

REPORT OF THE IMPACT OF PROPOSAL AND AWARD MANAGEMENT MECHANISMS WORKING GROUP (IPAMM)

I. INTRODUCTION

Background

As the nation's foremost agency responsible for funding academic institutions to conduct basic science and engineering research, for advancing science and engineering education, and for ensuring the health of the academic research community and its infrastructure, the National Science Foundation (NSF) currently supports over 50% of the Federal non-medical fundamental research at U.S. colleges and universities. NSF's stewardship is vital for maintaining the nation's competitive edge in a world where the solutions to many of the challenges facing society have their roots in our scientific understanding, where technology increasingly drives the global economic engine, and where many other nations are gaining rapidly in scientific and engineering capabilities.

The competition for NSF funds has always been intense, but it has grown more so in recent years. Beginning in FY 2000, the overall average proposal funding rate¹ for NSF research proposals decreased from 30% to 21% in FY 2006, although the NSF budget grew nearly 44% during the same period of time. Many researchers are dismayed that it has become more difficult to get funded by NSF. Members of the science and engineering (S&E) community, including those on NSF Advisory Committees, Committees of Visitors (COVs), proposal review Advisory Panels, and the National Science Board (NSB), have expressed concern that this trend may be negatively impacting the academic research community, resulting in increased workload and diminished S&E capacity. In response, a number of NSF program areas have attempted to manage workload (for both NSF and the community of proposers) and community expectations through a variety of approaches, such as restricting the number of program solicitations and solicitation target dates, and limiting the number of proposal submissions.

Charge to IPAMM

Responding to these concerns (and opportunities for improvement), the Impact of Proposal and Award Management Mechanisms Working Group (henceforth, IPAMM) was established in March 2006.² It was charged to: *“recommend policies and preferred practices to improve NSF’s program announcement and solicitation processes in ways that achieve appropriate balances between proposal funding rates, award sizes and award duration in the various types of awards that comprise the total NSF portfolio, with the emphasis on individual, investigator-initiated grants.”*³

¹ Sometimes referred to as “success rate”, the proposal funding rate for a given period is calculated by dividing the number of awards by the number of proposal submissions.

² See the full IPAMM membership and acknowledgement of those who assisted IPAMM on page ii.

³ See the full charge to IPAMM in Appendix A.

As set forth in its charge, the key issues for IPAMM are:

- What are the reasons for the recent declines in proposal funding rates and increases in proposal submissions?⁴
- How have these trends impacted the ability of NSF to fulfill its mission?
- What has been the impact and effectiveness of NSF efforts to manage proposals and funding rates?
- How can NSF data regarding funding rates, award amounts, and award duration be disseminated more effectively?

Scope and Definitions

The scope of the charge focuses on enabling NSF's goal of supporting as many high quality proposals as possible, while minimizing the workload on the principal investigator (PI) and community, which goes beyond simply reducing proposal submissions. In order to address the issues outlined in the charge, IPAMM used both quantitative and qualitative research methods and analyzed data from several sources.⁵ In general, IPAMM focused its overall data analyses at the NSF level, and used case studies to explore differences among directorates.

The primary source of attitudinal data was a survey of all NSF PIs who submitted research proposals during FYs 2004, 2005 and 2006, conducted by Booz Allen Hamilton. In January 2007, these PIs (numbering 43,412) received an invitation to complete the online survey. A total of 24,378 PIs responded to the survey for a response rate of 56%.⁶ The survey focuses on PI perceptions about the proposal submission process, factors that influence decisions to submit proposals, reviewer workload, and funding rates within NSF and other organizations. A copy of the survey instrument and the survey results are available at:

http://www.nsf.gov/od/ipamm/ipamm_2007nsfproposersurvey.pdf.

The findings from the survey are presented and discussed wherever they are relevant throughout this report. In addition to the survey, IPAMM received feedback from the external S&E community through focus groups with new NSF rotators⁷, discussions with Directorate-level Advisory Committees, analysis of COV reports, and discussions with the NSB.

Unless noted otherwise, the analysis contained in this report is based on award and decline decisions across the last five to ten years for the *research grant subset*⁸ of NSF proposals.

⁴ The 47% increase in proposal submissions began in FY 2000, peaked in FY 2004, and leveled off in FY 2005 and FY 2006.

⁵ In collecting data to analyze these issues, a wide variety of data sources were tapped, including the Enterprise Information System (EIS) database, and existing reports (e.g., Science Indicators, business analysis, merit review, etc.). The overall framework for analysis was to identify and analyze the major discontinuities in trends (i.e., funding rates and proposal submissions), and then formulate and test hypotheses with trends analysis of internal and external data, case studies of various practices, and a survey of NSF proposers.

⁶ A non-response analysis of the survey data indicated that the respondent population was representative of the overall population.

⁷ Rotators are experts from the S&E community who assume temporary professional positions at NSF, usually for one to two years.

⁸ The research grant subset of NSF proposals was developed to identify proposals that represent a typical research grant (as opposed to educational or development grants), particularly with respect to the size of the grant. Large awards (such as centers and facilities operations) and equipment and instrumentation grants are excluded, as are small items such as conferences and symposia. Also excluded are Small Business Grants and Small Grants for

Proposals are grouped by Fiscal Year (FY) by the date of the decision, unless otherwise noted. The proposal funding rate for a given period is calculated by dividing the number of awards by the number of proposal submissions.⁹ Unless otherwise noted, the term *proposal submissions* represents the number of proposals processed (i.e. awarded and declined) by NSF within a given time period, and does not include withdrawals, proposals returned without review, supplement requests, and other similar actions.

Unless otherwise noted, proposal and PI data include the lead PI only. In this report, the term PI refers to individuals that are identified as principal investigators on all proposals, regardless of whether or not the proposal was ultimately funded.

Organization of Report

This report is organized as follows:

- Section II, *The Issues in Context*, discusses major issues and data trends of concern to NSF and IPAMM.
- Section III, *Impacts on NSF and the Community*, examines how NSF's ability to fulfill its missions of supporting research at the frontier and investing in the development of all segments of the scientific and engineering workforce has been impacted by declining funding rates and increasing proposal submissions.
- Section IV, *Causal Factors*, analyzes the key factors contributing to declining funding rates and increasing proposal submissions.
- Section V, *NSF Efforts to Manage Proposal Submissions and Funding Rates*, assesses NSF practices that have been developed to manage proposal submission and funding rates.
- Section VI, *Findings and Recommendations*, discusses the principal findings of this study and offers some options and potentially promising practices for managing NSF's proposal and award processes.

Exploratory Research (because the award size for both is established at a particular level by policy) and most EHR grants unless they are specifically related to education research.

⁹ Among the proposals received by NSF are those from single institutions and those in which investigators from two or more organizations collaborate on a unified research project. In some cases, the collaborating institutions submit a single proposal, in which a single award is being requested (with subawards for the partner organization(s) that are administered by the lead organization). In other cases, the collaborating institutions may simultaneously submit separate, collaborative, proposals (which are joined together in FastLane), in which each organization requests a separate award. For the purpose of calculating funding rates, each of the collaborative proposals and awards are counted individually. For the purpose of calculating average award sizes, the awards for a collaborative project are grouped together as a single unit.