

Report to the National Science Board
on the
National Science Foundation's
Merit Review Process
Fiscal Year 2006



March 2007

TABLE OF CONTENTS

1.	<u>Introduction</u>	4
2.	<u>Proposal and Award Data</u>	4
	A. Proposals, Awards, and Success Rates	4
	B. Award Size and Duration	6
	C. Number of People Supported on Awards	7
	D. Types of Awards	8
	E. Awards By Sector/Institution	9
	F. Time to Decision (Proposal Dwell Time)	10
3.	<u>Merit Review Process</u>	11
	A. Merit Review Criteria	11
	B. Description of Merit Review Process	12
	C. Program Officer Award/Decline Recommendation	14
	D. Review Information to Proposer and Appeal Process	15
	E. Methods of External Review	15
	F. Data on Reviewers	18
	G. Reviewer Proposal Ratings and Impact of Budget Constraints	19
	H. Program Officer Characteristics and Workload	21
4.	<u>Special Activities on Merit Review Process</u>	22
	A. Quality and Transparency	22
	B. Impact of Proposal and Award Management Mechanisms (IPAMM)	23
	C. Transformational Research	24
5.	<u>Appendices</u>	26

APPENDICES

Appendix 1:	Proposals, Awards, and Success Rates by Directorate, FY 2002-2006	26
Appendix 2:	Preliminary Proposals	27
Appendix 3:	Proposals, Awards, and Success Rates by Minority PI Ethnic/Racial Status, FY 1999-2006	27
Appendix 4:	Median and Average Award Amounts by Directorate, Research Awards, FY 2001-2006	28
Appendix 5:	Number of People Involved in NSF Activities	29
Appendix 6:	EPSCoR: Jurisdictions, Proposal, Award, and Funding Data	29
Appendix 7:	Small Grants for Exploratory Research (SGER)	33
Appendix 8:	Merit Review Process Oversight Mechanisms	35
Appendix 9:	Requests for Formal Reconsideration of Declined Proposals by Directorate, FY 2002-2006	37
Appendix 10:	Average Number of Reviews per Proposal by Method and Directorate, FY 2006	38
Appendix 11:	Methods of NSF Proposal Review, FY 1993-2006	39
Appendix 12:	Methods of NSF Proposal Review, by Directorate, FY 2006	39
Appendix 13:	Distribution of Average Reviewer Ratings, Panel-Only Reviewed, FY 2006	40
Appendix 14:	Distribution of Average Reviewer Ratings Mail-Only Reviewed, FY 2006	41
Appendix 15:	Distribution of Average Reviewer Ratings, Mail and Panel Reviewed, FY 2006	42
Appendix 16:	Accomplishment Based Renewals	42
Appendix 17:	National Science Foundation Organization Chart	43
Appendix 18:	Terms and Acronyms	44

FY 2006 Report on the NSF Merit Review Process

I. Introduction

The National Science Foundation Act of 1950 directs the Foundation "to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels."¹ NSF achieves its unique mission by making merit-based awards to researchers, educators, and students at approximately 1,740 U.S. colleges, universities and other institutions. The merit review process is at the very heart of NSF's selection of the projects through which its mission is achieved.

This year NSF made 10,425 awards from 42,352 proposals submitted. All proposals are evaluated using the two NSB approved criteria: *intellectual merit* and *broader impacts*. As stated in the NSF *Grant Proposal Guide*, consideration is also given to how well the proposed activity 1) fosters the integration of research and education, and 2) broadens opportunities to include a diversity of participants, particularly from underrepresented groups. Additional criteria, as stated in the program announcement or solicitation, may be required to highlight the specific objectives of certain programs or activities. About 96 percent of NSF's proposals are evaluated by external reviewers as well as by NSF staff.

This *FY 2006 Report on the NSF Merit Review Process* responds to a National Science Board (NSB) policy endorsed in 1977 and amended in 1984, requesting that the NSF Director submit an annual report on the NSF merit review process. In this report, data are presented on both the merit review outcome in FY 2006 and the process itself. In this context, NSF has highlighted a few issues that impact the merit review process. Section II of this report provides summary data about proposals, awards, and success rates. Section III provides information about the process by which proposals are reviewed and awarded. Section IV provides information about special activities in FY 2006 on aspects of the merit review process; in particular, 1) quality and transparency of the review process; 2) impact of proposal and award management mechanisms; and 3) transformational research.

II. Proposals and Awards

A. Proposals, Awards and Success Rates

During FY 2006, NSF acted on 42,352 proposals, as shown in **Figure 1**. This resulted in 10,425 awards for a success rate of 25%. Although there are variations from one year to the next, there is a general trend of increase in the number of proposals and decrease in the success rate since FY 2000. **Appendix 1** provides proposals, awards, and success rate data by NSF directorate and office.

¹ 42 CFR 16 §1862, available at http://www4.law.cornell.edu/uscode/html/uscode42/usc_sec_42_00001862----000-.html

Figure 1
Proposal, Award and Success Rate Trends

	2000	2001	2002	2003	2004	2005	2006
Proposals	29,508	31,942	35,165	40,075	43,851	41,722	42,352
Awards	9,850	9,925	10,406	10,844	10,380	9,757	10,425
Funding Rate	33%	31%	30%	27%	24%	23%	25%

Source: NSF Enterprise Information System as of October 5, 2006.

In FY 2006, NSF also received a total of 1874 preliminary proposals, which are required for some NSF programs. See **Appendix 2** for additional data and information on preliminary proposals.

Figure 2 provides proposal, award, and success rates by PI characteristics (gender, minority status, new and prior PI status).

Figure 2
Proposals, Awards and Success Rates
By PI Characteristics, FY 1999-2006

		Fiscal Year							
		1999	2000	2001	2002	2003	2004	2005	2006
All PIs	Proposals	28,578	29,508	31,942	35,165	40,075	43,851	41,722	42,352
	Awards	9,189	9,850	9,925	10,406	10,844	10,380	9,757	10,425
	Funding Rate	32%	33%	31%	30%	27%	24%	23%	25%
Female PIs	Proposals	5,315	5,509	5,839	6,704	7,335	8,427	8,266	8,510
	Awards	1,682	1,949	1,894	2,012	2,090	2,118	2,107	2,233
	Funding Rate	32%	35%	32%	30%	28%	25%	25%	26%
Male PIs	Proposals	23,022	23,671	25,510	27,500	31,238	33,300	31,456	31,482
	Awards	7,428	7,778	7,867	8,203	8,495	7,923	7,305	7,765
	Funding Rate	32%	33%	31%	30%	27%	24%	23%	25%
Minority PIs	Proposals	1,434	1,480	1,728	1,906	2,141	2,551	2,468	2,608
	Awards	424	472	509	548	569	597	569	638
	Funding Rate	30%	32%	29%	29%	27%	23%	23%	24%
New PIs	Proposals	11,803	12,327	13,280	15,085	17,584	19,052	17,660	18,061
	Awards	2,689	3,024	3,136	3,329	3,390	3,256	3,001	3,240
	Funding Rate	23%	25%	24%	22%	19%	17%	17%	18%
Prior PIs	Proposals	16,775	17,181	18,662	20,080	22,511	24,799	24,062	24,294
	Awards	6,500	6,826	6,789	7,077	7,478	7,124	6,756	7,185
	Funding Rate	39%	40%	36%	35%	33%	29%	28%	30%

Source: NSF Enterprise Information System as of October 5, 2006.

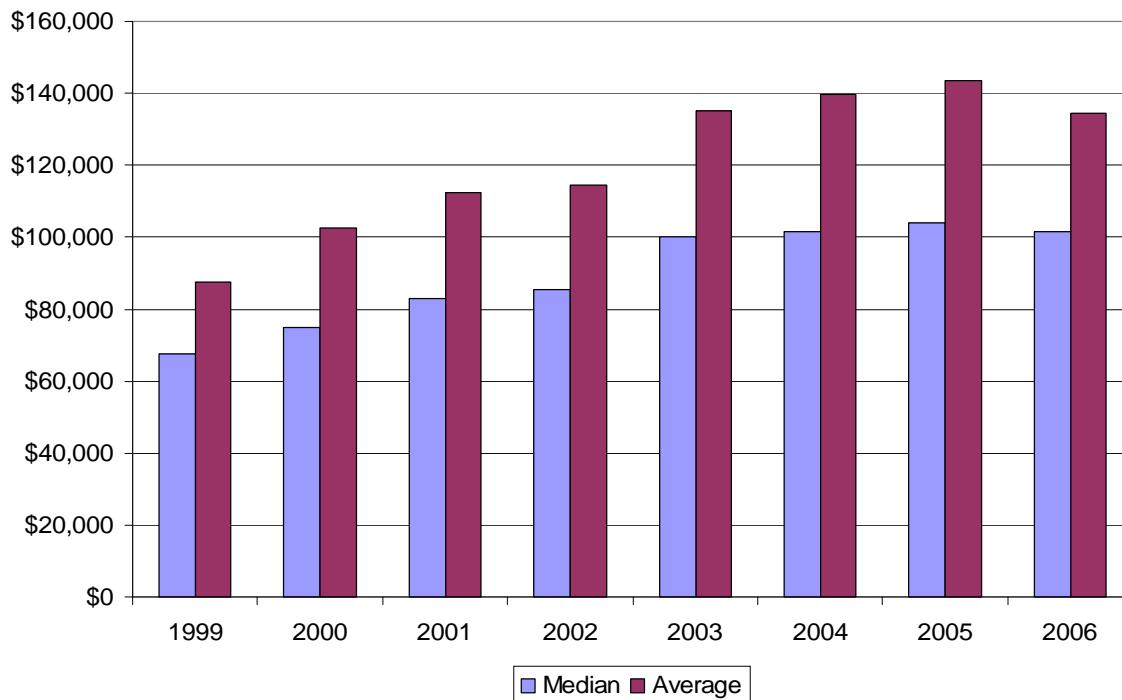
Gender and minority status is based on information in proposals as self-reported by the principal investigators, with about 90 percent of PIs providing this information. Minority status includes American Indian, Alaska Native, Black, Hispanic, and Pacific Islander and excludes Asian and White-Not of Hispanic Origin. New principal investigators are PIs who have not previously been awarded an NSF grant. **Appendix 3** provides this proposal, award, and success rate information by minority PI ethnic/racial status.

