

National Science Foundation
4201 Wilson Blvd.
Arlington, VA 22230



May 24, 2006

Dr. Gary S. May
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I have attached a diversity report and a response to the recommendations in the DMI COV report that was prepared by Warren DeVries, the Director of the Division of Design and Manufacturing Innovation (DMI) held Mar 7-9, 2006. I concur with this document and adopt it as the official response of the Directorate for Engineering.

I wish to express my appreciation to the individuals who participated in the COV review. This process is critical to the management of the Directorate and will help to guide our future decision-making.

Sincerely,

Richard O. Buckius
Acting Assistant Director for Engineering

Attachments

NATIONAL SCIENCE FOUNDATION
Directorate for Engineering
4201 Wilson Boulevard, Room 505
Arlington, Virginia 22230



TO: Richard Buckius
Acting AD/ENG

FROM: Warren DeVries
DD/DMI

DATE: May 17, 2006

SUBJECT: Report on Diversity, Independence, Balance and Resolution of Conflicts
for the DMI COV

This is my report to you on the diversity, independence, balance and resolution of conflicts of the Committee of Visitors (COV) for the Division of Design and Manufacturing Innovation (DMI) held during March 7 – 9, 2006.

The COV, which was assembled to review the DMI Division, and whose report was presented to the Engineering Advisory Committee on May 4, 2006, consisted of seventeen persons, of whom eleven are male and six are female. One of the members of the committee is African-American and one is Hispanic.

Eleven of the COV members are from academia, two from industry, one from a non-profit corporation, and two from Federal Government laboratories (NASA/JPL and Sandia National Laboratory) and one retired. The Chair of the COV is a mechanical engineer, and the Vice Chair is an industrial engineer. The members represent all the relevant areas of engineering design, service and manufacturing. All invited COV members attended the meeting.

The chair of the COV is a member of the Engineering AdCom and a Mechanical Engineering Department Chair. The committee members from academia include nine full professors, one associate professor and one senior research scientist. One is also a dean, and one a center director. The industry members are senior in their companies. The non-profit corporation member is Director of Sustainability (Carpet and Rug Institute). The member from NASA/JPL is a program manager, and the member from Sandia is Chief Scientist in the Advanced Concepts Group.

Seven COV members (Alzheimer, Benton, Dietrich, Engi, Prusha, Peoples and Resnick) have neither been applicants to DMI in the past five years nor served as ENG Advisory Committee members. Most COV members are familiar with DMI from having served on the ENG Advisory Committee or review panels, or are former or current grantees. None had proposals pending with DMI during the COV meeting. A conflict of interest briefing was held on the first day of the COV meeting. All COV members were required to complete the NSF Conflict of Interest form. All academic members of the COV were barred from seeing proposals from their home institutions, and all noted conflicts were resolved by barring members from seeing specific proposals with which they had conflicts. No real or apparent conflicts arose during the course of the meeting.

xc: 2006 COV Member Bios



National Science Foundation

4201 Wilson Boulevard, Arlington, Virginia 22230

Memorandum

To: Richard O. Buckius, Acting Assistant Director for Engineering

From: Warren R. DeVries, Division Director for Design and Manufacturing Innovation

Date: 12 May 2006

cc: 2006 DMI Committee of Visitors
Michael Reischman, Deputy Assistant Director for Engineering
Adnan Akay, Division Director for Civil and Mechanical Systems
George Hazelrigg, Senior Advisor for Technology
Betty Person, DMI Administrative Manager
DMI Program Directors
Veronica Calvo, Program and Technology Specialist

Re: Response to Recommendations of the 2006 DMI Committee of Visitors

The Design and Manufacturing Innovation (DMI) Committee of Visitors (COV) review was conducted March 7-9, 2006. The report of this COV was transmitted to Dr. Gary May, Chair of the Engineering Advisory Committee (ENG AdComm) on March 21, 2006. This response is based on the report accepted by the Engineering Advisory Committee on May 4, 2006, when Dr. Judy Vance, the Chair of the 2006 DMI COV and member of the ENG AdComm, gave the report. The report was accepted without additional comment by the Engineering Advisory Committee.

