**Response to Recommendations from the Committee of Visitors
for the
Division of Biological Infrastructure
June 27-29, 2007**

Introduction:
The Biological Sciences Directorate (BIO) and the Division of Biological Infrastructure (DBI) wish to thank the COV for its thoughtful analysis and suggestions for improvement. The latter will be especially helpful to DBI as it moves forward to provide infrastructure for the Biology of the 21st Century. Particularly important is the comment that "The COV would like to see DBI return to a more central role in its interactions with other divisions within BIO."

DBI also appreciates the COV's words of endorsement for the job it is doing, "DBI is one of the most interdisciplinary divisions within the NSF. The division funds a number of infrastructure projects that are multidisciplinary, and the number of awards that are jointly funded by more than one program also reflects this emphasis."

Recommendations and Responses

- **Recommendation 1:** Continue education of the scientific community on the meaning and the importance of NSF broader impacts criteria, particularly in infrastructure proposals as well as human resource proposals, through improved
  (a) instructions to panelists
  (b) outreach programs to applicants
  (c) use of examples on the Web. These examples could include not only broader impacts but also samples of equipment and human resources proposals, similar to those used in outreach programs.
  (d) program announcements for clarification of broader impacts criteria.

Response 1: BIO agrees that constant education of the community regarding broader impacts is important. DBI will continue its outreach activities emphasizing the broader impacts sections in proposals and instruct its panels to pay particular attention to criterion 2. DBI will also highlight criterion 2 in new program announcements. DBI will ensure that its website links to the examples of Broader Impacts compiled and posted by NSF and DBI will work to improve the broader impacts section in award abstracts. DBI will also show a Power Point presentation with examples of Broader Impacts at the beginning of each panel.

- **Recommendation 2:** Give continued attention to both the expertise and diversity of *ad hoc* reviewers and panelists
  (a) Encourage panelists to report their demographic information (e.g., give them a hard copy of the form at the panel meeting to voluntarily return).

(b) Develop a set of consistent guidelines and protocols for contacting *ad hoc* reviewers and improving the *ad hoc* return rate.

(c) Continue education of the panelists by the POs to ensure that the panel summaries are clear in the justification of the decision. The PO should clarify this justification to the PI if the panel summary is not clear, particularly in cases of inconsistencies within or between reviews

Response 2: DBI agrees and will begin to ask panelists to provide demographic information. Low return rate for ad hoc reviews is an NSF-wide problem. DBI will continue its current activities to identify new reviewers and increase the return rate of reviews. DBI will also review panel summaries during the panels to ensure that the information in them will be clear to the PI and add program notes to those panel summaries in which the justification for the panel's decision is not clear.

- **Recommendation 3:** Examine the steps limiting the time to decision (dwell time) within each program in an effort to help the overall Division meet the NSF annual performance goal in this area.

Response 3: DBI considered dwell time issues at a retreat in March 2006 and took steps so that in 2007 the Division met the 70% GPRA goal.

- **Recommendation 4:** Document more formally the most successful strategies being used by DBI to recruit and train reviewers, panelists, and new program officers

Response 4: A BIO web site has been developed for program officer training. DBI will include strategies to train reviewers and panelists on the web site in the Merit Review Process module.

- **Recommendation 5:** Review how carryover issues on proposals are handled by different programs within DBI with the goal of establishing, as practical, a set of best practices.

Response 5: DBI will conduct this review to identify practical best practices and institute them across all DBI programs.

- **Recommendation 6:** Continue to make the case within BIO and the NSF for the critical importance of DBI support for long-term infrastructure. While some of these awards are not directly innovative or transformational, they are ESSENTIAL because in many cases biological infrastructure enables innovations or transformations that otherwise may not have occurred.

Response 6: BIO agrees that support for long-term infrastructure is important and will continue to discuss internally and externally how best to provide this support. BIO also believes that short-term support for infrastructure improvement is critically important. The challenge then is to balance these needs with the resources available.

- **Recommendation 7:** Continue to take into consideration the institutional differences between non-Ph.D.-granting institutions and Ph.D.-granting institutions in award decisions in DBI and in educating panelists.

Response 7: BIO will ensure that DBI continues to take into consideration institutional type in making award decisions. In fact, DBI has been increasing the number of institutions supported and will work to improve the diversity of institutions supported.

