NSF Committee of Visitors Report
Instrumentation and Facilities Program
Division of Earth Sciences
Directorate for Geosciences
May 29-31, 2013

RESPONSE TO SPECIFIC COMMENTS IN THE COV REPORT

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On May 29-31, 2013, a Committee of Visitors (COV) met at NSF to review the Instrumentation and Facilities (IF) Program in the Division of Earth Sciences (EAR). The review covered IF proposal and award actions for the Fiscal Years of 2010, 2011, and 2012, as well as more recent activities that illustrate new developments in the IF Program. We are very pleased with the overall results of the COV as outlined in the Executive Summary of their report:

> "The EAR Instrumentation and Facilities program is a well-run, essential program for Earth Sciences. Instrumentation enables cutting-edge, transformative, and inter-disciplinary science. And as geoscience research becomes increasingly quantitative, the need for this instrumentation is growing.
>
> The POs have done a tremendous job in the face of increasing proposal pressure and flat budgets to fund crucial instrumentation across a broad swath of organizations, with a broadly representative PI base. Therefore, our main message to NSF is:
>
> **Please keep up this work. It is absolutely essential to the well being of Earth Science research in the US and for the US to maintain its competitive edge in science and engineering."**

While overall very positive and complimentary of NSF's management of the IF program, the COV report contains some specific recommendations on IF Program areas that the COV believes could be improved (recommendation numbers are added by NSF):

> *Recommendation 1:* The elimination of mandatory **cost-shares**, as of 2005, resulted in a marked increase in funding requests to the IF program that resulted in a plunge in proposal success rate (from 50% to ~30%). Furthermore, the recent (January 2012) elimination of all voluntary cost-shares is a serious problem that will lead to further deleterious effects on the IF program. While the admirable intent of this National Science Board policy was to "level the playing field", the unfortunate effect was to level the playing field and lower it onto the floodplain! The lack of institutional cost-shares significantly impairs the ability of IF to fund a broad range of projects, also making it

> more difficult to support instrumentation at smaller educational institutions -- exactly the opposite effect of the intention of the NSB policy. Leveraging of funds by the IF POs has been important in making scarce resources go further. Such leveraging involves co-funding with other NSF programs, other funding agencies, other governments, and private foundations. Why eliminate an important source of leverage – universities who are willing and able to supply cost-shares? The COV notes that most universities are already accustomed to cost-sharing for instrumentation because such cost shares are required for MRI Proposals. We recommend that the IF proposal to re-institute cost-shares should be strengthened, revised, and submitted to management for review.

We agree. We will continue our efforts to convince NSF upper management to re-institute cost share for IF proposals.

> *Recommendation 2:* **Balance**. There is a continuing demand for multi-user facilities. Those funded by IF have been highly successful and are models of well-run organizations that allow access to cutting-edge instrumentation by a wide cross-section of the community. Facilities that were not run well lost funding, and some well-run facilities have managed to become self-sufficient and operate without direct NSF support – so the process works! Yet these facilities are consuming an increasing share of the IF budget: currently facilities constitute nearly ¾ of the entire budget. It is absolutely crucial that both facilities and individual instruments be funded in order to keep the US competitive with the rest of the world. In the face of a declining budget, this is even greater rationale to re-institute cost-sharing on IF proposals to allow existing funds to go farther.

We agree that both facilities and individual instruments should be funded, and the balance between the two is constantly being evaluated by both the Program and the Division. Actually, the budget ratio between facilities and individual instruments has remained remarkably constant for the last ten years. It is important to note that many facilities act to support the equipment needs of individual PIs. Were they not to exist, the number of individual equipment submissions would be far higher. In a very real sense, Facility Support acts as a natural governor on the number of equipment requests. We believe that the current balance of 75%/25% is appropriate. The issue of cost-share renewal is addressed in Recommendation 1.

