

**APPROVED MINUTES<sup>1</sup>  
OPEN SESSION  
415TH MEETING  
NATIONAL SCIENCE BOARD**

National Science Foundation  
Arlington, Virginia  
August 25-26, 2010

Members Present:

Ray M. Bowen, Chairman  
Esin Gulari, Vice Chairman  
Mark R. Abbott  
Dan E. Arvizu\*  
Barry C. Barish\*  
Steven C. Beering\*  
Camilla P. Benbow#  
France A. Córdova#  
Kelvin K. Droegemeier\*  
Patricia D. Galloway  
José-Marie Griffiths  
Elizabeth Hoffman\*  
G.P. “Bud” Peterson#  
Douglas D. Randall  
Arthur K. Reilly  
Diane L. Souvaine  
Jon C. Strauss\*#  
Thomas N. Taylor  
Richard F. Thompson

Cora B. Marrett, *ex officio*

Members Absent:

John T. Bruer

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<sup>1</sup> The minutes of the 415<sup>th</sup> meeting were approved by the Board at the December 2010 meeting.

\* Consultant

#Attended the Plenary Open Session at 11:30 a.m., but absent from the Plenary Open Session at 1:20 p.m.

The National Science Board (Board, NSB) convened in Open Session at 11:30 a.m. on Thursday, August 26, 2010 with Dr. Ray Bowen, Chairman, presiding (Agenda NSB-10-46, Board Book page 255). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 1: 60th Anniversary Distinguished Speaker, Dr. Luis von Ahn

In commemoration of the Board's 60<sup>th</sup> Anniversary this year, the Board was pleased to have the second of three Distinguished Speakers in the "Voices from the Future" lecture series. Dr. Bowen welcomed Dr. Patricia Galloway, chairman of the Task Force on the NSB 60<sup>th</sup> Anniversary, who introduced the guest speaker.

Dr. Galloway stated that the Distinguished Lecture Series was made possible through the efforts of the Board's Task Force on the NSB 60<sup>th</sup> Anniversary with the help of NSF's 60<sup>th</sup> Anniversary Working Group. Speaker nominations were based on the following criteria for individuals who: are early in their careers with potential for making an impact on science education, have made stunning discoveries that have influenced the direction of science, are notable as the "best minds in science," have contributed to research that benefits society, and display a passion about their research.

She stated that Dr. Luis von Ahn met all of the criteria perfectly. He is the recipient of several fellowships, and has been named as: one of the 50 Best Minds in Science by *Discover* magazine, one of the 100 Most Creative People in Business of 2010 by *Fast Company* magazine, one of the 50 most influential people in technology by Silicon.com, and one of the Top Innovators in the Arts and Sciences by *Smithsonian* magazine. (Brief Biography, Board Book page 281)

Dr. von Ahn, Assistant Professor, Computer Science Department, Carnegie Mellon University, is working on a new area of computer science called "Human Computation," which combines the computational power of humans and computers to solve large-scale problems. He invented the "squiggly" characters on the Web that are needed to be typed to purchase tickets or obtain free e-mails. These "CAPTCHAs" prevent bots from abusing online services. His new reCAPTCHA project channels this effort into transcribing books. To date, over 400 million people - 6 percent of humanity - have helped digitize at least one word through this process, making it perhaps the largest example of massive collaboration. Dr. von Ahn also developed a number of "Games with a Purpose," or "GWAPs," which collect valuable information for training computer algorithms as a side effect of play.

Dr. Galloway thanked Dr. von Ahn for his informative and engaging presentation. She announced the upcoming 60<sup>th</sup> Anniversary "Voices from the Future" Distinguished Speaker, Dr. Emily Brodsky, Associate Professor of Earth and Planetary Sciences, University of California at Santa Cruz, who will be a speaker at the December 2010 Board meeting.

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

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The Board reconvened in Open Session at 1:20 p.m. on Thursday, August 26, 2010 with Dr. Bowen presiding (Agenda NSB-10-46, Board Book page 255). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

#### AGENDA ITEM 4: Director's Award for Collaborative Integration

Dr. Bowen and Dr. Cora Marrett, Acting NSF Director, presented the Director's Award for Collaborative Integration for the "NSB-DIS SharePoint Team." This collaborative award recognized staff members in the National Science Board Office and the Division of Information Systems (DIS) of the Office of Information and Resource Management (OIRM), for their ongoing and outstanding efforts to overcome the technological challenges of modernizing electronic information access for Board Members. From OIRM: Mr. James Graham and Ms. Abigail Marchetti; and from the Board Office: Ms. Lee Anne Arslan, Mr. Bruce Levenson, Dr. Elizabeth Strickland, and Ms. Betty Wong.

#### AGENDA ITEM 5: Demonstration of Science, Engineering, and Education (SEE) Innovation Web Site

NSF staff gave an update on a new Web site for Science, Engineering, and Education Innovation – also known as SEE Innovation. The Office of Legislative and Public Affairs (OLPA) has been developing the SEE Innovation Web site in partnership with OIRM and the Office of Budget, Finance, and Award Management (BFA). The Web site has potential for communicating the importance and impact of NSF's research investments to broad public audiences. Mr. Jeffrey Nesbit, OLPA Director, began the presentation on SEE Innovation, and acknowledged the efforts of Ms. Andrea Norris, DIS Director, OIRM, and Ms. Mary Santonastasso, Director, BFA Division of Institution and Award Support (DIAS).

Mr. James Graham, DIS Computer Specialist, continued the demonstration and presentation on SEE Innovation, which offers a view of NSF-funded research and education projects by sharing details about the outcomes of NSF awards. It also provides information about the scientists and engineers, researchers, and educators, as well as their resources that make discoveries possible. Available on the Web at [www.research.gov/seeinnovation](http://www.research.gov/seeinnovation), the site provides policy makers, science-related organizations, and the public with clear, accessible information about NSF-funded investments.

#### AGENDA ITEM 6: Presentation on STAR METRICS

Dr. Myron Gutmann, Assistant Director, Directorate for Social, Behavioral, and Economic Sciences (SBE), gave a presentation on STAR METRICS, which is a new way to measure the impact of Federal science investments on employment, knowledge generation, and health outcomes. STAR METRICS is an acronym for Science and Technology for America's Reinvestment: Measuring the Effect of Research on Innovation, Competiveness, and Science. STAR METRICS is a multi-agency venture led by the National Institutes of Health (NIH), NSF, and the Office of Science and Technology Policy (OSTP).

## AGENDA ITEM 7: Approval of Open Session Minutes, May 2010

The Board unanimously APPROVED the Open Session minutes of the May 2010 Board meeting (NSB-10-32, Board Book page 257).

## AGENDA ITEM 8: Chairman's Report

In the Chairman's Introduction on Wednesday, August 25, 2010, and during the Chairman's Report of the Plenary Open Session on Thursday, August 26, 2010, Dr. Bowen announced and reported on several items.

### **a. Electronic Participation by Board Members**

Dr. Bowen introduced a resolution regarding Electronic Participation by NSB Members at Board, Committee, Subcommittee, and Task Force Meetings (and Any Other Entity Consisting of Members of the Board and Reporting to the Board) (Resolution, NSB-10-42, Board Book page 285; Memo, NSB-10-43, Board Book page 283).

The Board unanimously APPROVED the resolution that the Board position on electronic participation by Board Members in Board Meetings embodies a preference for in-person attendance. However, in rare and exceptional situations the Chairman of the Board may authorize off-site attendance, by telephone or other means, of a Member at a meeting of the Board if the Member is physically unable to attend in person due to a medical condition, a transportation emergency or an unavoidable and/or unanticipated schedule conflict. The chairman of a Board committee, subcommittee, task force or any other entity consisting of Members of the Board and reporting to the Board may authorize off-site attendance at a meeting of that committee, subcommittee, task force or entity whenever appropriate.

