



**National Science Foundation**

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March 25, 2004

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Dear Drs. Kelly and Perry:

Thank you for submitting the report of the Committee of Visitors (COV) for the National Science Foundation's (NSF's) Biocomplexity in the Environment (BE) Competition, which was held on February 25-27, 2004.

The COV is to be commended for its extremely thorough review of the Competition and very thoughtful and constructive comments. We are grateful that the Committee members were willing to examine the performance of this cross-directorate program in meeting the goals established by NSF under the Government Performance and Results Act. Committee members have made a very valuable contribution to the National Science Foundation's operations, and their findings and suggestions will be particularly helpful to committees that review cross-directorate programs and priority areas in the future.

Staff on the NSF Working Group for Environmental Research and Education prepared the enclosed set of specific responses to a number of comments in the Committee's report. We look forward to the discussion of the COV report and the enclosed response at the AC/ERE meeting in April.

Once again, our deepest thanks go to you and to other members of the COV for your significant contributions to the maintenance of high quality in the operations of the National Science Foundation.

Sincerely,

Margaret Leinen  
NSF Coordinator, Environmental Research and Education  
Assistant Director, Geosciences

Enclosure

Copy to: COV Members  
David Skole, Chair, AC/ERE

**NSF Committee of Visitors Report  
Biocomplexity in the Environment (BE) Competition  
February 25-27, 2004**

**Response to Specific Comments in the COV Report**

On February 25-27, 2004, a Committee of Visitors (COV) met at NSF to review the Biocomplexity in the Environment (BE) competition during the Fiscal Years 2001, 2002, and 2003.

We are very pleased with the results of the COV, particularly since the members had the challenging task of breaking new ground by reviewing a highly interdisciplinary program that spanned nearly the entire Foundation and utilized a variety of review mechanisms. Many of the recommendations will be helpful to future COVs of this type.

We are delighted that the COV members consider the BE program to be a leadership activity that deserves long-term support. The program is viewed as having a significant impact on science and engineering and on the research community by opening new areas of investigation and inspiring new collaborations. The research was assessed as highly innovative, risky, interdisciplinary, and effective in integrating research and education.

The program also received good marks for a rigorous, efficient, and agile merit review process. The COV noted the high quality and interdisciplinarity of reviewers, attention to conflicts of interest, and excellent stewardship in the distribution of funds. These traits were credited to the formation of strong and diverse teams of highly motivated program officers by exceptional topical team leaders.

The COV report contains specific comments and recommendations that the COV believes would improve the BE program, NSF programs more generally, and the COV process. We have grouped the comments topically and addressed them below.

**BE-Specific Comments and Recommendations**

1. *Programmatic:* Integrating social and natural sciences in environmental areas is a great need and challenging goal that is being addressed by this program. However, some proposals and reviews indicate that there is some confusion about “integrating the social sciences” as opposed to considering “societal impacts.” Also, qualitative, in addition to quantitative, investigations of complexity in coupled human and natural systems should be included, since these capabilities have matured recently.

In preparing the next solicitations in BE/CNH and closely related programs, serious consideration will be given to the timeliness of the recommendation to ease the current requirement for quantitative approaches in those environmental studies that involve both the social and natural sciences. Further, the distinction between “societal impact” and integrating the social sciences will be clarified. Consideration will also be given to

encouraging activities that might increase mutual understanding and enhance collaborations between investigators in the social and natural sciences. Actions taken with regard to these recommendations will be reported to the AC-ERE.

2. *Reviewers*: The reviewer pool needs to be expanded to include more underrepresented groups, more diverse institutions (e.g., undergraduate and HBCU), private sector experts, and panelists familiar with interdisciplinary research.

To assist topical team leaders in identifying a more diverse set of panelists, science assistants will develop and provide annotated lists of potential reviewers gleaned from other relevant programs, such as CAREER, IGERT, ADVANCE, Partnerships in Innovation, and interdisciplinary programs, and from other databases and societies.

3. *Criterion 2*: Although this is not a BE-specific issue, and improvement was seen over the 3-year period of the BE program, it was found that reviewers did not adequately address Criterion 2, especially in the panel summaries, even when education and other projects were explicitly described in the proposal.

Topical team leaders will be encouraged to use panel summary templates that have categories that urge reviewers to discuss the strengths and weaknesses of proposals with respect to both Criterion 1 and Criterion 2.

4. *Documentation*: Post-panel decision-making process by topical teams should be more fully documented.

Topical teams will be encouraged to include in jackets associated with a particular panel a diary note that describes the process and the criteria used to select proposals for funding from among those that were highly rated. To relieve the burden on program officers, science assistants will help with this task by taking notes at team meetings and drafting diary notes.

5. *Outputs*: The COV suggested that it might be valuable to follow up on planning and developmental awards to see how many result in full proposals and to consider organizing COVs by BE topical areas in 3 years.

The idea of engaging a contractor to look at the outputs from BE and other priority areas will be referred to NSF management and the Office of Integrative Activities. In a few years, BE staff will consider the value of organizing COVs for BE topical areas.

### **General Comments, especially as related to cross-cutting programs**

6. *New Form*: The COV recommended adding a required form to proposals submitted by collaborative teams. The information on PIs, co-PIs, and other essential leadership personnel would be captured and made readily accessible to program officers and reviewers. The information would include each investigator's institution, discipline, and role in the project, and would also indicate any international collaboration.

WGERE staff have presented this recommendation to the NSF Policy Office, the office that recommends changes in the Grant Proposal Guide. Initial reaction to the idea is positive and the possibility of implementing it is under discussion.

