

**APPROVED MINUTES¹
OPEN SESSION
439TH MEETING
NATIONAL SCIENCE BOARD**

National Science Foundation
Arlington, Virginia
February 4, 2015

Members Present:

Dan E. Arvizu, Chairman
Kelvin K. Droegemeier, Vice Chairman
John L. Anderson
Roger N. Beachy (via telephone)
Arthur Bienenstock
Vinton G. Cerf
Vicki L. Chandler (via telephone)
Ruth David
Inez Fung
Robert M. Groves
James S. Jackson
G. Peter Lepage
W. Carl Lineberger
Sethuraman Panchanathan
Anneila I. Sargent
Diane L. Souvaine
Maria T. Zuber

France A. Córdova, *ex officio*

Members Absent:

Deborah L. Ball
Bonnie L. Bassler
Alan I. Leshner
Stephen Mayo
G.P. “Bud” Peterson
Geraldine Richmond
Robert J. Zimmer

The National Science Board (Board, NSB) convened in Open Session on Wednesday, February 4, 2015 at 1:15 p.m. with Dr. Dan Arvizu, Chairman, presiding (Agenda NSB-2015-1, Board Book page 43). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 9: Approval of Open Session Minutes, November 2014

The Board unanimously APPROVED the Open Session minutes of the November 2014 Board meeting (NSB-14-61, Board Book page 53).

¹ The minutes of the 439th meeting were approved by the Board at the May 2015 meeting.

AGENDA ITEM 10: Chairman's Report

In the Chairman's Report, Dr. Arvizu announced and reported on several items.

a. Upcoming Executive Committee Vacancies

Dr. Arvizu announced that there would be two vacancies on the Executive Committee in May 2015 as the terms for Drs. Lineberger and Sargent end. Therefore, he established the *ad hoc* Committee on Nominating for NSB Elections, otherwise known as the Elections Committee, and appointed Dr. Carl Lineberger as chairman, and Drs. Arthur Bienenstock and Anneila Sargent as members. The Elections Committee will prepare a slate of candidates for consideration and election at the May 2015 meeting for two 2-year terms from 2015 to 2017.

b. 2015 Board Retreat

The Chairman shared that the next Board retreat, slated for September 16-17, 2015 will be held in the Washington, D.C. area. Dr. Michael Van Woert, Executive Officer, was tasked with making the appropriate arrangements.

c. NSB Member Achievements

Several Members had recently received awards and recognition in their respective fields of expertise. Dr. Arvizu recognized each Member with a description of the achievement and congratulatory remarks. The recognized Members are:

- Dr. Geri Richmond, one of four eminent scientists who have accepted the honor of serving as a member of the fourth cohort of the U.S. Science Envoy Program. The Science Envoy program, announced by President Obama in Cairo in June 2009, demonstrates the United States' commitment to science, technology and innovation as tools of diplomacy and as engines of progress and economic growth.

U.S. Science Envoys travel in their capacity as private citizens and advise the White House, U.S. Department of State, and U.S. scientific community about the insights gained from other nations and on potential future areas of collaboration. Dr. Arvizu also mentioned that there are a total of four cohort scientists and the other three are: Dr. Jane Lubchenco (former NSB Member), Dr. Peter Hotez, and Dr. Arun Majumdar.

- Dr. Carl Lineberger will be honored with an award by the National Academy of Sciences at a ceremony on April 26th in recognition of his extraordinary scientific achievements in Chemical Sciences.

His development of an ion photoelectron spectroscopy as a tool to study small

molecules has provided both an important method to characterize highly reactive, short-lived species known as free radicals as well as a new, direct way to observe the structure and evolution of molecules in the process of undergoing a chemical reaction. Dr. Lineberger's experimental methods are now in widespread use in laboratories worldwide.

- Dr. Vicki Chandler was recently appointed as Dean of the College of Natural Sciences at The Minerva Schools at KGI (Keck Graduate Institute). In this role, Dr. Chandler will work directly with students and design an innovative curriculum for the Natural Sciences, among other responsibilities.

Dr. Arvizu also recognized NSF staff member, Inspector General, Ms. Allison Lerner, who was appointed as vice-chair of the Council of the Inspectors General on Integrity and Efficiency (CIGIE). CIGIE is an independent entity established within the executive branch to address integrity, economy and effectiveness issues that transcend individual government agencies and aid in the establishment of a professional, well-trained and highly skilled workforce in the Offices of Inspectors General.

d. NSB Staff Updates

- Dr. Arvizu noted that Ms. Rebecca Kelley, who joined the Board Office in June 2014 on a detail from her position as the Operations Officer for the Directorate on Education and Human Resources, recently retired from federal service. He formally acknowledged both her service to NSF and the NSB Office and wished her the best going forward.

Dr. Arvizu concluded his Chairman's Report and turned to Dr. Córdova for the Director's Report.