Participation by "other means" must also allow the Board member to actively participate in the meeting (e.g., video conferencing). Participation by telephone or other means constitutes a presence for quorum purposes. Telephone and other means participants will maintain the same confidentiality and follow the same conflicts of interest rules that applies to in-person participants.

This Resolution supersedes Resolution NSB-97-158 [of August 21, 1997].

### **b. Vote to Close Future Board Meetings or Portions of Board Meetings**

In an effort to better comply with the Sunshine Act, the Executive Committee, instead of the full Board, may be called upon to vote to close future Board meetings or portions of Board meetings. This will depend on whether action and agenda items for the next Board meeting can be finalized in time for a full Board vote. The ballot or resolution will address specific, instead of general, closure exemptions based on final agendas.

### **c. Board Meeting Calendar for 2011**

Dr. Bowen presented the proposed 2011 calendar for Board meeting dates (NSB-10-51, Board Book page 309). In developing the meeting dates, the Board Office considered a variety of constraints during the year including statutory requirements, the need for development and approval of future budgets, and the maximum availability of Board Members. The calendar includes dates for meetings during February, May, July, September, and December during 2011.

The Board unanimously APPROVED the Board meeting calendar for 2011 (NSB-10-51) (Appendix A).

### **d. Candidate Sites for 2011 Board Retreat and Off-Site Meeting**

Dr. Bowen announced that the Board will soon be considering locations for next year's off-site meeting and retreat to take place September 13-14, 2011, and asked that Board Members give their suggestions to Dr. Michael Van Woert, Executive Officer and Board Office Director. The Board will vote on the location of the 2011 retreat and off-site meeting at the December 2010 meeting. The 2010 Board retreat and off-site meeting will take place on September 23-24 in South Dakota.

### **e. Congressional Outreach**

On June 23, 2010, the Board's Vice Chairman, Dr. Esin Gulari, and Dr. Van Woert, joined Dr. Bowen for meetings on Capitol Hill. They met with the Chairman and Ranking Member of the Committee on Science and Technology, Bart Gordon and Ralph Hall respectively, who expressed broad support for NSF. They also met with Dr. John Holdren, OSTP Director, who expressed great interest in NSF's Science, Technology, Engineering, and Mathematics (STEM) education programs. He assured the Chairman that the process to appoint new Board Members was moving forward. He also identified two scientific areas of great interest: (1) data-enabled science and (2) science at the biology, physical science and engineering interface.

### **f. Pilot Program Intended to Award Grants**

The America COMPETES Act of 2007 directed NSF to develop a pilot program intended to award 1-year grants to allow new principal investigators (PIs) the opportunity to improve and resubmit their research proposals. The Board was to provide Congress with an evaluation of this pilot program in August 2010. Dr. Bowen announced that last week, on behalf of the Board, he sent a letter to Congress and detailed the following:

- As NSF laid the groundwork for this new program, it became evident that the eligibility requirements for individuals to receive a grant under the pilot were very restrictive. As a result, a limited set of investigators met the criteria.
- After consultation with congressional staff, NSF reviewed alternatives to this pilot program that would retain the spirit of the mandate – that is to increase the success rates of new PIs. Enactment of the American Recovery and Reinvestment Act (ARRA) provided an excellent mechanism for the agency to focus efforts on new PIs.
- Reports on ARRA funding, including the numbers of new investigators, were presented to the Board at every meeting since ARRA's inception.

- At the end of the second quarter in 2010, there were 2,810 new PIs and co-PIs funded through the ARRA Research and Related Activities account.
- With the additional ARRA funding, new PIs had a success rate of 25 percent in FY 2009, as compared to the previous 4 years where the success rate for this group ranged between 17 and 19 percent.
- NSF continues to review, evaluate, and broaden its reach to enhance the success of new PIs by means of such programs as Faculty Early Career Development Program (CAREER) and outreach efforts such as “NSF Days.”

#### **g. NSF Authorization Act of 2002, Section 14**

Dr. Bowen reported that the NSF Authorization Act of 2002, Section 14 requires that the Board report to Congress any delegations of authority related to the use of the Major Research Equipment and Facilities Construction (MREFC) account. He stated that he would report to Congress that there has been no delegation of authority related to MREFC during the last year. The report is due September 15, 2010.

#### **h. Committee Announcements**

The Chairman noted that information on new committee chairmen and committee members was reflected on the NSB Web site and in the Board Book (Board Book page 301, [NSB-10-49](#)). The new chairmen for standing committees are as follows:

- Committee on Audit and Oversight: Mr. Arthur Reilly
- Committee on Education and Human Resources: Dr. Camilla Benbow
- Committee on Science and Engineering Indicators: Dr. José-Marie Griffiths
- Committee on Programs and Plans: Dr. Mark Abbott
- Committee on Strategy and Budget: Dr. Diane Souvaine

Additionally, Dr. Bowen appointed the *ad hoc* Committee on Nominating for NSB Elections (also known as the Elections Committee) to form a slate of candidates for a vacancy on the Executive Committee. The election for this position will be held at the September 2010 meeting. Dr. Esin Gulari is chairman, and Drs. Bud Peterson and Douglas Randall are members.

Lastly, Dr. Bowen established the *ad hoc* Committee on Honorary Awards including Dr. France Córdoba, chairman, and Drs. Bud Peterson and Richard Thompson, members.

#### **i. NSB Office Staff Introductions**

Dr. Bowen welcomed the following new Board Office staff:

Dr. Michael Van Woert was appointed as the Executive Officer and Director of the National Science Board Office in May 2010. He previously served as the Executive Officer for NSF’s Office of Polar Programs (OPP) and managed the Office of Polar Environment, Health, and Safety. Additionally, Dr. Van Woert held management positions at the National Oceanic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). He received his Ph.D. from Scripps Institution of Oceanography at the University of California, San Diego.

Mr. Daniel Lauretano was appointed Legal Counsel to the National Science Board in May 2010, and serves as legal advisor and advocate for the Board and Board Office. Prior to his appointment, Mr. Lauretano served as a Lieutenant Colonel in the U.S. Army Judge Advocate General's Corps and other assignments for the Department of the Army and the Department of Defense. He received his J.D. from the University of Houston Law Center, and holds two LL.M. degrees – one in military law and the other in international and comparative law.

Dr. Matthew Wilson will be staying with the Board Office – having finished his American Association for the Advancement of Science (AAAS) fellowship – as of late August 2010. He was instrumental in guiding the STEM Innovators report from start to finish. Dr. Wilson will continue with outreach efforts for the report and the Committee on Education and Human Resources (CEH), and will also have new responsibilities with the Committee on Science and Engineering (SEI). He holds Ph.D. in Biochemistry and Molecular Genetics from the University of Pittsburgh School of Medicine.

Mr. Mike Town will join the Board Office staff in early September 2010. He is an Albert Einstein Distinguished Educator Fellow. Mr. Town teaches a variety of science courses at Redmond High School in Washington State. He received the National Education Association (NEA) Foundation's 2010 Green Prize in Public Education, the 2009 North American Environmental Teacher of the Year Award, and the 2009 Public Broadcasting Service (PBS) Golden Apple Award. He holds a Masters degree in Science Education from the University of Washington. During his time with the Board Office, he will be working on STEM education outreach.

#### **j. Updated Technology in Board Room**

After the May 2010 meeting, updated technology was installed in the Board Room. The Board Room table is now equipped with 12 screens for easy viewing of presentations. Large overhead screens for viewing by the Board, NSF staff, and the public were also added as well as a new microphone system.

#### AGENDA ITEM 9: Director's Report

Dr. Cora Marrett, Acting NSF Director, reported on the following items:

##### **a. NSF Staff Introductions**

Dr. James Lightbourne began serving as Division Director, Graduate Education (DGE), Directorate for Education and Human Resources (EHR), on June 6, 2010. He previously served as Senior Advisor in the Office of Integrative Activities (OIA), the Office of the Director (OD), and EHR. Dr. Lightbourne received his Ph.D. in Mathematics from North Carolina State University in 1976.

