

**National Science Board
Committee on Strategy and Budget**

**Guidance for National Science Foundation
Average Award Size and Duration, and Proposal Success Rate**

1. Introduction

Since 2000-2001, the National Science Foundation (NSF) has been operating under guidance from the National Science Board (NSB, the Board) that suggested the average research award size should increase.ⁱ In a later study commissioned by the Board, which resulted in the report entitled *NSF Report on the Efficiency of Grant Size and Duration*, NSF principal investigators (PIs) and institutions were surveyed to determine the appropriate size and duration of NSF grants, and to identify ways to improve the efficiency and effectiveness of NSF's funding process.ⁱⁱ Survey results revealed a general consensus among PIs that average award size should be increased to about \$250,000 and average duration to about five years.ⁱⁱⁱ

Between FY 2000 and FY 2006 the average annual size of research awards^{iv} was increased 32.5 percent, from \$101,525 to \$134,595. During this time period, the number of competitive research proposal actions processed by NSF increased 47 percent, from 21,442 to 31,514, and the number of awards was increased by 3.2 percent, from 6,498 to 6,708. As the number of proposals and award size increased, the corresponding success rate dropped from 30 percent to 21 percent. Duration remained stable at about 2.9 years. This occurred within the context of a 46 percent increase in the NSF Research and Related Accounts budget, from \$2,979.9 million to \$4351.0 million.^v

Guidance from the NSB was restated and confirmed in late 2003 in the publication *Fulfilling the Promise: A Report to Congress on the Budgetary and Programmatic Expansion of the National Science Foundation.*^{vi} In that report, the Board recommended that increasing grant size and duration was one of the highest priority areas to receive the projected increased investment in NSF.

Since March 2005 the NSB committees on Strategy and Budget (CSB) and the Committee on Programs and Plans (CPP) have studied current guidance on grant size and duration. In 2006, at the request of CSB and CPP, NSF conducted an in-depth study, *Impact of Proposal and Award Mechanisms (IPAMM)*.

2. IPAMM Study

The IPAMM study (*Impact of Proposal and Award Management Mechanisms*) was completed and presented to the CSB at its August, 2007 meeting.^{vii} Briefly, the charge to IPAMM was 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 durations....”

The IPAMM report contains a vast amount of valuable information on the broad subject of proposal and award management that should increase significantly the understanding of NSF as it pursues its mission of supporting excellent research. No doubt, the impacts of this report on management will extend beyond the NSB guidance issue which caused it to be created.

3. Recommendations

The NSB’s primary goal is to aid the NSF to achieve its vision: *Advocacy, discovery, innovation and education beyond the frontiers of current knowledge and empowering future generations in science and engineering*. Inasmuch as resources will always lag demand, a careful and thoughtful balance must be struck between NSF’s goals of increasing the average research award size and duration and maintaining acceptable proposal success rates. Towards this end, the Committee on Strategy and Budget recommends to the NSB that these recommendations, inspired by the IPAMM report, be adopted for implementation by the NSF.^{viii}

The context for these recommendations is as follows:

- a. The primary goal is to maximize scientific excellence while assuring broad coverage.
- b. There is not a single best or preferred approach to establishing an appropriate balance between funding rate and award size. Rather, there are a variety of options, all of which balance tradeoffs between encouraging the free flow of ideas to NSF and keeping the proposal workload to a manageable and productive level (for both NSF and the community).
- c. The directorates and research offices should be given the responsibility and flexibility to find this right level of competition and should focus on maintaining both enabling award sizes and funding rates that respond to the priorities and needs of the different communities that each unit serves.
- d. NSF management should view the proposal and award management process as a total system and take care to avoid unintended consequences when making changes.

The Committee on Strategy and Budget recommends:

1. NSF should require that the directorates and research offices develop overarching frameworks that account for and balance all of their research-related activities for periodic NSB review. These frameworks should:
 - guide strategic planning when determining the appropriate balance between funding rates and award size,
 - incorporate flexible management approaches that enable the directorates/offices to track and respond to developments that are most relevant to their disciplinary and interdisciplinary research, and
 - assure funding opportunities for early career faculty.
2. Long-term planning for the growth of communities and infrastructure must go beyond expecting the newly developed activities to be absorbed by core programs. Program solicitations that are intended to develop targeted research areas should be focused to help the community develop relevant proposals and should avoid the unproductive preparation of proposals that have a low likelihood of funding.
3. Careful consideration should be given to ensure than any decline in funding rate does not trap PIs and reviewers in an unproductive spiral of revising, resubmitting and re-reviewing highly rated proposals that could not be funded due to limited resources.
4. NSF management should inform appropriate internal and external communities when implementing new proposal management practices and should monitor community concerns during implementation. Changes to these practices should incorporate annual evaluations of proposal data and feedback from the research community.
5. The Foundation should monitor proposal and award trends provided in the IPAMM study and report them to the Board as part of the Director's annual report on the Foundation's merit review process. The IPAMM Group was discharged following release of their study and the Board does not expect replication of the PI survey or other one-time elements of the study on an annual basis. NSF senior management should reassess periodically the impact of the practices and policies employed by the directorates and research offices to ensure that NSF maintains its capacity to fulfill its vision of excellence in the science and engineering research enterprise.

ⁱ *2001-2006 NSF GPRA Strategic Plan*, NSB Resolution ([NSB-00-18](#)). This plan, which was sent to OMB in October, 2000, contained the following Implementation Strategy: “Reduce the burden on proposers and reviewers while maintaining the quality of decision processes, by increasing award size and duration.”

ⁱⁱ Mathematica Policy Research, Inc. (2002) *NSF Report on the Efficiency of Grant Size and Duration*.

ⁱⁱⁱ Within these averages there is a wide distribution of award size and duration based on the type of research being conducted.

^{iv} 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 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.

^v *Impact of Proposal and Award Management Mechanisms, Final Report*, August 1, 2007, (NSF-07-45).

^{vi} National Science Board (2003) *Fulfilling the Promise: A Report to Congress on the Budgetary and Programmatic Expansion of the National Science Foundation*. ([NSB-03-151](#)).

^{vii} *Impact of Proposal and Award Management Mechanisms Final Report*, August 1, 2007, (NSF-07-45).

^{viii} The full IPAMM recommendations can be found on pages 51-53 of the report.