This COV review covered DMI's core programs, considering actions and active awards during FY 03-05. These core programs are:

- Engineering Design
- Operations Research
- Service Enterprise Engineering
- Manufacturing Enterprise Systems
- Materials Processing and Manufacturing
- Manufacturing Machines and Equipment
- Nano Manufacturing

The COV also reviewed the cross disciplinary activity Grant Opportunities for Academic Liaison with Industry that engages other divisions across NSF, but is managed by DMI:

As a summary of the complete COV's report, we quote from Dr. Vance's transmittal letter:

"The COV found that the managerial practices and procedures in the DMI Division are excellent. The work of the Division Director, Program Officers and support staff is highly commendable. The merit review criteria are being addressed in proposals, reviews, panel summaries and review analyses. In spite of the increased workload, the quality of the program documentation remained high. Efforts to improve the diversity of awarded PIs and reviewers are also to be commended; however, improvements are needed in the NSF data base management system so that data on women and minorities is readily available.

Furthermore, NSF must be more effective in the development and implementation of information systems to assure proper integration according to the needs of the different users. The Division should be commended for a broad variety of funded work in areas of national priorities. The COV is concerned that current budget pressures have resulted in excellent proposals being declined and successful proposals receiving insufficient funds. The COV recommends that award amounts and the number of awards be increased in order to continue to fulfill the mission of the DMI Division.

In examining the effect of the Engineering Directorate reorganization on the ability of the DMI Division to realize the full potential of the Division's current programs, the COV concluded that more communication is needed between the Engineering Directorate and the user community to sell the DMI community on the opportunities presented by the reorganization. The COV believes that the new Division of Civil, Mechanical and Manufacturing Innovation (CMMI) should be structured to insure that the working chemistry of the DMI Division staff continues. The Division has done an admirable job in wisely managing its funding base for future development and supporting its core programs. We believe the new structure should be constructed so that the reorganization doesn't adversely penalize the DMI Division's ability to fund new programs."

The Division is pleased at this overall assessment of its performance and progress in meeting the Foundation's goals. All the staff in DMI were extremely pleased that the COV recognized, applauded and urged the continuity of the working chemistry of all the DMI Division staff as they move to form the new CMMI division.

Responses to the COV's Recommendations on Performance for Fiscal Years 2003-2005:

These responses focus almost entirely on the fifteen specific recommendations made in the COV report. The 2006 COV's recommendations fall into three sections that follow the COV report template and the Division's responses are identified by the sub-sections in the COV's report:

PART A. RESPONSES TO RECOMMENDATIONS ON THE INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES AND MANAGEMENT

A.1.3 Recommendation on individual reviews:

- *"The COV encourages PDs to assure that the individual reviewers provide quality comments and sufficient information to PIs as feedback. This is particularly important to those whose proposals have been rated "good"[but are declined,] so that they can understand what changes are needed to achieve a higher level of competitiveness with their proposal."*

Response:

DMI will continue or initiate the following actions to alleviate this problem:

1. DMI currently conducts a briefing (materials are made available to all Program Directors for these briefings) at the beginning of every panel meeting on expectations of the panelists, including the level of detail and items to be covered in each written review. Program Directors will redouble their efforts to instill in panelists the need to write more comprehensive reviews.
2. At its grantees conference, DMI conducts a research program development workshop that includes a section on becoming a panelist. We will stress the importance of comprehensive reviews in this presentation.
3. DMI will include this same information on its web page.

A.1.4 Recommendation on panel summaries.

- *“The COV encourages PDs to assure that panel summaries provide sufficient quality and quantity of information to PIs, especially to PIs whose proposals are ranked as ‘good’”.*

Response:

DMI will continue or initiate the following actions to alleviate this problem:

1. As mentioned under A.1.3, all DMI Program Directors currently conduct a briefing at the beginning of every panel meeting on expectations of the panelists, including the level of detail and items to be covered in each written review and panel summary.
2. Program Directors will redouble their efforts to instill in panelists the need to write more comprehensive panel summaries, and as part of their DMI training, Program Directors will be asked to look for substance in panel summaries before accepting them.