AGENDA ITEM 11: Director's Report

a. Science Presentation

As is her tradition, Dr. Córdova began her report with a brief science presentation. She asked Members to name a physicist and engineer who was funded 15 times by NSF, from the 1970s to 2014 and was responsible for research that made possible the following technologies: bar codes, DVDs, therapeutic eye surgery, and communication with fiber optics. This person also discovered the black hole at the center of the Milky Way, molecules in space with infrared spectroscopy, and won a National Medal of Science and the Nobel Prize. To this question, multiple Members responded, "Charlie Townes".

Dr. Córdova confirmed that indeed this was the legacy of Charlie Townes, who passed away on January 27, 2015 at the age of 99. She then asked Dr. Carl Lineberger for remarks about Dr. Townes' influence on his personal career and how Dr. Lineberger used one of Dr. Townes most important inventions in his own research.

Dr. Lineberger expressed how honored and delighted he was to speak about his former friend and colleague. He noted that the invention that spurred his own research is the laser. He said that Dr. Townes was clearly at the highest level, a physicist, an engineer, a chemist, an astronomer, and that his presence graced many of the campuses represented around the Board table. As the inventor of the microwave laser and the optical laser, conceptually Dr. Townes made an indelible mark in all of these fields, and everybody claims him for all the right reasons.

Dr. Lineberger discussed the influences and effects of Dr. Townes' work as seen in the lineage of his postdoc students. And he noted laser technology and instrument development played an unbelievable role in science and in producing the transformative technologies and instrumentation. In closing, Dr. Lineberger stated that the thing he believes is most important to remember was that Dr. Townes was generous, caring, and obviously able to transmit his genius to many people and that we are all going to miss him.

b. NSF Staff Updates

Dr. Córdova welcomed new staff members to NSF and announced staffing changes within NSF.

- Dr. James Kurose joined NSF as the Assistant Director (AD) for the Directorate for Computer and Information Science and Engineering (CISE) on January 5, 2015, and comes from the University of Massachusetts Amherst.
- Dr. David Berkowitz joined NSF as the Division Director, Division of Chemistry, Directorate for Mathematical and Physical Sciences (MPS) on February 2, 2015, from the University of Nebraska-Lincoln.
- Dr. Carol Frost joined NSF as Division Director, Division of Earth Sciences, Directorate for Geosciences (GEO) on December 15, 2014, from the University of Wyoming.
- Dr. Deborah Goodings joined NSF as Division Director, Division of Civil, Mechanical and Manufacturing Innovation, Directorate for Engineering (ENG) on January 16, 2015 from George Mason University.
- Dr. W. James Lewis joined NSF as Deputy Assistant Director, Directorate for Education and Human Resources (EHR) on January 26, 2015 from University of Nebraska-Lincoln.
- Dr. Richard Murray joined NSF as Division Director, Division of Ocean Sciences in GEO on January 12, 2015, from Boston University.

- Dr. Lynne Parker joined NSF as Division Director, Division of Information and Intelligent Systems in CISE on January 5, 2015 from the University of Tennessee, Knoxville.
- Dr. Paul Shepson joined NSF as Division Director, Division of Atmospheric and Geospace Sciences in GEO on September 15, 2014 from Purdue University.
- Dr. James Hamos joined the NSF Office of the Director (OD) as Senior Advisor in December 2014 from EHR. Dr. Hamos serves as the Office of the Director liaison to the NSB Office.
- Mr. Bart Bridwell, Branch Chief of the Cooperative Support Branch, Division of Acquisition and Cooperative Support, Office of Budget, Finance, and Award Management (BFA) is leaving NSF to take a position at ARPA-E, as the Director of Acquisition and Assistance Programs.

Dr. Córdoba concluded her staff updates and transitioned to an update on NSF's efforts to reduce administrative burdens.

c. Administrative Burdens

Dr. Córdoba reported that NSF's effort to reduce administrative burdens associated with the conduct of NSF funded proposals is ongoing. The Board's report which was released in March 2014 provides many recommendations on how Principal Investigator (PI) burden might be reduced. NSF staff has been very engaged in addressing these and other recommendations. In particular, it is notable that NSF was the only agency to implement the new OMB uniform guidance on time and in a manner that allowed for robust input from the community. She directed Members to their Board books for a written update that summarizes NSF's current burden reduction efforts as well as what is being considered for the future.

She expressed her appreciation for the continued collaboration with the Board's *ad hoc* Working Group on Administrative Burdens, chaired by Dr. Arthur Bienenstock and noted that regular updates on ongoing efforts to reduce administrative burdens would be provided in the future.

d. Congressional Updates

Since the last Board meeting in November, the 114th Congress convened in early January 2015. Dr. Córdoba distributed a document that showed the membership of the NSF's Congressional committees of jurisdiction, currently being finalized. She noted that she looks forward to working with the membership of the committees. Dr. Córdoba also mentioned that she would be testifying before the House on February 26, 2015 and to the Senate on March 17, 2015 about NSF's FY 2016 budget. She added that she continues to make meetings with Members of Congress a priority and has met with 14 individual members since the last Board meeting in November 2014. Dr. Córdoba also mentioned

her trip with Chairman Lamar Smith and nine of his colleagues to Antarctica in mid-December. NSF staff included Division Director Dr. Kelly Falkner and staff members, Dr. Scott Borg and Mr. Brian Stone, and from the Office of Legislative and Public Affairs (OLPA), Mr. Tony Gibson. It was a great opportunity to highlight the research work of the Foundation in Antarctica, on behalf of the nation. Dr. Córdova indicated that trip went well and congressional members were thoroughly engaged and very complimentary of the program and NSF.

