

**APPROVED MINUTES<sup>1</sup>  
OPEN SESSION  
432ND MEETING  
NATIONAL SCIENCE BOARD**

National Science Foundation  
Arlington, Virginia  
August 15-16, 2013

Members Present

Dan E. Arvizu, Chairman  
Kelvin K. Droegemeier, Vice Chairman  
Deborah L. Ball  
Bonnie L. Bassler  
Arthur Bienenstock  
Ray M. Bowen  
Vinton G. Cerf  
France A. Córdova  
Ruth David  
Inez Fung  
G. Peter Lepage  
W. Carl Lineberger  
Stephen Mayo  
Douglas D. Randall  
Anneila I. Sargent  
Diane L. Souvaine  
Arnold F. Stancell  
Claude M. Steele

Cora Marrett, *ex officio*

Members Absent

Esin Gulari  
Alan I. Leshner  
G.P. “Bud” Peterson  
Geraldine Richmond  
Robert J. Zimmer  
Maria T. Zuber

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<sup>1</sup> The minutes of the 432<sup>nd</sup> meeting were approved by the Board at the November 2013 meeting.

The National Science Board (Board, NSB) convened in Open Session at 1:15 p.m. on Friday, August 16, 2013 with Dr. Dan Arvizu, Chairman, presiding. (Agenda NSB-13-35, Board Book page 269). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 10: Approval of Open Session Minutes, May 2013

The Board unanimously APPROVED the Open Session minutes of the May 2013 Board meeting (NSB-13-32, Board Book page 287).

AGENDA ITEM 11: Chairman's Report

In the Chairman's Introduction on Thursday, August 15, 2013 and during the Chairman's Report in the Plenary Open Session on Friday, August 16, 2013, Dr. Arvizu announced and reported on several items.

**a. Board Meeting Calendar for 2014**

Dr. Arvizu presented the proposed 2014 calendar for Board meeting dates. In developing the meeting dates, the Board Office considered a variety of constraints during the year, including statutory requirements, and compiled a list of dates for the maximum attendance by Board Members. The 2014 calendar includes dates for meetings of the full Board during February, May, August, September, and November.

The Board unanimously APPROVED the Board meeting calendar for 2014 (NSB-13-40, Board Book Addendum) (Appendix A).

**b. Congressional Testimony**

On June 26, 2013, Dr. Kelvin Droegemeier testified before the Subcommittee on Environment, House Committee on Science, Space, and Technology. The topic of the hearing was "Restoring U.S. Leadership in Weather Forecasting Part 2." He presented information on the state of weather forecasting capabilities, the importance of timely and accurate weather forecasts, and opportunities for weather research and technology development to improve forecasting of severe weather events. Dr. Droegemeier, Regent's Professor of Meteorology and Director Emeritus of the Center for Analysis and Prediction of Storms at the University of Oklahoma, commented that the bill was sponsored by Representative Jim Bridenstine from Oklahoma. Dr. Droegemeier stated that Representative Bridenstine's focus was on improving weather forecasting, given the severe weather events in Oklahoma. He further noted that 550 lives were lost in the U.S. in tornadoes during 2011. In his testimony, Dr. Droegemeier emphasized the importance of social sciences research to understand human behavior during severe weather.

On July 11, 2013, Dr. Arvizu testified before the Subcommittee on Energy, House Committee on Science, Space, and Technology. The hearing was on Oversight and Management of the Department of Energy National Laboratories and Science Activities. As the Director of the U.S. Department of Energy's National Renewable Energy Laboratory, he presented information on the value of the national labs and improving strategic planning and management systems.

### **c. Board Member Recognition**

Dr. Arvizu reported that on July 31, 2013, President Obama announced his intent to nominate Dr. France Córdoba, President Emerita, Purdue University, as the next NSF Director to succeed Dr. Subra Suresh. Dr. Córdoba is currently a Board Member and Chairman of the Smithsonian Institution Board of Regents.

### **d. Committee Announcements**

Dr. Arvizu established the *ad hoc* Committee on Honorary Awards (AWD) with Dr. Ruth David as chairman, and Drs. Stephen Mayo and Douglas Randall, members.

