National Science Board

NSB-04-190
December 17, 2004

MEMORANDUM TO MEMBERS OF THE NATIONAL SCIENCE BOARD

SUBJECT: Major Actions and Approvals at the December 15-16, 2004 Meeting

This memorandum will be publicly available for any interested parties to review. A more detailed summary of the meeting will be posted on the National Science Board (NSB, the Board) public Web site within 10 business days. A comprehensive set of NSB-approved Open Session meeting minutes will be posted on the Board's public Web site following the February 2005 meeting.

Major actions and approvals at the 383rd meeting of the Board included the following (not in priority order):

1. At the Open Plenary Session, Dr. John Marburger, Senior Advisor to the President and Director, Office of Science and Technology Policy, the White House, administered the Oath of Office to seven Board Members: Dr. Dan E. Arvizu, CH2M Hill (retired); Dr. Steven Beering, Purdue University; Dr. G. Wayne Clough, Georgia Institute of Technology; Dr. Kelvin K. Droegemeier, University of Oklahoma; Dr. Louis J. Lanzerotti, New Jersey Institute of Technology; Dr. Alan I. Leshner, American Association for the Advancement of Science; and Dr. Jon C. Straus, Harvey Mudd College.

2. The Board approved the minutes for the Open Plenary, Executive Closed Plenary, and Closed Plenary Sessions of the October 2004 meeting of the NSB (http://www.nsf.gov/nsb/meetings/2004/1004/open_minutes_oct_2004.pdf.

3. The Board approved a slate of candidates for the NSB class of 2006-2012 for transmittal to the White House in February 2005.

4. The Board approved a resolution to close portions of the upcoming February 7-8, 2005 NSB meeting dealing with staff appointments, future budgets, pending proposals/awards for specific grants, contracts, or other arrangements, and those portions dealing with specific Office of the Inspector General investigations and enforcement actions, or agency audit guidelines (NSB-04-176) (Attachment 1).

5. The Board authorized the Director, at his discretion, to make an award to Dartmouth College for the Center for Cognitive and Educational Neuroscience (C-CEN).

National Science Foundation
4201 Wilson Boulevard • Arlington, Virginia 22230 • (703) 292-7000 • http://www.nsf.gov/nsb • email: NSBoffice@nsf.gov

6. The Board approved their responses to the four specific IPA-related questions that the Board's Executive Officer received from staff of the House Appropriations Subcommittee for VA, HUD and Independent Agencies.

7. The Board approved the establishment of the Committee on Programs and Plans Task Force on Transformative Research (NSB/CPP/TR-04-1) (Attachment 2).

Michael P. Crosby
Executive Officer

Attachment 1: NSB-04-176
Attachment 2: NSB/CPP/TR-04-1

National Science Board

NSB-04-176
November 29, 2004

MEMORANDUM TO MEMBERS AND CONSULTANTS OF THE NATIONAL SCIENCE BOARD

Subject: Closed Session Agenda Items for February 7-8, 2005 Meeting

The Government in the Sunshine Act requires formal action on closing portions of each Board meeting. The following are the closed session agenda items anticipated for the February 7-8, 2005 meeting.

1. Staff appointments
2. Future budgets
3. Grants and contracts
4. Specific Office of Inspector General investigations and enforcement actions

A proposed resolution and the General Counsel's certification for closing these portions of the meetings are attached for your consideration.

Michael P. Crosby
Executive Officer

Attachments

PROPOSED
RESOLUTION
TO CLOSE PORTIONS OF
384th MEETING
NATIONAL SCIENCE BOARD

RESOLVED: That the following portions of the meeting of the National Science Board (NSB) scheduled for February 7-8, 2005 shall be closed to the public.

1. Those portions having to do with discussions regarding nominees for appointments as National Science Board members and National Science Foundation (NSF) staff appointments, or with specific staffing or personnel issues involving identifiable individuals. An open meeting on these subjects would be likely to constitute a clearly unwarranted invasion of personal privacy.

2. Those portions having to do with future budgets not yet submitted by the President to the Congress.

3. Those portions having to do with proposals and awards for specific grants, contracts, or other arrangements. An open meeting on those portions would be likely to disclose personal information and constitute a clearly unwarranted invasion of privacy. It would also be likely to disclose research plans and other related information that are trade secrets, and commercial or financial information obtained from a person that are privileged or confidential. An open meeting would also prematurely disclose the position of the NSF on the proposals in question before final negotiations and any determination by the Director to make the awards and so would be likely to frustrate significantly the implementation of the proposed Foundation action.

4. Those portions having to do with specific Office of the Inspector General investigations and enforcement actions, or agency audit guidelines.

The Board finds that any public interest in an open discussion of these items is outweighed by protection of the interests asserted for closing the items.