Next, Dr. Córdova mentioned that Dr. Jim Kurose, AD for CISE, testified the week prior on behalf of NSF before the House Science Committee, Subcommittee on Research and Technology, on the topic of cyber security. On February 3, 2015, Dr. Richard Buckius, Chief Operating Officer for NSF, testified before the House Science Committee in a joint hearing between the Subcommittee on Research Technology and the Subcommittee on Oversight, regarding NSF's oversight of the National Ecological Observatory Network (NEON) project. Dr. Buckius was joined at the witness table by Dr. James Collins, former AD for Biological Sciences at NSF and currently the NEON board chairman. In addition, Ms. Marty Rubenstein, Head, Office of Budget, BFA and Chief Financial Officer at NSF, joined Dr. Buckius for the question and answer period. "They all did a very fine job in a challenging situation and we thank them," said Dr. Córdova.

Dr. Córdova then concluded her Director's Report. Dr. Arvizu thanked her on behalf of the Board for her leadership with congressional engagement and for her positive representation of NSF, both domestically and abroad.

AGENDA ITEM 12: Open Committee Reports

Dr. Arvizu moved on to the Open Committee Reports and mentioned that each of the committee chairs would submit a more comprehensive committee meeting *report for the record* and that the reports would be included in the plenary minutes. He then called on committee chairs to offer highlights of the committee meetings.

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

Dr. Ruth David, A&O chairman, stated that she wanted to highlight the successful completion of the FY 2015 audit, which was notable this year for having been done in parallel with the iTrack conversion. She gave kudos to the staff of both BFA and the Office of Inspector General (OIG) for working out the delayed audit and making it come to a successful conclusion.

Dr. David submitted an A&O report for the record (Appendix A).

b. Joint Committee on Programs and Plans/Committee on Strategy and Budget (Joint CPP/CSB)

Dr. Anneila Sargent, CPP chairman, stated that the Committees had met jointly in open session. She noted that most Board Members had been in attendance at the meeting, and as such had nothing further to highlight.

Dr. Sargent submitted a Joint CPP/CSB report for the record (Appendix B).

c. Committee on Programs and Plans (CPP)

Dr. Sargent, CPP chairman, stated that CPP had met the day prior in open session. She thanked NSF for the thoughtful presentations given to the Board and noted that the presentations provided a good understanding of both upcoming action items, and in the case of High Performance Computing (HPC) and the MagLab discussion, a better awareness of the long-term strategic issues facing the Foundation. Dr. Sargent also mentioned that she'll be looking into efficient options for making updates to the Arctic Support contract and promised to keep Committee members apprised of new developments.

Dr. Sargent submitted a CPP report for the record (Appendix C).

d. Committee on Strategy and Budget (CSB)

Dr. Carl Lineberger reported on behalf of Dr. Alan Leshner, CSB chairman, who was absent from the meeting. Dr. Lineberger stated that the Committee had met in open session the day prior, with Dr. Lineberger presiding in Dr. Leshner's absence. He noted that the Committee heard updates on the FY 2015 budget from Dr. Córdova and from Mr. Michael Sieverts, Division Director of Budget, BFA on the FY 2016 budget. Since most Board Members had been in attendance the day prior, there were no further highlights.

Dr. Lineberger submitted a CSB report for the record. (Appendix D).

e. Committee on Science and Engineering Indicators (SEI)

Dr. Kelvin Droegemeier, SEI chairman, noted that the Committee had met that morning in open session. He highlighted two areas of discussion at the meeting. The first topic was a review of the proposed cover art for *Indicators 2016*. A decision was not reached regarding the final cover but he noted that a selection is forthcoming. The second topic was the Subcommittee approval of the Policy Companion Piece to *Indicators 2014* entitled, "Revisiting the STEM Workforce." Dr. Droegemeier made a motion to the full Board to vote on the Companion Piece, subject to minor edits approved by the SEI Committee Chairman and the NSB Chairman. The Board subsequently voted and unanimously approved "Revisiting the STEM Workforce," a policy companion to *Indicators 2014*.

Lastly, Dr. Droegemeier reminded Members to inform staff if they wanted to be involved in various outreach activities surrounding the release of the Companion Piece. He mentioned that a concrete outreach plan would evolve over coming weeks and that the Board would be kept informed of upcoming plans.

Dr. Droegemeier submitted a SEI report for the record (Appendix E).

f. Committee on Education and Human Resources (CEH)

Dr. Peter Lepage reported on behalf of Dr. Deborah Ball, CEH chairman, who was absent from the second day of the meeting. Dr. Lepage noted that the Committee had met in open session the day prior. During that meeting the Committee heard two outstanding presentations from Dr. Sian Beilock, University of Chicago and Dr. Na'ilah Suad Nasir, University of California at Berkeley.