B. Award Size and Duration

Adequate award size and duration are important both for attracting high-quality proposals and for ensuring that proposed work can be accomplished as planned. Larger award size and longer award duration may also permit the participation of more students and allow investigators to devote a greater portion of their time to conducting research, as well as provide needed financial support.

Both average annualized and median award amount for *research grants*² had been increasing until FY 2006, during which there was a decrease in both average and median award amounts, as displayed in **Figure 3**. Data by NSF directorate for the last five years are presented in **Appendix 4**.

Figure 3
Award Amounts for Research Grants



Source: NSF Enterprise Information System as of October 5, 2006.

² *Research Grants* is a subset of total NSF awards associated primarily with individual investigator and group research projects. These do not include education and training grants, which are primarily multi-institution and of a much larger average size.

As indicated in **Figure 4**, the average duration has remained relatively constant.³ Program directors must balance competing requirements, such as increasing award size, increasing duration of awards, and/or making more awards.

Figure 4
Average Award Duration, FY 2001 – 2006

	2001	2002	2003	2004	2005	2006
Duration (years)	2.9	2.9	2.9	3.0	3.0	2.9

Source: NSF's Enterprise Information System

NSF will continue to give careful attention to award size and duration in the context of recent declines in success rates. This issue is discussed in more detail in Section IV.B of this report, "Impact of Proposal and Award Management Mechanisms."

C. Number of People Supported on NSF Awards

An analysis of the number of graduate students, postdoctoral associates, and senior personnel supported on NSF research awards showed an increase of 36 percent between FY 2000 and FY 2006. These data are broken down by category in **Figure 5**.

Figure 5
People Supported on NSF Research Awards, FY 2000 - 2006⁴

	2000	2001	2002	2003	2004	2005	2006	% Change, 2000 - 2006
Research Awards	13,291	13,528	14,167	14,691	14,792	14,715	14,592	9.79%
Senior Personnel Supported	15,910	17,443	18,643	19,864	21,711	22,255	23,186	45.73%
Postdocs Supported	3,743	4,367	4,320	4,629	4,399	4,068	4,023	7.48%
Graduate Students Supported	15,650	18,717	19,303	20,384	21,105	20,442	20,949	33.86%

Source: NSF's Enterprise Information System

³ Although the number of years is rounded to one decimal place, the variations below do not indicate significant changes since 0.1 years represents only about five weeks. In addition, this duration rate is the initial duration for new awards made in FY 2006. The rate does not take into account no-cost extensions that often occur.

⁴ In this chart, the Research Awards category represents new (standard and continuing) awards and continuing research awards that were supported in the given year. Education and training grants are not included in this category. The number of senior personnel, post-docs, and graduate students are obtained from research award budgets as individuals receiving salary compensation. These personnel counts include personnel supported on active standard research awards in addition to the new and continuing awards counted in the first row of the table.

Appendix 5 provides data on the number of individuals involved in NSF activities, including senior researchers, postdoctoral associates, teachers, and students across all educational levels.

D. Types of Awards

In general, NSF uses three kinds of funding mechanisms: grants, cooperative agreements, and contracts. Most of NSF's projects support or stimulate scientific and engineering research and education, and are funded using grants or cooperative agreements. Grants, which are the primary funding mechanism, can be funded either as standard awards, in which funding for the full duration of the project (generally 1-5 years) is provided in a single fiscal year, or as continuing awards, in which funding of a multi-year project is provided in increments (usually one year). For the latter mechanism, the initial funding increment is accompanied by a statement of intent to continue funding the project in yearly increments (called "continuing grant increments", or CGIs) until the project is completed. Cooperative agreements are used when the project requires substantial agency involvement during the project performance period (e.g., research centers, multi-user facilities, etc.). Contracts are used to acquire products, services and studies (e.g., program evaluations) required primarily for NSF or other Government use.

Of the 10,425 awards made in FY 2006, 6,382, or 61 percent were standard grants, and the rest were new starts on continuing grants. In addition to the standard and continuing grants, NSF awarded 7,741 continuing grant increments (CGIs) based on proposals that had been reviewed in earlier years.⁵ As shown below in **Figure 6**, NSF devotes 22 percent of its total budget to new standard grants and 17 percent to new continuing grants. The use of standard and continuing grants allows NSF flexibility in balancing current and future obligations.

Figure 6
Percentage of NSF Budget by Type of Award

	2002	2003	2004	2005	2006
New Standard Grants	26%	23%	23%	21%	22%
New Continuing Grants	21%	21%	17%	16%	17%
Continuing Grant Increments	35%	36%	39%	43%	41%
Centers, Facilities, and Other⁶	18%	20%	20%	20%	20%
100% = \$Billion	\$4.77	\$5.37	\$5.66	\$5.49	\$5.65

Source: NSF Enterprise Information System as of October 5, 2006.

⁵ While the original award is a competitive action, the CGI is a non-competitive renewal grant. Continued incremental funding is based on NSF review of annual project reports and additional oversight mechanisms established by specific programs.

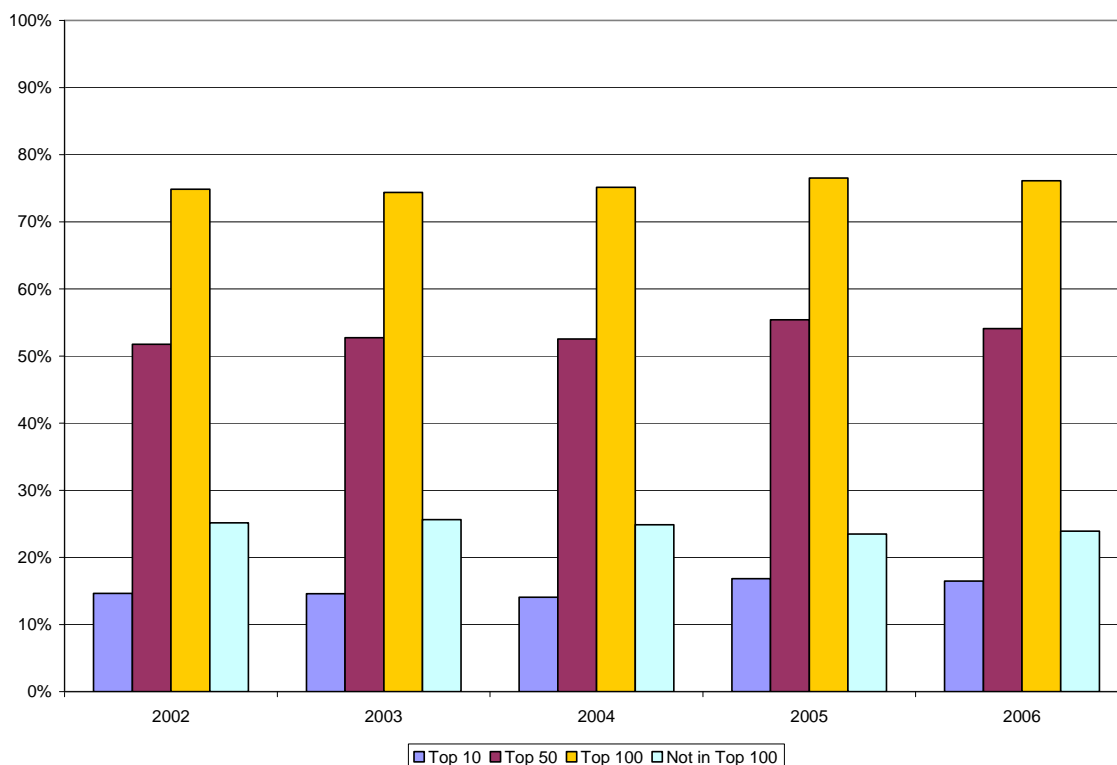
⁶ "Other" category includes contract activities to support organizational excellence, including program evaluations.

E. Awards by Sector/Institution

In FY 2006, NSF awarded 76 percent of its budget to academic institutions, 15 percent to non-profit and other organizations, 7 percent to for-profit businesses, and 2 percent to Federal agencies and laboratories. This overall distribution of funds by type of organization has remained fairly constant over the past five years.

For **Figure 7**, academic institutions are categorized according to the proportion of NSF funding they receive. As indicated in **Figure 7**, the percentages of NSF awards made to the “top funded” (i.e., the institutions receiving the largest proportion of NSF funding) ten, top funded fifty, and top funded one hundred academic institutions have varied little over the past five years. NSF has as a performance goal for FY 2007 to increase or maintain the percentage of proposals received from academic institutions not in the top 100 of NSF funding recipients.⁷

Figure 7
Percent of Awards to Top Funded Academic Institutions



Source: NSF Enterprise Information System as of October 5, 2006.

NSF also tracks success rates for different types of academic institutions. For FY 2006, the success rate for *research-intensive Ph.D. institutions*, defined as the top 100 Ph.D.-granting institutions ranked according to the amount of FY 2006 funding received from NSF, was 27 percent. In comparison, the rate for *non-research intensive Ph.D. institutions* in FY 2006 (i.e., the Ph.D.-granting institutions that are not in the top 100

⁷ See NSF's FY 2007 Budget Request to Congress, 6 February 2006, "Performance Information," available on the web at <http://www.nsf.gov/about/budget/fy2007/toc.jsp>.

NSF-funded category) was 18 percent. Two- and four-year institutions experienced success rates of 26 percent and 23 percent, respectively for FY 2006. For minority-serving institutions, the FY 2006 success rate was 20 percent, up from 18 percent last year.

The Experimental Program to Stimulate Competitive Research (EPSCoR) is a program that promotes geographic diversity of the participants in NSF programs. The mission of EPSCoR is to assist the National Science Foundation in its statutory function “to strengthen research and education in science and engineering throughout the United States and to avoid undue concentration of such research and education.” The EPSCoR program is directed at those jurisdictions that have historically received lesser amounts of NSF Research and Development (R&D) funding. During FY 2001-2006 EPSCoR jurisdictions increased in number, from 22 in FY 2001 to 27 in FY 2006. Twenty-five states, the Commonwealth of Puerto Rico and the U. S. Virgin Islands currently participate. **Appendix 6** has data on proposals, awards, and funding rates for the EPSCoR jurisdictions.