With the announcement of the President's intent to nominate Dr. Córdoba as the next NSF Director, Dr. Arvizu discharged the *ad hoc* Committee Regarding Recommendations for NSF Director, which was established in February 2013, with thanks to Dr. Ray Bowen, chairman, and members Drs. Kelvin Droegemeier, Alan Leshner, Anneila Sargent, and Maria Zuber.

### **e. Board Office Staff Introduction**

Dr. Arvizu welcomed Mr. Keaven Stevenson who returned to the Board Office after several years of active military duty. Most recently, as a Lieutenant Colonel in the Army, he served as the Deputy Director for Operations and Plans at Arlington National Cemetery. He is presently a Management Analyst and responsible for the Board Office records.

### **f. Webcast of Board Meeting**

The August 2013 Board meeting was Webcast and simultaneously available to viewers through the Internet. The Webcast included the Plenary Open Session of the full Board as well as Open Sessions of its committees. The Webcast is available from the NSB and NSF Web sites, <http://www.tvworldwide.com/events/nsf/130815/>.

## AGENDA ITEM 12: Director's Report

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

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

Dr. Myron Gutmann, Assistant Director (AD), Directorate for Social, Behavioral, and Economic Sciences (SBE) completed his tour with NSF on August 16, 2013. Dr. Gutmann joined NSF in November 2009 from the University of Michigan. Dr. Marrett stated that his leadership and

knowledge were greatly appreciated by NSF and that he would be sorely missed. She also said that he will leave NSF a much better organization as a result of his invaluable service to the social, behavioral, and economic sciences community.

Dr. Joanne Tornow will be appointed Acting SBE AD while NSF completes a nationwide search for the next SBE AD. Since joining NSF in 1999, Dr. Tornow has held numerous managerial and executive positions. Dr. Tornow received her Ph.D. in Genetics from Yale University.

Dr. Jacquelyn Gervay-Hague joined NSF as Division Director, Division of Chemistry (CHE), Directorate for Mathematical and Physical Sciences (MPS) on July 1, 2013. Dr. Gervay-Hague came to NSF from the University of California at Davis where she has served as Chair, Department of Chemistry, Associate Vice Provost for Outreach and Engagement, and Professor. She is a Fellow of the American Chemical Society. Dr. Gervay-Hague received her Ph.D. in Organic Chemistry from the University of California, Los Angeles.

Mr. Alan Blatecky, Division Director, Division of Advanced Cyberinfrastructure (SCI), Directorate for Computer and Information Science and Engineering (CISE), will complete his term at NSF in early September 2013. Dr. Marrett thanked him for his service to SCI, formerly the Office of Cyberinfrastructure (OCI), for his efforts in the development of the NSF Strategic Plan, and for his counsel and sage advice.

#### **b. NSF Relocation**

On June 7, 2013, the Government Services Administration (GSA) executed a 15- year lease for NSF with the Hoffmann Company for a newly built headquarters located in Alexandria, Virginia. NSF will occupy approximately 670,000 square feet in the new building, which is comparable to the current space holdings in Stafford I and Stafford II combined. The building will include ground floor retail space and below-grade parking. The building is designed with 14 full floors of approximately 44,000 square feet, each around east and west elevator cores or “wings.”

NSF will provide a final set of requirements to the builder during the next several months. Dr. Marrett recently commissioned a relocation advisory mechanism to review issues and provide a framework for major decisions on the new HQ that may impact the NSF budget and changes to operating policies. The City of Alexandria is standing up an NSF Relocation Task Force to assist NSF with local partnerships with the new neighbors.

#### **c. Diversity and Inclusion Feedback Assistance Roundtable (FAR)**

On August 5, 2013, NSF participated in Phase II of the Diversity and Inclusion Feedback Assistance Roundtable (FAR) conducted by the five representatives of the Office of Personnel Management (OPM). The purpose of the Phase II visit was to discuss the NSF strategy in implementing Executive Order 13583 – Establishing a Coordinated Government-Wide Initiative to Promote Diversity and Inclusion in the Federal Workforce.