Dr. Lepage submitted a CEH report for the record (Appendix F).

g. *ad hoc* Working Group on Administrative Burdens (AB)

Dr. Arvizu noted that the *ad hoc* Working Group on Administrative Burdens (AB) did not meet during the Board meeting, however, the Group had convened via teleconference in open session on January 22, 2015 and that Dr. Arthur Bienenstock, working group chairman, would report out on the actions of AB.

Dr. Bienenstock said that 14 members of the public were present at the telecon. He noted this was likely a Board record for public concern and participation in a teleconference and a reminder that NSF's communities are very interested in the topic of administrative burdens. At the teleconference, the AB group received two updates from NSF on activities related to the implementation of the Board's administrative burdens recommendations. First, NSF issued significant revisions to its Proposal and Awards Policies and Procedures guide on December 26, 2014. Many of these changes implemented the new Office of Management and Budget (OMB) uniform guidance. NSF was the only agency that met OMB's implementation deadline. They were committed to this and NSF staff worked hard to make it happen. The university research and administrative communities greatly appreciate the effort to minimize burdens. Dr. Bienenstock congratulated the team on their success.

NSF also offered a webinar on its new policies on January 27, 2015. Advanced registration hit the physical limit for the web system at 1,000 participants. And there was a large waiting list— another reminder of how much the work on improving administrative burdens matters to NSF's constituents.

Next, Dr. Cliff Gabriel, Senior Adviser in the OD and acting Deputy Assistant Director for the Directorate on Social, Behavioral and Economic Sciences (SBE) provided an update on NSF activities for implementation of the administrative burdens report recommendations. He also distributed a written document to the Board, NSF Update on

the NSB Report, *Reducing Investigators' Administrative Workload for Federally Funded Research* (January 29, 2015). Dr. Bienenstock referenced the update given by Dr. Córdova during her Director's Report and noted that the report was also available in the plenary folder in the NSB web portal. He said that the entire AB working group had read the report and agreed that it is an impressive and helpful document. He thanked the contributing NSF staff for their good work and their commitment to keeping the Board well informed. While he didn't have time to discuss the report in its entirety, he wanted to highlight a few areas.

First, Dr. Bienenstock pointed out that NSF's policy officials are leading the government in trying to reduce administrative burdens, in addition to leading the implementation of the uniform guidelines. NSF policy officials are also providing the leadership for the major cross-agency efforts to rationalize and standardize reporting requirements, public access mechanisms, standardized biographies, award terms and conditions, and the like. The AB group's recommendations emphasize how important it is to achieve harmonization across agencies. NSF's leadership is not just consistent with our recommendations, it exceeds them. It is clear, he said that NSF is dedicated to reducing burdens and is being highly effective in pursuit of that goal.

Second, for some time, NSF has encouraged staff to develop pilot programs that reduce burden. Several promising pilots are described in the report. NSF has begun holding sessions directorate by directorate to consider additional ideas to reduce PI and reviewer burden. The Board will learn of the results of those conversations at the May 2015 meeting. Dr. Bienenstock emphasized during the AB group's teleconference that it is also important to take this opportunity to reduce burden on NSF staff, not just the external community. The spirit of the AB group's report after all, is to reduce burdens in total, not shift them from PI's to NSF program officers. In NSF's report, this point is specifically emphasized.

After hearing updates, the AB group considered a draft letter related to a proposed new National Institutes of Health (NIH) policy encouraging the use of the single Institutional Review Board (IRB) for multi-site research studies. This was one of the explicit recommendations in the administrative burden's report based on extensive engagement with research communities. The AB group decided it would be helpful to send a letter to NIH to support them as they are working on this policy. The AB group discussed that letter and concerns being raised about the policy by various groups. The letter supported the policy overall and also encouraged clear guidance about the respective responsibilities of the institution housing the IRB of record and the institution where protocols would be implemented. The AB group reached consensus to send the letter, subject to some edits that were overseen by Drs. Droegemeier, Souvaine, and Bienenstock. Dr. Arvizu and the Executive Committee subsequently considered the letter, approved it, and recommended it be sent under the Chairman's signature, signifying full Board agreement. It was noted that the letter of support would be sent to NIH the following day.

Lastly, Dr. Bienenstock informed the Board that the National Academy of Sciences (NAS) had launched its new Committee on Federal Research Regulations and Reporting Requirements and New Framework for Research Universities in the 21st Century. This group is addressing one of the key recommendations from the AB group's administrative burdens report—to identify and eliminate or modify ineffective regulations. Dr. Bienenstock was invited to speak about the AB working group's report at the inaugural meeting of the NAS committee the following week. He noted that the NSB AB group would stay informed about the progress of the NAS committee going forward. In closing, Dr. Bienenstock thanked NSB staff members, Drs. Jacqueline Meszaros and John Veysey for their support of the AB working group.

