

**NATIONAL SCIENCE FOUNDATION
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MEMORANDUM

DATE: March 8, 2010

TO: Dr. Thomas W. Peterson, AD/ENG

FROM: Dr. Steven H. McKnight, DD/CMMI

SUBJECT: Division Response to Report of the Committee of Visitors for the Division of Civil, Mechanical & Manufacturing Innovation

I wish to express my thanks to the members of the CMMI Committee of Visitors (COV) for their thoughtful and detailed review of the divisions' programs and for the timely completion of their report. I also wish to commend the CMMI staff for their diligence and dedication in preparing, assembling, and organizing the large amount of material and information for this review.

In its summary observations COV judged CMMI to be successful in its activities, and that the portfolio of awards and the quality of research funded was strong. The research funded by CMMI was thought to be significantly advancing the frontiers of knowledge and responsive to emerging research and education opportunities within and across the disciplines supported within CMMI. Management of the programs within the division was also thought to be solid, balanced, and professional.

The COV did identify in its summary observations several areas of improvement for CMMI to address in order to further meet its goals and to serve its diverse community better. For example, the COV recommended that the division, which was formed in 2006 through the mergers of the former CMS and DMI divisions, regularly consider whether the current programs adequately support the mission of the division and how the programs and focus areas can evolve to address important national and societal issues. Other recommendations related to focusing the priorities and mission of the division were noted within the COV report, and CMMI responded to these concerns in detail following this letter.

Finally, for the 2009 Committee of Visitors, CMMI created a web-based system to present the information needed by the COV members to complete their review. Additionally, the meeting was held off site from NSF during the 2009 CMMI Grantees Conference in Honolulu, Hawaii. Overall, the committee members and CMMI thought this method of conducting the COV was successful. Nonetheless, the division will continue to improve its best practices for how it conducts such a paperless review based on comments and suggestions from the COV committee.

RESPONSES TO 2009 CMMI COV REPORT

1. *The COV recommends that program officers prompt panelists to give more substantive comments.* Agreed. CMMI will continue to encourage program officers to instruct panelists clearly to provide detailed comments and feedback, and will ensure that this message is conveyed consistently to panelists in the opening presentation. Panelists will be provided with clear examples of comments that reflect the desired level of information.
2. *The panel summary often does not provide insight on [the differences of opinion among reviewers].* Agreed. CMMI will develop and distribute a set of best practices containing illustrative examples designed to elicit more comprehensive and detailed summaries. The division will also develop a standard template for panel summaries that will be provided to each panelist during the meeting with specific guidelines and questions that should be addressed that will help illustrate the panel's rationale for decision.
3. *A better job could be done in providing the PI's with meaningful feedback on technical weaknesses and the addressing of the lack of discussion of broader impacts of the proposal.* Agreed. See response 2. Additionally, CMMI is developing templates and best practices for program director documentation of decisions that will ensure that sufficient information is provided in review analyses for declines and awards.
4. *The COV realizes that recruiting industrial reviewers for proposals is difficult. However, the COV reviewed a number of proposals that had a significant industry component, where industry was a partner or where the work being proposed might have a significant industry impact, and yet there were no industry representatives on the panel.* Agreed. We continually seek a broad and diverse set of panel members including representatives from industry, national laboratories, and other government agencies. Our experience has been that potential reviewers from industry are sometimes reluctant to participate (or are prohibited from serving on review panels) to protect them and their firms against claims made with respect to intellectual property. They also face greater constraints on their available time and some believe that they gain little personally from serving on a panel. Finally, because of collaborations between their companies and PIs in their area of expertise, there can be an excessive number of conflicts with proposals being reviewed by a panel. These challenges can hinder our outreach efforts to attract industry panel participants. CMMI will continue to seek reviewers from private industry whenever possible.
5. *Two cases [of] the appearance of a COI were noted. One involved a faculty member from the same institution reviewing a proposal and one had two panelists from the same department. There was inadequate documentation in both cases.* These cases have been investigated. In one case, the PI and the reviewer were from different campuses of the same university system (University of Connecticut at Storrs and University of Connecticut at Farmington) and hence did not have a conflict. The other instance involving two panelists from the same department may be undesirable, but does not represent a conflict. CMMI generally discourages the use of multiple reviewers from the same institution and department, but it occurs rarely and may be necessary to obtain the desired expertise. CMMI

will continue to stress our policy regarding selection of reviewers, and ensure that conflicts and the appearance of conflicts are managed appropriately.