7. The following points were made about the BE program, but are rather generic and relevant to other *cross-cutting programs* and priority areas.
  - Due to heavy workload, program officers should have release time and increased support staff in their “home” programs when involved in cross-divisional programs and priority areas.
  - Because site visits are necessary on large projects, funds should be set aside for site visits for priority areas.
  - The funding level for the BE program should be increased. At present levels, it is very difficult to achieve a balance among success rate, grant size and duration. Despite large grant sizes, each investigator within a large project often receives a low level of support; data on this should be developed.
  - Many panel summaries were very terse, and could have been more thorough. This is likely due to time constraints, and so additional staff should assist at panels in order to ensure that good panel summaries are prepared. Also, models of panel summaries that convey important information could be provided.
  - Accounting procedures for priority areas should be simplified in order to ease the burden of the current, time-consuming award process.
  - NSF should undertake a thorough analysis of how best to manage cross-cutting programs.

These concerns will be referred to NSF managers that have oversight of NSF Priority Areas. Responding to the first five items on the list would require additional staff or funds, and so the capacity to respond may be constrained. Accounting procedures are subject to many governmental and professional standards and may be difficult to modify. The last item could generate a list of best practices for managing cross-cutting programs that could be helpful to program officers who manage or may manage cross-cutting programs in the future. Information about implementation of these recommendations will be reported to future COVs on BE or related programs.

### **COV Process, especially as related to cross-cutting programs**

8. The following comments and recommendations were made about the *COV process*:
  - The COV template is confusing for cross-cutting programs since the term “program” in the template usually refers to a disciplinary program. COVs for other Priority Areas should be fully instructed about how to *interpret* the questions. The COV’s should not be asked to provide comparisons to other Priority Areas, since it is unreasonable to expect to learn about more than one priority area in a short time.
  - Some questions on the COV template are difficult to answer without more information on the metric that is being applied. For example, what are the metrics for institutional or geographic diversity or for new investigators? To make comparisons, additional data would have to be provided along with comparative data from other programs concerning Carnegie rankings, lists of minority serving institutions, and so on.
  - Priority Areas often have a number of independently managed components that use different review procedures. For this reason, the COV should be provided with a

“cheat sheet” about jacket organization and a description of the various types of review processes used.

- Cross-directorate or priority area programs are so extensive and so much information is provided that it would be helpful to have a guide to the importance or priority to place on the information the COV is asked to review.
- Information requested and provided during the meeting was very helpful and should be provided to other COVs in advance. One piece of information that was particularly helpful was the management plan for the program. Also, those not familiar with NSF would benefit from general background material on NSF, its organization, and programs. It would be helpful to have more time scheduled with topical team leaders.
- NSF needs to develop tools to make data across disciplines and directorates readily accessible. This includes information on co-PIs, new investigators, geographic distribution, and institution types. For collaborative proposals, information on subawardees and international components is difficult to access, but could be provided in the required form described in item 6 (above). Other data needs include frequency distributions of the number of reviewers/proposal for each component of the competition, and more information on reviewers who are members of underrepresented groups.

These suggestions and issues will be shared with managers of other priority areas so that they can take them into account when planning COVs for those programs. The recommendations will also be referred to NSF management and the Office of Integrated Activities so that they can be addressed to the extent possible, within the constraints of GPRA legislation or other external factors. Information about implementation of these recommendations will be provided to future COVs on BE or related programs.

Prepared by:

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Margaret A. Cavanaugh  
Chair, Working Group on Environmental Research & Education (ERE)

Concurrence by:

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Margaret Leinen  
NSF Coordinator for ERE and Assistant Director, Geosciences

**MICHIGAN STATE**  
**U N I V E R S I T Y**

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26 April 2004

Dear Dr. Leinen

The Advisory Committee for Environmental Research and Education (AC-ERE) commends the work of the Committee of Visitors (COV) for their excellent assessment of the Biocomplexity in the Environment (BE) priority area competition. While the AC-ERE believes the BE program was a success and provides a pathfinder model for future cross-directorate interdisciplinary programs, we remain concerned with specific management challenges that the COV identified. Of particular concern is the need to ensure coordination among the topical team leaders and the various program managers, and the increased workload that arises with cross-directorate initiatives.

The AC-ERE recognizes that fully integrating interdisciplinary research and education into the operations of the Foundation's program is a long-term goal of the Foundation that will be eventually realized when interdisciplinary science and engineering is funded directly within directorates. Nonetheless, before that goal is ultimately achieved, the AC-ERE believes there will be an important near term need for other initiatives similar to BE. The lessons learned from the BE experience clearly suggest that future cross directorate priority areas will need to consider more effective modes of management and funding. The AC-ERE is especially gratified with the COV's identification of the need to sharpen a focus on Criterion 2 of the NSF proposal requirements. Doing so would position BE to take the lead in strengthening NSF's commitment to its broader educational mission. Within that context we look forward to increased attention to opportunities to increase diversity within the enterprise.

Congratulations to the National Science Foundation for showing leadership in this important area of environmental research and education; and no amount of praise is enough for such a dedicated staff. As research results from funded BE projects move into publication, we fully expect to see increasingly widespread enthusiasm within the community for more of these kinds of initiatives.

Sincerely,



David L. Skole  
Chair, AC-ERE

cc: Advisory Committee, Environmental Research and Education  
Dr. Margaret Cavanaugh, NSF ERE Working Group  
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