In the past year, NSF made a number of outreach presentations to diverse institutions across the country in an effort to increase awareness and improve the transparency of the NSF merit review process.⁸ Two Regional Grants Conferences, organized by the NSF Policy Office and hosted by the University of South Florida and the University of Colorado at Boulder, were held in FY 2006. Nine “NSF Days”, organized by the Office of Legislative and Public Affairs, were held throughout the year in Alabama, California, Colorado, Georgia, Illinois, Kentucky, Maryland, New Mexico, and South Carolina. Representatives from most of NSF’s directorates and offices attend each of these conferences, and hold separate focused sessions for faculty in specific disciplines in addition to providing general information about proposal preparation and the merit review process. NSF also reaches out to the community by hosting an information booth at scientific meetings such as the Annual Meeting of the American Association for the Advancement of Science (AAAS). In addition to these larger NSF-wide organized efforts, outreach workshops were sponsored by several of the individual directorates, as well as some of the NSF-wide programs (such as CAREER and the Major Research Instrumentation Program). Finally, program officers frequently conduct outreach on an individual basis, when visiting institutions or participating in scientific meetings. A major emphasis running through all of NSF’s outreach is to encourage the submission of proposals submitted by scientists and engineers from underrepresented groups. Outreach efforts included workshops for tribal colleges and minority-serving institutions, including historically black colleges and universities, and those institutions eligible for support through EPSCoR.

F. Time to Decision (Proposal Dwell Time)

It is important for applicants to receive a timely funding decision. NSF’s FY 2006 GPRA performance goal was, for at least 70 percent of proposals, to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt. As indicated in **Figure 8**, NSF is surpassing this goal. The achievement of this

⁸ A description of numerous outreach events, both past and planned, is available on the NSF web page at <http://www.nsf.gov/events/>.

goal is particularly significant because of major increases in the number of proposals submitted, thus adding to the workload of program staff.

Figure 8
Proposal Dwell Time
Percentage of Proposals Processed Within 6 Months

	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Percentage	63%	74%	77%	77%	76%	78%

Source: NSF Enterprise Information System as of October 5, 2006.

III. The NSF Merit Review Process

A. Merit Review Criteria

In FY 1998 the National Science Board approved the use of the two current NSF merit review criteria now in effect:

Intellectual Merit. *What is the intellectual merit of the proposed activity? How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?*

Broader Impacts. *What are the broader impacts of the proposed activity? How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?*

Careful consideration is also given to the following in making funding decisions: 1) *Integration of Research and Education* and 2) *Integrating Diversity into NSF Programs, Projects, and Activities*, as is indicated in the **Grant Proposal Guide**. In addition, NSF programs may have additional review criteria specific to the goals and objectives of the program. These review criteria are described in the program announcement or solicitation.

Effective October 1, 2002, NSF returned without review proposals that failed to address separately both merit review criteria within the Project Summary. In FY 2006, NSF returned a total of 134 proposals without review due to the failure to address both merit review criteria. 176 proposals were returned without review for this reason in FY 2005, and 236 were returned in FY 2004.

B. Description of NSF Merit Review Process

The NSF merit review process includes the steps listed below and is depicted in **Figure 9**:

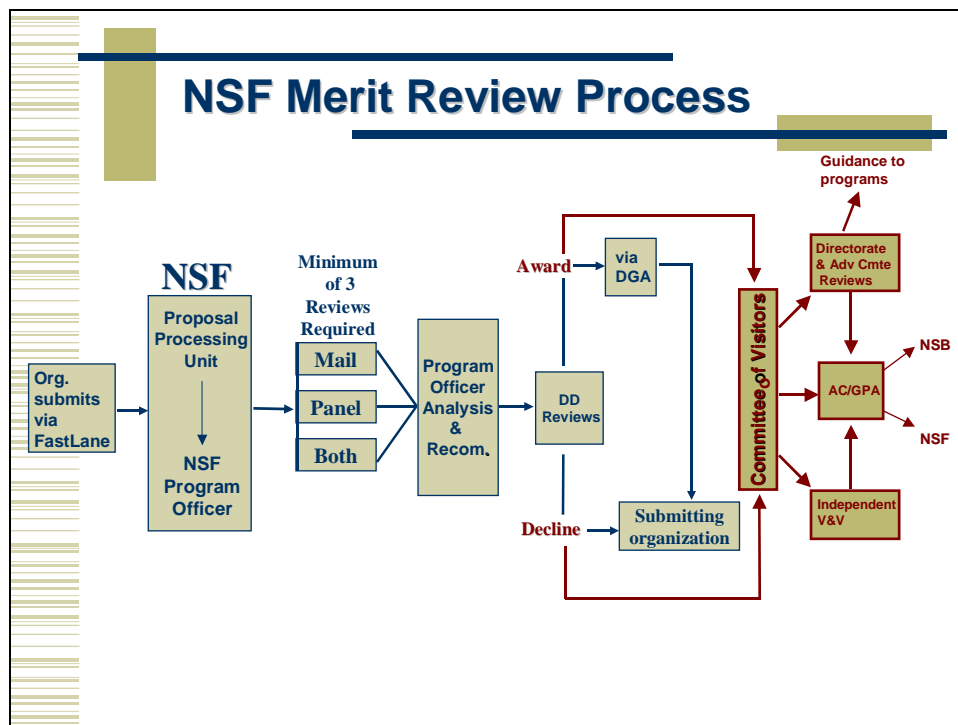
- The proposal arrives electronically, and NSF staff assign the proposal to the appropriate program(s) for review. Some programs also include preliminary proposals as part of the application process. See **Appendix 2** for more information about preliminary proposals. Proposals that do not comply to NSF regulations, as stated in the *Grant Proposal Guide*, may be returned without review.
- The program officer (or team of program officers) reviews the proposal and assigns it to at least three experts from outside the Foundation. NOTE: **Small Grants for Exploratory Research (SGER)** proposals do not require external review. See **Appendix 7** for more information about SGER proposals.

The review process is overseen by a Division Director, or other appropriate NSF official. The program officer or team:

- selects reviewers and panel members, based on program officer's knowledge, references listed in proposal, recent publications in science and engineering journals, presentations at professional meetings, reviewer recommendations, bibliographic and citation databases, and proposal author's suggestions.
- checks for conflicts of interest. In addition to checking proposals and selecting reviewers with no apparent potential conflicts, NSF staff provide reviewers guidance and instruct them how to declare potential conflicts. All program officers receive conflict-of-interest training annually.
- synthesizes the comments of the reviewers and panel (if reviewed by a panel), as provided in the individual reviewer analyses and the panel summary.
- makes a recommendation to award or decline the proposal, taking into account external reviews, panel discussion, and other factors such as portfolio balance and amount of funding available.
- A Division Director, or other appropriate NSF official, reviews all program officer recommendations. For award recommendations, a grants officer in the Office of Budget, Finance, and Award Management performs an administrative review. Large awards receive additional review. The Director's Review Board reviews award recommendations with an average annual award amount of 2.5 percent or more of the awarding Division's annual budget. The National Science Board reviews recommended awards with an annual award amount of one per cent or more of the

awarding Directorate's annual budget.⁹ In FY 2006, NSB reviewed and approved 7 recommended awards.

Figure 9
Diagram of the NSF Merit Review Process



To ensure that this process, which leads to funding decisions, remains robust, NSF has a variety of mechanisms in place to review the merit review process itself, as follows:

- An external Committee of Visitors (COVs), whose membership is comprised of scientists, engineers, and educators, assesses each program every 3-5 years. COVs examine the integrity and efficiency of merit review processes and the results from the programmatic investments.
- Advisory Committees (whose membership is also comprised of scientists, engineers, and educators) review COV reports and directorate/office responses and provide guidance to the Foundation's directorates and offices based on the reports.
- The Government Performance and Results Act of 1993 (GPRA) was established to provide strategic planning and performance measurement in the Federal Government. The NSF-wide Advisory Committee for GPRA Performance Assessment (AC/GPA), a single committee of external experts convened yearly to assess results, evaluates the Foundation's portfolios and their linkages to strategic outcome goals. The AC/GPA uses Committee of Visitor reports, internal and external directorate assessments of

⁹ Other items requiring NSB prior approval include new programs, major construction projects that meet certain specifications, and awards involving policy issues.

particular programs, investigator project reports, and directorate/division collections of outstanding accomplishments from awards in order to perform the evaluation.

- An external contractor performs an independent verification and validation of the Foundation's performance measurements.
- The National Science Board's Audit and Oversight Committee reviews the findings presented by the AC/GPA.
- The Program Assessment Rating Tool (PART), developed by the Office of Management and Budget, is used to assess program performance of federal agencies in four areas: Program Purpose and Design, Strategic Planning, Program Management, and Program Results/Accountability.

Additional information about COVs, role of Advisory Committees, AC/GPA, PART, and the verification and validation process is provided in **Appendix 8**.

Section IV describes special activities NSF has been conducting regarding the implementation of several aspects of the merit review process as indicated above.

C. Program Officer Award/Decline Recommendation

As noted above, the narrative comments and summary ratings provided by external reviewers are essential inputs that inform the judgment of the program officers who formulate award and decline recommendations to NSF's senior management.

NSF program officers are experts themselves in the scientific areas that they manage. They have advanced educational training (i.e., a Ph.D. or equivalent credentials) in science or engineering, plus experience as appropriate in research, education, and/or administration. They are expected to produce and manage a balanced portfolio of awards that addresses a variety of considerations and objectives. When making funding decisions, in addition to information contained in the external proposal reviews, NSF program officers evaluate proposals in the larger context of their overall portfolio and consider issues such as:

- Support for high-risk proposals with potential for transformative advances in a field;
- Different approaches to significant research questions;
- Capacity building in a new and promising research area;
- Potential impact on human resources and infrastructure;
- NSF core strategies, such as 1) the integration of research and education and 2) broadening participation;
- Achievement of special program objectives and initiatives;
- Other available funding sources; and
- Geographic distribution.

D. Review Information to Proposer and Appeal Process

Proposers receive notification of the award/decline decision, copies of all reviews used in the decision with reviewer-identifying information redacted, and a copy of the panel summary (if panel review was conducted). A "context statement" is also sent that explains the broader context under which any given proposal was reviewed. Program Officers are also expected to provide additional communication (either in writing or by phone) to proposers in the case of a decline recommendation if the basis for the decision is not provided in the panel summary.