During the review, the NSF Office of Diversity and Inclusion (ODI) and the Office of Information and Resources Management (OIRM) provided a collaborative strategic plan for NSF.

OPM highlighted several of the NSF initiatives regarded as best practices in the Federal Government. Dr. Marrett thanked Ms. Claudia Postell, ODI Head, for being a prominent force.

#### **d. PortfolioStat**

The Office of Management and Budget (OMB) established PortfolioStat accountability sessions to assess the effectiveness of each agency's information technology management. NSF's "IT" team recently completed its 2013 Portfolio session. At that session, the Federal Chief Information Officer (CIO) considered NSF IT management practices among the strongest in the executive branch. Dr. Marrett recognized Ms. Amy Northcutt, NSF CIO, who led this effort. Using a transparent, standardized governance process to make investment decisions, the NSF team is committed to continuous, incremental improvement of IT at NSF.

#### **e. Feds Feed Families Campaign**

To address the 2013 summer need for assistance to local community's families, NSF is partnering with other Federal agencies in the "Feds Feed Families" Food Drive in the Washington, DC metropolitan area. In 2012, NSF staff contributed over 15,000 pounds. NSF's goal for 2013 is 16,000 pounds. In July 2013, NSF already delivered 9,853 pounds of food/goods to the Feds Feed Families campaign putting NSF well ahead of where it was at this point last year. The effort speaks to the generosity of the NSF staff in spite of no pay raises and no cash awards.

#### **f. Congressional Update**

On July 17, 2013, the U.S. House of Representatives Committee on Appropriations passed the FY 2014 Commerce, Justice, Science, and Related Agencies (CJS) Appropriations Bill. The legislation will provide \$6.995 billion for NSF. This represents an increase of 1.6 percent over the current funding level, but below the request of the President.

On July 18, 2013, the Senate Appropriations Committee approved its version of the CJS FY 2014 Appropriations Bill. That legislation provides NSF with an increase of 7.3 percent, but 2.7 percent below the request.

Dr. Marrett noted that the House started with a significantly lower funding allocation than the Senate. Both versions are a clear indication of the continued strong congressional support that NSF has come to rely upon, even in this extremely difficult fiscal environment.

#### **AGENDA ITEM 13: NSF Plan on Open Access**

This item is a continuation from the May 2013 meeting with additional information from NSF on the topic of the NSF Public Access Plan, entitled "Today's Data, Tomorrow's Discoveries: Expanding Access to the Results of Research Funded by the National Science Foundation" (Board Book page 312) and the NSF response to the Office of Science and Technology Policy (OSTP) call for plans to improve the availability of publications and digital data from federally-funded research.

Dr. Marrett provided a background introduction stating that OSTP issued a memo in February 2013 on increasing access to the results of federally-funded research (Board Book page 306). NSF was engaged in framing an approach before this directive was issued. The memo directs NSF and other agencies to submit to OSTP and OMB by August 22, 2013 a plan addressing the policy objectives that were outlined for publications and digital data. Dr. Clifford Gabriel, Senior Advisor, Office of the Director, provided the Board with a brief summary at the May 2013 meeting.

Dr. Marrett reminded the Board that the plan is pre-decisional and should not be distributed pending further approval by OSTP and OMB. NSF had not yet submitted this plan, but there were two cross-directorate working groups that were developing options to address the key components of the memorandum. To inform the NSF plan and to address the agency's efforts, NSF had extensive input through the National Academies in public comment meeting, and for 4 days in May 2013 when Federal agencies heard from numerous stakeholders. This consultation had a major impact on the plan. The plan is open, flexible, incremental, and is designed to minimize burden on awardees and staff, recognizes the diversity of science and research communities that NSF supports, and manages publications and data in an integrated way. At the end of July 2013, NSF had a lead reviewer-type call on the draft plan with Drs. Arthur Bienenstock, Vinton Cerf, Kelvin Droegemeier, and Alan Leshner. The plan was modified to reflect their comments.

Dr. Marrett noted that there was still work to be done and many issues to be addressed. She stated that Dr. Gutmann provided excellent leadership for this project. She also thanked Drs. Amy Friedlander and Jane Silverthorne for leading working groups on the publications and data, and Dr. Gabriel for his work on this project and continued leadership. As soon as the plan is approved by OSTP and OMB, the plan could be piloted as early as October 2013.