6. *The NSF gathers extensive demographic data (Science and Engineering Indicators; www.nsf.gov/statistics/seind08). The COV recommends that this data be used to evaluate balance.* This is a perennial issue across NSF that is complicated by a number of factors. Submission of demographics data by applicants and reviewers cannot be required and is provided on a voluntary basis by individuals. For a variety of reasons, many PIs do not declare their data, and the absence of data distorts the database. Thus, there are questions concerning the validity and accuracy of any assessments derived from this database relative to the questions asked of the COV. Getting better and more complete data is a policy issue that has to be resolved at the Foundation (or governmental) level. Program directors do refer to such information (when available) when making funding decisions and by CMMI as a whole when planning for future support. While CMMI provided some data (for example, distribution of proposals/awards received by academic disciplines) for the COV to consider in evaluating the division, CMMI will ensure such data is provided in a clearer fashion and with supporting baseline information on the available pool of researchers for comparison for the next COV.
7. *The COV has a concern that some interdisciplinary proposals were not reviewed by interdisciplinary panels. If not addressed, with the anticipated increase of cross-disciplinary proposals, this could become an issue.* ENG now has a directorate-wide initiative and CMMI has a program called Interdisciplinary and Cross-Directorate Activities. It is the purpose of this program to assure that interdisciplinary proposals are appropriately reviewed. This program is still in its infancy and will develop over the next few years. CMMI will closely monitor the activities of this program and evolve it towards accomplishing its intended purpose.
8. *...further attention to grant sizes is probably required in light of the continuously increasing costs of conducting research. Reductions in requested funding levels should be justified on the basis of project scope rather than availability of funds. This has been a perennial issue.* We acknowledge that grant size is an issue, and the CMMI grant size has increased somewhat over the years, albeit perhaps not as much as PIs desire. Ideally, CMMI desires to fund awards at requested levels and minimize, where appropriate, the amount of budget reductions initiated by the program director. With fixed budgets, there is a trade-off between award size and proposal success rate. CMMI is reviewing jackets to determine the magnitude of the issue. At that point, we will be better prepared to propose potential remedies, and engage other Divisions and the Directorate as appropriate to ensure consistency in any proposed strategy. (See response to question 10.5 for preliminary findings).
9. *...the participation of African Americans and Hispanics specifically is low and if it is much less than the pool of available participants should be improved.* Agreed. The participation of underrepresented minorities is a continuing issue. CMMI will continue to emphasize outreach activities that promote broader participation. For example, the annual CAREER proposal writing workshop, sponsored by CMMI, is widely supported throughout the

Division. This workshop gives priority to women and minorities seeking to attend. Our hope is that improving the competitiveness of proposals submitted will increase the level of participation by women and minorities. The Division will also continue to make supporting such activities that are designed to encourage broader participation (e.g. BRIGE, GRS, etc.) a priority in its outreach and diversity efforts.

Along with these efforts, CMMI will continue to assess its portfolio of awards to ensure that the race and gender balance reflects the pool of applicants. The division will assess different ways to obtain this information in accordance with pertinent Federal statutes and regulations from its individual PIs. The division will conduct an analysis to compare this demographic data with data concerning broader community demographics to ensure that such underrepresented groups are represented appropriately in the funding portfolio.

10. *The program appears to have responded positively to the recommendations of previous COVs, but there are some areas where the program still has not advanced as far as expected:*

1. *The CMS COV of 2004 recommended “To meet the challenge of increasing numbers of proposals, the COV recommends that additional staff be assigned to CMS at both the PD and support staff levels.” Since then new staff have been hired, but insufficient to compensate adequately for attrition. Program Directors continue to appear to be overextended. This remains a concern. Staffing levels have been a continuing issue within the Division. Formal staffing levels are established external of the Division, and CMMI cannot directly control its staffing allocations. The Division is actively recruiting to fill open vacancies and is making substantial progress.*
2. *The DMI COV of 2006 observed, “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.” We understand that a plan has been submitted and approved, but we have not seen evidence that the plan is referred to in the normal business practice. CMMI has developed a divisional plan that aligns with the NSF strategic plan and ENG goals. This plan has been revised and refined over the past two years, and a new round of planning has been initiated within ENG that will further refine and articulate our overall vision. CMMI’s division plan will be updated and rewritten as part of this ENG-wide planning process.*
3. *Broader impact*
 - a. *There is still no common understanding by the reviewers of how to judge the quality of potential broader impacts.*
 - b. *The degree to which broader impact is achieved should be assessed – at least qualitatively.*

Agreed. Since Broader Impact has been introduced as a review criterion, there has been confusion as to what qualifies as broader impact and how reviewers are to rate proposals regarding their broader impacts. We believe

that this is an issue that spans the entire Foundation. CMMI will work to communicate more effectively the proper interpretation of the Broader Impacts criterion. As one way to do this, CMMI will provide guidance from NSF on examples of appropriate Broader Impacts to both its program directors (as part of their orientation to NSF) and to panelists (before the panel meetings) to attempt to alleviate this lack of common understanding. This document is found here: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