If, after receiving the reviews and other documentation of the decision, an unsuccessful proposer would like additional information, he or she may ask the program officer for further clarification. If, after considering the additional information, the applicant is not satisfied that the proposal was fairly handled and reasonably reviewed, he or she may request formal reconsideration. In response to concerns from the National Science Board and the Office of Inspector General, NSF implemented, beginning in FY 2006, a policy to include information about the reconsideration process in all decline notifications.¹⁰ A reconsideration request can be based on the applicant's perception of procedural errors or on disagreements over the substantive issues dealt with by reviewers. If the relevant NSF Assistant Director or Office Director upholds the original action, the applicant's institution may request a second reconsideration from the Foundation's Deputy Director.

NSF declines approximately 30,000 proposals a year but receives only 30-50 requests for formal reconsideration. The number of requests for formal reconsideration and resulting decisions at both the Assistant Director and Director levels from FY 2002 through FY 2006 are displayed in **Appendix 9**. NSF received 35 formal reconsideration requests in FY 2006; 34 decline decisions were upheld and one was reversed.

E. Methods of External Review

NSF's merit review process relies on extensive use of knowledgeable experts from outside the Foundation. NSF policy, as stated in the *Proposal and Award Manual*, requires at least three external reviews for each award or decline recommendation on a proposal, unless the requirement has been waived.¹¹

NSF programs obtain external peer review by three principal methods: (1) "mail-only," (2) "panel-only," and (3) "mail-plus-panel" review. The total numbers of reviews and the average numbers of reviews per proposal obtained by the three different review methods are presented in **Figure 10**. As expected, the mail-plus-panel method had the highest number of reviews per proposal, averaging nearly eight, while the mail-only method averaged around four. Directorate-level data for FY 2006 are presented in **Appendix 10**.

¹⁰ Please note that certain types of proposals are not eligible for reconsideration. See NSF's Grant Policy Manual, Chapter 10, available on the NSF web page at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm.

¹¹ Exceptions include proposals for Small Grants for Exploratory Research (SGER) and workshop and symposia proposals. For workshop and symposia proposals, however, the program officer may obtain external reviews whenever he or she deems that such review is appropriate.

As indicated above, Small Grants for Exploratory Research (SGER) do not require external review, only review by NSF staff. See **Appendix 7** for more information about SGER proposals.

F. Data on Reviewers

NSF maintains a central electronic database of more than 300,000 reviewers (which includes both mail reviewers and panelists). Program officers identify potential reviewers using a variety of sources including their own knowledge of the discipline, applicant suggestions, references attached to proposals, published papers, scientific citation indexes and other similar databases, and input from other mail reviewers and panelists. During FY 2006, approximately 46,000 individuals served on panels, conducted a mail review for one or more proposals, or served in both functions. About 16,000 of these reviewers had never reviewed an NSF proposal before. The reviewers came from all 50 states in addition to the District of Columbia, Puerto Rico, Virgin Islands, and other U.S. jurisdictions. More than 6,000 reviewers came from outside of the United States. Moreover, reviewers came from a range of institutions, including two-year and four-year colleges and universities, Master's level and Ph.D.-granting universities, industry, and government. NSF also maintains data on numbers of reviewers from each state, territory, and country as well as by type of institution.

In FY 2001, NSF developed systems and policies to request demographic data electronically from all reviewers to determine the participation of underrepresented groups in the NSF reviewer pool. The goal was to establish a baseline for participation of underrepresented groups in NSF proposal review activities. In FY 2006, out of a total of 41,989 distinct reviewers who returned reviews, 10,508 – about 25 percent -- provided demographic information. Out of the 10,508 who provided information, 3,780 (36%) indicated they were members of an underrepresented group (i.e., minority or women).

During FY 2004, NSF altered the FastLane reviewer module to make it more convenient for reviewers to provide demographic information and, as a result, NSF has seen a slight increase in the proportion of reviewers providing demographic information after the FastLane change. In FY 2006, 25 percent provided information in comparison to 22 percent in FY 2005 and 17 percent in FY 2004. However, provision of demographic data is voluntary and, given the low response rate, there is not enough information to establish a baseline. This remains a challenge that the Foundation continues to address.

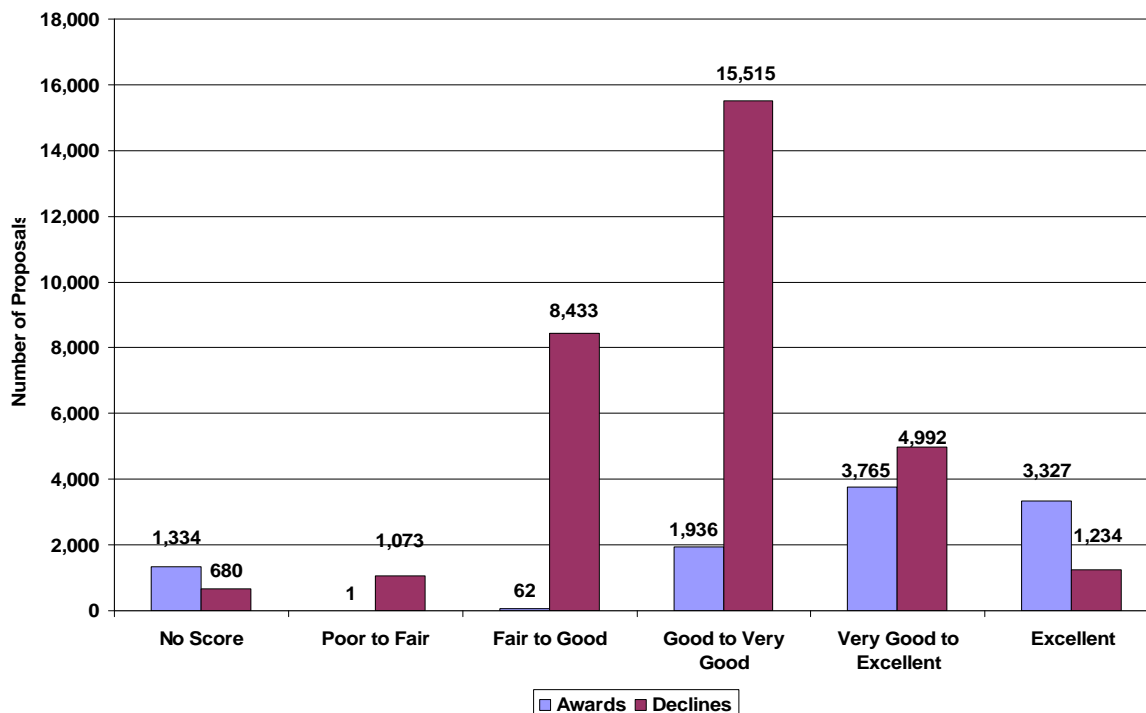
NSF continually updates its Library resources, including databases, web pages, and directories, and conducts frequent tutorials on finding reviewers. Other activities include the collection and sharing of potential reviewer data from associations serving groups that are underrepresented in science and engineering, and encouraging participation of members of underrepresented groups in NSF workshops and conferences. Some NSF divisions actively solicit new reviewers through their web pages and their outreach activities. To improve the transparency of this process for the proposer, the next version of the *Grant Proposal Guide* will have a new section in Chapter III: NSF Proposal Processing & Review, describing how reviewers are selected by the NSF program officers.

Participation in the peer review process is voluntary. Panelists are reimbursed for expenses; mail reviewers receive no financial compensation. In FY 2006, NSF requested 60,188 mail reviews, of which there were 36,780 positive responses. This 61 percent response rate in FY 2006 is up slightly from 60 percent in FY 2005 and 59 percent in FY 2004.

G. Reviewer Proposal Ratings and Impact of Budget Constraints

The NSF merit review system emphasizes reviewer narratives in addition to numerical ratings. The written comments provided by reviewers, the summary of panel discussions, and the expert judgments of program officers are important components of the merit review system. Summary ratings are another indicator of reviewer judgment. The distribution of average summary ratings of reviews for awarded and declined proposals is provided in **Figure 12**.

Figure 12
Distribution of Average Reviewer Ratings, FY 2006



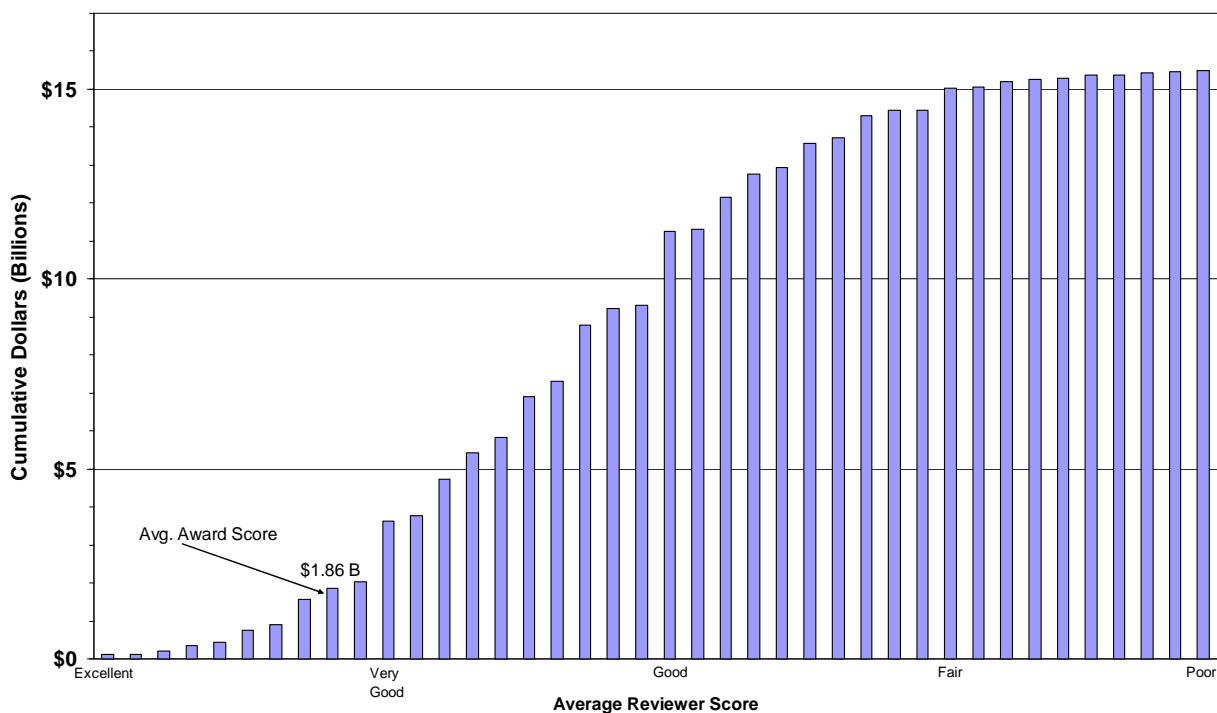
Source: NSF Enterprise Information System as of October 5, 2006.