In response to a question from the Board, Dr. Phillip Ruben, OSTP Principal Assistant Director for Science, at the Board meeting, commented that the goal is to develop a uniform approach, although different agencies have different missions and restrictions. He mentioned that after OSTP reviews the plan, it will go to OMB.

#### AGENDA ITEM 14: Open Committee Reports

[Note: The Executive Committee (EC) did not meet in August 2013.]

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

Dr. Arnold Stancell reported on behalf of Dr. Bud Peterson, A&O chairman. He stated that A&O had a short but constructive meeting. Both Ms. Allison Lerner, NSF Inspector General, and Ms. Martha "Marty" Rubenstein, NSF Chief Financial Officer, provided useful information on a broad range of topics (Board Book page 99) and ably answered questions.

The committee approved a revised A&O Charge (Board Book page 97), and recommended approval by the full Board. Based on this recommendation:

The Board unanimously APPROVED the revised Charge to the Committee on Audit and Oversight (NSB-13-51) (Appendix B).

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

Dr. Claude Steele, CEH chairman, reported that he updated the committee on the status of the FY 2014 budget proposals and the CoSTEM Strategic Plan (Board Book pages 113, 256, 258, and 260).

The committee then held a panel discussion on institutional and cultural barriers to STEM education improvements. A panel of four experts discussed system-level changes that support pedagogical innovation. The panel consisted of the following: Dr. Philip Kutzko, Professor of Mathematics, University of Iowa, and Director, National Alliance for Doctoral Studies in the Mathematical Sciences; Dr. Silvia Ronco, Program Director, Research Corporation for Science Advancement; Dr. Judy Miner, President, Foothill College, Los Altos Hills, California; and Dr. Peter Lepage, Professor of Physics, Cornell University, and current Board Member (Board Book Addendum).

The committee learned that time, resources, and personal connections are crucial and the importance of policies on evaluation, tenure, and student services. The committee also learned that exceptional faculty commitment to student success, departmental commitment, cross-institutional arrangements, and partnerships of various kinds can help meet institutional challenges. CEH will use the input from the discussion to design a set of activities that can help those working to improve STEM education as well as to help retention and success in STEM fields. The committee appreciated the Board's participation in the discussion and invited further thoughts or input.

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

Dr. Ray Bowen, SEI chairman, reported that the committee heard an update of ongoing projects relating to *Science and Engineering Indicators (Indicators)* 2014.

The content for the 2012 *Indicators* mobile application was finalized and Apple was expected to decide in 7-10 days whether it will publish the app. SEI will keep the Board apprised of the status, and send Board Members a link to the app once it is released.

At the May 2013 meeting, the Board approved the 2012 STEM Education Data and Trends online tool. The tool is expected to be finalized in the next couple of weeks. The Board Office staff and the NSF Office of Legislative and Public Affairs (OLPA) were developing an outreach plan to release the tool. The staff will monitor the tool's usage and feedback from various users. The Board will also receive a link to the tool when it is finalized.

Dr. Jeffrey Alexander, SRI International, provided an update on the project to redesign *Indicators* as a primarily digital document. During the last several months, SRI engaged users and experts to develop design concepts for the new format. The committee was presented with design concepts

for the layout, enhanced search capability, and visualization and data presentation. A prototype of the “Digital Indicators” is expected to be completed by February 2014.

In May 2013, the Board approved the topic for the 2014 companion report to *Indicators*, and an *ad hoc* working group was convened to focus on the topic. The working group met on July 26, 2013. The group reviewed three options for focusing the topic, and its top choice was “Towards a Stronger S&E Workforce – Improving Policies through Better Information and Information Flows.” If this topic proves too complex or if there is a lack of appropriate data, the fallback topic will be “U.S. Competitiveness in Knowledge- and Technology-Intensive (KTI) Industries through a High-Skill Workforce.” The working group agreed to a timeline, and expects that a final report will be ready for publication in the spring of 2014.

