

**BIO Advisory Committee
November 17-18, 2005
Stafford I – Room 375**

Summary Minutes

THURSDAY, NOVEMBER 17, 2005

Directorate Updates

Welcome and Approval of Minutes

Dr. Susan Stafford, Chair of the Advisory Committee for Biological Sciences (BIO AC), convened the Fall 2005 meeting at 9:00 am. Dr. Stafford welcomed the new Assistant Director for the Directorate for the Biological Sciences (BIO), Dr. James Collins, along with the other members and guests. Dr. James Collins greeted the AC and noted that Dr. Arden Bement had charged him with helping the larger community shape the discipline of biology during his tenure at NSF. The Committee unanimously approved the minutes for the April 2004 meeting.

How do we operate the BIO of today while becoming the BIO of tomorrow? – Dr. James Collins

After acknowledging current budget realities, Dr. Collins posited the challenge he saw facing BIO, “How do we operate the BIO of Today while becoming the BIO of Tomorrow?” He discussed the processes and challenges of incremental and radical change, BIO’s charge to support “transformative research” as exemplified by the Plant Genome Research Program (PGRP) and the National Ecological Observatory Network (NEON), and the role of BIO’s core competencies (the collective learning in the organization) in directing change. He challenged BIO to take the lead in transformation while minimizing the disruption associated with radical change, fund the best US science, enable international networking, and break down internal barriers between BIO divisions and between BIO and other NSF directorates.

Plant Genome Research Program (PGRP) – Dr. Machi Dilworth, Division Director, Division of Biological Infrastructure (DBI)

Dr. Dilworth presented a brief history of PGRP, citing the importance of the initial investment package, budgetary growth, entrepreneurial management, use of the NSF merit review process, interagency working groups, commitment to basic research, timely publication, data sharing and international coordination as all contributing to the program’s success. She also identified benefits to the larger plant research community from PGRP: providing a forum for international collaboratories, increasing the visibility of plant science and supporting plant research outside of the program through venture funding.

National Ecological Observatory Network (NEON) – Dr. Elizabeth Blood, (DBI)

Dr. Blood described the development of NEON, which began with community workshops, reports and a NAS study. She then updated the Committee on its progress. She described the potential of NEON to: nurture “citizen scientists” by engaging local communities in research efforts throughout the nation; transform ecology and field biology by providing field deployed sensing technologies across the US; and create novel collaborative environments. The suite of best practices developed during the planning and construction of NEON may also serve as models for future distributed infrastructure projects. Dr. Blood explained that BIO needs to plan ahead fiscally for NEON’s maintenance, operations, and utilization phase. She stressed the importance of cyberinfrastructure, including utilizing the extant Internet backbone, for the success of NEON.

Cyberinfrastructure

NSF Cyberinfrastructure Strategic Plan – Dr. Deborah Crawford, Office of Cyberinfrastructure (OCI), Interim Director

Dr. Crawford briefed the AC on the role of the newly created OCI and its strategic planning activities that began in summer 2005. She presented the components of the draft NSF Cyberinfrastructure Strategic Plan: High Performance Computing, Data, Data Analysis & Visualization, Collaboratories, Observatories and Virtual Organizations, and Learning and Workforce Development. She also discussed the early summer 2006 Vision Document completion timeline. NSF's role in cyberinfrastructure (CI) activities has the potential to revolutionize how and what science is being done and by whom. Dr. Crawford cautioned the AC against assuming that the High Performance Computing (HPC) community would dominate NSF's CI activities and stated that NSF's goal was to ensure that all CI components would be thoroughly developed in the Plan.

The BIOAC and Dr. Crawford discussed:

- How increasing the efficiency of “mundane tasks”, like improving access of the scientific community to networked data, may have the greatest impact on scientific advances.
- The need to mobilize non-HPC communities and translate the importance of their needs to NSF and appropriators so these needs are not overlooked in the CI strategic plan.
- The importance of supporting software development and hardening that serves biological discovery by combining data from many, small labs into a single, large knowledge network.
- The value of interagency cooperation but not at the expense of providing for the specific needs of the community supported by NSF.
- The necessity of including each Directorate's needs in CI initiatives.