These data indicate considerable overlap among the average reviewer ratings of successful and unsuccessful proposals, most notably in the range of “very good” average ratings.¹² **Appendices 13-15** indicate that this overlap among the average reviewer ratings is present and similar in degree for each of the three proposal review methods used by NSF (panel-only, mail-only, and mail plus panel).

¹² The corresponding numerical ratings, on a five-point scale, are as follows: Excellent (4.5 – 5.0); Very Good – Excellent (4.0 - <4.5); Good – Very Good (3.0 - <4.0); Fair – Good (2.0 - <3.0); and Poor – Fair (<2.0). Proposals with “No Score” include Small Grants for Exploratory Research and workshop/symposia proposals that do not require external review.

A large number of potentially fundable proposals are declined each year. One measure of the magnitude is the number of proposals highly rated by external reviewers that are declined, as indicated in **Figure 12** above. As shown in **Figure 13**, close to \$1.9 billion was requested for declined proposals in FY 2006 that had received ratings at least as high as the average rating (4.2) for an awarded proposal. Over the last ten years, NSF’s capacity to fund these highly rated proposals has diminished. In FY 1997, the ratio of awards to highly rated declines was 5:1; in FY 2006, that ratio had dropped to less than 2:1. NSF is thus supporting a smaller proportion of potentially fundable proposals. These declined proposals represent a rich portfolio of unfunded opportunities, proposals that if funded may have produced substantial research and education benefits.

Figure 13
Cumulative Requested Amounts of Declined Proposals
By Average Reviewer Score for FY 2006



Source: NSF Enterprise Information System as of October 5, 2006.

H. Program Officer Characteristics and Workload

The number of program officers increased from 400 in FY 2005 to 438 in FY 2006, a nearly 10 percent increase. The characteristics of NSF program officers are presented in **Figure 14**.

Figure 14
Distribution of NSF Program Officers by Characteristics
As of October 1, 2006

Program Officers	Total	Percent
Total	438	100%
Gender		
Male	282	64%
Female	156	36%
Race		
Minority	97	22%
White, Non-Hispanic	341	78%
Employment		
Permanent	212	48%
Visiting Scientists, Engineers & Educators (VSEE)	53	12%
Temporary	44	10%
Intergovernmental Personnel Act (IPA)	129	29%

Source: NSF Division of Human Resource Management

Program Officers can be permanent NSF employees or non-permanent employees (includes Visiting Scientist, Engineer, or Educator; Temporary; and Intergovernmental Personnel Act categories). About half of the program officers fall into the non-permanent category. Some non-permanent program officers are “on loan” as visiting scientists, engineers, and educators (VSEEs) for up to three years from their host institutions. Others are employed through grants to the home institutions under the terms of the Intergovernmental Personnel Act (IPA). Non-permanent employees provide NSF with new ideas and fresh science and engineering perspectives. They bring knowledge of the most recent disciplinary and interdisciplinary developments to enhance NSF’s responsiveness and agility. Whether they are hired as temporary or permanent, incoming NSF program officers receive training in the merit review process.

The number of proposals that the program officers handle has increased significantly over the last several years. In addition, with the growing emphasis on interdisciplinary and cross-directorate programs, program officers are handling an increasing number of programmatic activities. While NSF was able to increase the number of program officers

in FY 2006, workload concerns are still present and frequently highlighted by NSF's Committees of Visitors (see **Appendix 8**).

NSF has revitalized its professional development opportunities for program staff, offering in-house courses in project management, leadership, and communication through the NSF Academy. New NSF Program Staff (including, for example, Program Officers, Division Directors) also attend the NSF Program Manager Seminar, which is a four day off-site orientation to NSF and the merit review process.

IV. Special Activities on Merit Review Process

A. Quality and Transparency

The NSB was requested by Congress to conduct a review of the NSF merit review process. The Board issued its report in September 2005, concluding that the NSF merit review process is a fair and effective way to review the more than 40,000 proposals the Foundation receives annually in a wide variety of subject areas. The Board provided several recommendations for NSF to improve the transparency and effectiveness of the NSF merit review process, while preserving the ability of the program officers to identify the most innovative proposals and effectively diversify and balance NSF's research and education portfolio.¹³

In response to the Board's recommendations, NSF has undertaken an agency-wide effort to address quality of reviews, transparency of the award/decline decision, and support of transformational research. To date the following actions have been taken:

- The FY 2007 NSF Budget Request includes the operation of a credible, efficient merit review system as a strategic goal.
- A merit review performance indicator has been added to the Senior Executive Service (SES) annual personal performance plans.
- Standards have been developed for the Major Research Instrumentation Program and were tested in FY 2006 as possible agency-wide standards for the merit review process.
- Sessions have been conducted with senior staff of all NSF Directorates and Offices to raise issues regarding merit review process. All directorates currently have underway activities that address the transparency and effectiveness of the merit review process.
- Sessions have been conducted at the Annual Division Director retreats on the merit review process and mechanisms to address quality of review, transparency of award/decline decision, and support of transformational research.
- Sessions have been conducted with NSF Administrative Officers (AOs) regarding their role and responsibilities in helping to ensure the quality of documentation of the merit review. AOs have supervisory responsibilities for administrative staff and oversee general operations.

¹³ *Report of the National Science Board on the National Science Foundation's Merit Review System*, NSB-05-119. Available on the web at http://www.nsf.gov/nsb/documents/2005/0930/merit_review.pdf.

- An external NSF web page is being designed to inform the research and education community of the NSF review process. A mock-up of the site has been completed and its review is now underway.
- An internal NSF web page is being designed to provide merit review process information to NSF staff. The website will include the standards expected, effective practices, and examples of reviews, panel summaries, program officer analyses, and program officer communications to principal investigators. A mock-up of the site has been completed and its review is now underway.
- Training sessions on the merit review process were developed in FY 2006 and implemented in the Program Management Seminar for new NSF staff.
- Two NSF Forums were conducted on the Merit Review Process in FY 2006 to identify issues and effective practices.
- Metrics are under development to assess the transparency and quality of the merit review process.
- The Director's Award for Merit Review Excellence was initiated in FY 2006, with the inaugural year awardees recognized at the Annual Director's Award Ceremony in June 2006.

B. Impact of Proposal and Award Management Mechanisms (IPAMM)

The IPAMM working group, initiated in April 2006, has broad representation from across NSF. The working group is charged to:

identify best practices to achieve an appropriate balance between proposal success rates, award size, and award duration.

The working group analyzed funding rate trends over the last ten years, and has formulated hypotheses related to factors associated with and impacts resulting from changes in funding rates and proposal submission rates. To date the working group has gathered important background data to test these hypotheses, such as PI profiles, likelihood of a PI being funded over multiple years, number of proposals a PI submits before being successful, trends in funding rates for a variety of subgroups, and drivers that increase proposal submission. The working group is also conducting case studies of practices related to proposal submissions.

As part of the IPAMM study, the working group has elicited external input through discussions with many of the Advisory Committees and small focus groups with new rotator program officers during the Fall of 2006. In addition, a web-based survey was administered in January 2007 to the approximately 45,000 PIs that submitted research proposals to NSF in FY 2004-2006. The survey was designed to help:

- Identify drivers that increase submissions
- Assess PI perceptions regarding success rates
- Assess impacts of increasing proposal submission rates on the PI and reviewer community
- Identify perceptions and issues related to transformational research
- Identify trends in customer satisfaction

The survey results are being analyzed in February-March, 2007. The data will be analyzed as a whole, and will also be stratified by NSF Directorate/Office and by institution type, to assess differences among these groups. The results will be further validated through discussions with large focus groups of rotator program directors.

The NSB has been provided updates on the working group activities and its data analyses. The IPAMM working group will complete a draft report in Spring 2007 for submission to the NSF Director and Deputy Director.

C. Transformational Research

NSF has several mechanisms that provide variations within the merit review process for the submission and review of proposals that are potentially transformative. These include:

- **Small Grants in Exploratory Research (SGER).** Proposals for small-scale, exploratory, high-risk research may be submitted as SGER proposals. Characterizations of research supported through SGER include:
 - preliminary work on untested and novel ideas;
 - ventures into emerging and potentially transformative research ideas;
 - application of new expertise or new approaches to "established" research topics;
 - having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment, including quick-response research on natural or anthropogenic disasters and similar unanticipated events; or
 - efforts of similar character likely to catalyze rapid and innovative advances.

With SGERs, proposers are particularly encouraged to contact an NSF Program Officer to discuss their ideas and, based on these discussion, an abbreviated proposal is submitted. Also, NSF does not require external review of SGER proposals; the award decision may be based on an internal review only. See **Appendix 7** for additional information about SGERs.

- **Creativity Extensions.** A program officer may recommend the extension of funding for research grants beyond the initial period for which the grant was awarded for a period of up to two years. The objective of such extensions is to offer the most creative investigators an extended opportunity to pursue adventurous, "high-risk" opportunities in the same general research area, but not necessarily covered by the original/current proposal. Awards eligible for such an extension are generally three-year continuing grants. Special Creativity Extensions are initiated by the NSF program officer based on progress during the first two years of a three-year grant; PIs will be informed of such action a year in advance of the expiration of the grant.
- **Accomplished Based Renewals.** For an Accomplishment Based Renewal proposal, the Project Description is replaced with copies of reprints and possibly preprints of publications resulting from the research supported by NSF (including research supported by other sources that is closely related to the NSF supported

research) during the preceding three to five year period. Based on this information, the proposal receives external and internal review. See **Appendix 16** for more information about Accomplished Based Renewals.

- **Guidance to Reviewers and Panels.** Program Officers use different approaches to emphasize to reviewers and panelists NSF's interest in supporting potentially transformational research, even if the proposals are considered "high-risk." For example, some Program Officers emphasize this in their opening remarks to a panel. Other Program Officers conduct a concluding summary session with panels, during which there may be discussions about proposals that may have received mixed reviews but some reviewers consider having high potential. These discussions provide further input to the program officers' decision on whether or not to recommend a proposal for funding.

