



NATIONAL SCIENCE FOUNDATION
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Date: December 07, 2018
From: Dr. Dawn Tilbury, Assistant Director, Directorate for Engineering (ENG)
To: ENG Advisory Committee,
CC: ENG Senior Management (DD, DDD, Senior Advisors),
NSF Senior Management (OD, COO, CFO, OIG, OIIA Director, NSF Committee
Management Officer), NSF COV Coordinator
Subject: Response to 2018 Recommendations Report of the Committee of Visitor (COV)
for the Office of Emerging Frontiers and Multidisciplinary Activities(EFMA)

Please find attached the ENG response to the Committee of Visitors (COV) report from the Office of Emerging Frontiers and Multidisciplinary Activities (EFMA) 2018 review (June 13 to 14, 2018). The review was thorough and insightful, and the findings will be very helpful to me and to the Division in fulfilling our responsibilities to the scientific community and to the nation.

The Office of Emerging Frontiers and Multidisciplinary Activities has drafted the attached response, and I concur with its contents. I, therefore, adopt it as the official response of the ENG Directorate. The required Diversity and Conflict of Interest Report is provided along with the COV report. I hope the full ENG Advisory Committee finds this COV review and the ENG response useful.

Dawn Tilbury
Assistant Director, Directorate for Engineering

Attachments:

- The response of the Office of Emerging Frontiers and Multidisciplinary Activities to the 2018 EFMA COV Report
- 2018 EFMA COV Diversity and Conflict of Interest Report

EFMA 2018 Committee of Visitors Report: 2018 EFMA Response

Introduction:

This document is the response to the 2018 Committee of Visitors (COV) recommendations report for the Office of Emerging Frontiers and Multidisciplinary Activities (EFMA). The EFMA COV meeting took place June 13-14, 2018 and covered random samples of EFMA proposal actions for FY2014-FY2017.

I. Quality and Effectiveness of Merit Review Process:

COV Comment I.1:

Given the number of full proposals that received mediocre evaluations and recommendations, EFMA/EFRI may want to consider increasing the rigor of the pre-proposal review. Requesting fewer full proposals would reduce the workload on both the review process and on researchers whose pre-proposals makes it highly unlikely that their full proposals will be competitive. This would support the sustainment of EFMA/EFRI's record of very rapid review. A more selective review of pre-proposals should include more detailed feedback to the PIs who have brought forward truly transformative ideas that need more development before being appropriate for a full proposal.

EFMA response:

We appreciate COV's comment about the review process of pre-proposals. We will strive to continue to improve the quality of our review process. In particular, we concur with the utility of providing more detailed feedback to PIs and will work to improve the quality of panelist reviews. It is essential to recognize, however, that due to the emerging and transformative nature of EFRI topics, some good ideas may appear raw at the pre-proposal stage. Given that our mandate is to invest in important, emerging areas in a timely manner, we make great efforts not to miss out on potentially transformative projects due to unpolished pre-proposals. Of note, our experience has been that some of the lowest ranked pre-proposals that were invited matured into highly ranked full proposals.

COV Comment I.2:

Numerous inconsistencies were noted in the depth, specifics, and quality of comments that address both merit criteria and additional criteria outside the two main review elements. The Program Director leading the review panel should stress to reviewers that full sentences, paragraph-level thoughts, and more complete summaries are more appropriate, are more helpful to the Program Director, and allow more informative feedback to proposers.

EFMA response:

We agree that improved reviews could be helpful to proposers and, as mentioned under Comment I.1, we will work to improve panel review quality to address this.

COV Comment I.3:

In many reviews and Panel Summaries, the consideration of Broader Impacts was more perfunctory than the reviews of Intellectual Merit.

EFMA response:

We appreciate this comment. Evaluation of the Broader Impacts criterion during the NSF review process continues to be a challenge. We will include an emphasis on adequate evaluation of Broader Impacts as part of our efforts to improve the quality of panel reviews.

COV Comment I.4:

The COV believes that the NSF program management team should require proposers to address the Data Management Plan in a substantive way and provide guidance to the reviewers as they evaluate the content of the Data Management Plan element.

EFMA response:

We appreciate this insight from the COV and modified the FY19 solicitation prior to release to increase emphasis on the data management plan. We also plan to increase guidance to reviewers during panels.

COV Comment I.5:

Panel Summaries of funded proposals tended to be more detailed than reviews for weaker submissions. This is a lost opportunity to give proposers the valuable information they need to strengthen future proposals.

EFMA response:

We recognize that panels sometimes generate less detailed panel summaries for the lower rated proposals. We will explore opportunities for improving panel summaries for these proposals to assist proposers should they plan to resubmit.

COV Comment I.6:

More specific comments in the Review Analysis are encouraged, especially in the case of proposals with similar scores from the same panel but different funding outcomes.

EFMA response:

Programmatic considerations beyond the intellectual merit and broader impacts of the proposal, including portfolio balance and availability of funds, factor into final funding decisions. Program Directors are encouraged to document these considerations in the Review Analysis.