Dr. Howard Wactlar joined NSF as Division Director, Information and Intelligent Systems (IIS), Directorate for Computer and Information Science and Engineering (CISE), on June 7, 2010. Dr. Wactlar came to NSF from Carnegie Mellon University where he is Vice Provost for Research Computing, Alumni Research Professor of Computer Science, Scientific Director, Quality of Life Engineering Research Center, and Director, Informedia Digital Video Library Project.

Dr. Michael Morgan became Division Director, Atmospheric and Geospace Sciences (AGS), Directorate for Geosciences (GEO), on June 21, 2010. Dr. Morgan came to NSF from the University of Wisconsin – Madison where he is a Professor in the Department of Atmospheric and Oceanic Sciences, and served as a Senior Legislative Fellow in the Office of Senator Benjamin Cardin. He received his Ph.D. in Meteorology from the Massachusetts Institute of Technology in 1994.

Dr. David Conover joined NSF as Division Director, Division of Ocean Sciences (OCE), GEO, on July 19, 2010. Dr. Conover came to NSF from Stony Brook University where he is Dean and Professor, School of Marine and Atmospheric Sciences. He received his Ph.D. in Fisheries Biology from the University of Massachusetts at Amherst in 1982.

### **b. Human Frontier Science Program**

NSF anticipates making an award to the Human Frontier Science Program (HFSP) at the request of OSTP. HFSP is a multinational, nonprofit organization that promotes interdisciplinary research and cooperation on the complex mechanisms of living systems through peer-reviewed fellowships and research grants. It is supported by annual funding from 13 countries and the European Union. U.S. support is provided by the NIH and NSF. It is expected that NSF will contribute \$2.3 million and NIH will provide \$7.6 million. This is an increase of 1 percent over the 2009 contribution and will bring the U.S. contribution to \$9.9 million. This is compared to almost \$30 million provided annually by Japan and the total HFSP budget of \$61 million. U.S. continues to be the primary beneficiary of the program with the U.S. receiving a disproportionate amount of both Fellows and grantees coming to the U.S. HFSP has been in existence for 20 years, and during that time Japan has been the major contributor. Dr. Marrett thanked Dr. Joann Roskoski, Acting Assistant Director, Directorate for Biological Sciences (BIO), for agreeing to serve as the NSF representative for the HFSP.

### **c. NSF Congressional Update**

Since the May 2010 NSB meeting, NSF saw action on both the reauthorization of the America COMPETES Act, as well as some movement on the FY 2011 appropriations.

On May 28, 2010, the House passed H.R. 5116, the America COMPETES Reauthorization Act of 2010 by a recorded vote of 262-150. The Senate Committee on Commerce, Science, and Transportation held a full committee mark up on July 22, 2010 on S. 3605. There is a difference in the versions of these bills in that the Senate version is for a 3-year authorization, and the House version is for 5-year authorization. The House bill was passed by voice vote. Senate floor action had not yet been scheduled.

On May 29, 2010, the House Appropriations Committee's Subcommittee on Commerce, Justice, Science, and Related Agencies (CJS) held a Subcommittee mark-up of its FY 2011 CJS appropriation bill. The bill passed the Subcommittee by voice vote. NSF received its full requested amount, an 8 percent increase over the FY 2010 enacted level. There was no word yet as to whether or not there will be a full committee mark-up. The Senate Appropriations Subcommittee on Commerce, Justice, Science, and Related Agencies held a Subcommittee mark up on July 21, 2010. The bill was passed by voice vote and subsequently brought up by the full committee the next day, where it was also passed by voice vote. NSF received a slightly lower

appropriation, but still an increase over the enacted level for FY 2010. Senate floor action was uncertain.

On June 10, 2010, Dr. Thomas Peterson, Assistant Director for Engineering (ENG), testified before the House Science and Technology Committee's Subcommittee on Research and Science Education at a hearing entitled, "From the Lab Bench to the Marketplace: Improving Technology Transfer." The purpose of the hearing was to review the process of transferring knowledge and technology from academic researchers to the private sector and discuss ways to improve technology transfer.

#### AGENDA ITEM 10: Open Committee Reports

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

Mr. Arthur Reilly, A&O chairman, reported that A&O heard several presentations.

Dr. Marrett provided an update on human resource activities at the NSF, including information about the Labor-Management Partnership activities, and the Office of Personnel Management (OPM) recent evaluation of NSF's human resource activities. NSB will be provided copies of the OPM report and, when available, the NSF's draft response.

Ms. Martha Rubenstein, Chief Financial Officer (CFO), briefed the committee on a number of activities, including the follow-up to the FY 2009 Financial Statement Audit, the current 2010 audit, audit and control actions, progress on modernization of the NSF's financial system, NSF's successful oversight of activities related to ARRA awards, and the considerable progress that has been made to enhance the collaboration between Office of Inspector General (OIG) and NSF staff in the audit resolution arena.

Ms. Allison Lerner, Inspector General (IG), briefed the committee about OIG's recent activities. She began by introducing the new Assistant IG for Audit, Dr. Brett Baker, and thanking Mr. James Noeth, Deputy Associate IG for Audits, who assisted in this position prior to Dr. Baker's arrival. She also discussed the joint working group, comprising of OIG and BFA, which is developing an improved method for resolving audit findings, recommendations and building better communications between the two organizations in the process. Ms. Lerner then spoke about some recent meetings with congressional staff so that their interests and concerns could be taken into account when planning future audit work. She concluded by reporting the outcomes of two investigations: one related to a Small Business Innovative Research Award that resulted in \$934,000 repaid to the Federal Government; and the other for a joint investigation involving NSF and two smaller agencies that returned \$1.17 million to NSF.

Ms. Mignon Anthony, the Project Officer in charge of the effort to identify and design NSF's future headquarters, gave an update on NSF's plans for headquarters space when the lease expires in 2013. She noted that the prospectus request for NSF's future space is under review with the Office of Management and Budget (OMB). NSF's future space requirements address the administration's important mandates and goals towards efficient and more environmentally responsive Federal occupancies.

The last agenda item was the subject of NSB policy on what the threshold amounts should be for awards that require Board approval. At the meeting of the Committee on Programs and Plans (CPP), Dr. Abbott reported that there was a discussion about how the Board could move forward to update its thresholds and other program oversights in a manner that affords the Board the opportunity to provide NSF with effective oversight and still assure a reasonable workload for all involved. Discussions among the Board members with regard to this issue will take place during the fall, and A&O anticipated a vote at the December 2010 meeting on any changes that take place to the dollar threshold amount.

#### **b. Committee on Education and Human Resources (CEH)**

Dr. Elizabeth Hoffman reported on behalf of the CEH chairman, Dr. Camilla Benbow. She stated that the committee expressed thanks and appreciation to Dr. John Bruer for his service as CEH chairman.

The committee addressed the report, *Preparing the Next Generation of STEM Innovators: Identifying and Developing Our Nation's Human Capital* (NSB-10-33), and the planned rollout scheduled for September 15, 2010 at the National Press Club in Washington, D.C. Drs. Bowen, Marrett, and Benbow, as well as Dr. Joan Ferrini-Mundy, Acting EHR Assistant Director, would attend the event.

She reported that several committee members offered suggestions to enhance the accessibility of the report, which included: issuing a separate executive summary publication, developing a companion PowerPoint presentation, and circulating the report and associated materials electronically for Board Members. A draft dissemination and advancement strategy was outlined. It was noted that the President's Council of Advisors for Science and Technology (PCAST) would soon release an education-focused report as well. Several recommendations regarding disseminating and advancing the report's messages were offered by members including exploring ways to coordinate with PCAST and engaging interagency groups that focus on STEM education. Additionally, it was noted that the draft dissemination strategy offers a best practice model that the Board might consider adopting for other future activities.