Dr. Arvizu thanked Dr. Bienenstock for his leadership, tenacity, and progress on the issue of administrative burdens.

Dr. Bienenstock submitted an AB Working Group report for the record (Appendix G).

AGENDA ITEM 12: Chairman's Remarks

Dr. Arvizu then asked to hear from the Board's two *ad hoc* discussion groups on their recent activities. He turned to Dr. Maria Zuber, chairman of the *ad hoc* Discussion Group on Congressional Engagement.

***ad hoc* Discussion Group on Congressional Engagement**

Dr. Zuber mentioned that the Group was receiving good support from NSF staff and that they had been monitoring membership changes in several congressional committees. She emphasized the importance of congressional interaction and that they are encouraging Board Members to speak with legislative representatives in their respective districts to convey the seriousness that the Board takes in its governance function and its commitment to transparency and accountability in the merit review process.

Dr. Arvizu thanked Dr. Zuber and then asked Dr. Vint Cerf, chairman of the *ad hoc* Discussion Group on Communications to give a brief report.

***ad hoc* Discussion Group on Communications**

Dr. Cerf said that the Group had not yet met, but that a charter for the Group was in draft form and would be circulated among Board Members. He added that additional members for the Discussion Group are needed. He also noted that the Group would need to meet between Board meetings and that perhaps a video teleconference solution would be the best mode of operation. Dr. Cerf emphasized that outreach needs to be a joint effort and that he anticipated meeting with OLPA and EHR leadership to explore ways to use their resources and expertise. For example, he said, the Group would like to be able to repurpose NSF supported educational materials used in schools, though not always visible to the public. He also spoke of capturing talks and sound bites from articulate researchers for promotional purposes. Lastly, he mentioned that sources were available for advice to the Board and NSF such as Alan Alda, James Burke and John Hendricks, founder of Discovery Channel.

Dr. Cerf then called upon Ms. Dana Topousis, Acting Director of OLPA to discuss ongoing projects in OLPA that coincide with goals of the Communications Group.

Ms. Topousis said that over the last few months her office had been in discussions with the Kavli Foundation, which works with Alan Alda to do a number of sessions for scientists around the country and has been very successful. Ms. Topousis also mentioned that she had spoken with the Kavli communications director and the Alan Alda Center for Communicating Science at Stony Brook University. As well, she included EHR colleagues in those conversations. A meeting with this group was planned for the end of February 2015. She enquired if Mr. Alda would be willing to come to NSF to do a session for program staff. The request was received positively and interest was expressed in doing this, given the support from NSF through the years. It is possible that Mr. Alda will come to NSF in the spring, but that will be decided in the near future.

Dr. Cerf thanked Ms. Topousis and noted that he was excited that the Group could now move forward with outreach efforts and that he has some ideas that include taking advantage of the *Indicators* report and Companion to *Indicators* to help the public understand the complexities of STEM degrees and knowledge. Dr. Cerf then concluded his report.

In closing, Dr. Arvizu thanked the Members for the high level of engagement and participation in the meeting.

As there were no further comments or business of the Board, the Chairman adjourned the Plenary Open Session at 2:05 p.m.



Kim L. Silverman
Acting Executive Secretary
National Science Board

Appendices:

- A: A&O Report Submitted for the Record
- B: Joint CPP/CSB Report Submitted for the Record
- C: SEI Report Submitted for the Record
- D: CPP Report Submitted for the Record
- E: CSB Report Submitted for the Record
- F: CEH Report Submitted for the Record
- G: AB Working Group Report Submitted for the Record

**Committee on Audit and Oversight (A&O)
Open Meeting Summary Submitted for the Record
Dr. Ruth David, Chairman**

Dr. Ruth David, A&O Chairman, opened with introductory remarks that alerted the Committee to NSF's new management fee policy as published in the Federal Register, with closing date for comments due February 13, 2015. At the May 2015 meeting, the Committee will be given an update on the comments received and implementation of the new policy.

NSF Inspector General Allison Lerner introduced Mr. Sal Ercolano of Clifton Larson Allen, partner-in-charge of NSF's financial statement audit, who briefed the board on the results of the FY 2014 audit. The Committee requested a more detailed briefing about the FISMA (Federal Information Security Management Act) findings during the May meeting.

Ms. Martha Rubenstein, Chief Financial Officer, updated the Board on the status of the stabilization of NSF's financial system.

**Joint Committee on
Programs and Plans (CPP) / Committee on Strategy and Budget (CSB)
Open Meeting Summary Submitted for the Record
Dr. Anneila Sargent, CPP Chairman and Dr. Alan Leshner, CSB Chairman**

Dr. Anneila Sargent, CPP Chairman, opened the session by reminding the Board that the Annual Facilities report is critical to CPP's work, providing baseline context for deliberations over potential projects, divestments, and tradeoffs between facilities and operational expenses. Dr. Carl Lineberger, Acting CSB Chairman, added that the NSF annual facilities plan has been a primary element of the Board's role in overseeing NSF's large facilities since 2005. The annual facilities plan provides background on all Major Research Equipment and Facilities Construction (MREFC) projects and other facilities in the NSF portfolio, as well as highlighting major issues related to financial and project oversight.

