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Report to Congress on Limits on Proposal Submissions by Institution



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# **National Science Board**

## **Report to Congress on Limits on Proposal Submissions by Institution**

### **Executive Summary**

As directed by the America COMPETES Act, Limit on Proposals § 7037 (b), this report addresses the National Science Foundation's (NSF) use of limits on the number of proposals that a single institution can submit to NSF in response to particular solicitations.<sup>1</sup> This practice is currently used in about 12 percent of NSF's 300 to 400 annual competitions, and each solicitation containing institutional limits is reviewed and approved by senior NSF management. To inform its findings and recommendations, the Board obtained input from three major stakeholder groups: (1) members of broad research and education communities as represented on NSF advisory committees, (2) university research administrators, and (3) the NSF proposer community. In general, all stakeholder groups supported or were neutral to the use of limits on proposal submissions by institution for certain types of programs (infrastructure and instrumentation, centers and facilities, and education and training). Institutions reported both positive and negative impacts, but overall these were relatively minor in scope. In conclusion, the Board found NSF's current practice of limiting proposals for carefully selected competitions to be well-justified and appropriate. The Board recommends that NSF continue to allow certain types of programs to limit the number of proposals that a single institution can submit to NSF, provided that such limits are reviewed and approved by senior NSF management and that the rationale for institutional limits is communicated to the relevant communities.<sup>2</sup>

### **Introduction**

The National Science Foundation (NSF) and the U.S. academic community are mutually responsible for identifying new scientific frontiers and setting priorities for science and engineering research. NSF plays a critical role in supporting fundamental research by issuing limited-term grants to fund specific research proposals that have been judged the most promising by a rigorous and objective merit review process. In FY 2007, NSF received about 44,600 proposals (an increase of nearly 50 percent over the number of proposals received in FY 2000) and issued approximately 11,500 new research awards. NSF oversees a total of about 35,000 active awards each year.

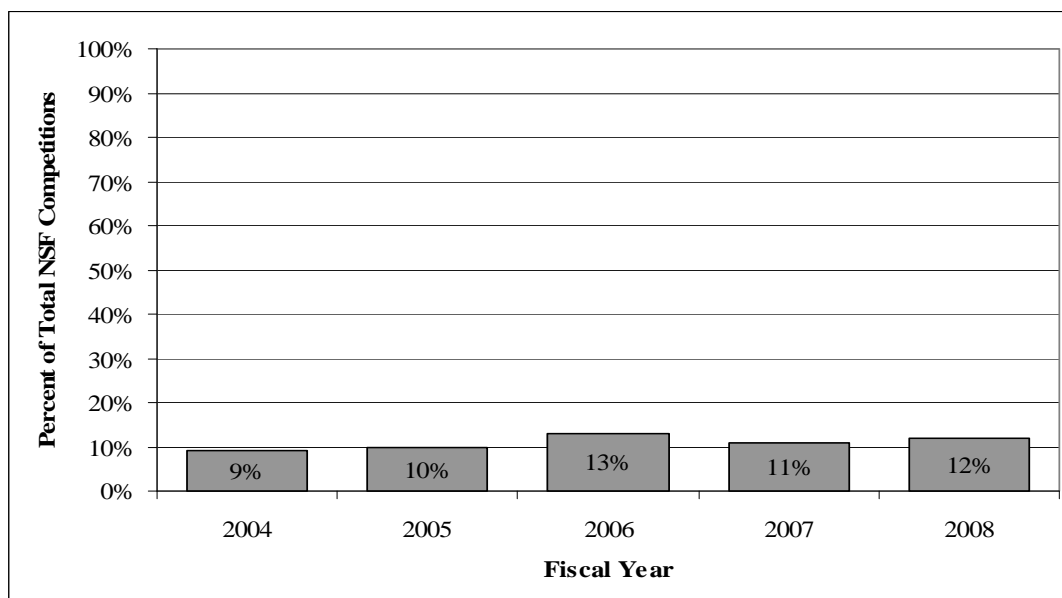
NSF maintains a cutting-edge portfolio of the most meritorious basic scientific and engineering research and education projects across a broad array of disciplines. The NSF portfolio is a critical and well-recognized element in the promotion of U.S. competitiveness. NSF's strategic goals include enabling research at the forefront of discovery, encouraging collaborative research and education efforts, fostering connections between discoveries and their use in the service of society, and increasing opportunities for underrepresented individuals and institutions in research and education activities.