For the topic of education research, Dr. Benbow highlighted the House's call in the draft America COMPETES Act for key agencies, including NSF, to identify and address grand challenges in education research.

Dr. Bruer informed the committee about the exploratory work that he and Dr. Kathryn Sullivan have undertaken to determine the feasibility of NSB organizing a decadal study on education research similar to the Astronomy Decadal Survey recently published. Both Drs. Sullivan and Bruer had garnered over 10 years of data from NSF and other organizations. The conclusion reached by Dr. Bruer was that the magnitude of the activity exceeds NSF's resources, and that CEH and NSF would be better served by giving attention to key, focused NSF education matters.

Dr. Ferrini-Mundy provided an overview of NSF's role in the current and future education research landscape. She described how NSF has been engaged in this issue since its inception. She noted that educational research investments have had impact. Dr. Ferrini-Mundy also underscored that NSF plays a vital role in shaping the education research landscape, and she observed that such investments are not unique to EHR but are made NSF-wide. The committee

and NSF officials exchanged information and perspectives about the following: the level of funding for research education; the fact that education research is conducted in programs sponsored outside of EHR, for example, the Science and Technology Centers Program; the degree of and need to promote interconnectivity between education researchers and researchers in other disciplines or education practitioners; and the importance of balancing resources aimed at meeting short-term priorities versus support of long-term goals. CEH looks forward to future exchanges with NSF staff on this topic.

At the conclusion of the meeting, the committee was made aware of the National Academies' Board on Science of Education's recently released draft framework for science education standards.

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

Dr. José-Marie Griffiths, SEI chairman, reported that the committee reviewed the process for producing *Science and Engineering Indicators* 2012, including the key dates for Board involvement. The committee then discussed plans for the different *Indicators* chapters. The committee was pleased to see that new and better data were becoming available on a variety of topics that were identified in past years. Revisions in light of Board comments will be circulated to the committee in a few weeks for review so that chapter outlines could be approved at the December 2010 meeting. SEI decided to continue the focus on Experimental Program to Stimulate Competitive Research (EPSCoR) states that appeared in the 2010 *Indicators* State Chapter, and to defer decisions about the treatment of public knowledge of evolution until the completion of the SBE study in February 2011.

SEI agreed on a title for the Indicators Education Tool, "STEM Education Data and Trends." The Education Tool is designed to acquaint precollege students, parents, guidance counselors, and educators with data bearing on STEM education and workforce opportunities. The committee suggested several organizations that should be notified of the publication of this Web-based tool.

Lastly, the committee approved plans for the print and electronic publications related to *Indicators*, which will be published during this cycle. The plans stressed movement toward Web-based materials and noted the role of the Digest as something that could be handed out and used as an introduction to some of the important findings in *Indicators* found in the larger, much less portable, print volume or on the Web. The printed *Indicators*, along with the Board's Companion Piece policy document, will be mailed at the time of publication, with CDs available about 3 weeks later.

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

Dr. Mark Abbott, CPP chairman, opened his report with thanks to Ms. Sonya Mallinoff and Ms. Lisa Lewis, CPP Executive Secretaries, and Dr. Elizabeth Strickland, Board Office CPP Liaison, for all their efforts.

Dr. Abbott reported that the committee discussed the MREFC process and annual timeline for integration of the Board MREFC process with the NSF budget process ([NSB/CPP-10-11](#), Board book page 31). As there were no new projects to be considered, the current Board-approved priority order of MREFC projects stands. Dr. Abbott asked the committee to consider small

modifications to the Annual Timeline document to clarify the role of the CPP and the new Subcommittee on Facilities (SCF). The committee approved the revised documents. Based on the recommendations of CPP:

The Board unanimously APPROVED the National Science Board MREFC Process. ([NSB-10-65](#)) (Appendix B)

The Board unanimously APPROVED the Annual Timeline for Integration of Board MREFC Process with NSF Budget Process. ([NSB-66-10](#)) (Appendix C)

Dr. Abbott also reported that CPP experimented with a new process to better manage the committee workload. Before the August 2010 meeting, CPP worked with NSF on the numerous information items and divided them into oral and written presentations. The following information items were presented only in a written format:

NSF Director's Determination of Satisfactory Progress in the Management of the National Radio Astronomy Observatory (NRAO) by Associated Universities, Inc. ([NSB/CPP-10-50](#), Board Book page 37)

High Performance Computing Update: National Institute for Computational Sciences, University of Tennessee, Knoxville ([NSB/CPP-10-53](#), Board Book page 51)

Update on Implementation of NSF's Revised Cost Sharing Policy in Response to the 2nd NSB Cost Sharing Report ([NSB/CPP-10-54](#), Board Book page 53)

The committee addressed each individual written item, and asked the lead reviewer for each item for any comments or thoughts. Dr. Abbott believed the new process worked well. Depending on feedback, the committee will proceed to implement this process on a regular basis.

CPP asked about the status of the DataNet Awards, which had fallen off the critical date list for Board review. Dr. Marrett informed the Board that NSF is still in the process of learning from the first two awards to Johns Hopkins University and the University of New Mexico ([NSB/CPP-10-51](#), Board Book page 49), and that those best practices needed to be incorporated into any future awards. NSF will continue to report back to the committee on that process.

#### Discussion Item: Review of NSB Policy on Threshold for Awards Requiring NSB Approval

The committee continued an ongoing discussion on the NSB Policy on the threshold for awards requiring Board approval. CPP proposed to break this discussion and process into two parts: (1) determining a threshold for individual awards requiring Board action, and (2) determining the appropriate level of involvement with NSF on programmatic and planning activities, likely to require extensive discussion. Background information and a white paper were provided to Board Members ([NSB/CPP-10-57](#), Board Book page 67; [NSB/CPP-10-58](#), Board Book page 55; [NSB/CPP-10-59](#), Board Book page 69).

Dr. Kelvin Droegemeier, continuing earlier efforts as CPP chairman, provided a high-level walk-through of the documents. It was emphasized that this is not about a CPP workload, but a focus

on how the Board can be most helpful to NSF and provide the best guidance. As CPP goes forward, working closely with NSF, the committee needs to consider what it wants to achieve, and how the threshold policy can help in this regard. The committee and NSF discussed and agreed to continue the conversation on this topic with the goal of finalizing action on thresholds by the December 2010 meeting, and on the programmatic and planning activities by the May 2011 meeting. NSF will continue discussions internally with staff. Dr. Marrett suggested that NSF present options, impacts, and recommendations for further discussion during a teleconference meeting in October 2010 and at the December 2010 meeting.

#### NSB Discussion and Information Items: NSB Recompetition Policy Implementation

The committee discussed the Board's recompetition policy and issues that have arisen in implementation of that policy within NSF (NSB-08-12, Board Book page 75; NSB-08-16, Board Book page 77). Dr. Thomas Peterson began the discussion, and was followed by Dr. Edward Seidel, Assistant Director, Directorate for Mathematical and Physical Sciences (MPS), who provided two information items as examples of issues and challenges in implementing the policy.

- NSB Information Item: Support of the Operations of the National Superconducting Cyclotron Laboratory (NSCL)

Dr. Seidel provided an update on the plan for the terminal award to Michigan State University for Support of the Operations of NSCL (NSB-/CPP-10-49, Board Book page 81). He noted that this is a candidate for recompetition, as the center is planned to ramp-down, and the Department of Energy (DOE) will become the steward of a new facility on the site. NSF determined that U.S. science is not well served by recompeting under these circumstances.