Nevertheless, reviewing and identifying potentially transformational research presents unique challenges. The National Science Board is completing a report on Transformational Research, with recommendations to NSF based on workshops conducted by the Board, as well as discussions of the NSB Task Force on Transformational Research and the full Board. Although the Board report has not been released, NSF has benefited from the discussions of the Board.

Also, the current NSF Director has made clear in his speeches his vision for the Foundation's support of transformational research, declaring that NSF must support research at the frontier and that NSF's role is not to fund 'safe science.'

Consequently, NSF is currently placing particular focus on ways to increase the promotion and support of potentially transformational research. The recently developed NSF Strategic Plan specifically identifies transformational science and engineering research in the Foundation's *Discovery* goal.

NSF leadership will continue to work with the Board in identifying further steps to advance NSF's promotion and support of transformational research.

Appendix 1
Proposals, Awards and Success Rates
By Directorate, FY 2002-2006

		Fiscal Year				
		2002	2003	2004	2005	2006
NSF	Proposals	35,165	40,075	43,851	41,722	42,352
	Awards	10,406	10,844	10,380	9,757	10,425
	Funding Rate	30%	27%	24%	23%	25%
BIO	Proposals	5,143	5,591	6,063	6,475	6,617
	Awards	1,400	1,448	1,432	1,355	1,202
	Funding Rate	27%	26%	24%	21%	18%
CISE	Proposals	4,317	5,270	6,276	5,238	4,843
	Awards	1,039	1,175	1,017	1,088	1,280
	Funding Rate	24%	22%	16%	21%	26%
EHR	Proposals	3,966	4,111	4,644	3,699	3,254
	Awards	1,044	890	925	736	824
	Funding Rate	26%	22%	20%	20%	25%
ENG	Proposals	6,883	9,076	8,994	8,692	9,423
	Awards	1,726	1,945	1,753	1,493	1,730
	Funding Rate	25%	21%	19%	17%	18%
GEO	Proposals	4,114	4,230	4,267	4,676	4,603
	Awards	1,450	1,515	1,419	1,315	1,418
	Funding Rate	35%	36%	33%	28%	31%
MPS	Proposals	5,996	6,694	7,184	7,083	7,466
	Awards	2,105	2,268	2,175	2,071	2,221
	Funding Rate	35%	34%	30%	29%	30%
OCI	Proposals	223	342	220	116	130
	Awards	54	56	47	75	42
	Funding Rate	24%	16%	21%	65%	32%
OISE	Proposals	608	670	851	822	712
	Awards	334	373	386	333	319
	Funding Rate	55%	56%	45%	41%	45%
OPP	Proposals	572	557	689	816	775
	Awards	264	241	268	281	238
	Funding Rate	46%	43%	39%	34%	31%
SBE	Proposals	3,279	3,491	4,619	4,089	4,520
	Awards	931	894	939	1,004	1,144
	Funding Rate	28%	26%	20%	25%	25%
Other	Proposals	64	12	44	16	9
	Awards	59	12	19	6	7
	Funding Rate	92%	100%	43%	38%	78%

The following are not included in the above statistics: 7,742 Continuing Grant Increments (CGIs), 3,379 supplements, and 384 contracts.

Source: NSF Enterprise Information System as of October 5, 2006.

Appendix 2 Preliminary Proposals

Some NSF programs invite the submission of preliminary proposals. Normally, preliminary proposals require only enough information to make fair and reasonable decisions regarding whether or not the proposer should submit a full proposal. Review practices for preliminary proposals range from a) non-binding advice from program officers encouraging or discouraging submission of a full proposal, to b) formal recommendations from external reviewers or panels to invite or not invite a full proposal. A binding (invite/non-invite) decision is the type of mechanism used when the NSF decision made on the preliminary proposal is final, affecting the PI's eligibility to submit a full proposal. A non-binding (encourage/discourage) decision is the type of mechanism used when the NSF decision made on the preliminary proposal is advisory only. This means that submitters of both favorably and unfavorably reviewed proposals are eligible to submit full proposals.

In FY 2006, NSF received a total of 1,874 preliminary proposals, compared to 2,120 in FY 2005 and 2,310 in FY 2004. For those proposals subject to non-binding advice, NSF encouraged the submission of full proposals in 509 cases and discouraged submission of a full proposal in 770 cases. For the proposals subject to binding advice through formal recommendations, NSF invited the submission of a full proposal in 136 cases and did not invite the submission of a full proposal in 458 cases. One preliminary proposal was withdrawn.

Appendix 3 Proposals, Awards and Success Rates By Minority PI Ethnic/Racial Status, FY 1999-2006

		Fiscal Year							
		1999	2000	2001	2002	2003	2004	2005	2006
American Indian/Alaska Native	Proposals	58	90	118	100	112	93	94	93
	Awards	19	34	52	30	28	23	24	30
	Funding Rate	33%	38%	44%	30%	25%	25%	26%	32%
Black/ African American	Proposals	539	522	668	748	822	900	813	881
	Awards	146	169	180	207	192	208	193	197
	Funding Rate	27%	32%	27%	28%	23%	23%	24%	22%
Hispanic or Latino	Proposals	807	854	955	1,041	1,191	1,432	1,436	1,483
	Awards	245	258	285	300	342	347	322	374
	Funding Rate	30%	30%	30%	29%	29%	24%	22%	25%
Native Hawaiian/ Pacific Island	Proposals	37	41	23	32	37	47	21	25
	Awards	13	19	6	7	12	4	4	7
	Funding Rate	35%	46%	26%	22%	32%	9%	19%	28%

Source: NSF Enterprise Information System as of October 5, 2006.

Appendix 4
Median and Average Award Amounts by Directorate,
Research Awards, FY 2001-2006

		Fiscal Year					
		2001	2002	2003	2004	2005	2006
NSF	Median	\$84,387	\$85,839	\$100,000	\$101,566	\$103,965	\$101,698
	Average	\$113,833	\$115,656	\$135,609	\$139,522	\$143,669	\$134,565
BIO	Median	\$108,333	\$110,000	\$126,000	\$133,191	\$140,000	\$139,972
	Average	\$143,512	\$136,509	\$177,305	\$171,074	\$183,939	\$190,585
CISE	Median	\$92,000	\$93,511	\$113,333	\$113,333	\$112,431	\$116,667
	Average	\$130,289	\$135,788	\$158,899	\$166,517	\$150,523	\$145,863
ENG	Median	\$80,946	\$83,965	\$99,997	\$96,677	\$97,054	\$90,000
	Average	\$99,506	\$102,060	\$119,470	\$119,704	\$117,456	\$110,031
GEO	Median	\$76,667	\$80,168	\$102,667	\$114,730	\$116,492	\$110,394
	Average	\$98,917	\$103,439	\$146,475	\$150,181	\$147,690	\$148,520
MPS	Median	\$86,243	\$83,319	\$100,000	\$100,000	\$100,000	\$100,000
	Average	\$114,421	\$111,617	\$128,585	\$130,043	\$135,423	\$119,637
OCI	Median	\$75,000	\$125,000	\$134,333	\$365,408	\$160,522	\$253,153
	Average	\$82,882	\$176,289	\$160,262	\$401,828	\$315,044	\$287,458
OISE	Median	\$8,784	\$9,800	\$10,000	\$10,000	\$14,996	\$32,500
	Average	\$17,429	\$16,441	\$20,869	\$15,003	\$90,980	\$59,006
OPP	Median	\$77,789	\$81,517	\$126,143	\$141,452	\$122,106	\$132,234
	Average	\$113,164	\$130,343	\$144,392	\$204,126	\$180,487	\$150,488
SBE	Median	\$63,377	\$62,950	\$77,388	\$77,948	\$84,050	\$85,164
	Average	\$80,709	\$78,035	\$89,488	\$90,373	\$110,184	\$102,560

Source: NSF Enterprise Information System as of October 5, 2006.

Appendix 5 Number of People Involved in NSF Activities

In FY 2006, an estimated 226,000 senior researchers, post-doctoral associates, teachers and students across all levels were directly involved in NSF programs and activities, receiving salaries, stipends, or participant support.

	FY 2006 Estimate
Senior Researchers	34,915
Other Professionals	13,140
Postdoctoral Associates	5,540
Graduate Students	31,990
Undergraduate Students	21,345
K-12 Students	22,850
K-12 Teachers	96,040
Total, Number of People	225,820

Source: NSF FY 2008 Budget Request

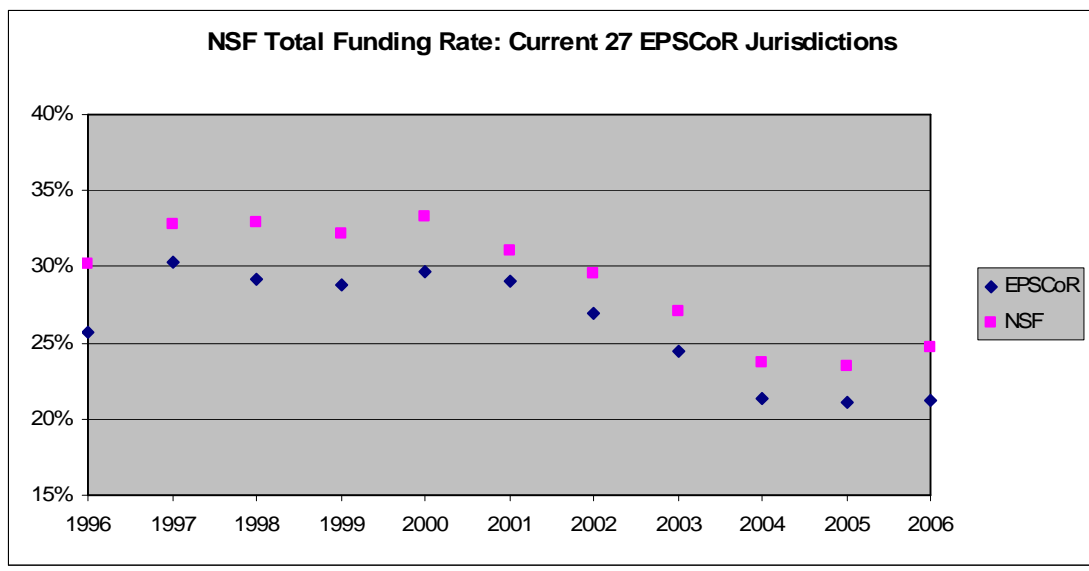
In addition, NSF programs indirectly impact many millions of people. These programs reach K-12 students, K-12 teachers, the general public, and researchers through activities including workshops; informal science activities such as museums, television, videos, and journals; outreach efforts; and dissemination of improved curriculum and teaching methods.

