

**Response to Recommendations from the Committee of Visitors (CoV)
for the
Division of Biological Infrastructure (DBI)
June 12-14, 2010**

Introduction

The Division of Biological Infrastructure expresses its sincere appreciation to the members of the Committee of Visitors for their insightful observations and constructive recommendations. It was evident that each member of the CoV was interested in the welfare and development of the diverse programs in DBI and the science communities that are served by these programmatic activities.

In general, the Report of the CoV is favorable with respect to the operations and management of the various programs and activities of DBI, although a number of important recommendations were made to improve upon current activities and practices.

BIO is particularly appreciative of the CoV's view of the importance of DBI to BIO and of the current unique window of opportunity for DBI, specifically with respect to cyberinfrastructure. We will strive to realize that opportunity through partnerships within BIO, between BIO and OCI and other parts of NSF, and with other agencies, domestic and international. Finally, the CoV's emphasis on DBI's need to focus on the impact of our investments is both important and timely.

RECOMMENDATIONS AND RESPONSES

Section 1 – Infrastructural Challenges

Recommendation 1.1. Building on the progress described in the updated response to #8 from the previous CoV, as well as a recent DBI strategic planning document on infrastructure life cycle costs and sustainability (see below), we recommend that DBI catalyze the development of a cyberinfrastructure research agenda across the thematic areas of the BIO directorate. This agenda should identify both strategic opportunities and the appropriate scale of investment needed for their implementation. This agenda should allow DBI to leverage significant NSF-wide investments, through OCI, in support of new and expanded programmatic opportunities for transformational research with high impact on the BIO directorate and NSF.

Response 1.1: The Directorate agrees on the importance of DBI taking a leadership role in catalyzing development of a cyberinfrastructure research agenda for all of BIO. DBI staff are in the process of funding the first of a series of community workshops and are also actively engaged in a variety of activities with the NSF Office of Cyberinfrastructure.

Context: The Updated Response #8 from previous CoV: Infrastructure should enable research; persistent infrastructure should transform a field. There are at least three modes for continuing to provide BIO with critical input and relevance.

- Program to Program. This involves training of new Program Officers in DBI to be proactive to meet other BIO program officers, to solicit input on proposals and program announcements, and where appropriate to jointly review proposals.
- Leadership in cross-BIO activities:

- Dimensions of Biodiversity: Cyberinfrastructure led by Reed Beaman and Workforce led by Diana Anderson.
- Digitization of Biological Research Collections, involving Reed Beaman and Carl Taylor.
- Innovations in Biological Imaging and Visualization led by Steve Ellis, with active participation from MCB and DEB.
- Influencing and Leading NSF-wide activities.
 - DBI is heavily involved in components of Cyberinfrastructure for the 21st Century (CF21) (see Appendix A). Also, by developing the CI requirement of Dimensions, DBI plans to influence the shape of CF21 activities.
- Note: Accomplishing these activities requires recruiting outstanding candidates to “rotating” and permanent staff (note the recent hire of a permanent ABI program officer, who will build ties with CISE); training of program officers to be proactive in working across programs, divisions, directorates and agencies; and having program officers pose questions of CI, instrumentation, and workforce development needs. By reviewing and assessing progress in annual performance evaluation, these approaches can be reinforced and success in these areas can be recognized.

Recommendation 1.2. The CoV recommends that DBI continue its critical support for these long-term resources and expand opportunities for synergy within the BIO directorate to optimize the programmatic impact of these resources. There was some feedback from other divisions within BIO suggesting that DBI is perceived as performing a service function, as opposed to enabling bona fide scientific activity. Thus, the committee recommends that DBI, with the support and assistance of the higher levels of BIO, take a more proactive role in (a) promoting the use of the infrastructure it supports for scientific discovery, and (b) communicating the transformative impact of these resources to the wider community.

Response 1.2: BIO appreciates these comments and that DBI has already begun to increase outreach activities within NSF and to the broader community to emphasize the critical and transformative impact of infrastructure investments (see also Response 1.1). Specifically DBI is actively leading in activities such as Digitization and Dimensions to help define the approaches for long-term sustainability of resources.

Recommendation 1.3. The CoV recommends that NSF provide latitude in support of DBI leadership for the creative development of new initiatives within BIO, more broadly within NSF, and with agency partners, particularly in the area of cyberinfrastructure.

Response 1.3: DBI leadership is playing an increasingly proactive role within BIO, across NSF, and with other Federal agencies to develop creative new initiatives, particularly in the area of cyberinfrastructure. Specifically, the DBI Division Director and several of the DBI Program Directors are actively involved in the development of the new Cyberinfrastructure Framework for 21st Century Science & Engineering (CF21), the Computing in the Cloud Activity, and the new Software Institutes. See Response 1.1. We will continue to work with the community of researchers, centers, and longer-term

programs to articulate requirements and promote CI support for biological sciences investments.

Recommendation 1.4. To complement internal strategic planning at NSF, the CoV recommends that the agency undertake an external assessment and study (by, for example, the NAS) of these opportunities and possibilities for synergy at all levels: within and across programs at DBI, BIO and NSF.

Response 1.4: While BIO agrees that the recommended external assessment and study would be a useful activity, it is beyond the purview of the Directorate to implement this recommendation on behalf of the agency. This recommendation will be conveyed for consideration at higher levels within NSF.