With that introduction, Dr. Matthew Hawkins, Acting Deputy Division Director of NSF's Large Facilities Office, gave a presentation on the Annual Facilities Plan for FY 2015. His presentation discussed the five project stages of the MREFC process – development, design, construction, operations, and termination. He noted that the NSF portfolio covers all of these stages. He described each of the current projects in the design stage or construction stage, with emphasis on upcoming Board actions and information items, as well as costs, schedules, and construction end dates. Dr. Hawkins outlined a potential MREFC budget profile through FY 2022, including notional costs for the Regional Class Research Vessel (RCRV) and Antarctic Infrastructure Modernization for Science (AIMS). NSF's projected operational cost profiles are carefully considered by the directorates, with each directorate managing their facilities budget differently. Several renewals, recompetitions, and divestments are now under discussion, and the Board will be kept apprised of these.

The comment period for the Large Facilities Manual (LFM) ended in January 2015. This document discusses contingency policy and risk management as well as cost analyses for all of the MREFC projects. The LFM will be finalized no later than April 2015 and will reflect NSF's Management Fee Policy, which is currently being revised. The Large Facilities Working Group is standardizing large facilities lexicon and NSF-wide roles and responsibilities. Board Members noted that NSF does well in estimating project costs but not as well in estimating schedules, which may reflect the unique nature of the facilities and a desire for quality relative to a specific timeline. Dr. Hawkins indicated that NSF is aware of this and taking steps to improve time estimates. Board Members were also concerned that operational costs may be growing as a percentage of directorate budgets and were assured that this is carefully considered during renewal/recompetition and divestment stages. One Member noted that if operations and maintenance budgets are flat, the purchasing power is diminished, with potential adverse impacts on facilities. Finally, it was noted that there may be a need to further stimulate the scientific community for new ideas at the frontiers of science. Dr. France Córdova acknowledged this and talked briefly about steps taken at NSF to stimulate this discussion at the highest levels.

**Committee on Science and Engineering Indicators (SEI)
Open Meeting Summary Submitted for the Record
Dr. Kelvin Droegemeier, Chairman**

The Committee began the meeting with an overview of *Science and Engineering Indicators (Indicators)* 2016 production.

The Committee and other NSB Members were asked their preferences for 2016 chapter review assignments. Some Members indicated that they would be comfortable being given any chapter assignment. The Chairman and staff will follow-up with the Members on their preferences and assignments.

The Committee also continued their discussion on the cover design for the *Indicators 2016* Digest. Staff will follow-up with Members to obtain additional feedback on their preferences.

Dr. Droegemeier provided an update on the NSB letter to the U.S. Census Bureau on the status of the “Field of Degree” question on the American Community Survey. A final decision on retaining this item has not yet been made. The Board will be informed as soon as additional information is available.

The Board was provided with a revised draft of the *Indicators 2014* companion report on the STEM workforce. The revision incorporated suggestions from Board members after a January 2015 SEI teleconference. The committee had only minor comments on the report. It was agreed that the main goal of the report is to change the way issues on STEM workforce are framed and to bring clarity to the debates that are occurring.

NSB Communications Director Nadine Lynn presented an outreach strategy to the committee. Several members commented that the outreach strategy should be targeted based on the audience, and they made suggestions on how to do this. Dr. Sethuraman Panchanathan suggested that a short flyer should also be produced that summarized the main report.

The committee had voted during the January 2015 teleconference to send the companion report to the full Board for approval pending final revision. Those changes have now been made; the draft report will be presented to the full Board at the plenary for final NSB approval.

The discussion on the broader issue of *Science and Engineering Indicators* engagement and outreach opportunities (agenda item 5; [NSB/SEI-2015-02](#)) was deferred while staff continues to work on materials for the Committee’s consideration. Staff will follow-up with the Committee before or during the next meeting.

**Committee on Programs and Plans (CPP)
Open Meeting Summary Submitted for the Record
Dr. Anneila Sargent, Chairman**

Following approval of the minutes from the open session of the November 2014 CPP meeting, Dr. Anneila Sargent drew attention to the updated CY 2015 schedule of action and information items for NSB review. She pointed out the many items scheduled for the upcoming calendar year. Dr. Sargent also emphasized that this is a planning calendar, and thus all action and information items are tentative and subject to changing NSF review schedules.

Dr. Sargent then drew attention to a written information item that was provided in advance of the meeting, the annual update on NSF's Arctic Logistics contract. She noted that this was the third annual report. In all three, Polar Programs support contract spending stayed very close to their program plan and, for the future, the ratio of support costs to science grants was not expected to change substantially. She therefore suggested that the Committee remove the formal requirement for an annual update, requesting updates when there are significant changes. The Committee raised some issues related to this and Dr. Sargent agreed to explore next steps. She clarified that specific details for update requirements will be discussed offline with the Executive Committee.