- NSB Information Item: Plan to Recompete the Management of the National High Magnetic Field Laboratory (NHMFL)

The next potential award for recompetition is the management of NHMFL, also known as the Mag Lab (NSB/CPP-10-48, Board Book page 85). In this case, the facility is a complex set of user facilities that is distributed over a number of institutions. NSF's assessment was that there is value in recompetition, but there are complications and risks. A National Research Council (NRC) study is needed to advise NSF on future of high magnetic field science in next decade. Careful consideration must be given to recompetition actions that consider facility lifetime, value, ownership of facilities, partnerships, and timing. The committee noted the thoughtful analysis and the emphasis on ensuring that scientific progress would not be significantly disrupted by a recompetition.

The Board further discussed this issue and concluded that NSF made the right recommendations in these two cases. The committee agreed to proceed with plans as outlined. Dr. Abbott asked NSF to provide a list of all multi-user facilities and an implementation plan in December 2010, so that CPP could see the larger picture with respect to recompetition.

#### NSB Discussion Item: Strategic Planning for Cyberinfrastructure

Dr. Alan Blatecky, Acting Director, Office of Cyberinfrastructure (OCI), provided an update on CF21, the Cyberinfrastructure Framework for 21st Century Science and Engineering. The committee noted that CF21 is a program, and that the committee was interested in seeing a complete strategic plan for cyberinfrastructure, which would then allow priority setting. Dr.

Marrett understood and acknowledged that work is still in progress by NSF, but wanted to provide information on CF21 as a start and would be back with a full plan.

NSB Information Item: LIGO - Possible Additional AdvLIGO Site

Dr. Seidel gave an update on the status of the Advanced Laser Interferometer and Gravitational-Wave Observatory (AdvLIGO). The Gravitational-Wave International Committee determined that an Indian Ocean site is ideal for an additional detector, and LIGO proposed a new idea to locate one of the two Hanford, Washington detectors in Western Australia. NSF was initially skeptical of this idea, but worked through the proposal with the LIGO-Australia team, and determined that the opportunities presented by this proposal would greatly outweigh any possible risks. Dr. Seidel informed the Board that the Australian group sent NSF a Letter of Intent that NSF plans to approve.

NSB Information Item: Gemini Extension of Cooperative Agreement

Dr. James Ulvestad, Director, Division of Astronomical Sciences (AST), MPS, gave an update on the status of the Cooperative Agreement for the Gemini telescope. The Association of Universities for Research in Astronomy (AURA), the managing entity, will submit a proposal for a renewal of the current cooperative agreement by January 31, 2011, extending through 2015. MPS expects to bring an action item for the award extension before the board at the August 2011 meeting.

NSB Information Item: Renewal of Science of Learning Centers (SLCs)

Dr. Myron Gutmann, SBE Assistant Director, presented an information item on the renewal of the six SLCs in two cohorts. The second cohort is undergoing review for renewal. Last year, two of the centers from the first cohort were extended for a shortened period of 18 months, pending a critical review at that time. Based on the outcome of these reviews, SBE expects to bring up to five actions before the Board at future meetings: two possible actions in December 2010 and; and possibly three actions for renewal in February 2011.

NSB Information Item: Arctic Logistics Contract

Mr. Patrick Haggerty, Research Support and Logistics Manager, Office of Polar Programs (OPP), provided an update on the contract for Logistics Support to Arctic Research. This contract is currently with CH2M HILL, but is up for renewal after May 2012. OPP determined that a contract similar to the current contract is ideal, and they expect to come before the Board at the December 2010 meeting for approval of the issuance of a request for proposal (RFP) and competitive procurement process for obtaining a contract.

CPP Subcommittee on Polar Issues (SOPI)

Dr. Abbott reported on the subcommittee led by Dr. Thomas Taylor, SOPI chairman. Dr. Karl Erb, OPP Director, informed the subcommittee that the White House issued a Presidential Memorandum integrating the Interagency Arctic Research Policy Committee (IARPC) into the National Science and Technology Council (NSTC). This will increase the effectiveness of IARPC, which will continue to be chaired by the NSF Director.

Dr. Erb also reported that NSF and the U.S. Coast Guard (USCG) have signed a Memorandum of Agreement that governs NSF use of and reimbursement to USCG for icebreaking services, if the USCG again includes funds for this activity in its budget request. NSF signed an agreement with France's Minister of Science and Education that provides U.S. scientists access to French-held facilities and vice versa for collaborative research. A joint workshop will be held in France next spring.

Additionally, Dr. Erb provided an update on the U.S. Antarctic Program (USAP) review (NSB/CPP/SOPI-10-6, Board Book page 91). The 2010-2011 review will consist of two phases: an NRC panel will identify the science drivers, looking ahead 20 years; and a subsequent external Blue Ribbon Panel will identify options for any required logistics and infrastructure. Board Members expressed concerns regarding the long timeline, but Dr. Erb noted that the NRC study must be completed before the Blue Ribbon Panel begins, and the members need to visit to Antarctica ice to inform their recommendations, which would not be possible until November 2011.

In response to a request from Board Members, Dr. Alexandra Isern, OPP Program Director, provided an update on polar research vessel support. She summarized the importance of polar science and vessel capabilities, and described the current status of the polar research vessel fleet. Dr. Isern summarized the Polar Research Vessel study from 2002 to 2006, which developed a "science requirements list" and plans for meeting long-term needs for a research icebreaker. Subsequent Board discussion focused on how NSB might assist meeting long-term needs, when and where dual use ships might be appropriate, and whether NSF had explored the possibility of partnering with mission-oriented agencies to meet its needs. Board Members also expressed concern that research vessel access must be booked at least 3 years in advance, which sometimes caused difficulty in scheduling science and matching it with the infrastructure needs met by for ships. Dr. Erb stated that partnerships with other countries were an option, but could be expensive.

Dr. Kate Moran, OSTP Senior Policy Analyst, noted that OSTP was aware of this dilemma, and that NSTC will be coordinating efforts in the Arctic. Dr. Marrett noted that NSF is strongly supportive of the NSTC involvement as it will address larger inter-governmental questions.

On behalf of Dr. Thomas Taylor, Dr. Abbott thanked Dr. Joan Frye, SOPI Executive Secretary, for all her efforts.

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

[Previously known as the Task Force on Mid-Scale and Multi-Investigator Research]

Dr. Abbott thanked both Drs. Kelvin Droegemeier and Diane Souvaine for their leadership for this task force. Dr. Droegemeier originally served as MS chairman and had been the driving force behind this project. When Dr. Droegemeier's term on the Board ended in May 2010, Dr. Souvaine became the chairman of this task force.

Dr. Abbott reported that CPP reviewed and discussed the MS charge. The goal of the task force is to address whether mid-scale, unsolicited research is effectively supported by NSF. The task force defines mid-scale research projects as those with an average annual budget ranging from

between an amount that is substantially higher than that which is typical for a single-PI research project and \$10 million per year. The task force noted that it is important that NSF accommodate potentially transformative projects that do not necessarily fit with the administrative structure or the science structure of the existing mid-scale programs. The task force decided to remove “multi-investigator,” originally in the task force title, because the salient issue is whether a project is “mid-scale,” regardless of the number of investigators.

The task force’s draft charge was developed after preliminary fact gathering meetings with NSF staff and discussions during an MS teleconference on August 12, 2010. The charge includes the background for the project, main policy objectives, logistics, and a final product. The charge also includes a timeline, which outlines data gathering, a workshop, and a final report next year. Based on the recommendation of the committee:

The Board unanimously APPROVED the charge and workplan of the Task Force on Unsolicited Mid-Scale Research. (NSB-10-59) (Appendix D)

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

Dr. Diane Souvaine, CSB chairman, reported that Dr. Clifford Gabriel, Acting MPS Executive Officer and Chairman of NSF’s Strategic Plan Working Group, provided an update on NSF’s progress on revising NSF’s current Strategic Plan. Dr. Gabriel noted that the document is currently under review at OMB.