The committee received the Federal agency reviews of the final draft of *Indicators* 2014 (known as the “Orange Book”). The reviewers made numerous constructive suggestions and did not raise any major concerns. Accordingly, the committee voted to recommend that the full Board approve the “Orange Book” (Board Book Addendum). Based on this recommendation:

The Board unanimously APPROVED the “Orange Book” draft for *Science and Engineering Indicators* 2014, subject to final edits to be approved by the SEI chairman and the Board Chairman.

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

Dr. Diane Souvaine, CPP chairman, submitted a detailed summary for the record (Appendix C).

Dr. Souvaine asked what the Board would like to see at the next CPP meeting in November 2013 in partnering with NSF senior management. The suggestions were as follows:

- That a forum with ADs at the CPP meeting focusing on specific projects be held to invigorate substantive discussions about what the Board could address in the future.
- To continue the practice of having a new AD present an overview of their directorate’s activities during the Board lunch times. New ADs from the Directorate for Geosciences (GEO) or Directorate for Engineering (ENG) could possibly engage the Board in November 2013.
- Have a panel of ADs talk about their own interests in a single project or a single facility to provide a clearer perspective on which projects or facilities are multi-agency or multi-national in scope.
- For the Subcommittee on Facilities (SCF) and CPP to coordinate efforts relating to facilities.

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

Dr. France Córdova, CSB chairman, reported that the committee meeting included an update on the NSF Strategic Plan for 2014 – 2018 (Board Book Addendum). NSF is also preparing a performance plan, which CSB hopes to see in the next couple of weeks. Both documents will go to OMB on September 9, 2013.

The committee received an update on FY 2014 appropriations activities from Dr. Marrett. She reported that both House and Senate appropriations committees have “marked up” (or taken action on) the NSF FY 2014 Budget Request. Both marks provided increases over current year funding. Dr. Marrett noted that it is possible that a continuing resolution will start the fiscal year.

The committee turned its attention to the ongoing study on Trends in Science Budgets. CSB heard from Dr. Asha Balakrishnan, Science and Technology Policy Institute (STPI), on tenure data trend on NSF authorizations and major legislative and executive events, funding levels within NSF and among various Federal agencies, NSF award data, and information on NSF principal investigators. The presentation generated a lively discussion among Board Members and led to a series of questions and requests for additional data. The Board Office and STPI will work together to generate the additional data and to answer questions not fully addressed during the session.

### Subcommittee on Facilities (SCF)

With the Chairman’s permission, Dr. Carl Lineberger, SCF chairman, reported that SCF met to discuss the 2013 Annual Portfolio Review (APR) and how it can best serve the needs of the Board.

SCF discussed some of the Board’s history with facilities, and what its role should be in evaluating the long-term value proposition of facilities against other research opportunities. The subcommittee discussed what it means for the Board to set priorities and how SCF can best help the Board safeguard the long-term well-being of the NSF (Board Book pages 78 and 87).

The subcommittee discussed some specific data products for the APR, the need to conclude the 2013 APR shortly, and to use this document as a feed for further enhancing the value of this portfolio review in the future.

Dr. Lineberger submitted a detailed summary of the SCF meeting for the record (Appendix D).

### **f. Task Force on Administrative Burdens (AB)**

Dr. Arthur Bienenstock, AB chairman, reported that the task force heard several interesting presentations. The first was a presentation of the results of AB’s recent Request for Information (RFI) by Dr. Jason Gallo, STPI. The task force discussed several particular results, including issues of how reported information is being used, varying levels of institutional support, and how some of the effort involved in writing proposals is a valuable part of science. The task force also discussed possible recommendations and actions, and asked for more information about the recommendations in the RFI responses (Presentation Book page 94, Board Book Addendum).

The RFI report is expected to be finalized by the end of August 2013. The task force will share the RFI findings with pertinent Federal agencies and working groups and related organizations, which may provide additional feedback to help inform the Board’s final report and recommendations.