Next, CPP heard an information item on the status of NEON. Dr. Jane Silverthorne, Deputy Assistant Director for the Directorate for Biological Sciences (BIO), and Dr. Elizabeth Blood, program director for NEON, gave the presentation. Dr. Blood informed the Board that NEON is 60 percent through construction and beginning early operations; by summer 2015, an additional 13 domains will be in operation. Dr. Blood also profiled examples of early NEON science.

The presentations stimulated a very lively discussion. Because of time constraints, Dr. Sargent asked that the Committee submit any further questions to Dr. John Veysey from the NSB Office and Dr. Sonya Mallinoff, CPP Executive Secretary, who will ensure a response from the Foundation.

Dr. Fleming Crim, Assistant Director for the Directorate for Mathematical and Physical Sciences (MPS), briefly introduced Dr. James Ulvestad, Division Director for Astronomical Sciences (AST) within MPS. Dr. Ulvestad began by providing a framework for the three MPS information items on the agenda. He noted that all three facilities became due for re-competition solicitations at the same time. Thus, to streamline and better stage the process, NSF had kept one (NOAO) on the original schedule, requesting extensions to the current awards for the other two (Gemini and NRAO/ALMA).

Dr. Ulvestad then gave a brief overview of the Gemini Observatory, the largest optical/infrared facility available to the general observing communities of the U.S. and

partner countries. He informed the Committee that the competition of Gemini management for 2017-2022 is now underway. As already noted, this time frame for competition requires a one year extension of the current award to the managing organization, Association of Universities for Research in Astronomy (AURA). NSF plans to bring an action item before the Board in May 2015 for the extension. The management competition process is continuing simultaneously and the Board will likely see an item regarding that aspect at the August 2015 meeting.

Next, CPP heard an information item on NOAO. Dr. Vern Pankonin, program director for NOAO, gave the presentation. NOAO is a Federally Funded Research and Development Center (FFRDC) sponsored by NSF, and is currently under competition for management and operations. He emphasized that this management competition solicitation stipulated a transformation of mission and scope for NOAO, a requirement that was motivated primarily by funding reductions recommended in the 2012 Astronomy portfolio review. He also noted that a transformation plan had already been implemented in FY 2014 and 2015, with NSF guidance. The goal is to provide a solid foundation for growing a leadership role in U.S. optical and infrared astronomy over the new award period. NSF plans to bring an action item on the award before the Board in May 2015.

The final AST information item on Radio Astronomy Facilities was presented by Dr. Phil Puxley, program director for the National Radio Astronomy Observatory (NRAO) /ALMA. Dr. Puxley informed the committee that the major construction activities on the Atacama Large Millimeter/submillimeter Array (ALMA) are complete, and that early science operations are underway. He also stated that NSF plans to bring an action before the Board in May for a one-year extension to the current cooperative agreement with the NRAO management organization.

Next, CPP heard an update on Blue Waters and Strategic Planning for High Performance Computing (HPC). Dr. Jim Kurose, Assistant Director for the Directorate for Computer and Information Sciences and Engineering (CISE), gave the presentation. Ms. Irene Qualters, Division Director for the Division of Advanced Cyberinfrastructure Programs (ACI) in CISE, was at the table for the discussion. Dr. Kurose noted that Blue Waters is currently enabling science across many disciplines, that is not otherwise possible. The first year review shows that the project is on track and risks are under control. He also noted that Blue Waters is just one component in NSF's large, diverse set of HPC investments, and that demand is growing for national computational resources. Moving forward, ongoing community engagement will help to inform strategic directions.

Given the potential impact of the recommendations in the National Research Council report on "Future Directions for NSF Advanced Computing Infrastructure", Dr. Peter Lepage requested that the committee be briefed as soon as possible on NSF response to the recommendations.

**Committee on Strategy and Budget (CSB)
Open Meeting Summary Submitted for the Record
Dr. Alan Leshner, Chairman**

Dr. Alan Leshner, CSB Chairman was absent during this meeting, thus Dr. Carl Lineberger presided as the acting Chairman.

Mr. Michael Sieverts, Division Director, Budget Division/BFA, updated the Board on the FY 2015 Appropriations. He began by summarizing the budget activity since the November Board meeting. The first Continuing Resolution (CR) was through December 11, 2014. Two short term CRs provided funding through December 16, 2014. The Consolidated and Further Continuing Appropriations Act, 2015 was signed by President Obama on December 16, 2014. NSF's total funding for FY 2015 is \$7.34 billion. This is the first time NSF's appropriation has been greater than Request since 2004 (aside from ARRA funding in 2009).

The Research and Related Activities (R&RA) and Education and Human Resources (EHR) appropriations are each +2 percent above FY 2014. R&RA is above Request, which was essentially equal to FY 2014. The EHR appropriation is below Request but contains guidance to increase funding in CyberCorps: Scholarship for Service, Advanced Technological Education and Broadening Participation. The offsets are at NSF's discretion. The NSB, OIG, and MREFC appropriations are at the Request level. The Agency Operations and Award Management budget was funded below Request, but most of the reduction is associated with the relocation, where there is schedule flexibility.