> *Recommendation 3:* There is a crucial need for infrastructure in the **mid-range budget category**: $4 to $50 M. IF currently helps to fill this gap through funding of facilities. A GEO-wide program for funding mid-range infrastructure would benefit EAR and perhaps remove some pressure from the IF program. COV recommends that the IF program officers submit a proposal to the NSF to establish a program for the support of meritorious projects falling in the "mid-size infrastructure" range. This might be accomplished in the short term by raising the cap on MRI proposals to $10M or $20M.

The gap between MRI and MREFC funding ranges has been well recognized and discussed frequently by the National Science Board and more recently at the NSF AD level. However, these discussions have not yet resulted in a policy change.

> *Recommendation 4: Funding* of proposals from **minority PIs** may be an issue for further investigation. There was a decrease in the success rate of proposals submitted by PIs

from minority populations from 2010 to 2012. Although the numbers are small and one or two proposals could change the result significantly, this is cause for concern. Perhaps these proposals could be reviewed to determine the reasons for the declines and to see if there is any obvious way to counteract this trend.

While we agree that the significance of the decrease may not be meaningful because of the small sample size, we will follow up by investigating the minority PI proposals as recommended to determine if there is a valid way to improve future minority success rates.

Recommendation 5: **Return rate of reviews** is historically disappointing. One way to perhaps increase the yield would be to require reviewers to respond to the request – either agree or decline. If they do not do so within a week of receiving the request, a follow-up email could be automatically generated. (Checking responses and re-requesting responses should be automated, as is commonly done by most professional journals.) Once a PI has agreed, they may feel compelled to follow through.

Implementing this suggestion requires a modification of the overall NSF ad hoc reviewer software. We will forward this suggestion to those responsible for maintenance and improvement of this software.

Recommendation 6: For **multi-user facilities** that are routinely strongly reviewed, perhaps consider increasing the funding cycle period (e.g., from 3 years to 5 years). This would help to lessen the workload on POs, PIs, ad hoc reviewers and panelists.

While some multi-user facilities have a funding cycle of 5 years, we will evaluate those that are shorter to see if they are appropriate for a longer cycle.

Recommendation 7: The POs endeavor to avoid **COI** when sending proposals for review. When COIs are self-identified by the reviewer, the review is marked as a conflict by the PO and is not considered further. Inevitably, however, given the proposal load, some self-identified reviewer COIs were not caught. We recommend continued and perhaps increased diligence to eliminate reviewer COI. This could be facilitated by having any review that is returned with text in the COI box to be automatically flagged for PO attention. The POs could then decide whether or not there is a conflict and perhaps provide text to explain their decision regarding the potential COI in the review analysis.

We agree and will increase our efforts to monitor and evaluate self-identified conflicts by reviewers.

In addition to the recommendations above which were taken from the Executive Summary of the COV review, the text of the Core Questions and Report Template has further recommendations, some of which repeat the above and some are new.

Recommendation 8. Make the review analysis by the PO (redacted as necessary) available to PIs. We recognize that this adds additional work for the POs, but perhaps the

PO could include similar details in the PO comments while removing sensitive information.

We agree and, while this may not have been done uniformly early in the review period, all IF program officers currently insert their recommendation explanation paragraph from the review analysis into the PO Comments.

Recommendation 9. For multi-user facilities that are routinely strongly reviewed, perhaps consider increasing the funding cycle period (e.g., from 3 years to 5 years). This would help to lessen the workload on POs, PIs, ad hoc reviewers and panelists.

See response to Recommendation 6.

Recommendation 10. We recommend continued and perhaps increased diligence to eliminate reviewer COIs. This could be facilitated by having any review that is returned with text in the COI box automatically flagged for PO attention. The POs could then decide whether or not there is a conflict and perhaps provide text in their review analysis to explain their decision.

See response to Recommendation 7.

Recommendation 11. Remove information about past reviewer rankings from the reviewer database.

Implementing this suggestion requires a modification of the overall NSF reviewer database. However, we are reluctant to make this recommendation because the same information can be used to ensure a fair review process by avoiding an overload of the review process with either always "favorable" or always "critical" reviewers. In the end, the reviews are advice to the Program Officer who makes the final recommendation. The COV process is the best evaluation of the fairness of the Program Officers.