On July 26, 2010, NSF met with OMB and OSTP staff to discuss the plan. The document was well received; however, it was noted that the linkages to Administration science and technology policies should be sharpened and potential improvements of the Merit Review process should be better captured. Although OMB and OSTP were not prepared at that time to provide edits, both provided general comments on the document. Formal comments from OMB and OSTP were subsequently received by NSF on August 18, 2010, which included a request to identify targets and measures for NSF activities. These comments, as well as the others mentioned during the meeting, are being addressed and incorporated into the Strategic Plan by NSF.

Although OMB provided NSF’s draft plan to other agencies for review, there does not seem to be a significant effort being made to ensure alignment and linkages between agency plans at this time. Members noted that it may be a worthwhile endeavor for NSF to consider working with other agencies, such as DOE, to create these linkages and alignment. Although the draft Strategic Plan has been, and will continue to be, used for the FY 2012 Budget cycle. The document is not expected to be finalized until February 2011.

Dr. Souvaine reported that Dr. Van Woert provided an update on the NSB budget. He gave a brief breakdown of the current \$4.5 million NSB budget, highlighting the different expense categories, of which staff salary was identified as the largest category at 65 percent. He noted that there is flexibility in the budget to carry out Board activities, with the present amount of approximately \$1 million. One of the large projects currently underway is the digitization of Board records, which should facilitate Board Office staff and Board Member access to archival data. Dr. Van Woert stated that he will be evaluating staffing levels and space requirements and utilization within the framework of an overall staffing and space plan for the Board Office. He confirmed that cost savings within the different expense categories could be shifted as needed to cover Board projects.

### CSB Subcommittee on Facilities (SCF)

Dr. Souvaine reported that SCF, led by Dr. José-Marie Griffiths, SCF chairman, discussed the outcome of the June 29, 2010 meeting with the Acting NSF Director and NSF Assistant Directors and the *NSF Draft Principles for Managing the Large Facility Investment*. SCF also identified next steps in the SCF portfolio review. The meeting on June 29 established the basis for ongoing collaboration and spurred the initial development of principles for research infrastructure funding and management. SCF identified key areas for additional consideration and will work with CPP and NSF to develop revised principles. The revised principles will be tested using MREFC projects that come before the NSB for approval this year. The subcommittee will also broaden its focus to encompass additional aspects of the research infrastructure portfolio. SCF plans to hold a teleconference in late October or November 2010 to further discuss the principles, with a goal of having a document ready for approval at the December 2010 meeting.

### CSB Task Force on Data Policies (DP)

Dr. Souvaine reported on the task force, also led by Dr. José-Marie Griffiths, DP chairman. Dr. Siedel provided an update on NSF data policy and implementation changes planned for January 2011. The charge and workplan developed from the May 2010 meeting were reviewed, discussed, and approved by the task force (NSB/CSB/DP-10-1, Board Book page 127), and CSB and recommended to the full Board for approval.

The Board unanimously APPROVED the charge and workplan of the Task Force on Data Policies. (NSB-10-60) (Appendix E)

The task force revised a draft set of principles that will inform future activities, and discussed the goals for a stakeholder workshop planned for early 2011.

### **f. Task Force on Merit Review (MR)**

Dr. Douglas Randall reported for Dr. John Bruer, the newly appointed MR chairman. He stated that Dr. Bruer led a discussion on the goals of the task force, and provided an historical perspective on some of the larger issues surrounding the two merit review criteria. The task force then engaged in a full-ranging discussion about the various approaches being used to gather data on the use and utility of the two merit review criteria, which included the following: the analysis of the information in the Committee of Visitors (COV) reports is ongoing; a refined the set of issues on which to elicit input, discussing the importance of understanding both short- and long-term impacts that the review criteria have had on the way the scientific community approaches its research questions; the status of the Directorate for Computer and Information Science and Engineering (CISE)/SBE Research Portfolio Analysis project to exploit automated text-mining tools to help NSF look at its portfolio of proposals and awards; and the feasibility of setting up a blog for eliciting informal input broadly from the stakeholder communities on the issues MR is addressing.

Assuming all of the logistics fall into place, including OMB approval of the various instruments to gather input, implementation should take place throughout the fall and early winter of this year. The merit review criteria are of great interest to individual researchers, institutions, professional societies, and Congress. The work of the task force, plus input from NSF staff and the Board,

could have considerable impact in guiding discussion and policy concerning education, diversity in the scientific workforce, and the relation of science to society.

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Dr. Bowen closed with meeting with thanks to the Board Consultants for continuing to serve on the Board and providing valuable input. He also thanked Drs. Cora Marrett and Thomas Peterson, who, in their first Board meeting in their new roles, did a wonderful job. He also mentioned that all of the NSF staff continues to provide the Board with great information, and the Board appreciates all their efforts. Lastly, he acknowledged Dr. Van Woert, at the first Board meeting in his new role, and the Board Office staff for everything they do to make the meeting Board meeting go smoothly. Dr. Bowen adjourned the Open Session at 3:00 p.m.

*[signed]*

Ann A. Ferrante  
Executive Secretary  
National Science Board

Attachments:

- Appendix A: Calendar of Meetings for 2011 ([NSB-10-51](#))
- Appendix B: National Science Board MREFC Process ([NSB-10-65](#))
- Appendix C: Annual Timeline for Integration of Board MREFC Process with NSF Budget Process ([NSB-10-66](#))
- Appendix D: Charge and Workplan for the Task Force on Unsolicited Mid-Scale Research (MS) ([NSB-10-59](#))
- Appendix E: Charge and Workplan for the Task Force on Data Policies (DP) ([NSB-10-60](#))

**NATIONAL SCIENCE BOARD**  
**CALENDAR OF MEETINGS**  
**2011**

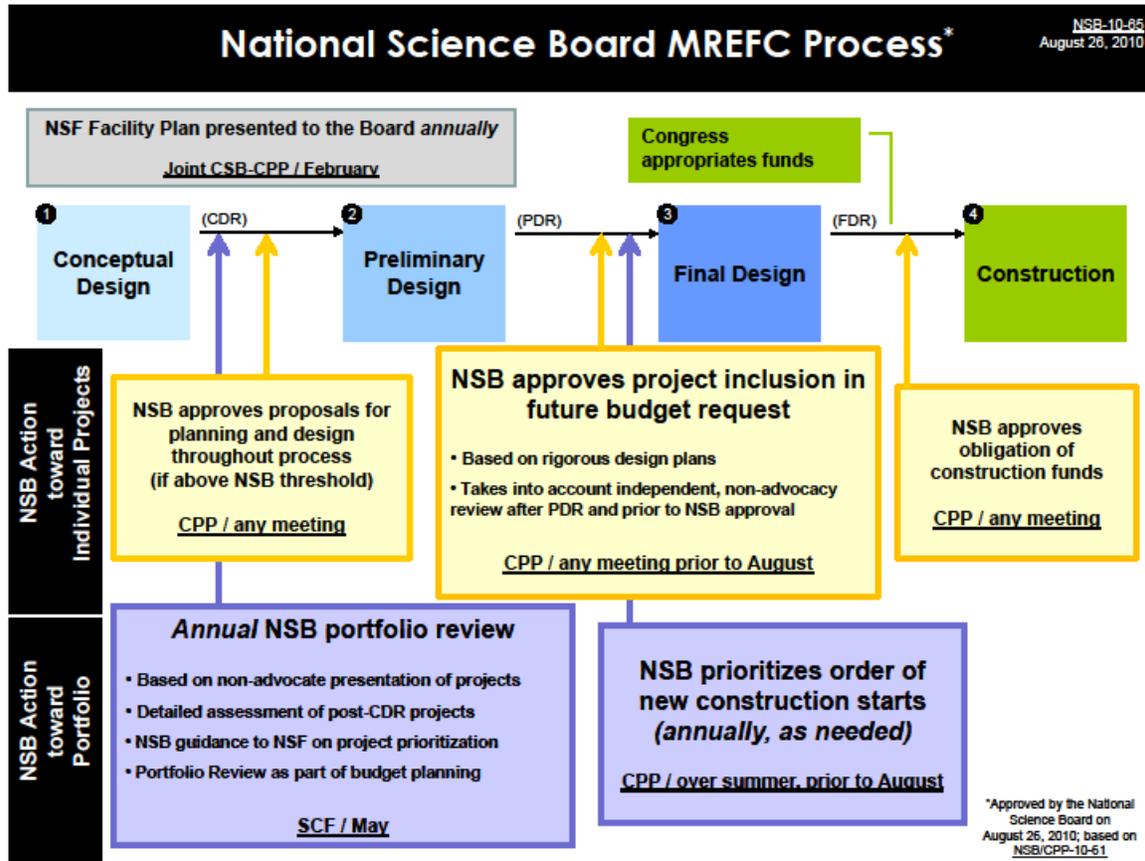
February 15 - 16  
(Tuesday - Wednesday)