We note, however, that BIO provides core support (through DBI) to the Board on Life Sciences (BLS) of the National Academy of Sciences. Two years ago, DBI encouraged the BLS to consider a study of infrastructure needs in biology as supported by NSF. NAS accepted the suggestion. BLS has convened 2 sessions at its regularly scheduled meetings to discuss infrastructure needs in biology with DBI, other NSF organizations (Engineering), and other Federal agencies (Department of Energy, National Institutes of Health, Department of Homeland Security). This activity is expected to continue and will perhaps lead to a focused NAS study.

Finally, the CoV's recommendations are encouraging with respect to focused efforts underway to stimulate external input at the program level through workshops activities that seek to identify emergent issues in critical areas such as collections digitization, long-term sustainability, and changing use of biological field stations.

Recommendation 1.5. The CoV recommends that DBI seeks to engage the relevant communities more closely in their leadership efforts, including those that originated in DBI. The World Wide Web (W3C) consortium and the federal government wide data.gov in particular come to mind. That engagement brings the opportunity not only of significant scientific advancements, but also very substantial cost savings by leveraging wider investments in computational infrastructure. DBI should also maintain close contact and interface with a number of large scale initiatives, such as the Plant Genome Research Program (PGRP) and the National Ecological Observatory Network (NEON), that were incubated by DBI and later moved to other offices within BIO. DBI should also pay attention to supporting and interfacing with grass roots networking efforts that leverage other resources external to NSF to accomplish their mission. One example is the Global Lake Ecological Observatory Network (GLEON).

Response 1.5: We agree in principle with this recommendation to engage the relevant community. Specific activities will involve partnerships and input from the community. For example, as DBI discusses issues of sustainability, it makes great sense to involve individuals from the data.gov activity. We especially appreciate your comments encouraging DBI to remained engaged with large scale BIO projects and activities such as PGRP and NEON, and to integrate them into their thinking along with resources and activities such as iPlant, Dimensions/Digitization, BIO Centers, and other BIO activities

that may arise over the course of the next several years. DBI will harness the input from these communities in their discussions with OCI. On the other hand, OCI's interest in virtual organizations can help BIO in considering grass roots activities such as GLEON, and others that are likely to come from BIO investments in Research Coordination Networks (RCN). In general, we also see a change in the needs of the biology community, and that our programs in infrastructure need to accommodate multiple scales in infrastructure.

Section 2 – Impact Metrics

Recommendation 2.1. Develop an electronic application process that will facilitate having the applicant enter this information in a way that can be integrated with the current electronic information database.

Response 2.1: It is beyond the purview of the Directorate to implement this recommendation on behalf of the agency. This recommendation will be conveyed for consideration at higher levels within NSF.

Recommendation 2.2. Evaluate the effectiveness of the e-jacket tools. Request that PIs classify proposals according to disciplines represented, as well as classify research activities in terms of NSF mission activities found in the DBI self study, page 23. Another option might be to study co-authorship and co-funding networks using newly available technologies (e.g. that used by BioMedExperts) to aid in assessment of the breadth of impact of DBI across BIO.

Response 2.2: This recommendation consists of two parts. For the PIs classifying proposals according to discipline, it is beyond the purview of the Directorate to implement this recommendation on behalf of the agency. This recommendation will be conveyed for consideration at higher levels within NSF. For other approaches, we agree to the need to measure impact of our investments. In particular we will be exploring this issue in the series of workshops on sustainability, which will consider how to measure impact of infrastructure investments on the community.

Recommendation 2.3. Improve assessment of education/training and disciplinary association throughout BIO by tracking of undergraduates participating in research through standard REU supplements.

Response 2.3: DBI agrees that it would be useful to begin accumulating this tracking data. As discussed with the CoV, BIO has initiated an activity to determine the baseline investments in undergraduate education/training. While analysis of investments made via REU supplements to individual awards was not part of that initial activity, we will pursue methods to include these investments in future analyses.

More generally speaking, REU sites are developing plans for being able to assess student outcomes for longer terms impacts of these programs.

Recommendation 2.4. Request that POs produce Highlights that are explicitly targeted to these longer timelines, and demonstrate the unique contributions enabled by the support of infrastructure such as field stations, training programs, living stocks, instrumentation, etc.

Response 2.4: BIO agrees with this recommendation and will encourage and expect DBI Program Directors to describe and document this type of unique contribution in future Highlights. DBI Program Directors will also pursue outreach activities with the intent of raising awareness among the PI community of the importance of reporting the downstream impacts of infrastructure investments.

Recommendation 2.5. Look for creative solutions to improve outreach and tailor programs to be more accessible and attractive to potential participants from these 2-4 yr organizations. With respect to improving demographic diversity among its beneficiaries, DBI should explore synergies with EHR as well as with initiatives such as the STEM Coalition. This is also an example of an area where DBI could leverage the outreach capabilities of the centers that it funds to broaden participation in its programs. A solicitation that specifically targets 2 and 4 yr degree institutions may be the most effective way to increase their participation in DBI.

Response 2.5: DBI and BIO are already engaged in extensive ongoing interactions with EHR; the NSF support for the AAAS Vision & Change activities were centered in DBI and will continue to be an important part of the DBI portfolio for BIO. The various BIO-funded Centers have already begun meetings to share best practices with respect to outreach and broadening participation. However, given that each DBI program has its own solicitation, it is impractical to develop new solicitations for each activity that specifically target 2 and 4 year degree institutions. On the other hand, as other cross-BIO activities are developed, we will promote the issue of involving 2 and 4 year degree institutions as part of a workforce activity. DBI has been conducting outreach to 2 and 4 year colleges via meetings such as SACNAS and AISES, and will have a major focus on HBCUs and community colleges in the New Orleans area in Spring 2011. In addition both REU and URM panels have had representatives from 2 year colleges on their panels.