Cyberinfrastructure in the Biological Sciences (CIBS) Working Group – Dr. Michael Willig, Division Director, Division of Environmental Biology (DEB)

Dr. Willig reviewed the visions and goals in the CIBS report. He suggested some actions that BIO could undertake related to the NSF strategic plan, including: supporting workshops to obtain information on biologists' cyber requirements, especially related to data and information management; requiring all BIO POs to attend CI workshops; holding a CI-BIO forum at NSF; and recruiting BIO Program Directors with cyber expertise to contribute to BIO's cyber activities and represent BIO on interagency cyber committees.

The BIOAC discussed:

- BIO's imperative to be involved in early CI development: (1) to allow BIO's CI needs to be actively addressed and (2) to broaden participation since CI can democratize the scientific playing field by providing the infrastructure needed for national and international collaborations.
- Younger scientists brought up in a CI world will expect CI to be a ready and usable resource. To prepare BIO to meet the expectations of people at all scientific levels, we need to develop CI in biology.
- As a way to implement and advance BIO-relevant CI initiatives, the AC suggested engaging BIO Post-docs.

Report on Recent NSF Cyber Workshops – Dr. Joann Roskoski, Executive Officer, BIO

Dr. Roskoski reviewed the two most recent HPC workshops and detailed NSF's plan to fund the acquisition of High Performance Computers (HPCs) in 2006 and subsequent years, emphasizing the importance of BIO's involvement with HPC initiatives. The goal of the first meeting (High Performance Computing Workshop, Sept. 9, 2005) was to discuss with vendors and resource providers different solicitation models for acquiring HPCs while the second meeting (Request for Input: HPC System Performance Requirements and Benchmarks, Oct. 18, 2005) was to obtain input on which suite of bench marks should be used to evaluate proposed HPCs. Dr. Roskoski

gave a synopsis of the discussions from the meetings: general agreement that NSF should solicit proposals from resource providers who would work with machine vendors in crafting HPC acquisition proposals; poor representation from the social sciences and engineering at the Chicago meeting; need for HPCs that can run multiple programs or are more general in function; need for software and code creation to test new computers; and desire for continued community-wide workshops.

NSF Cyberinfrastructure SWOT Teams – Updates – Drs. Manfred Zorn (DBI), Christopher Greer (DBI), Elizabeth Blood, and Sally O'Connor (DBI)

The speakers, who each represent BIO on separate working groups charged with drafting the individual chapters of NSF Cyberinfrastructure Strategic Plan, presented updates on the status of the plan. Zorn pointed out the importance of HPC by suggesting that what is considered a HPC today, may be a desktop computer in the future. The working groups were recently formed (the Education and Workforce Development working group had not yet met at the time of the AC meeting) and all teams are working on an aggressive schedule to complete their sections.

The BIOAC discussed:

- The rushed timeline for drafting the NSF Strategic Plan and the negative impact it will have on integrating input from community workshops.
- Their concern that current funding for CI is designated primarily for HPC acquisition, so there is little left for other CI solicitations.
- The importance of discerning from PIs what CI advances will be most beneficial to their research. The AC suggested data compatibility, access control, and training issues are currently the highest cyber priorities in biology.
- Possibilities of partnerships with software and middleware providers for advancing CI initiatives.
- HPC solicitations should explicitly recognize the time commitments needed to create and harden new codes.
- Encouraging NSF to lead in advancing HPCs that can answer multiple questions and to consider non-HPC investments as cutting edge.

Cyber Discussion – Next Steps for BIO – Dr. Robert Robbins, Chair, BIO AC Cyber Working Group

Dr. Robbins led the discussion, stressing the importance of optimizing the minimum cyberinfrastructure installation as a way to use funding most efficiently, achieve the most “best science” and increase the number of people, especially minorities, who are able to do science by increasing their access to data and collaborations. Noting the importance of CI in BIO, Dr. Collins charged the Committee to think about the large-scale cyber needs of biology, using PGRP and NEON as differing models. The AC discussed the need for BIO to engage the community – by staying globally aware yet still connected with the PIs doing the current research – and consider the ethical/legal/social implications of cyber-enabled transformative research. Dr. Collins also suggested meeting with other ACs (from SBE and CISE) during the next meeting to jointly discuss CI endeavors.