The task force also heard from Dr. Jane Silverthorne, Director, Division of Integrative Organismal Systems (IOS), Directorate for Biological Sciences (BIO). This division and the Division of Environmental Biology (DEB) were midway through a 3-year pilot of preliminary proposals, which require only a one-page project summary, a five-page project description, and biosketches. Dr. Silverthorne presented some compelling data, suggesting that the pilot is reducing workload for program officers and the scientific community while not harming the quality of reviews. Task force members praised the pilot and noted that community outreach efforts continued to be essential. In particular, they felt it was important to make it clear that the number of awards is not changing under this pilot (Presentation Book page 121).

#### AGENDA ITEM 15: Chairman's Remarks

Dr. Arvizu had no further comments, and adjourned the Open Session at 2:05 p.m.

*[signed]*

Ann A. Ferrante  
Executive Secretary  
National Science Board

#### Attachments:

- Appendix A: Board Meeting Calendar for 2014 (NSB-13-40)
- Appendix B: Committee on Audit and Oversight (A&O) Charge (NSB-13-51)
- Appendix C: Committee on Programs and Plans (CPP), Detailed Committee Report for the Record
- Appendix D: Committee on Strategy and Budget (CSB), Subcommittee on Facilities (SCF), Detailed Committee Report for the Record

**NATIONAL SCIENCE BOARD**  
**CALENDAR OF MEETINGS**  
**2014**

February 25 - 26  
(Tuesday - Wednesday)

May 6 - 7  
(Tuesday - Wednesday)  
[Annual Meeting and Awards Dinner]

August 13 - 14  
(Wednesday - Thursday)

September 17 - 18  
(Wednesday - Thursday)  
[Annual Retreat and Visit]

November 19 - 20  
(Wednesday - Thursday)

### **Charge to the Committee on Audit and Oversight**

The purpose of the Committee on Audit and Oversight (A&O) is to help ensure that NSF is properly evaluating and managing its operational risks. In achieving this purpose, A&O generally supervises the NSF Inspector General (IG), as delegated by the Board. A&O oversees major agency administrative processes and principal administrative systems, including NSF's stewardship and performance measurement activities. In addition, A&O recognizes and promotes NSF efforts to educate grantees about the responsibilities they accept upon receiving an NSF grant, and supports a positive environment that reflects good business practices. As appropriate, A&O makes recommendations to the Board for its full consideration and action.

I. Pursuant to the Inspector General Act of 1978, as amended, and National Science Board (NSB) delegation, A&O has general supervision over the NSF IG. A&O leads the selection process for employment of the IG.

The Office of Inspector General (OIG) serves as an independent and objective unit responsible under the Act for:

- conducting and supervising audits relating to NSF's programs and operations;
- providing leadership and coordination and recommending policies for activities designed to promote economy, efficiency and effectiveness and prevent and detect fraud and abuse in the administration of NSF programs and operations; and investigating cases involving misconduct in science; and
- preparing and transmitting to the NSB, for forwarding to the Congress, semiannual reports summarizing the activities of the OIG during the immediately preceding 6-month periods ending March 31 and September 30.

The OIG will provide information to and solicit input from A&O regarding the annual audit plan. OIG will keep A&O apprised of the progress of the financial statement audit and of any significant audit findings, and inform A&O of any significant investigative issues that arise. A&O members will review the OIG semiannual report and NSF management response, and it may request further information before recommending to the Board that the OIG semiannual report be transmitted to Congress.

II. A&O oversees the implementation by NSF management of the agency's principal administrative systems and internal controls. To keep itself informed, A&O will periodically receive information from senior NSF officials as appropriate including the Chief Operating Officer, Chief Financial Officer, the Chief Human Capital Officer, and the Chief Information Officer on areas including the following:

- the proposal and award system, including a statistical report on proposal disposition for each fiscal year, and the Director's annual report on merit review;
- the status of the agency's internal accounting and administrative controls systems, as required by applicable legislation;
- NSF's management information systems, consistent with applicable legislation; and the NSF personnel system, including its functioning and effectiveness.

III. A&O provides the primary means for keeping the NSB fully and currently informed of problems and deficiencies relating to the administration of NSF programs and operations and the necessity for and progress of corrective action. A&O will report to NSB, as necessary, on issues presented to it, as well as on any matters into which it has requested further research. A&O may report to NSB, as necessary, on recommendations of all U.S. Government Accountability Office (GAO) reports involving NSF, including follow-up on subsequent performance.

