

REPORT OF THE 2013
NSF-DMS
COMMITTEE OF VISITORS

Submitted by

Mark L. Green, Chair

The Mathematical Sciences

- A rich and complex ecosystem, one in which people and ideas move across boundaries
- For the mathematical sciences to be healthy, all parts of this ecosystem must be nurtured

A Period of Rapid Change

- There has been a notable expansion of the impact of the mathematical sciences on other subjects
- A Golden Age for the core mathematical sciences
- Cost pressures on universities will disproportionately affect the mathematical sciences
- More details in the National Academies report, “The Mathematical Sciences in 2025”

Level of Cooperation the COV Encountered

- DMS was commendably forthcoming in providing the information needed for this study
- For example, one committee member wanted to know about decisions which were appealed; DMS obtained this information from MPS and the member was satisfied

Integrity of the Proposal Review Process

- The Committee of Visitors was satisfied that the system in place functions very well overall
- The quality and significance of the division's programmatic investments is extremely high—however, assessing outcomes was not part of the committee's charge

Unique Features of the Mathematical Sciences (I)

- Among core mathematicians, NSF plays such a predominant role that not receiving NSF funding often means not receiving funding at all
- Most core mathematicians submit only one proposal, so that it is investigator funding rate rather than proposal funding rate that is the relevant measure for comparison with other disciplines
- There are not just unfunded excellent proposals, but unfunded excellent investigators in the mathematical sciences
- This results in a waste of the considerable resources that went into training these investigators

Unique Features of the Mathematical Sciences (II)

- There are 8 national research institutes in the mathematical sciences
- These are our community's large projects, our telescopes peering into the future and our microscopes focusing intently on the deepest fundamental problems, our laboratories experimenting with new configurations of people and ideas and a significant vehicle for cultural change
- Some artifacts of the history of the program need adjustment

Workforce Programs

- There is a “rich tapestry” of DMS workforce programs, and these have great value
- DMS shows laudable initiative in creating new programs and phasing out ones where appropriate
- The workforce programs strike the COV as sometimes being overly complex

Mid-Career Mathematical Scientists: A Demographic Needing Support

- There is a substantial falloff in proposals from researchers 10-15 years out from the PhD
- Small amounts of funding would make a big difference, e.g. having a budget line on conference and summer school grants for support of mid-career mathematical scientists

Underrepresented Minorities in the Mathematical Sciences

- DMS has made great efforts
- The number of PhD's annually remains woefully small
- Care is needed to nurture promising underrepresented students and researchers in a sequential way as they move along the pipeline
- Fresh ideas are needed to make a breakthrough

Service on Panels

- Promoting diversity is the shared responsibility of the entire mathematical sciences community, not only of women and underrepresented minority mathematical scientists
- Some women on the COV felt that women are overburdened by service on panels and wondered whether a better balance could be struck
- The situation for underrepresented minorities is different, since it is often a matter otherwise of not having any representation at all

Feedback from Reviewers to Proposers

- Feedback is of variable quality; having good feedback about the shortcomings of a proposal is crucial to encourage researchers, especially new researchers, to come back with a new proposal in the next round
- DMS program directors are proactive in ensuring that panel summaries are substantive and indicate where improvement is needed
- Reviews prepared before the panel arrives at NSF are less likely to do this
- DMS should experiment with new ways to educate reviewers about the importance of giving substantive and useful feedback

Assessment of Effectiveness

- Finding ways to assess the effectiveness of DMS programs in a way that captures multiple layers of outcomes is by its nature difficult
- DMS to its credit has not jumped at easy answers
- Carefully and deliberately, further progress needs to be made

Program Directors and Management

- Quality of DMS Program Directors and management is excellent
- Balance of rotators and career Program Directors is about right; it should not tilt too far in either direction
- Rotators are given considerable independence and are involved in working groups; nevertheless the COV would like to see them more consistently involved about major policy initiatives and decisions
- Former rotators are a valuable resource to the mathematical sciences community

Administrative Staff

- Number of administrative staff is lower on a per-proposal basis than any other division of MPS
- Some DMS Program Directors expressed the need for a science assistant; this would promote more efficient use of the Program Directors' time
- Generally, the level of technology used to assist the workflow of Program Directors is suboptimal; the COV understands an MPS-wide effort to improve this is underway and applauds this

Keeping Abreast of Recent Developments

- DMS does an admirable job of this
- Funds to attend conferences, visit institutes, etc. are crucial to keeping up
- The benefits of this small amount of funding to the quality of decisions made at DMS are disproportionate to the expense
- Such funding also has the benefit of allowing rotators to remain active in research during their time at NSF

Problems in the COV Process

- Needed to log into 3 different systems every day, better-integrated system needed
- Had 6 subcommittees instead of 3, can one avoid conflicts and still have only 3
- Have chair and subcommittee chairs arrive $\frac{1}{2}$ day early
- Need more clarity about what parameters went into compiling overall statistics

Thank you's

- Sastry Pantula and Hank Warchall and the program officers and staff at DMS
- Fleming Crim, Celeste Rohlfing and Kelsey Cook at MPS