Discussion of Current Issues in BIO – Dr. James Collins

Dr. Collins continued his earlier presentation, stressing that BIO's role was to fund interdisciplinary research and education, take risks and be entrepreneurial when planning programs, and build off the successes of past initiatives. He presented the idea of BIO as “federated competencies,” highlighting BIO's potential to work integratively across the directorate and throughout NSF. He reviewed the FY06 budget, noting the yearly decreases in BIO funding since FY03. He saw four goals for BIO no matter the budget environment: (1) understanding the nature of change, (2) supporting the creativity needed to integrate research projects, programs, and networks inside and outside of NSF, (3) supporting short and long term research and training across all of Biology while sustaining the world class skills and infrastructure needed to identify the very best research, and (4) keeping in mind the lessons of program transformation, as seen in PGRP.

The BIOAC discussed:

- Possible causes and implications of decreasing success rates, including the loss of NSF's prestigious reputation and how difficult budgetary decisions will be made.
- Past grass-root successes, like PGRP, that generated funds from Congress for innovative research by citizen lobbying groups that underscored "international economic competitiveness potential" as a selling point.
- Dr. Ellen McCulloch-Lovell suggested BIO use the NAS report describing the crisis in science education and its potential impact on the US as an incentive to appropriators to increase NSF funding.
- The importance of intrinsic citizen support in generating funds from appropriators for basic scientific research.

FRIDAY, NOVEMBER 18, 2005

Susan Stafford greeted Norma Allewell, now present at the meeting.

Broadening Participation

Broadening Participation Working Group – Dr. Thomas Brady, Division Director, IOB
Dr. Brady reviewed NSF's 2004 Minority Serving Institution (MSI) Report to Congress and the steps BIO is taking to broaden participation. In the last fiscal year, Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), and Tribal Colleges (TCs) received only ~4% of NSF's direct funding. Dr. Brady discussed the most recent BIO-funded Quality Education for Minorities (QEM) Workshops, citing their ability to increase knowledge about NSF and provide grant-writing workshops to attending researchers. He also described the new Research Initiation Grants and Career Advancement Awards (RIG/CAA) program in BIO whose goal is to increase the number of competitive proposals submitted to BIO from individuals underrepresented in the S&E enterprise.

The BIOAC discussed:

- NSF programs that build linkages between MSIs and other institutions of higher learning (IHEs) to provide opportunities for collaborative work and expose undergraduates to scientific research careers (i.e. REUs, C-RUIs, Minority Post-Doc travel grants).
- Disparity between applications from underrepresented groups and the extent to which NSF can establish mentorship programs on site to aid grant writing, proposal submission and award handling.
- The inability for some PIs to travel, especially those from TCs, and the need to hold QEM workshops (as well as similar programs) in those geographic areas. Dr. Brady said divisions in BIO are committed to doing outreach visits to every TC in this country and will consider hosting satellite meetings on site at TCs in addition to QEM workshops.

Discussion with Dr. Arden Bement, Director, National Science Foundation

The AC discussed four issues with Dr. Bement: (1) how to manage NSF in 2005 and position NSF for long term success and growth, (2) what can the AC do to help the CI initiative, (3) how should we consider falling success rates and how can we better use metrics to assess NSF programs, and (4) our inability to properly broaden participation in the sciences.

The BIOAC and Dr. Bement discussed:

- The NSB is articulating a vision and NSF is drafting a new strategic plan for NSF. Dr. Bement welcomed comments on these documents
- The transformational impact CI will have on science due to a heightened ability to manage data and transform it into new knowledge. Advances in nerve synapse research were cited as an example.