**Committee on Programs and Plans (CPP)  
Detailed Committee Report for the Record**

CPP Program Portfolio Discussion: Science Portfolio and Prospects  
(Presentation Book page 3)

CPP resumed the ongoing series of Portfolio Planning discussions, but with a different approach. The purpose of the discussion remained the same - to have an informal conversation that improves the NSF's and the Board's understanding of exciting science or cross-cutting issues, but drawing upon the shared expertise of the Board and building an appreciation of NSF processes. Dr. Fleming Crim, Assistant Director (AD), Directorate for Mathematics and Physical Sciences (MPS), took the lead for this discussion, with all NSF ADs participating. He provided an example of a successful NSF project – the Ice Cube Neutrino Observatory – to highlight the larger strategic issues and questions that NSF grapples with on a regular basis.

The committee and the ADs had a robust discussion.

- Dr. Bud Peterson noted that an IceCube-type project could not be taken on by a single university; this is the kind of science that needs to be undertaken by NSF.
- Dr. Vinton Cerf inquired about the budget split between MPS and the Directorate for Geosciences (GEO). He also noted that there is an important lesson here, and that is to not get trapped in stovepiped disciplines, because science is continuous.
- Dr. Bonnie Bassler felt that this type of science is very exciting, and asked how the Board could be of help ensuring that these types of awards “hit more than they miss.” She also inquired about what happens when NSF invests in a project that has a disappointing outcome, and how the Board can help “pull the plug.”
- Dr. Geraldine Richmond built on Dr. Bassler's question of pulling the plug, and noted that criteria for determining a bad outcome for a single investigator award was a lot easier to determine than criteria for a large facility. She noted that if there were no criteria, perhaps the Board and NSF should have this discussion.
- Dr. Roger Wakimoto, GEO AD, reminded the Board that the IceCube project was funded when budgets were better. With increasing budget austerity comes increasing responsibility to make appropriate tradeoffs with respect to portfolio balance.
- Dr. Peter Lepage asked how many projects were funded from multiple directorates, and how these directorates felt about funding these types of projects vs. their own disciplinary research.
- Dr. Farnam Jahanian, CISE AD, is also head of the Major Research Equipment and Facilities Construction (MREFC) Panel. He noted that by the time projects get built, so much work has gone into it that it is rare that there is a bad outcome. However, the Large Facilities Office Manual does address off ramps.
- Dr. John Wingfield, BIO AD, spoke about the National Ecological Observatory Network (NEON). Dr. Douglas Randall asked why this was a BIO-only project, and whether bringing in additional disciplines could lower overall costs. Dr. Wingfield noted that this was on the table; when operations begin, it will be easier to see who else is benefitting from the project.
- Dr. Jahanian also noted that a lot of exciting research across NSF is mid-scale and does not involve facilities.
- Dr. Maria Zuber noted that a major issue was providing enough funding at the beginning of a project; funding usually appears more favorable in the outyears.

At the conclusion of the discussion, CPP had touched on five important issues for further exploration.

1. What is the appropriate balance between high risk large-projects and what we think of as “core research” and what opportunity costs are involved in this trade-off between big and small science?
2. What are the appropriate shared costs of large projects?
3. What are the appropriate criteria to be considered in terminating or scaling back projects, even if mid-stream?
4. What are the appropriate pathways for NSF to raise questions with or begin to engage NSB?
5. How do we finance and govern large interdisciplinary and interagency projects?

NSB Information Item: Status of Ocean Drilling  
(Presentation Book page 12)

Dr. David Conover, Director, GEO Division of Ocean Sciences (OCE), presented an update on the status of the International Ocean Drilling Program (IODP), and the operations and management of the *JOIDES Resolution* drillship.

Dr. Richmond asked why there were not more partnerships with other agencies. Dr. Conover answered that the natural partnership here would be with the U.S. Geological Survey (USGS), but historically it has not participated. He added that expecting another agency to support additional projects in this budget climate seemed unlikely. He also noted that any extension of funding for the *JOIDES Resolution* would be done through a cooperative agreement to retain as much flexibility as possible. NSF plans to bring an action item to the Board in November 2013.