A.1.5. Recommendation on Program Director documentation:

- *“Program Directors should pay particular attention to documenting proposals where the recommendation for funding does not match the panel recommendation. Also, the Division Director should pay particular attention to check for careful documentation of these decisions when she/he signs off on the action.”*

Response:

DMI will seek to improve the standardization of documentation and to check documentation against the standard. Responding to this COV recommendation, a written procedure on “Documenting Proposal Processing in DMI” now outlines cases where additional documentation, often in the form of a diary note, shall be used. All Program Directors and Program Staff have access to this procedure and have been briefed on it.

A.1.6. Recommendations on time to decision:

- *“DMI is encouraged to carefully examine the proposal evaluation process to determine where bottlenecks occur and take necessary steps to eliminate them to be able to systematically reduce the dwell time.”*
- *“A more active approach to bringing awareness to the need to reduce dwell time could involve using color-coded files (by month instead of year) to bring attention to long dwell time jackets.”*

Response:

We agree that timeliness on decisions is important. We believe that dwell time issues revolve around Program Director and Support Staff workload issues. During the FY 03-05 period specific factors contributed to our need to refocus on dwell time: the division underwent a reorganization that reduced the administrative and support staff by one, and new electronic systems were introduced. DMI will or has taken the following actions to decrease dwell time:

1. ENG provided a new Program Director position for DMI in FY 06.
2. Training will be provided to the Support Staff and new Program Directors, to assure that each member of the DMI staff is equipped to achieve shorter proposal dwell times.
3. Proposal dwell time objectives will be added to the performance plans of Administrative and Support Staff, and Program Directors.

A.2.1. Recommendation regarding individual reviews addressing both merit review criteria:

- *“Broader Impacts: From the COV’s experience on panels and from reading jackets, the appropriate inclusion in a proposal and review of broader impacts could be improved. For example, it was not clear that all the reviewers understood the definition of broader impacts before arriving at their panel. In order to help reviewers, the definition and examples of broader impacts should be linked to RFPs on Fastlane.”*

Response:

This is a continuing discussion point across the Foundation. We will continue to brief panelists and include in our research program development workshops material to clarify their and our own understanding of broader impacts. The COV’s detailed discussion on this topic is a potential source of material to enhance our existing presentations.

Providing clear definitions and examples of broader impacts together with what is expected from PIs, and linking to these in solicitations and announcements on Fastlane goes beyond the scope of DMI and cannot be corrected by DMI alone. It will be brought to the attention of the appropriate people at NSF.

A.2.4 Recommendations under additional comments on merit review criteria:

- *“Discussions between Program Directors in DMI pertaining to the meaning of the broader impact criteria and the use of the criteria in the proposal evaluation process would be helpful. Many PIs and reviewers are guided in their thinking by discussions of ideas with Program Directors. If PDs understand and are consistent in the definition and application of this criterion, this will positively impact PIs and reviewers, resulting in less confusion in the community.”*
- *“Instructions should be included in the information that is sent to reviewers to encourage them to read the NSF document that defines broader impacts and to make it clear to the reviewers that a proposal does not need to accomplish all of the types of broader impacts given in the examples.”*

Response:

We have noticed that discussion of broader impacts in COV recommendations occurs across the Foundation. When DMI Program Directors brief panels or make presentations on proposal writing on outreach visits to the community, the definition we use is “The Broader Impact focuses on the benefit to society at large as a result of your research result,” and when we give examples we reiterate that these are examples, not a check list. These recommendations will prompt us to redouble our efforts, striving for clarity. Again, these are issues that transcend DMI and impact the Foundation at a higher level, so it will be brought to the attention of the appropriate people at NSF, including ENG’s Awards Impact and Assessment Working Group.