Dr. France Córdova, NSF Director, updated the Board on the President's FY 2016 Budget Request to Congress for NSF. The FY 2016 Request calls for \$7.72 billion for NSF, an increase of \$379 million over FY 2015, which is an increase of 5.2 percent.

The budget request includes support for new approaches to research on sustainability, global climate, the food-energy-water nexus, cognitive science and neurosciences, and risk and resilience. It promotes advanced manufacturing research and clean energy activities and sustains investments in cybersecurity research. It also supports a range of investments in developing the science, technology, engineering and mathematics (STEM) workforce, including new efforts to broaden participation in STEM fields. Cross-disciplinary activities for FY 2016 include priority investments to address issues of major scientific, national and societal importance including: Understanding the Brain (\$144 million), Innovations at the Nexus of Food, Energy and Water Systems (\$75 million), Risk and Resilience (\$58 million), and NSF INCLUDES (Inclusion across the Nation of Communities of Learners that have been Underrepresented for Diversity in Engineering and Science) (\$15 million). The Major Research Equipment and Facilities Construction (MREFC) Request is \$200 million and Agency Operations and Award Management is \$355 million.

**Committee on Education and Human Resources (CEH)
Open Meeting Summary Submitted for the Record
Dr. Deborah Ball, Chairman**

The Committee on Education and Human Resources (CEH) met in open session.

Dr. Deborah Ball, Chairman of CEH, framed three key constituencies for STEM human capital development: 1) future scientists and engineers, 2) people preparing for STEM-involved work; and 3) the broad American public, which needs to be aware of, value, and support science, technology, engineering, and mathematics.

Dr. Sian Beilock, University of Chicago, presented an overview of her research program on the ways in which academic attitudes such as anxiety develop and are related to performance. She highlighted a series of studies ranging from laboratory studies of performance among college students, classroom studies of children, studies of family interventions and functional magnetic resonance imaging (fMRI) studies of anxiety to illuminate the ways in which a program of research in education can provide insight on learning and suggest interventions to improve learning.

Dr. Na'ilah Suad Nasir, University of California, presented an overview of her research program on the ways in which culture and race shape the conditions of learning in and out of school. Her research centers on how context and culture interact with and shape learning opportunities and outcomes. She discussed relationships between racial and ethnic identity and learning and achievement in mathematics, as well as how institutional structures in the urban high schools she has studied affect experiences of African American students. Her work suggests ways to organize schools to capitalize on opportunities for all students to learn.

The Board asked several questions focusing on what would be needed to enact programs of research with broader impacts, using examples from the scientific infrastructure in other disciplines. The speakers discussed ways of scaling promising efforts to link research and educational practice, to simplify barriers to collaboration between researchers and schools and universities, as well as the need for data sharing.

***ad hoc* Working Group on Administrative Burdens (AB)
Open Meeting Summary Submitted for the Record
Dr. Arthur Bienenstock, Chairman**

The *ad hoc* Working Group on Administrative Burdens met in open teleconference session on January 23, 2015. Fourteen members of the public called in to listen to the telephonic meeting.

The Group discussed sending a letter of comment to the National Institutes for Health (NIH) relating to a proposed new NIH policy promoting the use of the single Institutional Review Board (IRB) for multi-site research projects. The Board's 2014 report on *Reducing Investigators' Administrative Workload for Federally Funded Research (NSB-14-18)* explicitly encouraged the use of a single IRB for multi-site studies. A draft comment letter was circulated in advance and members reached consensus to send the letter, subject to some edits that were to be approved by Drs. Bienenstock, Droegemeier and Souvaine. The letter was to be forwarded to the Board Chairman, Dr. Dan Arvizu, before submission to NIH.

Dr. Arthur Bienenstock provided an update on NSF's implementation of the OMB's new Uniform Guidance (Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, 2 CFR Chapter I, Chapter II, Parts 200, 215, 220, 225, and 230).

NSF issued significant revisions to its Proposal and Award Policies and Procedures Guide on December 26, 2014, most of which were changes made in order to implement the new Guidance. This issuance met OMB's implementation deadline. NSF was the only agency to meet the deadline.

Dr. Cliff Gabriel provided a briefing on NSF's activities to implement the Board's administrative burdens recommendations. In spirit of the Board recommendations, and in some ways exceeding them, NSF has taken leadership positions in interagency efforts to harmonize and streamline regulations on project reporting, public access, common terms and conditions, and cost sharing. They are also considering ways to get awardee institutions to share best practices. Internally, they continue to pursue pilots for just-in-time delivery of some proposal components and streamlined budgets. They have begun meetings with program directors at the directorate level to identify additional possible steps to reduce PI burden without damaging the quality of merit review. The working group encouraged NSF to ensure that as new steps are designed, they do not increase burden for NSF program directors and staff since the intent of the Board report was to reduce burden, not to shift it.