There exist a number of practical challenges associated with developing and maintaining an investment portfolio that achieves NSF's diverse objectives. Current challenges include an increasing number of competitive proposal submissions; fiscal constraints on the number of proposals that NSF can fund per year; the time and effort necessary for both principal investigators (PIs) and institutions to develop NSF proposals; the availability of high quality external reviewers to participate in the NSF merit review process; and the continuing need to broaden participation of institutions of different sizes, locations,

missions, and character in NSF funding opportunities. One management practice that NSF has employed to address these challenges has been limiting the number of proposals that a single institution can submit to NSF in response to solicitations for certain programs.

## NSF Practice

Most NSF programs allow an unlimited number of proposals to be submitted in response to a given program solicitation. A small number of NSF programs, however, have chosen to limit the number of proposal submissions that a single institution may submit in response to a particular program solicitation. Since 2004, 9 to 12 percent of the approximately 300 to 400 NSF funding competitions per year have employed proposal limitations (see Figure 1) ranging from 1 to 4 proposals per institution.



**Figure 1. Percentage of NSF competitions with limits on proposal submissions by institution, FY 2004-2008.** *This Figure shows that about 90 percent of the approximately 300 to 400 NSF funding competitions per fiscal year do not contain limitations on the number of proposals that a single institution can submit to NSF. Data drawn from NSF solicitation database by the NSF Office of Budget, Finance, and Award Management.*

NSF programs that have employed limits on proposal submissions have done so on a case-by-case basis for specific solicitations. Limits are usually only applicable to the lead institution submitting the proposal in response to a specific solicitation; participating or collaborating institutions are not precluded from being involved in multiple proposals. Excerpts from a sample of solicitations that limit proposal submissions by institution are provided in Appendix 1.

NSF senior management reviews and approves each solicitation (and its accompanying management plan) issued by NSF programs. NSF's internal *Proposal and Award Manual* (PAM) provides guidance for this clearance process and includes a specific requirement that any proposed solicitation that limits proposal submissions by institution must provide a rationale for the limit in its internal management plan. Proposal limits have been approved by senior management based on the following rationales:

- (1) Limits facilitate institutional review and commitment to ensure the sustainability of the project beyond the life of the NSF award (e.g., infrastructure-building proposals, and establishment of research centers);
- (2) Limits ensure that the funded programs fit within the long-term strategic goals of the institution (e.g., development of partnerships); and
- (3) Limits encourage participation by diverse and non-traditional institutions to compete for funding in programs with broad appeal (e.g., scholarship, fellowship, and training programs).

Accordingly, NSF programs that have been approved to issue solicitations with limits on proposal submissions by institution have generally fallen into three broad categories:

- (1) Infrastructure and instrumentation,
- (2) Centers and facilities, and
- (3) Education and training.

Solicitations in these categories tend to fund large-scale projects requiring more institutional commitment and strategic planning than single PI awards. In addition, they support activities intended to involve a diverse set of institutions.

## **Impacts on Institutions**

To assess the impacts of institutional proposal limits, the Board obtained data reflecting input from three affected stakeholder groups: members of diverse NSF advisory committees, university research administrators, and the NSF proposer community, as described below.

### ***NSF Advisory Committees***

NSF advisory committees are composed of experts and leaders from a variety of academic institutions and industry and from a wide range of disciplines and backgrounds. The Board distributed key questions on NSF's practice of limiting proposal submissions by institution to all NSF advisory committees and invited comments. A list of the twelve NSF advisory committees that provided written input to the Board is provided in Appendix 2.

Advisory committee respondents reported both positive and negative impacts of NSF's practice and offered suggestion for addressing them. These impacts and suggestions are summarized in the Summary of Findings section of this report.

### ***University Research Administrators***

The Board obtained input from several senior university research administrators by conducting informal discussions to gain a more in-depth understanding of existing practices established by institutions to handle limits on proposal submissions, and to assess institutional viewpoints on such procedures and limits. Four geographically-diverse universities were chosen based on factors such as their history of having responded to multiple solicitations that had institutional limits and, therefore, with experience in making internal university selections from among multiple proposals that originated within their institution. The interviews with senior research administrators from these institutions were designed and conducted to provide candid insights into internal institutional processes and impacts.

The research administrators generally supported the use of limits on proposal submissions by institution for NSF programs that required significant institutional commitment and that focus on and generally draw proposals from a single discipline. However, in the context of inter-departmental competition for funding, they were less supportive of proposal limits for solicitations that seek interdisciplinary proposals or that encourage the submission of proposals from a variety of disciplines.

### ***NSF Proposer Community***

In early 2007, NSF conducted a survey of individuals who had submitted research proposals to NSF during fiscal years 2004-2006. A total of approximately 24,500 individuals responded to the survey. The survey was designed to gather data on PI perceptions about a wide range of NSF's proposal and award management mechanisms. The survey included a set of multiple choice attitudinal questions about NSF's practice of placing limits on proposal submissions by institution in certain program solicitations. Approximately 8,500 respondents who had participated in funding competitions with limits on proposal submissions by institutions responded to these questions.