- **Recommendation 8:** Encourage activities to enhance interactions of DBI with other BIO directorates and to better inform the BIO user community. Such communication can put an interdisciplinary division, such as DBI, squarely at the center of BIO activities, rather than at the periphery. In addition to more informal means, these include
- increasing solicitation of suggestions for reviewers and panelists from appropriate divisions within BIO, along with input on reviews of proposals;
- annual meetings of the DBI director (or designate) with POs in other BIO divisions detailing DBI programs, especially those with opportunities for co-funding or of interest to the PIs in those particular divisions. Ideally such a visit would be scheduled for a time shortly after new rotators arrive at NSF;
- development of a formal mentoring program to ensure that critical expertise is passed on to all program officers in DBI, and to orient new program officers within the larger BIO directorate. Such a mentoring program may also be helpful in the BIO Directorate as a whole.

Response 8: BIO has a mentoring program and will ensure that DBI participates in it. DBI will encourage its program directors to solicit names of reviewers from the other BIO divisions and will schedule a brown bag meeting this fall to inform program directors of DBI activities. DBI will continue to work with the BIO directorate on a web site for program director training. DBI will also explore creating a brochure that can be shared with all NSF program directors highlighting DBI programs.

- **Recommendation 9:** Enable greater transparency in the priority-setting process within DBI as well as BIO, particularly in the procedures which target the research areas of training programs such as post-docs. This

information needs to be communicated to (a) program officers throughout the BIO Directorate as well as to (b) the user community.

Response 9: Historically, when BIO prepares to select a new topic area for programs, such as postdocs, each Division names a representative to a BIO-wide working group chaired by DBI. Members of the group vet topics for new or renewal programs based on discussions with review panels and at community workshops. Recommendations from the working group are forwarded to the BIO senior management who usually select an emerging scientific area with a dearth of practitioners for the focus of the postdocs program. Individual members of the working group and Division Directors bring suggested topics to the working group and explain the results of the working group's deliberations. DBI will work with BIO to ensure better communication about the role of the working group. DBI staff will attend division staff meetings to explain the process and encourage all staff to make nominations to the working group. Areas of emphasis for the new solicitations are posted on the NSF web page immediately following publication of the new program announcements to inform the community and are included in DBI's outreach materials.

- **Recommendation 10:** Encourage improvement of NSF's own cyberinfrastructure and information technology systems.

Response 10: BIO will forward this recommendation to the NSF Office of Information Resource Management, which is responsible for the internal NSF IT systems. DBI will continue to be active in NSF-wide cyber working groups and to participate in many of the beta tests for internal NSF systems.

- **Recommendation 11:** Consider new ways to drive the integration of research and education, such as collaborations with EHR or applications of research tools in teaching.

Response 11: BIO is working closely with EHR on ways to collaborate and DBI staff is part of this activity. Both these recommendations can be served through the development of a network program modeled on the RCN program and that is being discussed.

- **Recommendation 12:** Continue to think strategically about how to best identify emerging fields and balance the related needs of maintenance of long-term infrastructure with innovation.

Response 12: As noted above under Response 6, DBI will continue to think about these issues and discuss them with the communities involved, including the Office of Cyberinfrastructure at NSF.

- **Recommendation 13:** Consider new models to address the challenge of a better balance between funding promising new undergraduate

programs, and long term, highly successful programs for human resources, as well as research resources. For example, training programs such as REU sites could be re-structured in such a way that home institutions are strongly encouraged to support some, if not all, of the investment in an REU site that has demonstrated success over the long term.

Response 13: DBI will bring this recommendation to the NSF REU committee for discussion and consideration. It is an important issue that has to be decided by the REU Site program, which is an NSF-wide program.

- **Recommendation 14:** Maintain flexibility with an ability to target emerging areas that may require more focused funding to become established and flourish.

Response 14: DBI agrees and the division leadership will instruct the Program Directors to keep this in mind when balancing their portfolios. As much as possible, DBI will structure the division budget to accommodate flexibility.

- **Recommendation 15:** Improve coordination of the various post-doc programs and areas among the different divisions of BIO. When choosing new targeted areas for postdoctoral programs, take into consideration areas of other existing postdoctoral programs available from non-NSF sources.

Response 15: This is an important issue and is partially addressed above in response 9. The working group of program directors from every BIO division does consider all other possible sources of funding for a selected area in its recommendation for new topics as well as investigate potential partners for joint funding. Background information on the topics is included in the introduction and background sections of the program announcements. DBI will take a careful look at future program announcements to ensure that this information is clearly stated.

- **Recommendation 16:** Continue efforts to build capacity at minority serving institutions and continue other efforts aimed at nurturing the careers of scientist-scholars at all stages of their careers, with continued investment in postdoctoral fellowships in critical scientific areas, including initial faculty startups. Consider whether human resource programs are demographically sound, i.e., whether support (from NSF or elsewhere) is available throughout an individual's scientific career.