A.3.1 Recommendations on number of reviewers:

- *“Maintain an average of not more than ten proposals per panel member for review prior to the panel meeting.”*
- *“Establish a target of no more than 15 proposals per day to be reviewed by a panel.”*
- *“Refresh the reviewer list on a consistent basis involving successful recent awardees on new panels to add to the pool of reviewers.”*

Response:

It is already DMI policy that each reviewer is assigned a maximum of ten proposals to review, and the Division has a very strong outreach effort to expand its reviewer pool, particularly using young, prospective and new grantees. These policies will continue in effect. It is also noted that Program Directors already strive to keep panels manageable by limiting the number of proposals reviewed in each panel. However, we also recognize that, given the very high proposal loads in some programs, it will not be possible to keep the number of proposals reviewed by each panel at or below 15.

A.3.2 Recommendations on reviewers with appropriate expertise:

- *“Seek out potential reviewers in other directorates to bring a diverse expertise, as needed.”*
- *“Strive for a panel composition that includes both new panelists and senior panelists, with a heavier weighting on senior panelists.”*
- *“Consideration of panel expertise should reflect any anticipated changes brought about by the reorganization with regard to the review process.”*
- *“Panels should be composed so as to provide opportunities to mentor qualified junior faculty members in the NSF review process while assuring that panelists have adequate experience in the review process to maintain high quality review outcomes.”*

Response:

By and large, the DMI Program Directors already address these issues because they are critical to the merit review process. There is an existing concern for diversity and for the use of young reviewers in a balanced way. And there is a very strong emphasis on getting the necessary expertise for high quality reviews. The DMI Program Directors will be encouraged to continue their extant policies in these regards, and to continue to identify new reviewers as they make outreach visits.

A.3.3 Response on reviewer balance was “Data Not Available”**Response:**

While not a recommendation, the context for this response by the COV related specifically to the diversity of reviewers from underrepresented groups in engineering. They estimated that 17 percent of the reviewers came from underrepresented groups. However, they felt that there were insufficient data to make a full determination of diversity because it must be self reported and is usually not reported. Unfortunately, NSF policy makes it optional for PIs and reviewers to report their ethnicity and gender. The provision of more complete data will require major policy decisions.

A.4.2 Recommendation on award size and duration:

- *“It was the sense of the COV members that additional funding per PI is required to achieve the desired level of scientific impact.”*

Response:

We understand the significance of this recommendation and we agree with it. However, making larger awards under a fixed budget has the consequence that fewer awards will be made, thus lowering the Division’s success rate. The current award size and duration reflect the balance that the Program Directors feel best benefits the community.

A.4.3 Recommendation on high risk projects:

- *“DMI should seek to fund high risk/high potential proposals through the use of SGER grants and the Office of Emerging Frontiers [in Research and Innovation].”*

Response:

Some COV members equate high-risk with SGER awards, but the COV overall noted that the lack of a clear definition of risk makes it difficult to assess the extent to which high-risk proposals are funded.

However, the COV encourages the Division to fund high-risk proposals through the use of SGERs, empowering Program Directors to consider panel advice on what are deemed “too risky” unsolicited proposals and fund them as SGER awards, and pursuing new opportunities presented by the new ENG Office of Emerging Frontiers in Research and Innovation to explore new fields of research. DMI agrees with this recommendation and will continue these practices.

A.4.7. Recommendation on appropriate geographic balance of PIs:

“Additional information should be provided to future COVs that will enable them to make a more informed judgment on the appropriateness of the geographical distribution of submissions and awards. Suggested additional information per state includes: (1) population, (2) college enrollment, (3) undergraduate engineering enrollment, (4) graduate engineering enrollment, and (5) number of engineering faculty members. This additional information would allow for the estimation of reasonable target numbers per state.”

Response:

We understand this as a recommendation that more contextual information be provided for future COVs. The recommended changes would require expanding the NSF database systems in a way that is beyond the scope of action from within the Division, or accessing other organization’s databases, such as the American Society for Engineering Education. The appropriate NSF persons will be notified.