Survey results suggested that the respondents believed that limits had a positive to no impact on the quality of proposals submitted or on the success of proposals containing transformative ideas. However, respondents tended to think that limits on proposal submissions from their institutions had a negative to no impact on their motivation to seek future NSF funding, and on fair representation of their fields of research within their institutions.

### **Summary of Findings**

There were several common themes in the input obtained by the Board. All three stakeholder groups generally supported or were neutral to the use of institutional limits on proposal submissions for the types of NSF programs in which limits have typically been employed: infrastructure and instrumentation, centers and facilities, and education and training.

Advisory committees and research administrators noted that solicitations with institutional limits on proposal submissions encourage institutions to think strategically about their research investments and commitments. Further, they observed that research administration officials become better informed about the disciplines and research projects across their campuses and can identify opportunities for collaboration across PIs and departments through conducting internal review and selection procedures.

When a solicitation sets limits on proposal submissions by institution, institutions that have strong faculty or departments in the area of the solicitation might have to select among internally competing proposals to support for submission to NSF more often than less research-intensive institutions. Some advisory committee members and research administrators suggested that the practice of employing the same proposal limit for all institutions in a given solicitation may impact larger or more research-intensive institutions more often than smaller or less research-intensive institutions. Several advisory committees suggested that the number of proposals that an institution is allowed to submit to NSF for a solicitation with limits be based on the institution's size and/or research-intensiveness. They also suggested that NSF expand its use of pre-proposals to make initial determinations about which proposals institutions should submit to NSF.

Most advisory committees reported that their members' institutions had established internal procedures to select among proposals to submit to NSF for limited solicitations when the number of proposals exceeds the limit. Based on in-depth conversations with research administrators, these internal procedures typically include the following steps:

- (1) Notification of faculty members about NSF funding opportunities imposing a limit on proposal submissions by institution,
- (2) Submission by interested faculty members of a brief prospectus/project plan,
- (3) Review of brief prospectus/project plan by an internal panel/committee composed of faculty and/or research administrators, and
- (4) Selection of proposals to develop and submit to NSF by a senior administrative or research official in consultation with internal panel/committee.

- (5) The final selection typically considers the quality of research, institutional strategic goals, and chance of success in the NSF decision process.

However, some advisory committees and administrators suggested that the NSF merit review process, with access to a larger population and diversity of reviewers, is more suitable for assessing the scientific merit of proposals than their internal procedures. Internal selection procedures tend to weigh more heavily the perceived chance of NSF funding, and as a result, there is the perception that fewer potentially transformative research and education proposals may be forwarded to NSF

Although respondents from advisory committees and universities acknowledged that institutional limits on proposal submissions reduces the burden on external reviewers involved in the NSF merit review process, they felt that the use of limits does not generate any overall time and effort savings for the research community, because the practice simply shifts some of the reviewing burden to university research administration staff.

## **Conclusions**

The Board has determined that:

- (1) NSF's current use of limits on proposal submissions by institution is well-justified and appropriate for the types of programs that currently employ such limits.
- (2) NSF should continue to allow the types of programs that currently employ proposal submission limits by institution to have discretion over implementation strategy, so long as the use of limits is internally reviewed and approved by senior NSF management and the rationale for each limit is understood by the research community.
- (3) Institutions should implement or continue to use internal procedures to select their faculty's most scientifically meritorious and strategically aligned proposals to submit to NSF in response to solicitations with limits on proposal submissions by institution.
- (4) There are substantial benefits to be gained from prioritization of research projects at the university level, and the implementation of fair and transparent internal selection procedures can ensure effective achievement of these benefits.

NSF's use of limits on proposal submissions by institution raises an important broader question regarding the partnership between the Federal government and the U.S. academic community in the academic basic research enterprise. Since NSF's founding, the academic basic research enterprise has grown into a partnership in which these entities would jointly identify new scientific frontiers and set priorities for science and engineering research. NSF has provided Federal cohesion and financial resources to the very best of the Nation's basic research proposals and educational activities, and universities and their faculties have taken the lead in proposing and carrying out NSF-sponsored research and science education.

Confronting the realities of today's academic basic research enterprise involves universities shouldering an appropriate portion of the responsibilities inherent in the partnership between NSF and the academic community—including the setting of strategic priorities and plans for investment in research and education projects within their institution. NSF's practice of setting institutional limits on proposal submissions in carefully selected competitions should be seen by universities as an opportunity to step up to the challenge of prioritizing and strategizing their research investments. In doing so, universities will move forward as an integral partner in the academic basic research enterprise.