Response 16: The startup awards will continue for the minority postdoctoral program. BIO agrees that opportunity for funding throughout a career is an important issue, one that requires institutional and NSF vigilance. BIO appreciates the COV mentioning "NSF or elsewhere" in its report.

- **Recommendation 17:** Review (both DBI and BIO) the need for a program such as the suspended Multi-User Equipment program, to fill important gaps in the resources available to purchase shared equipment costing between $60 and 100K, especially for small to medium-sized groups of investigators at large universities. Also re-evaluate the policy of allowing only two to three proposals from any given university per year in the NSF-wide MRI Program. This policy may limit and effectively remove highly competitive proposals from the potential pool for funding.

Response 17: BIO constantly reviews the MUE program in light of budget constraints and other opportunities. The MRI program is an NSF wide program and the NSF working group has discussed increasing the limit to 4 proposals per institution and increasing the award size. The decision to take either action will be at the NSF Director's Office level. BIO representatives to this committee have and will continue to question limits on proposal number per institution and request data to show that highly competitive proposals are not being submitted because of these limits.

- **Recommendation 18:** Documenting the most successful recruiting and training strategies being used by DBI POs would be helpful to provide in future reports to the COV.

Response 18: DBI will do this for future COVs.

- **Recommendation 19:** Programs supporting integration of biology with quantitative science in undergraduate education will require development and support of individuals capable of providing leadership in these programs. Because innovative proposals in this area have been scarce, the COV encourages the efforts of DBI and other NSF divisions in rethinking how to best promote this type of training.

Response 19: DBI and BIO agree with this statement and so support the IGERT program, the BIO/MATH program, and for this reason, are continuing the postdoctoral program in bioinformatics and computational biology. This issue will be discussed with the BIO/EHR working group on undergraduate education. DBI is seeing an increased number of proposals which meld BIO and MATH in the REU Sites program and in the new URM program

- **Recommendation 20:** The Division needs to gives careful thought as to who will be filling the recent vacancy in the critical area of instrumentation development, a key position where experience and background knowledge are very important to its functioning.

Response 20: DBI carefully considered this position and has identified a person whose experience and knowledge will enhance the program and who also adds to the diversity of DBI.

Recommendation 21 – 24: The next four recommendations are included together since they deal with the COV process.

- Routinely provide in advance the additional data requested by the COV (for details, see Part C.5. of the report). Many of these requests were for statistics for each program in addition to that provided for the division as a whole.

- Facilitate downloading documents at home institutions and at NSF (consistent file names for similar documents among programs and across years, smaller file sizes).

- Devise a sampling procedure of E-jackets that makes available to the COV a reasonable number of both awards and declines within each DBI program.

- Continue the meetings of the COV with program officers within DBI as well as BIO program officers outside of DBI.

Responses 21-24: DBI will try to provide the additional data requested for the next COV. Being a divisional and not programmatic COV, material was provided that encompassed the division. However, as soon as the COV requested specific program information, it was provided. The file names, sizes of files, sampling procedure and meetings are excellent suggestions that DBI shared with colleagues on the NSF-wide COV working group and with other BIO divisions. In fact, DBI added the meetings of the COV with program officers throughout BIO in response to the COV for plant genome which occurred only two weeks prior to this COV. It is reassuring to see that the DBI COV appreciated DBI's action and response to the PG COV recommendation.

- **Recommendation 25:** DBI should seriously consider creating a new cluster for long-term infrastructure (LTI) and pursue an intensive organizational planning process incorporating internal meetings as well as workshops involving experts on the management of other programs that fund long-term resources (both inside NSF and outside). Goals for the organizational process would be to:
  (a) develop and refine goal and mission statements for the new cluster
  (b) identify which elements of existing programs should be moved to new programs within the cluster
  (c) identify the best models for expert and timely review of LTI programs
  (d) identify best models for management of long-term infrastructure that will facilitate its collaborative development and efficient operation,

including criteria and processes for adding, relocating, or discontinuing specific resources.

Response 25: BIO and DBI will thoughtfully consider this recommendation, which is also an NSF and Federal agency-wide issue. DBI will continue to engage in dialogues with other directorates and the Office of Cyberinfrastructure to determine the best approach to this issue. In addition, DBI will involve the community of researchers and the scientific societies in considering long term care and support for research materials, and will add to these the publishers and librarians in workshops on issues of long term infrastructure support for data. NSF has representatives on an Interagency Working Group on Collections – both specimen collections and data collections – and the information concerning the current state of support that will be gathered by these two interagency groups will be essential for future assessments and strategic planning. BIO appreciates the COV suggesting that communities outside of NSF need to be involved in long term support and completely agrees with this sentiment.