COV Comment I.7:

Sufficient details on the review process were contained in the Panel Summaries to support the decisions. However, in more than one case, it was challenging to reconcile the scores and final dispositions with the reviewers' narratives.

EFMA response:

The general philosophy at NSF is that the review is the opinion of the individual reviewer prior to attending the panel, whereas the Panel Summary reflects the opinions arrived at during panel discussion. Practice varies between Program Directors as to whether they request that panelists revise their reviews following panel discussion, but reviews are not invariably updated. Therefore, it's appropriate that the final recommendation is not always reflected in the reviewers' narratives.

COV Comment I.8:

The majority of the Review Analyses and Context Statements did not include any narrative specific to the proposal under review.

EFMA response:

This is correct. The goal of Context Statements is to provide PIs with the overall context in which all proposals considered by an NSF division or panel were reviewed. The

Context Statements for proposals reviewed by EFMA thus describe the review circumstances for each proposal (panel or ad hoc review description) but do not contain information that is specific to individual proposals. With respect to Review Analyses, the EFRI program permits EFRI PDs to utilize standard language for RAs for declined proposals unless the declination decision is inconsistent with reviewer recommendations, in order to reduce the workload on the PDs.

COV Comment I.9:

The individual reviewers should be encouraged to provide some level of detail in their reviews of all the EFMA/EFRI review requirements (e.g., specific, critical and constructive comments on Intellectual Merits, Broader Impacts, and additional review criteria in the solicitation).

EFMA response:

In FY18, we provided templates for both reviews and panel summaries that specifically listed each criterion, which should enable us to assess whether the use of these templates improved panelist reviews.

COV Comment I.10:

The panels from across different programs should be given more consistent guidance for preparing the panel summary.

EFMA response:

We will attempt to address this through our efforts to improve panel review quality, which will involve designated EFMA personnel attending all panels.

II. Selection of Reviewers:

COV Comment II.1:

One opportunity for improvement would relate to promoting a culture of inclusivity. This would be enabled by a higher response rate on reviewer self-reporting of gender/race.

EFMA response:

Reviewer demographic self-reporting is a perennial challenge at NSF, but we will continue to encourage self-reporting while being respectful of the individual's right to privacy.

COV Comment II.2:

The COV noted that many of the Broader Impacts narratives were generic, and their evaluation by reviewers seemed perfunctory. Boiler-plate reviews of the Broader Impacts criterion is an NSF-wide issue. It may be worth cultivating a community of scientists and engineers who can do this well.

EFMA should consider recruiting reviewers who have experience/expertise not only in a technical area but also in the education or policy issues associated with the technical area.

EFMA response:

Two ENG divisions have recently held workshops on Broader Impacts, and we are in the process of digesting the reports from these workshops to identify strategies for addressing this issue. The GERMINATION program should also result in individuals trained to focus on the bigger picture, with an enhanced ability to relate fundamental research to societal needs. Additionally, we will endeavor to recruit reviewers with policy perspectives in consultation with our colleagues from the Directorate for Social, Behavioral, and Economic Sciences.

COV Comment II.3:

The COV suggests that NSF re-examine the process of identification and the form used to see if there are ways to have more inclusive choices for race and gender.

EFMA response:

Modification of instruments for demographic data collection will require Foundation-level attention; we will bring this comment to the attention of the NSF Office of Integrative Activities.

COV Comment II.4:

The 2014 COV review raised but did not firmly address, the issue of industry participation on panels. Does this remain an issue? Ideally, panels should contain a spread of panelists from academia, industry, and national labs.

Coupled with the suggestion above, this may be expanded to include appropriate panelists from institutions in EPSCoR states, HBCUs, HSIs, and tribal colleges.

EFMA response:

This is an excellent suggestion and we will strive to achieve this.

III. Management of the Program Under Review:

COV Comment III.1:

It was also noted that a macro analysis or trend analysis might yield further insights about cross-cutting problems worthy of NSF investment.

EFMA response:

Thank you for this suggestion. We will consider it as we continue to refine our idea generation process.

COV Comment III.2:

Given all of this excellent work, the question one naturally asks is “can we do more?” Can the impact be expanded without altering the character of the core programs? We believe this question merits discussion across EFMA.

EFMA response:

Thanks for your suggestion; we are constantly assessing how much we can achieve and agree it is important to always ask this question and will discuss ways of achieving this.

COV Comment III.3:

At the time of the 2018 COV, ... program awards remain at the \$2M maximum level (which is the normal level to which most submitters propose). This was noted as concerning to the COV, in concurrence with the 2014 findings. When adjusted for inflation, these funds do not go as far; and certainly, if there are significant instrumentation or hardware needs, the static budgets could be problematic.

EFMA response:

We appreciate the comment. Increasing award budget in the recent budget climate is challenging. We will examine this question in the coming year.

COV Comment III.4:

It is recommended that survey instruments and other assessment methods be developed to track the impact of the program and “life after” for awardees. It would be valuable for some of these survey results to be made public.

EFMA response:

Addressed below under Comment IV.7.