CERTIFICATE

It is my opinion that portions of the meeting of the National Science Board (NSB) or its subdivisions scheduled for February 7-8, 2005 having to do with nominees for appointments as NSB members and National Science Foundation (NSF) staff, or with specific staffing or personnel issues or actions, may properly be closed to the public under 5 U.S.C. § 552b(c) (2) and (6); those portions having to do with future budgets may properly be closed to the public under 5 U.S.C. § 552b(c) (3) and 42 U.S.C. 1863(k); those portions having to do with proposals and awards for specific grants, contracts, or other arrangements may properly be closed to the public under 5 U.S.C. § 552b(c) (4), (6), and (9) (B); those portions disclosure of which would risk the circumvention of a statute or agency regulation under 5 U.S.C. § 552b(c) (2); and those portions having to do with specific Office of the Inspector General investigations and enforcement actions may properly be closed to the public under 5 U.S.C. § 552b(c) (5), (7) and (10).

Lawrence Rudolph
General Counsel
National Science Foundation

NSB/CPP/TR-04-1
December 16, 2004

Committee on Programs and Plans
Charge to the Task Force on Transformative Research

Statutory basis
"...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 consider new policies that would enhance the ability of the National Science Foundation (NSF, the Foundation) to identify, evaluate, and fund innovative, "transformative" research, defined as research that has the potential to revolutionize an existing discipline through a paradigm shift or create a new one.

Background
In July 1999, the NSB noted a need to revitalize a commitment to innovative research (NSB-00-39). In October 2000, the former NSB Chair, stated to the Committee on Science's Subcommittee on Basic Research, "industry is increasingly dependent on the Federal government to support long term and high risk research at the same time that the Federal share of the U.S. R&D enterprise is declining." At the February 2003 retreat, the Board itself discussed ways in which it could help NSF develop new and more effective approaches to reviewing and funding both multidisciplinary and innovative research that has the potential to transform disciplines.

The August 2004 report of the NSF Advisory Committee for Government Performance and Results Act Performance Assessment (AC/GPA) concluded that no obvious formula exists to guide NSF as to the fraction of the portfolio that should be "high risk" (or "bold"). However, the Advisory Committee also stated "... without hesitation that it is vital that the overall portfolio contain an appropriate amount of "bold" research and that the definition of such research must be clear and widely understood by NSF's key stakeholders". They recognized that there is always a tension between funding such research and funding other priorities, and where possible, they suggested that NSF should do more. The Committee concluded by stating that it "... believes that this issue is important enough to warrant attention by the National Science Board".

The Board's *ad hoc* Task Group on High-Risk Research (now referred to as transformative research) has conducted an initial review of current practices that NSF and other funding organizations use to identify and support potentially transformative research. The NSB Office developed a white paper that provided an overview of the variety of current approaches to identify and fund such research. The Task Group also convened a workshop at the Santa Fe Institute in Santa Fe, New Mexico (22-23 September 2004) to solicit the individual views of members of the scientific community on NSF's approaches to funding transformative research and their suggestions for improvements. Several major issues were identified during the course of the workshop that affect NSF's ability to identify, evaluate, and fund potentially transformative research:

- There is a lack of common definitions of "high-risk" or "transformative" research.
- There is a need to develop criteria within NSF for flagging potentially transformative proposals.
- There is a need to establish appropriately higher failure rates, as well as extended time-frames, for potentially transformative research.
- There is a need to establish a different and possibly higher target funding rate for potentially transformative research than for research with a more certain outcome.
- There is a need to develop ways of tracking potentially transformative research through the NSF system and of evaluating outcomes over an extended period.

Workshop participants also discussed aspects of the peer review process that militate against selection of potentially transformative research and identified key variables in the review and funding processes that could enhance NSF's ability to identify and support truly pioneering researchers at an early stage in the development of transformative concepts:

- A markedly greater emphasis on selection of individuals, rather than projects.
- A different view of panels, including the possible constitution of separate and different panels for evaluating potentially transformative research and researchers.
- Developing mechanisms that would permit applicants to respond to questions during the review process in written form, in real-time electronic form, and in person.
- Expanding funding specifically for the support of transformative research irrespective of discipline to encourage the influx of new ideas.
- Increasing the ability of program officers to identify and champion such research through better training, greater autonomy, and rewards.
- Increasing awareness and confidence in the scientific community that NSF welcomes transformative concepts, research and researchers.
- Establishing ways of measuring and tracking both the success of potentially transformative proposals within the NSF system and the long-term outcome of funding them.

Policy Objectives

The *ad hoc* Task Group recommends that the Board approve the creation of a formal Task Force on Transformative Research 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.

- Definition of "transformative/high risk" research
- An acceptable "failure" rate for transformative research
- Review process modifications to improve identification of potentially transformative research
- Appropriate funding mechanism amount and duration
- Mechanisms for assessing success in identifying and supporting transformative/high risk research

Logistics

The Task Force will bring together NSF staff, NSB members, and members of the scientific community. The NSB Office will serve as the focal point for coordination and implementation of all Task Force activities, including liaison with NSF staff, Task Force members, and external contractors.

A series of workshops will be held during 2005, some internal and some external, to address the issues identified above. In addition, the Task Force will convene such working groups as it deems necessary to obtain relevant information about the success rate and fate of "transformative" proposals within the current NSF system, using external contractors as appropriate.

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 presents recommendations for the NSB to consider in formulating policy on soliciting, identifying, supporting and tracking potentially transformative research within the NSF framework. Printed copies of an 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. The Task Force expects to conclude its activities with 2 years from the date that formation of the Task Force is approved.