## Appendix 1

### Examples of Text from Solicitations that Limit Proposal Submissions by Institution

#### 1. NSF 08-503: Major Research Instrumentation Program (MRI)

***Limit on Number of Proposals per Organization:***

*Three (3) as described below.*

*Both of the following conditions must be met or proposal(s) will be returned without review:*

- 1. An organization may submit or be included as a partner or subawardee in no more than three proposals.*
- 2. If an organization submits or is included as a partner or subawardee in three proposals, at least one of the three proposals must be for instrument development.*

*NSF reserves the right to carefully examine development proposals to ensure that an institution does not exceed its proposal limit. If NSF determines that a development proposal is an acquisition proposal, and such determination results in an institution exceeding its limit, then said proposal will be returned without review. Please see Section II Program Description, under Instrument Development for further information on topics that are not considered development.*

#### 2. NSF 08-528: Centers of Research Excellence in Science and Technology (CREST) and HBCU Research Infrastructure for Science and Engineering (RISE)

***Limit on Number of Proposals per Organization:***

*Only one CREST center proposal may be submitted per eligible institution. An institution may have only one active CREST award, irrespective of focus area. Centers that have completed two prior, consecutive 5-year CREST Cooperative Agreements may not recompute in the CREST centers competition. New research teams from former awardee institutions may submit proposals in disciplinary areas that are completely different from those of the previous award(s). Only one HBCU-RISE proposal may be submitted per eligible institution. An institution may have only one active HBCU-RISE award.*

*For Fiscal Year 2008, proposals are being solicited in six EHR programs that advance  $F^3$  goals: CREST, ITEST, MSP, Noyce, RDE, and TCUP. Given the focus on institutional integration, an institution may submit only one proposal to the  $F^3$  competition in only one program.*

#### 3. NSF 08-530: Ethics Education in Science and Engineering

***Limit on Number of Proposals per Organization:***

*An eligible organization, as defined above, may submit only one proposal as the lead organization. Organizations submitting more than one proposal as the lead organization will be notified and given one week from notification to select one proposal for consideration. If one is not selected in that time period, all of those proposals will be returned without review. There is no limit on the number of proposals under which an organization may be included as a non-lead collaborator or sub-awardee.*



## Appendix 2

### **List of NSF Advisory Committees Providing Input to the Board on the Impacts of Proposal Limits on Institutions**

NSF advisory committees are generally composed of ten or more leading disciplinary experts from a variety of academic institutions and industry, and from a diverse range of geographic locations and backgrounds. The aggregated feedback from this stakeholder group to a Board request for information on the impacts on institutions of proposal submissions by institution represents the input of over 200 leaders in science, engineering, education, and academic administration.

The following NSF advisory committees responded to the Board's invitation to submit written comments on institutional proposal limits:

- Advisory Committee for Business & Operations
- Advisory Committee for GPRA Performance Assessment
- Advisory Committee on Environmental Research and Education
- Committee on Equal Opportunities in Science and Engineering
- Directorate for Biological Sciences Advisory Committee
- Directorate for Computer & Information Sciences & Engineering Advisory Committee
- Directorate for Education & Human Resources Advisory Committee
- Directorate for Engineering Advisory Committee
- Directorate for Geosciences Advisory Committee
- Directorate for Mathematical & Physical Sciences Advisory Committee
- Directorate for Social, Behavioral, & Economic Sciences Advisory Committee
- Office of Cyberinfrastructure Advisory Committee

## Endnotes

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<sup>1</sup> The Act also addressed the relationship between pre-proposals and full proposals in § 7037 (a). It directed NSF to allow institutions to submit a full proposal for every pre-proposal that was determined to have merit based on NSF's merit review process. NSF has implemented changes to comply with this directive.

<sup>2</sup> The Board is grateful to the numerous individuals who contributed their time and insight to the development of this National Science Board (Board) report. In particular, we thank members of the NSF advisory committees and several university research administrators who provided written and verbal input to inform the Board's findings.

We appreciate the invaluable assistance of several National Science Foundation staff members in the report development process: Ms. **Jean Feldman**, Head, Policy Office, Division of Institution and Award Support, Office of Budget, Finance, and Award Management (BFA); Ms. **Joanna Rom**, Deputy Director, BFA; Mr. **Vernon Ross**, Branch Chief, Budget Division, BFA; Dr. **Joanne Tornow**, Acting Division Director, Division of Molecular and Cellular Biosciences, Directorate for Biological Sciences; and Ms. **Elizabeth Velo**, Information Technology Specialist, Budget Division, BFA.

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