical requirements for centers is to demonstrate the "value added" nature of activities expected from investing in research and education through this mode of support; in other words, research that cannot be performed by single investigators or small groups. To ensure that each center is providing this value, investments in centers should be periodically reviewed by NSF to make certain that supported centers maintain the highest levels of excellence and have not evolved into activities that should be done by single or a small group of investigator grants. A second critical requirement is to ensure the education of a diverse set of students in substantive programs related to the center's research mission in order to provide for the next generation of U.S. researchers and to prepare them for a broad set of career paths. A final critical requirement is the effective management of centers through strategic planning and implementation of proven effective management practices. This management requirement applies to both the management at the centers and within the NSF.

Background

Definition of Centers

NSB (1988) defined a research center as: "an organized academic research activity that receives budgetary support from sources independent of departmental allocations; occupies space with access to university operated physical facilities and support services; is directed by an administrator drawn from faculty ranks; participates in the institution's educational function, but is not degree-granting; and is more than a facilitator of research."[i] However, NSB (1988) recognized that the NSF's funding modes are not discrete, but rather form a continuous spectrum of activities. But for the purposes of the 1988 study, the

modes of funding support were divided into three broad, albeit artificially constructed, categories: scientific research project, facility, and research center.

As part of the FY 2007 Office of Management and Budget budget formulation process, all directorates were asked to review programs reported as centers against the criteria outlined in *Principles of National Science Foundation Research Centers*[ii]. Those that did not meet the stated principles were recharacterized and funding was moved to the Fundamental Science and Engineering (FS&E) investment category. As a result of this reclassification process, center programs were characterized as representing investments that enable organizations to integrate ideas, tools, and people on scales that are large enough to significantly impact important S&E fields and cross-disciplinary areas. Centers exploit opportunities in science, engineering, and technology in which the complexity of the research problem or the resources needed to solve the problem require the advantages of scope, scale, change, duration, equipment, facilities, and students that can only be provided by an academic research center.

Rationale for Centers

NSB (1988) cited that the use of centers was increasing because centers epitomize the growing complexity, cost, and organization of modern research. A multitude of rationale to support centers exists and generally applies in different combinations for specific centers. The following reasons were listed by NSB in its 1988 report on centers:

- Exploit opportunities in science where the complexity of the research problem can benefit from the sustained interaction among disciplines and/or subdisciplines.
- Stimulate new directions and styles of inquiry in research including collaborative, cross-disciplinary, and interdisciplinary approaches.
- Provide experimental facilities, professional staff, technical support and services, and related infrastructure support.
- Conduct research that is impossible or unfeasible under traditional support, such as research on large systems, research centered on a major experimental capability, or research requiring extensive regional coordination.
- Assist education programs of the institutions including research training and exposure to multidisciplinary approaches.
- Enhance the visibility of activity to provide a focus for interactions with the academic communities, industrial interests, and national or local government agencies.
- Respond to an identified national concern or the furtherance of specific national goals and priorities.

Current Board Guidance on Centers

The 1988 NSB report on centers stated, "It is the conclusion of the National Science Board that there should be no numerical targets specified for funding by any of these modes [which cover a continuous spectrum ranging from individual investigators through groups to centers], but that the balance among them should be determined by the requirements of research and education in science and engineering in accord with the purposes specified in the National Science Foundation Act…"[iii] The range of support for NSF centers, as defined in 1988, has been 8-12 percent of total NSF funding.[iv]

As NSF defined centers in FY 2004, approximately 200 NSF centers accounted for 6.7 percent of the total NSF budget, and 8.5 percent of the Research and Related Activities (R&RA) account.[v] This was a reduction from FY 2000, in which approximately 250 NSF centers accounted for 7.3 percent of the total budget, and 9.2 percent of the R&RA account. [vi] Under the 2005 revised classification of centers, in FY 2004 there would have been approximately 84 NSF centers accounting for 4.2 percent of the total NSF budget, and 5.6 percent of the R&RA account.

New NSB Guidance

Portfolio Balance

NSF's investment in centers should be reported as both a percentage of the R&RA account and as a percentage of the total NSF budget, with the range of support for NSF centers being 6-8 percent of R&RA. However it is important to consider that the relative balance of funding for principal investigators, large facilities, and centers will vary considerably across disciplines.

Review Investment in Centers

The Foundation will periodically review the investment in centers to ensure that no center is being supported that has evolved into activities that could best be done by single/small group of investigator grants. To this end, centers programs (as opposed to individual centers) should be reviewed by the Board on a regular basis. While centers are an important part of the portfolio, they should not be created and supported without considerable justification on the part of NSF.

Endorse Practice of Recompetition

NSB reaffirms its endorsement of the practice of NSF recompeting centers. In 1997, the Board affirmed its "strong support for the principle that expiring awards are to be recompeted unless it is judged to be in the best interest of U.S. science and engineering not to do so."[vii] Many, although not all, center awards are limited to a maximum duration – usually on the order of 10 years although subject to mid-course external peer reviews. After this time, the Board stated that continued funding requires success in open, merit-reviewed competition. Specifically regarding centers, the Board suggested that guidelines be established for the review and renewal of centers, to make the procedure as uniform and explicit as is practical. These procedures should also address the issue of phase-down of support for centers that are not renewed.[viii]

Management Practices

Effective management of centers for successful research and education results is imperative to ensure the accountability of public investments. The Board endorses the implementation of proven management principles, including strategic planning, the use of strong cooperative agreements, and the commitment of ample resources for management both at the center and within the NSF.

[i] National Science Board (1988) *Report of the National Science Board Committee on Centers and Individual Investigator Awards*. February 1988. (NSB-88-35).
[ii] Senior Management Integration Group, June 21, 2005, *Principles of National Science Foundation Research Center*s.
[iii] National Science Board (1988) *Report of the National Science Board Committee on Centers and Individual Investigator Awards*. February 1998. (NSB-88-35).
[iv] "NSF Centers," presentation by Dr. Nathaniel Pitts, Joint Session of the Committee on Strategy and Budget and the Committee on Programs and Plans, May 25, 2005.
[v] NSF Office of Budget, Finance, and Award Management. Background data on the portfolio balance of centers and individual investigator support provided for the May 2005 Board meeting.
[vi] NSF Office of Budget, Finance, and Award Management. Background data on the portfolio balance of centers and individual investigator support provided for the May 2005 Board meeting.
[vii] National Science Board, Resolution on *Competition, Recompetition and Renewal of NSF Awards.* (NSB-97-224).
[viii] National Science Board, Statement on *Competition, Recompetition and Renewal of NSF Awards*. (NSB-97-216).