Dr. Conover then discussed the challenges that the Division of Ocean Sciences (OCE) faces as it tries to balance facilities and science in the context of rising costs, sequestration, and possible flat or declining budgets. He noted that a Decadal Survey of Oceans Sciences has begun, with a report due May 2015. He invited the Board’s help in meeting these budgetary challenges.

In response to questions, Dr. Conover stated that the proposal brought to the Board in November 2013 would retain flexibility to accommodate the results of the Decadal Survey. He pointed out that the IODP benefits many areas of research outside OCE. Some Board Members expressed their agreement. Because of limits in time, D. Souvaine asked that CPP members e-mail any further questions on this topic, which will be forwarded to the program to be prepared for the action item in November. Further questions can be e-mailed to Dr. Souvaine or the CPP Executive Secretaries, Ms. Sonya Mallinoff or Ms. Lisa Lewis.

NSB Information Item: Update on the Process for Assessing the Balance of the Division of Materials Research’s (DMR) Facilities and Instrumentation Portfolio, and Update on the Review of the Renewal Proposal for Cornell High Energy Synchrotron Sources (CHESS)  
(Presentation Book page 18)

This information item covered two topics. The first component was an update on the renewal proposal for the Cornell High Energy Synchrotron Source, also known as CHESS. Dr. Thomas Rieker, MPS Program Director, presented both items. Dr. Rieker told the committee that CHESS received a renewal proposal in February 2013 and conducted a site visit in April 2013. NSF plans to bring an action item on CHESS before the Board at the November 2013 meeting. As with the Ocean Drilling program, Dr. Souvaine asked CPP members to e-mail questions to her on CHESS in advance of the November 2013 meeting.

The second component of this item was a discussion about the process for balancing facilities and instrumentation within the MPS Division of Materials Research (DMR).

Dr. Rieker told the committee about a new subcommittee for DMR instrumentation and facilities, under the umbrella of the MPS Advisory Committee. This committee is called the “Synchrotron Science” subcommittee, and is charged with advising DMR on the role of NSF and DMR in synchrotron science, taking into account other facilities, compact light sources, the Materials 2022 report, and realistic fiscal scenarios.

Board Members discussed how different communities of stakeholders led to the differing recommendations of the two reports. They were told that the new subcommittee, though composed of materials scientists, was specifically charged to consider the needs of other communities, including structural biologists as well as national capacity issues. Dr. Rieker stated that the final report is anticipated in the spring of 2014, and will be presented to the Board.

**Committee on Strategy and Budget (CSB), Subcommittee on Facilities (SCF)  
Detailed Committee Report for the Record**

The Subcommittee on Facilities met to discuss the 2013 Annual Portfolio Review (APR) and how it can best serve the needs of the Board. It was noted that some NSF directorates and divisions are engaged in internal reviews that overlap with the APR. Dr. Lineberger commented that this presents an opportunity to collaborate and make what NSB is doing more useful to the Foundation.

Dr. John Veysey, Board Office staff, then reviewed the Board's history with facilities and the reasons for the creation of the Subcommittee, along with the current Board Major Research Equipment Facilities and Construction (MREFC) process. He explained that some Board prioritization processes reflect a backlog of projects that no longer exists.

Dr. Veysey then gave a high-level overview of the draft 2013 APR and some of its data products, inviting comments and input from Board members. Board members discussed what it means to set priorities, as well as NSF's processes for advancing MREFC projects. SCF discussed the challenges involved in considering the long-term value proposition of facilities, especially across fields and against other research opportunities. Members described the need to concretely capture the opportunity costs associated with facilities investments.

SCF reviewed some of the proposed data products for the APR, discussing how to make it better suited to the Board's needs, including asking whether the APR could consider the scientific output and utilization of a facility. Board Members emphasized the importance of relying on NSF expertise, while remembering that the role of the Board is to ensure the long-term well-being of the NSF, and Dr. Cora Marrett, Acting NSF Director, noted that the APR was an opportunity for the Board to work with NSF to improve portfolio level discussions across NSF.