Appendix 6 EPSCoR: Jurisdictions, Proposal, Award, and Funding Data

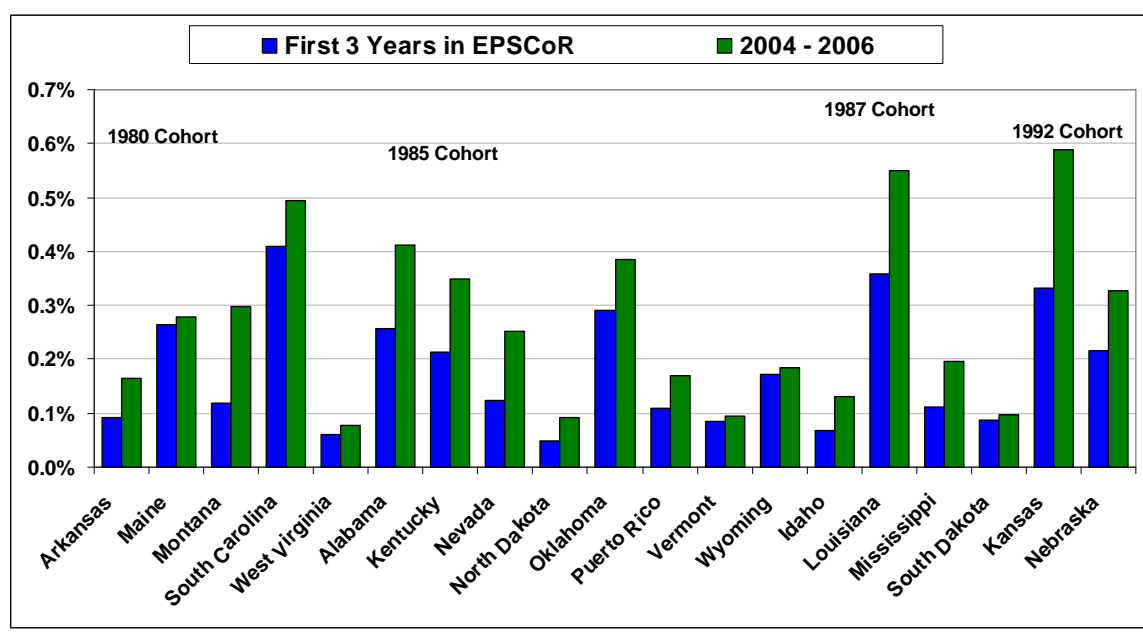
Twenty-five states, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands are currently eligible to compete in the NSF EPSCoR program opportunities. The states are: Alabama, Alaska, Arkansas, Delaware, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, West Virginia, and Wyoming.

The figure in **Appendix 6.1** shows the change over time of the funding rate of the EPSCoR jurisdictions in comparison with the overall NSF funding rate. The figure in **Appendix 6.2** indicates, as a percentage of the overall NSF budget, the change in funding received by each of the EPSCoR jurisdictions, comparing their first three years in EPSCoR to the most recent three-year time period (FY 2004-2006). The table in **Appendix 6.3** shows the funding data for each EPSCoR jurisdiction (the year the jurisdiction joined EPSCoR is shown in parentheses below the name of that jurisdiction).

Appendix 6.1 Overall Funding Rates for EPSCoR Jurisdictions, FY 1996 – 2006



Appendix 6.2 Funding to EPSCoR Jurisdictions as Percentage of the NSF Budget: First 3 Years in EPSCoR Compared to Most Recent 3 Year Period



Appendix 6.3
Funding Rates by EPSCoR Jurisdiction, FY 2002 - 2006

		2002	2003	2004	2005	2006
NSF	Awards	10,339	10,798	10,367	9,772	10,450
	Proposals	35,082	40,084	43,816	41,723	42,374
	Funding Rate	29%	27%	24%	23%	25%
All EPSCoR jurisdictions	Awards	1,511	1,567	1,454	1,433	1,489
	Proposals	5,595	6,418	6,815	6,802	7,037
	Funding Rate	27%	24%	21%	21%	21%
Alabama (1985)	Awards	82	81	99	78	84
	Proposals	385	443	488	483	530
	Funding Rate	21%	18%	20%	16%	16%
Alaska (2000)	Awards	37	74	63	52	63
	Proposals	132	200	211	203	209
	Funding Rate	28%	37%	30%	26%	30%
Arkansas (1980)	Awards	38	43	45	29	47
	Proposals	186	201	236	191	209
	Funding Rate	20%	21%	19%	15%	22%
Delaware (2003)	Awards	49	64	50	54	50
	Proposals	194	239	266	254	247
	Funding Rate	25%	27%	19%	21%	20%
Hawaii (2001)	Awards	71	71	66	89	77
	Proposals	216	247	252	265	240
	Funding Rate	33%	29%	26%	34%	32%
Idaho (1987)	Awards	27	33	24	31	29
	Proposals	130	153	148	140	148
	Funding Rate	21%	22%	16%	22%	20%
Kansas (1992)	Awards	74	79	70	88	76
	Proposals	329	338	388	367	393
	Funding Rate	22%	23%	18%	24%	19%
Kentucky (1985)	Awards	71	66	72	62	52
	Proposals	266	298	337	307	293
	Funding Rate	27%	22%	21%	20%	18%
Louisiana (1987)	Awards	95	98	107	100	117
	Proposals	375	455	517	514	548
	Funding Rate	25%	22%	21%	19%	21%
Maine (1980)	Awards	76	53	41	50	36
	Proposals	189	190	197	192	181
	Funding Rate	40%	28%	21%	26%	20%
Mississippi (1987)	Awards	51	33	43	32	48
	Proposals	152	181	238	226	293
	Funding Rate	34%	18%	18%	14%	16%
Montana (1980)	Awards	43	67	54	43	52
	Proposals	136	189	194	193	242
	Funding Rate	32%	35%	28%	22%	21%
Nebraska (1992)	Awards	48	44	52	41	59
	Proposals	201	233	242	226	238
	Funding Rate	24%	19%	21%	18%	25%

		2002	2003	2004	2005	2006
Nevada (1985)	Awards	40	45	31	40	42
	Proposals	176	160	159	203	200
	Funding Rate	23%	28%	19%	20%	21%
New Hampshire (2004)	Awards	68	67	53	64	53
	Proposals	200	244	232	280	243
	Funding Rate	34%	27%	23%	23%	22%
New Mexico (2001)	Awards	101	117	90	80	91
	Proposals	355	406	378	352	348
	Funding Rate	28%	29%	24%	23%	26%
North Dakota (1985)	Awards	30	29	20	19	22
	Proposals	127	127	140	154	170
	Funding Rate	24%	23%	14%	12%	13%
Oklahoma (1985)	Awards	73	61	65	55	74
	Proposals	270	302	338	327	342
	Funding Rate	27%	20%	19%	17%	22%
Puerto Rico (1985)	Awards	18	20	20	16	19
	Proposals	82	115	106	119	140
	Funding Rate	22%	17%	19%	13%	14%
Rhode Island (2004)	Awards	106	105	128	117	140
	Proposals	297	291	340	334	353
	Funding Rate	36%	36%	38%	35%	40%
South Carolina (1980)	Awards	101	110	80	90	86
	Proposals	382	472	452	453	464
	Funding Rate	26%	23%	18%	20%	19%
South Dakota (1987)	Awards	24	23	12	21	14
	Proposals	99	86	93	101	97
	Funding Rate	24%	27%	13%	21%	14%
Tennessee (2004)	Awards	115	111	102	113	99
	Proposals	440	521	540	585	564
	Funding Rate	26%	21%	19%	19%	18%
U.S. Virgin Islands (2002)	Awards	3	0	2	2	1
	Proposals	3	1	6	5	6
	Funding Rate	100%	0%	33%	40%	17%
Vermont (1985)	Awards	22	24	21	22	16
	Proposals	81	113	111	129	119
	Funding Rate	27%	21%	19%	17%	13%
West Virginia (1980)	Awards	24	18	17	16	19
	Proposals	107	111	105	100	121
	Funding Rate	22%	16%	16%	16%	16%
Wyoming (1985)	Awards	24	31	27	29	23
	Proposals	85	102	101	99	99
	Funding Rate	28%	30%	27%	29%	23%

Appendix 7 Small Grants for Exploratory Research (SGER)

Since the beginning of FY 1990, the Small Grants for Exploratory Research (SGER) option has permitted program officers throughout the Foundation to make small-scale grants *without formal external review*. Characteristics of activities that can be supported by an SGER award include:

- preliminary work on untested and novel ideas;
- ventures into emerging and potentially transformative research ideas;
- application of new expertise or new approaches to "established" research topics;
- having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment, including quick-response research on natural or anthropogenic disasters and similar unanticipated events; or
- efforts of similar character likely to catalyze rapid and innovative advances.

Potential SGER applicants are encouraged to contact an NSF program officer before submitting an SGER proposal to determine its appropriateness for funding. Directorate-level data on SGER proposals and awards are presented in the table in **Appendix 7.1** (below). In FY 2006, NSF made 472 SGER awards, compared to 387 awards in FY 2005, and 382 awards in FY 2004. The increase in FY 2006 is in large part due to the number of SGERs awarded to collect ephemeral data immediately following Hurricane Katrina.

In September 2003, NSF raised the maximum SGER award threshold from \$100,000 to \$200,000. Program officers may obligate up to five percent of their program budget per fiscal year for SGER awards. The average size of an SGER award in FY 2006 was around \$85,000, up from \$70,000 in FY 2005. The total amount awarded to SGERs in FY 2006 was approximately \$40 million compared to \$27 million in the previous year. This represents about 0.7 percent of the operating budget for research and education.

NSF initiated a study of the SGER portfolio in FY 2006 to determine the effectiveness and impact of the SGER mechanism. The results of the study are expected in FY 2007.