Recommendation 12. Strive to seek reviews from a broadly representative reviewer base. In particular, increase the proportion of female ad hoc reviewers and panel members.

We agree, and we will increase our efforts to implement this suggestion whenever possible and appropriate.

Recommendation 13. Include a reviewer response box in the email request and follow up with non-responses through automated emails.

See response to Recommendation 5.

Recommendation 14. The data available for gender and ethnicity of IF reviewers are not particularly complete. We recommend that the reviewer database be upgraded to improve this information. Perhaps this could be accomplished through merging of the IF reviewer database with the PI database maintained by EAR.

Completeness of gender and ethnicity data has always been a problem. These data are voluntarily self-reported by reviewers and PIs. Others are not allowed to modify these data.

> *Recommendation 15.* We see a continuing need for three officers in this program, given the very significant number of proposals received by EAR IF, the need to provide substantive feedback to individual PIs, as well as other duties required of the POs, such as site visits to facilities.

While we have been able to generate a third program officer slot for the IF Program, the distribution and assignment of personnel in the Division is regularly reviewed by management based on variations in work load and other considerations across the Division.

> *Recommendation 16.* The COV recommends that the POs work with the community to solicit more innovative ITD type proposals, as these proposals, if successful, can catalyze new research directions. The COV also recommends that the term "analytical" be taken out of the current solicitation, as this might present a barrier to the type of proposals submitted....

We agree. ITD (Instrumentation and Technique Development) proposals have been a very successful and innovative award class for IF, and we will work with the community to identify critical needs that are ready for development and future solicitations will be updated appropriately.

> *Recommendation 17.* The POs might consider extending the award duration for smaller facilities that routinely review strongly from three years to five years. Such a change could be by invitation only at the discretion of the POs.

See response to Recommendation 6.

> *Recommendation 18.* The IF program should give some preference to instrument development proposals relative to instrument acquisition proposals because of the greater potential for leading to transformational science.

See response to Recommendation 16.

> *Recommendation 19.* We recommend continuing to support early career scientists and perhaps increasing the proportion of the IF budget that goes to such PIs, provided sufficient numbers of high quality proposals are submitted.

We agree and intend to continue support for early career scientists who submit competitive proposals. The proportion of the IF budget that will be devoted to this category will be continually assessed based on the quality of early career proposals and the demands from other worthy IF proposal categories.

> *Recommendation 20.* We suggest that effort be made to evaluate the significance and possible causes of the decline in proposal numbers and success rates of minority PIs and,

especially, that steps be taken to reverse the trends. For example, review all of the past proposals from identified minority PIs and evaluate the review and analysis process. Where did these proposals fall within the overall spectrum of proposals?

We agree that we should intensify our efforts to make sure that proposals from minority PIs are treated fairly. We will investigate the 3 year decline from 35% to 20%. However, as pointed out by the COV, the significance of the observed decline in minority success rates from 2010 to 2012 is suspect because of the small numbers of minority proposals, and the uncertainty due to the voluntary nature of minority identification.

Recommendation 21. The IF proposal to re-institute cost-shares should be strengthened, revised, and submitted to management for review.

We agree.

Recommendation 22. GEO should create a mid-range facilities program along the lines of the current MRI.

See response to Recommendation 3.

Recommendation 23. NSF may wish to reach out to minority PIs in an attempt to determine if there are mentoring steps that might be utilized, especially concerning proposal preparation. A study to determine how minority proposals fared across NSF would also be useful.

Each year, the NSF Office of Legislative and Public Affairs organizes NSF Days at a number of Minority Serving Institutions for this purpose. NSF also keeps statistics on the success rates of minority PIs (subject to the difficulties of incomplete reporting data as discussed above). These data show that the IF minority PI success rates are consistent with those of NSF as a whole.

We again would like to thank Professor Rudnick and the other members of the COV for their time and efforts in making these excellent recommendations that will improve the Instrumentation and Facilities Program of EAR.

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