A.4.11 Recommendation on appropriate participation of underrepresented groups:

- *“Additional information should be provided to future COVs to enable them to make a more informed judgment. Suggested additional information includes: (1) award data for each of the underrepresented groups, and (2) number of engineering faculty members per each of the underrepresented groups from which reasonable target numbers can be inferred.”*

Response:

The COV noted that it was not provided with the data necessary to evaluate the participation of underrepresented groups, and urges that such data be provided. However, it is the current NSF policy that the provision by PIs of such data is not mandatory. Hence, the question cannot be answered. The contextual information on the total numbers in the field that NSF collects in its *Science and Engineering Indicators* does not have the fidelity needed for specific engineering fields. As mentioned in the response to A.4.7. ASEE might be a source of this information. This is a policy matter that must be addressed at a level higher than the Division.

PART B. RESPONSES TO RECOMMENDATIONS ON THE RESULTS OF NSF INVESTMENTS

Part B. Recommendation on the NSF's Strategic Outcome Goals and DMI and ENG Goals.

- *“Both the Directorate and the DMI Division should examine their strategic plans for consistency with the GPRA goals and make changes to align these strategic plans with the desired outcomes.”*

Response:

The Foundation is in the midst of updating its five year plan, and as the Engineering Directorate completes its reorganization, necessitating a new strategic plan for the Division of Civil, Mechanical and Manufacturing Innovation, alignment of the plans and objectives will be an important focus. This includes ensuring that the DMI programs that support the NSF mission and the nation's needs remain vibrant and the best operational practices become part of the new division. Action on this recommendation will primarily be an ENG management responsibility at the Directorate level.

B.1 Recommendations on Outcome Goal for People:

- *“Additional information should be provided to future COVs that will enable them to make a more informed judgment on the effect these projects have on creating a competitive, globally engaged workforce. Data such as patents developed, companies started, extension of the research into industry, eventual placement of graduate students, etc. is needed to fully evaluate this metric.”*

Response:

The COV reported that significant evidence exists to show that DMI-funded research contributes to both NSF and GPRA goals, and that this research is of high quality. However, they also noted that there exists some ambiguity associated with the objectives across different levels of the Foundation. We agree that the Division's programs align with critical issues facing the nation, including globally competitive and transformative research on manufacturing and service enterprises that will be key components of the American Competitiveness Initiative. This is a topic that will be part of the planned ENG reorganization and is already considered by ENG's Awards Impact and Assessment Working Group.

PART C. Responses to Recommendations on OTHER TOPICS

C.5 Suggestions on improving the COV review process:

- *“The data made available to the COV should be consistent and clearly identified. For example, the information in Tab 7 is labeled Proposals Submitted and Reviewed by DMI Programs; however, this data is for core DMI programs only and did not include agency-wide programs which had DMI participation.”*
- *“It is important that the COV be given data not only on proposal submission from under represented groups, but also on awards to under represented groups. In addition, the percentage of faculty from underrepresented groups would be valuable.”*
- *“During the presentations by DMI staff, a complete description of the process flow for a proposal from receipt to final disposition would be helpful, particularly in terms of time at each step and any rate limiting steps.”*
- *“Assembling the COV report could be more efficient if every member of the COV had access to his/her own sections of the report on the NSF website. This could be handled*

similar to the electronic panel summary where everyone has an opportunity to send in comments and/or edits.”

- *“The COV should be provided with a list of staff and support staff changes over time.”*
- *“A higher sample rate for award jackets and SGERs would be helpful. While we rectified this by asking for additional jackets during the COV meeting, future COVs should consider pulling more of these jackets at the outset.”*
- *“More of the data relevant to the outcome questions should be made available in a statistically analyzed format. If the data was organized under the topics that the COV had to answer, this would improve the efficiency of the COV.”*
- *“Provide the COV with the GPRA Outcome Goals.”*

Response:

DMI concurs with these recommendations as ways to improve the next COV. We have some reservation about the seventh bullet that requests analysis of the data by the DMI staff, since we believe it should be done with care so that the Division doesn't present a biased view of the data. However, some of the data requested above are governed by higher Foundation policy, and cannot be provided by unilateral actions of DMI. For example, we were unable to find a list of NSF's GPRA Outcome Goals on the NSF web site. Also, to provide the data requested by the COV with respect to underrepresented groups would require that it be mandatory that PIs and institutions provide such data.

Attachments: Committee of Visitors Report, Division of Design and Manufacturing Innovation,
21 March, 2006