4. *The previous COV commented on there not being documentation in the jackets to assess the qualification of the reviewers. This issue might be resolved easily, through, for example, self-assessments by reviewers. Reviewers' qualifications are established by the program directors that use their knowledge of their respective communities to determine appropriate panelists. While self-assessment by reviewers may be one method to document these qualifications, there are specific reasons one would exclude this option. For example, providing this information in the jackets would open the review process to argument and challenge by the PIs, and may also divulge the identity of anonymous reviewers. This is a matter that would require a significant policy change, and it is at a level that must be considered NSF-wide. However, CMMI will conduct an analysis to determine how, consistent with existing NSF policies, the qualifications of reviewers (e.g. C.V.) could be collected and added to each jacket's record.*
5. *The DMI COV of 2006 observed that the award size and duration were not appropriate. The COV has found no evidence of an analysis of the process for determining the appropriate size of awards. This is correct. CMMI is in the process of conducting an analysis of reduction in award size for FY 2009. A key preliminary finding is that for about 90 percent of awards, there was no more than a 20 percent reduction from the amount requested by the PIs. CMMI relies on the expertise of its program directors to determine appropriate award size based research requirements and scope. However, the Division Director reviews each award before it is made to ensure that it is appropriate in the context of the CMMI portfolio. CMMI is exploring ways to define the real cost of doing research across the CMMI community.*
11. *The COV recommends that the division regularly consider whether the current programs adequately support the mission of the division and how the programs and focus areas can evolve to address important national and societal issues (e.g., health care reform, energy sustainability, next generation transportation, infrastructure). The COV believes this activity would help the division align with and advance developing national priorities as well as better articulate the importance of the division's research investments to the Foundation. This is a valid concern. The division was reorganized in 2008 to reflect such concerns; however, it is still very much structured as it was as two separate divisions. There are, most likely, opportunities to improve upon the current structure at the program and cluster levels and these are being considered in current planning activities.*

12. *In light of the division's expanded mission, the COV recommends that an assessment of the CMMI Grantee's Conference be undertaken to identify clearly the benefits achieved by the meeting and to examine alternate formats to better achieve its goals. The division should ensure that program directors and PIs have adequate resources to interact with their PIs and to stay engaged in their disciplinary areas.* Agreed. CMMI has recruited an AAAS fellow, Dr. J. Phillip King on sabbatical from New Mexico State University's Department of Civil Engineering, to carry out various evaluation functions, including an assessment of the Grantees' Conference. His preliminary finding is that the Grantees' Conference is an effective way to address CMMI's stewardship objectives. We are aware of no other approach that can achieve the economy of scale that the conference provides for constructive interaction among Program Directors, PIs, and students. CMMI is exploring other avenues for interaction among PIs and other stakeholders.
13. *To improve their ability to meet goals and objectives, the division's mission statement should be sharpened. It should be succinct and the connection between vision, mission, goals, and objectives should be clear.* We agree, and this will be part of the development of an improved divisional plan, which is a high-priority item on the agenda for FY 2010.
14. *To promote the programs, it is necessary that more travel funds be made available to program directors that hold permanent employment with NSF. The current dichotomy between program directors who are rotators and non-rotators in travel fund budget should be eliminated.* This has been a recurring issue that has dominated discussion of COVs for decades. It is an issue across ENG and NSF as a whole, as noted by NSF Director Arden Bement at the Fall 2009 ENG Advisory Committee, because while funding for research support has increased, NSF overhead budgets have remained constant. CMMI is careful to allocate overhead funds in a manner that preserves the maximum possible amount for permanent staff travel. However, this still leaves the permanent program directors quite short of funds. It is a problem that cannot be solved by CMMI, other than to maintain a high priority on the use of such funds for staff travel.
15. *[For the next COV,] the CMMI director should initially, give a division overview and should be available throughout the COV visit. Areas should be emphasized that directly pertain to the questions addressed by the COV.* Agreed. A more comprehensive briefing will be presented at the next COV.
16. *It might be appropriate to hold the COV meeting at a different time than the annual CMMI conference so that the COV could have more focused attention from the program officers and provide less stress on the support staff.* This is what was originally planned for the 2009 COV. The two activities will be kept separate during the next Committee of Visitors.
17. *[For the next COV,] a senior program officer should be given specific charge:*
 - a. *To walk through the CMMI review process to assure that people and facilities that the COV is likely to need are readily available.*
 - b. *To assure that the COV has all documentation necessary to answer the broad questions charged of them.*

The web-based approach and location of the meeting gave rise to unanticipated issues. We

will ensure that things go more smoothly for future COVs.

18. *[For the next COV,] because all materials are available to the COV only over the web, the COV should have access to the Internet throughout their visit. CMMI will ensure that this happens.*

Note concerning items 17 and 18: This was the first time that CMMI has used a wholly web-based system for its COV; there were several lessons learned from this experience. Many of the issues noted above could be classified as “growing pains,” and CMMI will work to prevent them in future COVs and to employ best practices from this experience.