May 10 - 11  
(Tuesday – Wednesday)  
[Annual Meeting and Awards Dinner]

July 28 - 29  
(Thursday - Friday)

September 13 - 14  
(Tuesday - Wednesday)  
[Annual Retreat and Visit]

December 13 - 14  
(Tuesday - Wednesday)



**Annual Timeline for Integration of Board MREFC Process with NSF Budget Process<sup>2</sup>**

January	CSB teleconference	Update on any late changes to budget, particularly related to MREFC account projects
February	Board meeting	Annual NSF facilities plan is presented to joint session of CSB/CPP committees by NSF Deputy Director to provide input into upcoming facility portfolio reviews (SCF/CSB) and individual project actions (CPP). The plan will incorporate budget guidance reflective of both Administration and Board priorities for MREFC projects. (The February Board meeting is typically scheduled following the release of the President's budget the first Monday in February.)
March/April	SCF/CSB teleconferences as necessary	Preparation for May portfolio review of NSF large facilities
<i>April</i>	<i>NSF budget retreat</i>	<i>NSF senior management discuss critical funding needs</i>
May	Board meeting	1) <i>OMB budget guidance issued</i> 2) Annual budget planning meeting of the Board 3) Facilities portfolio review by SCF/CSB
June	Joint CSB/CPP teleconference	Discuss budget, including guidance from SCF to CSB and CPP following the portfolio review of MREFC and other facilities projects
June/July	CPP teleconference	CPP final review and examination of priority order for Board-approved MREFC projects. Develop recommendations for full Board approval on priority of MREFC projects.
July	CSB teleconference	Discuss budget, including MREFC projects, based on input from SCF and CPP
August	Board meeting	Final Board review and approval of NSF budget, including examination of priority order of Board-approved MREFC projects to be included within the budget request [considering recommendations received from CSB/CPP following summer telecons]
<i>September</i>	<i>OMB budget submission deadline</i>	<i>NSF budget sent to OMB</i>
December	Board meeting	Board discussion of modifications to budget, as needed, based on OMB feedback

<sup>2</sup> Approved by the National Science Board on August 26, 2010; based on NSB/CPP-10-60

## **Charge to the Task Force on Unsolicited Mid-Scale Research**

### Statutory Basis

“The Board shall render to the President and the Congress reports on specific, individual policy matters related to science and engineering and education in science and engineering, as the Board, the President, or the Congress determines the need for such reports.”<sup>3</sup>

### Action Recommended

The National Science Board (Board) Task Force on Unsolicited Mid-Scale<sup>4</sup> Research (MS) will be created under the Committee on Programs and Plans (CPP). The Task Force is charged with examining and making recommendations regarding National Science Foundation (NSF) support of unsolicited MS research. This type of research often requires funding that is not obtainable via proposals submitted in response to specific solicitations or that potentially reside within the scope of specific programs.

### Background

NSF utilizes a variety of mechanisms to fund research projects across a wide spectrum of topics and size (e.g., standard and continuing grants, cooperative agreements, centers, programs linking industry and academia, and Major Research Equipment and Facilities Construction (MREFC) projects). The agency’s supported projects range from single investigator grants to multi-institutional (and sometimes multi-national), long-term projects.

NSF funds projects in response to unsolicited and solicited proposals. Unsolicited proposals are submitted to core programs in their specific research areas. Solicited proposals are submitted in response to specific requests from the agency to fund specific topics of inquiry and types of projects.

Many directorates have programs that actively solicit and support mid-scale research projects. These programs often set structural and/or topical requirements for proposed projects. Currently, the question exists as to whether there are any gaps in both the opportunity to submit proposals in support of, and the availability of funding to support, unsolicited mid-scale projects that do not fall under the purview of a particular program. There may be a need to ensure that proposers in the research community have the ability to submit a proposal without procedural constraints in structural framework, topic of inquiry, and research methodology.

The definition of a ‘mid-scale’ budget varies among NSF directorates due to differences in each directorate’s average award size. For the purposes of this Task Force, mid-scale research projects are defined broadly as those with an average annual budget ranging from between an amount that is substantially higher than that which is typical for a single-PI research project and \$10M per year.

### Policy Objectives

The following issues will be analyzed by the Task Force:

- Examine the effectiveness of previous and current mechanisms at NSF for accommodating unsolicited mid-scale research.

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<sup>1</sup> Title 42 U.S. Code Section 1863(j)(2)

<sup>2</sup> Here, mid-scale refers to the financial size of the project.

- Examine the balance of prescription and flexibility in current structures for supporting mid-scale research.
- Evaluate the appropriateness of reporting requirements for current mid-scale research activities and the extent to which uniformity now exists, or should exist, in the information being provided.
- Determine whether requirements for education, outreach, broadening participation, and other related activities are appropriately integrated into current mid-scale research activities.

The Task Force will seek to compile data and information on past and current practices at NSF in supporting mid-scale research, and perspectives from NSF staff and the research community. Based upon the work of this Task Force, the Board will provide guidance to NSF on the necessity of action to modify NSF’s support structures for unsolicited mid-scale research, and potential means to achieve such actions.

Product

The outcome of this project will be a report or set of recommendations for internal NSF distribution. These recommendations will be accompanied by an implementation plan from NSF management. The report or set of recommendations will be made available on the Board website for all interested parties.

Logistics

A variety of methods will be used by the Task Force to gather relevant information: briefings from NSF staff, review of the current NSF research portfolio, review of techniques for supporting unsolicited mid-scale research at NSF and possibly across other Federal Government agencies, a possible survey of the research community, and a workshop to gather stakeholder perspectives. The stakeholders involved in this workshop will include individuals from NSF directorates, Advisory Committees, and NSF PIs.

The review of the current NSF practices in supporting mid-scale research activities will include an analysis of requirements in NSF’s current mid-scale programs (e.g., centers programs), and in other Federal agencies’ solicitations for centers-type programs.

A regular and proactive 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 12 months from the date that formation of the task force is approved. The Board Office will serve as the focal point for coordination and implementation of all task force activities.

Task Force Activity Timeline

Summer 2010	Collection of background information on current NSF funding mechanisms for unsolicited mid-scale research
August 12, 2010	Mid-Scale Research Task Force Teleconference
August 26, 2010	Approval of Task Force charge by full Board
Fall 2010	Continue information gathering at NSF
Feb 2011	Mid-Scale Research workshop
Spring 2011	Draft outline of workshop findings and preliminary recommendations submitted to workshop participants for comment
Summer 2011	Preparation of report and recommendations
August 2011	Approval of the report and recommendations by the full Board

**NATIONAL SCIENCE BOARD  
TASK FORCE ON DATA POLICIES**

National Science Foundation

**Background**

The increasing ease of gathering large amounts of varied data—including digital data, research specimens, artifacts, etc.—and funding of large-scale collaborative projects, have caused the broad policy issues surrounding the management of scientific and engineering research data to become critically important. How data collected with National Science Foundation (NSF) funding are shared and managed to ensure broad, timely, and long-term availability and accessibility to the entire research community is an important issue. A determination of what, if any, NSF policies related to data sharing and management would be in the best interests of the Nation’s scientific and engineering enterprise warrants careful examination by the National Science Board (NSB).