- CI needs must be prioritized since resources are finite, but NSF is striving to maintain a flexible schedule in the beginnings of the program.
- Importance of infrastructure, training, global practices, and interagency coordination to prevent duplicative efforts in the CI initiative.
- Need for NSF to take a more active role in funding and in outreach to MSIs, as investments to HBCUs, HSIs, and TCs have been static.
- The role of programs like NEON to involve citizens and educational institutions in science – helping to form “citizen scientists” which will in turn create a more scientifically literate society that can understand issues like climate change or stem cell research.
- Using both quantitative and qualitative metrics in determining grant and long-term program outcomes and tightening up accountability programs to get metric data.

Committee of Visitors Reports

Division of Molecular and Cellular Biology – Dr. Mary Lou Guerinot

Dr. Guerinot reviewed issues raised by the MCB COV: tension caused by funding larger programs like Frontiers in Integrative Biological Research (FIBR) or Microbial Observatories (MO) at the expense of supporting unsolicited single-PI awards; increased staff workload due to increasing proposal numbers; need for more transparency to outside community in cluster organization; and difficulties in obtaining traineeship numbers associated with awards. The MCB COV considered post-doc programs essential. Overall, the MCB COV found MCB performed at an exemplary level due in part to staff dedication, quality of funded science and education, and commitment to broadening participation. The AC unanimously accepted the MCB COV report.

Division of Integrative Organismal Biology – Dr. Richard McCombie

Dr. McCombie reviewed the issues raised by the IOB COV: lack of available metrics to determine scientific outcomes of awards versus dollars spent; increased staff workload (the IOB COV recommended putting more responsibility on investigators to self-report progress); lingering confusion over cluster reorganization; overrepresentation of rotating PDs; and drop in multi-disciplinary grants. The IOB COV was impressed with IOB’s initiatives to increase diversity, sustain a collaborative environment, and the value of the “Self-Study Guide.” The AC unanimously accepted the IOB COV report.

The BIOAC discussed:

- The current method to query Criteria Two compliance (using a 5-word metric) is less than ideal, and investigator responses regarding Criteria Two need to be more substantive.
- Problems with the quality of mail-in reviews, which are generally substandard.
- Dr. McCombie suggested using a post mail-in review conference call for ad-hoc panels.

Discussion – NSB Vision Document

In response to NSB’s call for public comment on the *NSB 2020 Vision for the NSF* (<http://www.nsf.gov/nsb/documents/2005/nsb05142/nsb05142.pdf>), members of the AC read and created a list of concerns about the document. The issues included: (1) education and diversity topics appearing late and understated in document, (2) lack of emphasis on building infrastructure into CI initiatives, (3) shift of funding priorities to individuals and away from integrative, large scale projects, (4) pessimistic tone throughout document, (6) reliance on vague terms or jargon and (7) basic grammatical mistakes. The AC drafted a letter to the NSB elaborating these concerns. The AC also noted that the lack of women, minorities, and representatives from top-ranked universities on the NSB might have led to shortcomings in the vision document.

BIO and the BIO AC and the BIO AC and BIO – Drs. Susan Stafford and James Collins

The AC discussed how they can help BIO and how BIO can help the AC. The AC discussed taking a more active role in planning BIO’s future, reinforcing education and diversity initiatives, looking at CI’s role in BIO, and participating with the Legacy Infrastructure Network for Natural Environments (LINNE) project. Dr. Collins charged the Committee with providing the energy for

new endeavors and reassured the Committee BIO can help with staffing committees and organizing activities.

The BIOAC discussed:

- Using pre-workshop position papers from participants as a way to increase efficiency and success of workshops.
- Maintaining consciousness of how and what you are monitoring when determining programmatic success.
- Importance of visionary documents in determining direction and success of programs.

Future Business

- Call for nominations for new members
- Call for BIO AC reps for the DEB and EF COV
- Spring Meeting

The BIOAC discussed:

- Hosting a shared Spring AC meeting with the Advisory Committees from Social, Behavioral, and Economic Studies (SBE) and Computer & Information Science & Engineering (CISE) to discuss CI.
- Starting the second morning with a 30 min. executive session to summarize business.
- Bringing in an outside distinguished speaker to address the AC, such as Tom Friedman.

The AC concluded with unanimous approval of the meeting's progress. The meeting ended at 2:00pm.

Susan G. Stafford, Chair

Date