COV Comment III.5:

It seemed to some members of this COV that there is still a considerable amount of effort, time, and money going into the development of pre-proposals that are not selected and full proposals that are not funded. Even at current funding rates, there are large costs to proposing institutions in faculty and staff time in sponsored programs offices. As the number of pre-proposal submissions is not limited, there are many of these. When considered end-to-end (pre-proposals to awards), the overall funding rate is low, and the collective effort is substantial. Given that the program's current process yields a bounty of excellent proposals – resulting in a very competitive process – the COV recommends exploring ways in which the pre-proposal submission process can be made even easier.

EFMA response:

The EFRI program has introduced several modifications to the pre-proposal requirements to improve the pre-proposal submission process, including reducing the required budget information at the pre-proposal stage. The issue of reducing the number of full proposals invited is addressed above under Comment I.1.

IV. Resulting Portfolio of Awards:

COV Comment IV.1:

If additional funding were available there could be a greater distribution of topics during the time period reviewed.

EFMA response:

The issue of additional funding for EFRI is addressed above under Comment III.2.

COV Comment IV.2:

There should be purposeful discussion and decisions about whether the program should grow to achieve true innovation while maintaining the spirit of agility. Examples include planned award budget growth to be more attractive to leading institutions and resources required to do cutting- edge research.

EFMA response:

Addressed above under Comment III.3.

COV Comment IV.3:

Long-term programming of GERMINATION needs a more stable funding source either through topic selection through EFRI or other sources to provide the flexibility, size, and duration to make an impact. The COV recommends that EFMA leadership identify ways to make the impact of GERMINATION more significant.

EFMA response:

We appreciate the COV's recognition that GERMINATION is a program with tremendous potential. Scaling mechanisms will be sought for GERMINATION approaches that prove successful.

COV Comment IV.4:

The COV noted that, for the most part, the distribution of awards reflects the distribution of the geographic locations from which the applications are submitted. The distribution of the applicants, however, has large disparities.

EFMA response:

We appreciate this comment and the EFMA office does strive to achieve geographic spread. Given the small number of EFRI awards and the discrete focus of each topic in a particular year, it is challenging to achieve alignment of awards with a population according to geographic distribution. We will explore outreach options to underrepresented states.

COV Comment IV.5:

EFMA should continue to strive to broaden participation of institution types, especially for the REM and GERMINATION programs. Outreach could improve the balance across the EFRI / REM / GERMINATION programs.

EFMA response:

We agree with this comment. The EFMA office sponsored workshops in both 2014 and 2018 focusing on broadening participation. Additionally, the EFMA PD recently participated in and presented at an NSF grants meeting in Detroit. We will explore future opportunities for EFRI PDs to conduct outreach. The EFMA Office will co-ordinate with EEC to identify opportunities for impact, since the EEC Division in ENG leads the Directorate's NSF INCLUDES efforts.

COV Comment IV.6:

The COV suggests that EFMA program directors and partners be proactive in communicating the importance of self-reporting.

EFMA response:

NSF PI demographic self-reporting continues to be a challenge that will require addressing at the Directorate or Foundation level. However, we must ensure that the drive to collect demographic data is balanced against individuals' rights to privacy.

COV Comment IV.7:

To capture the full impact of REM, GERMINATION, and EFRI, methods should be developed to track the individual investigators and their contributions through existing databases at NSF and other agencies, in order to assess the impact of EFMA programs on the future careers of these investigators and participants, on possible commercial activity, and on society more broadly. The data will be valuable for future efforts to guide, sustain, and/or expand the EFMA programs.

EFMA response:

We will consider plans to address tracking of the impact of EFMA programs. This will necessitate additional dedicated resources for this activity. We will pay attention to other efforts at longitudinal tracking taking place within the foundation to see if there are any lessons we could apply.

V. OTHER TOPICS:

COV Comment V.1:

The 2-minute video on Broader Impacts did not communicate NSF's commitment to encouraging PIs to address Broader Impacts in a significant way. Rather, the video came across as a cautionary note for reviewers to find ways, not to "ding" proposals on the Broader Impacts criterion.

EFMA response:

We appreciate this comment and will communicate the COV's experience to the NSF Office of Integrative Activities. There is a new, longer video that is now made available

through NSF systems to every panelist and ad-hoc reviewer. NSF is seeking feedback from all reviewers on the effectiveness of the video.

COV Comment V.2:

EFMA should not lose the opportunity to coordinate with the Director of NSF to develop a career map inclusive of high school through faculty, including leveraging existing NSF-wide programs (ADVANCE, AGEP, EFRI, GERMINATION, INCLUDES, LSAMP, NRT, REU, REM, RET, etc.) to attract underrepresented groups (women, minorities, low-income).

EFMA response:

The Director of NSF is fully committed to the issue raised here. In fact, the NSF INCLUDES initiative is one of NSF's 10 Big Ideas. The EEC Division in ENG leads the Directorate's NSF INCLUDES efforts. The EFMA Office will co-ordinate with EEC to identify opportunities for impact.