Significant policy debate on this broad set of issues is ongoing at both national and international levels, with many stakeholders and organizations involved. Past and ongoing efforts by the Board, NSF as a whole, and other organizations could inform the current effort. In addition to reports from the National Science and Technology Council (NSTC) and the National Research Council (NRC),<sup>5</sup> especially relevant to this effort is the NSB Report *Long-Lived Digital Data Collections: Enabling Research and Education in the 21st Century* (NSB-05-40, September 2005).

Given that sharing and managing research data are problematic for the entire international research community, the NSB, in taking up this topic, has a real opportunity to contribute productively to a significant and ongoing policy discussion. The policy issues surrounding data are critically important at both national and international levels and for NSF as we carry out our mission to promote the progress of science.

The issues surrounding data sharing and management—of which there are many—are complex and include broad and timely access to data, sustainability of data (particularly of digital data), the cost burdens associated with data management, and openness of data generated with taxpayer dollars, to name a few.

**Charge to the NSB CSB Task Force on Data Policies**

The NSB CSB Task Force on Data Policies was established at the February 3-4, 2010 NSB meeting with the charge of further defining the issues and outlining possible options to make the use of data more effective in meeting NSF’s mission.

Membership on the NSB CSB Task Force on Data Policies: Dr. José-Marie Griffiths, chairman, and Drs. Mark Abbott, Camilla Benbow, John Bruer, Bud Peterson, Diane Souvaine, Thomas Taylor, and Mr. Arthur Reilly, members, with Executive Secretary Dr. Philip Bogden, NSF. NSF Liaison members on the Task Force are Drs. Myron Gutmann (Assistant Director, SBE) and Ed Seidel (Assistant Director, MPS).

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<sup>1</sup> NSTC Interagency Working Group on Digital Data, *Harnessing the Power of Digital Data for Science and Society* (January 2009); and NRC’s *Ensuring the Utility and Integrity of Research Data in a Digital Age* (2009).

## **Process and Strategies**

This work plan describes the process and strategies for gaining input from stakeholders regarding their understanding of the NSF data policies along with current data sharing and management practices. The stakeholder groups are both internal and external to NSF and mainly include research communities and their institutions (external) and NSF program officers (internal). The input gained from this study will inform the task force on how best to proceed with follow-up action, which includes detailing the findings, deliberating recommendations, discussing recommendations with NSF leadership, and working together to find the best solutions.

The first step for the Task Force is to hear from the NSF Data Working Group. Then it will work with the Board and NSF senior staff to further define the issues and outline possible options to make the use of data more effective in meeting NSF's mission. During this period, the Task Force will solicit input widely from the research and stakeholder communities and may solicit special studies as appropriate.

The Task Force's strategy on developing Data Policies is multi-phased:

- NSF updated implementation of long-standing data policy – the Data Management Plan requirement – should go into effect in January 2011 and will become a starting point for the Task Force. The Task Force will monitor the impact of this implementation change in order to inform a review of NSF policy.
- Considering issues of data policy, Open Data movements, and related issues, the Task Force will then develop a “Statement of Principles.”
- Provide guidance to subsequent Board efforts to develop specific actionable policy recommendations focused, initially, on NSF, but that could potentially promulgate through other Federal agencies in a national and international context.

This effort requires significant background material on current NSF data policies; data policies at other Federal agencies; data policies at international counterparts to NSF; and the views of NSF awardees on the value of data policies and the impact on the administrative burden. A survey of researchers/PIs may also need to be considered.

The steps in the process are as follows:

1. Receive update from Dr. Edward Seidel on NSF's plans to enhance the enforcement of existing data policy.
2. Determine the way the current data policies, and their instructions, are interpreted and utilized by both proposers and NSF program staff. Solicit input of Program Directors.
3. Interviews with key stakeholders conducted by Task Force leads.
4. Prepare a Statement of Principles.  
Assess further need for NSB study.

Attached are a Proposed Timeline and an appendix of possible Data Policy Issues.

## Data Policies Task Force Timeline

Date	Task
April – May 2010	Task Force members consider the questions they want answered; the information necessary to attain the answers; and the means by which to gather the information
May 4-5, 2010	Task Force meeting at Board meeting to discuss next steps in proceeding with internal and external research
May – August 2010	Develop a Statement of Principles
August 25-26, 2010	Task Force meeting at Board meeting to approve charge, review and revise plan, review draft Statement of Principles, discuss plans for workshop of key stakeholders to be held in winter
August – Sept. 2010	Review and compile findings
September 2010	Offsite Board meeting/Informal discussion of progress
Sept. – Dec. 2010	Proceed with internal and external research and begin to formulate recommendations
Dec. 1-2, 2010	Task Force meeting at Board meeting to review and discuss results of research
Dec. – Feb. 2011	1- or 2-day Workshop of key stakeholders
Feb. – May 2011	Draft final report with findings and recommendations for data policies

### Appendix: Possible Data Policy Issues

1. Internal policies that could be addressed include:
  - a. Defining what constitutes the release of “complete” data. Would complete data release include the original, “raw” data; cleaned-up, publication-ready data, along with the methods for clean-up; publication-ready data with the meta-data necessary to reproduce any interpretations of the data; raw data with software to make it usable to others; data organized in a way that is interoperable to some standard; etc.?
  - b. Defining what types of “data” are to be shared—should we add specimens, samples, etc.?
  - c. Defining what “sharing” entails—what is expected of principal investigators and awardee institutions? Who is responsible for ensuring persistent access?
  - d. Defining good data management/curation practices.
  - e. Timeline for release of data (e.g., a certain time period after collection, after publication of results, etc.).
  - f. Timeframe for continued availability of data—forever?
  - g. Balance between acknowledging variations in the expectations of different disciplines and research communities regarding the proprietary nature of data and setting agency-wide data policies.
  - h. Potential NSF guidelines to awardees relating to management of data that could, for example, require awardees to develop a data management plan with certain components that is peer-reviewed and considered part of the terms and conditions of the award.
  - i. Particularly significant impact of the data policies of NSF-funded large facilities and centers on whole research communities. Merit, if any, of including data policies as part of the site-visits and design reviews of large centers and facilities.
  - j. NSF role, if any, in setting standards for meta-data requirements. If processed data is made available, determining what the requirements should be for making available the work processes performed on the data so that its provenance can be established.

- k. NSF role, if any, in setting standards for data formats for sharing and exchange, as well as for long-term curation.
  - l. NSF role, if any, in setting requirements for data “publishing” or deposit.
  - m. NSF role, if any, in off-setting or funding the administrative burden placed on awardee institutions and principal investigators by any required data management policies.
2. Technical considerations in archiving and ensuring the accessibility of many types of data that are becoming more and more complex. Just as “publications” are often no longer exclusively a printed piece of paper and often involve supplemental material provided in a variety of electronic media, “data” may not be simply original data or measurements, but raw data in the context of its associated meta-data.
  3. What proprietary rights, if any, are appropriate for a principal investigator relating to data retention and usage?
  4. Accessibility of data for evidence-based policy development.
  5. Identification of the appropriate party or parties who should be responsible for ensuring the long-term archiving and curation of data, both for the cost burden and implementation. Possibilities include NSF, awardee institutions, principal investigators, a combination of the above, etc.
  6. Merit, if any, of a national repository (or multiple repositories) for data and the appropriateness of NSF’s assisting in funding such repositories, helping set standards for such an effort, and/or requiring awardees to deposit data in such repositories.
  7. Impact of the NSF DataNet program on data management.
  8. International complexities, particularly for large facilities with international partnerships.
  9. Legal complexities.
  10. Potential overlap of policy issues between the curatorship of physical specimens and the management of large, and often digital, datasets.