Appendix 7.1
SGER Funding Trends by Directorate, FY 2004-2006

		Fiscal Year		
		2004	2005	2006
NSF	Proposals	640	504	697
	Awards	382	387	472
	Total \$	\$29,493,932	\$26,980,122	\$40,022,729
	% of Obligations	0.5%	0.5%	0.7%
	Average \$	\$77,209	\$69,716	\$84,794
BIO	Proposals	65	55	55
	Awards	52	38	49
	Total \$	\$5,392,558	\$3,020,321	\$5,366,962
	% of Obligations	0.9%	0.5%	0.9%
	Average \$	\$103,703	\$79,482	\$109,530
CSE	Proposals	51	82	89
	Awards	48	71	88
	Total \$	\$3,170,389	\$6,678,905	\$10,249,890
	% of Obligations	0.6%	1.4%	2.0%
	Average \$	\$87,814	\$94,069	\$116,476
EHR	Proposals	17	15	16
	Awards	16	11	16
	Total \$	\$2,092,916	\$1,498,645	\$818,176
	% of Obligations	0.2%	0.2%	0.1%
	Average \$	\$130,807	\$136,240	\$51,136
ENG	Proposals	127	176	180
	Awards	119	126	145
	Total \$	\$8,147,351	\$6,708,778	\$11,210,530
	% of Obligations	1.4%	1.1%	1.8%
	Average \$	\$68,465	\$53,244	\$77,314
GEO	Proposals	68	62	83
	Awards	64	59	79
	Total \$	\$3,508,457	\$3,414,557	\$4,393,904
	% of Obligations	0.4%	0.5%	0.5%
	Average \$	\$54,820	\$57,874	\$55,619
MPS	Proposals	272	21	39
	Awards	45	18	31
	Total \$	\$4,423,294	\$1,663,544	\$2,636,865
	% of Obligations	0.4%	0.1%	0.2%
	Average \$	\$98,295	\$92,419	\$85,060
OCI	Proposals	0	11	2
	Awards	0	11	2
	Total \$	\$1,044,683	\$1,458,472	\$182,371
	% of Obligations	0.8%	1.2%	0.1%
	Average \$	N/A	\$132,588	\$91,186
OISE	Proposals	0	0	0
	Awards	0	0	0
	Total \$	\$62,200	\$102,000	\$147,753
	% of Obligations	0.2%	0.2%	0.3%
	Average \$	N/A	N/A	N/A
OPP	Proposals	18	24	16
	Awards	16	24	16
	Total \$	\$695,961	\$1,197,306	\$483,973
	% of Obligations	0.2%	0.3%	0.1%
	Average \$	\$43,498	\$49,888	\$30,248
SBE	Proposals	22	58	217
	Awards	22	29	46
	Total \$	\$820,999	\$1,237,594	\$4,532,305
	% of Obligations	0.4%	0.6%	2.0%
	Average \$	\$37,318	\$42,676	\$98,528

Source: NSF Enterprise Information System as of October 5, 2006.

Appendix 8

Merit Review Process Oversight Mechanisms

Performance evaluation of the operation of the merit review system is supported with information from the following activities:

- **Program Evaluation by Committees of Visitors (COVs).** To ensure the highest quality in processing and recommending proposals for awards, NSF convenes external groups of experts, called Committees of Visitors (COVs), to review each program approximately every three to five years. This includes disciplinary programs in the various directorates and offices, and the cross-disciplinary programs managed across directorates. The COVs (comprised of scientists, engineers and educators from academe, industry, and government) convene at NSF for a two to three day assessment. These experts evaluate the integrity and efficiency of the processes used for proposal review and program decision-making. In addition, the COVs provide a retrospective assessment of the quality of results of NSF's programmatic investments. The COV reports, written as answers and commentary to specific questions, are submitted for review through Advisory Committees to the directorates and the NSF Director. Questions include aspects of the program portfolio, such as the balance of high-risk, multidisciplinary, and innovative projects. The recommendations of COVs are reviewed by management and taken into consideration by NSF when evaluating existing programs and future directions for the Foundation.¹⁴
- **Advisory Committee (AC) Reporting on Directorate/Office Performance.** Advisory committees regularly provide community perspectives to the research and education directorates, the Office of Cyberinfrastructure, Office of International Science and Engineering , and Office of Polar Programs. They are typically composed of 15-25 experts who have broad experience in academia, industry and government. The role of the ACs is to provide advice on priorities, address program effectiveness, review COV reports, and examine directorate/office responses to COV recommendations. In FY 2001 and previous years, directorate/office advisory committees assessed directorate/office progress in achieving NSF-wide GPRA goals. With the advent of the AC/GPA (see below), advisory committees no longer assess directorate progress toward these goals.
- **Advisory Committee for GPRA Performance Assessment (AC/GPA)** During FY 2002, NSF determined that a more efficient and effective process for the assessment of agency performance with respect to GPRA strategic goals was to charge a single external committee of experts with review of all Foundation accomplishments. The AC/GPA consists of approximately 25 external experts from various fields of science, engineering, mathematics and education. The AC/GPA looks at Foundation-wide portfolios linked to the agency's strategic outcome goals of Ideas, People, Tools, and Organizational Excellence and their associated performance indicators. In June 2005, the AC/GPA convened to assess results, using COV reports, investigator project reports, and collections of outstanding accomplishments from awards as reported by NSF program officers. This external assessment found that, overall, in FY 2004, NSF

¹⁴ The COV reports and directorate responses are available electronically as a link from the NSF GPRA web page, <http://www.nsf.gov/about/performance/>.

achieved all four of its strategic outcome goals. With regard to merit review, the AC/GPA concluded "that the MRP [Merit Review Process] is effective in the processing and reviewing of a large and increasing volume of proposals and in the engagement of a broad and diverse segment of talent in the NSF's science and engineering enterprises. While the MRP will always, in our view, require vigilance and a commitment to continuous improvement, when taken as a whole and when one looks at the results as illustrated in the People, Ideas, and Tools portfolios, clearly the process remains a major positive force in advancing the frontiers of science, mathematics, and engineering."¹⁵

- **Assessment Utilizing the Program Assessment Rating Tool (PART).** The Program Assessment Rating Tool was developed by the Office of Management and Budget (OMB) to assess program performance in four areas: Program Purpose and Design, Strategic Planning, Program Management, and Program Results / Accountability. In February 2005, results from PART assessments were released on the "Institutions," "Collaborations," and "Polar Research Tools, Facilities, and Logistics" programs and the Biocomplexity in the Environment priority area. All four areas were rated "effective," the highest possible rating from OMB for the PART. Again, NSF received the top three scores of all research and development programs assessed, and NSF programs were ranked with five in the top fifteen out of the over 600 programs assessed across the entire government that year. Each year, additional programs will be assessed for the first time and previous assessments will be updated to reflect new information and actions taken to enhance program management and results. All NSF programs and current priority areas will be assessed by the end of FY 2008.
- **Independent Verification and Validation of Performance Measurement for the Government Performance and Results Act and the Program Assessment Rating Tool.** NSF contracted with IBM Business Consulting Services to assess the validity of the data and reported results of NSF performance goals and to verify the reliability of the methods used by NSF to compile and report data for the performance measurement goals and objectives. The contractor's independent review, completed in October 2005, concluded that NSF made a concerted effort to report its performance results accurately and has effective systems, policies, and procedures to promote data quality. The review also verified that NSF relied on sound business policies and internal controls, and maintained adequate documentation of its processes and data.¹⁶

¹⁵ *Report of the Advisory Committee for GPRA Performance Assessment*, July 2005, page 48. Available at <http://www.nsf.gov/pubs/2005/nsf05210/nsf05210.pdf>.

¹⁶ IBM Business Consulting Services, "National Science Foundation: Government Performance and Results Act (GPRA) and Program Assessment Rating Tool (PART) Performance Measurement Validation and Verification, Report on FY 2005 Results," October 2005. In NSF's *FY 2005 Performance and Accountability Report*, Section 2, page 92. Available at <http://www.nsf.gov/about/performance/reports.jsp>.

Appendix 9
Requests for Formal Reconsideration of Declined Proposals
By Directorate, FY 2002-2006

		Fiscal Year				
		2002	2003	2004	2005	2006
First Level Reviews (by Assistant Directors):						
BIO	Request	4	4	3	2	4
	- Upheld	4	4	3	2	4
	- Reversed	0	0	0	0	0
CISE	Request	1	1	2	3	1
	- Upheld	0	0	2	3	1
	- Reversed	0	1	0	0	0
EHR	Request	2	3	2	7	4
	- Upheld	2	3	2	7	4
	- Reversed	0	0	0	0	0
ENG	Request	2	2	3	3	6
	- Upheld	2	2	3	3	6
	- Reversed	0	0	0	0	0
GEO	Request	1	4	4	0	0
	- Upheld	1	4	4	0	0
	- Reversed	0	0	0	0	0
MPS	Request	15	4	24	15	16
	- Upheld	15	4	24	15	15
	- Reversed	0	0	0	0	1
SBE	Request	1	2	3	3	4
	- Upheld	0	2	3	3	4
	- Reversed	1	1	0	0	0
Other	Request	0	0	0	0	0
	- Upheld	0	0	0	0	0
	- Reversed	0	0	0	0	0
Second Level Reviews (by Deputy Director):						
O/DD	Request	4	5	7	2	0
	- Upheld	4	4	7	2	0
	- Reversed	0	1	0	0	0
Total Reviews First & Second Level						
NSF	Request	30	26	49	35	35
	- Upheld	29	24	48	35	34
	- Reversed	1	2	1	0	1

Source: Office of the Director

Note:

The number of decisions (upheld or reversed) may not equal the number of requests in each year due to the carryover of the pending reconsideration request.

Appendix 10
Average Number of Reviews per Proposal
By Method and Directorate, FY 2006

		Methods of Review				Not Reviewed	Returned without Review	Withdrawn Proposals
		All Methods	Mail + Panel	Mail-Only	Panel-Only			
NSF	Reviews	239,149	99,907	16,938	122,304	1,724	1,294	317
	Proposals	40,628	14,349	3,895	22,384			
	Rev/Prop	5.9	7.0	4.3	5.5			
BIO	Reviews	41,596	36,145	481	4,970	197	267	29
	Proposals	6,421	5,237	90	1,094			
	Rev/Prop	6.5	6.9	5.3	4.5			
CSE	Reviews	23,887	1,459	461	21,967	231	69	44
	Proposals	4,612	227	112	4,273			
	Rev/Prop	5.2	6.4	4.1	5.1			
EHR	Reviews	21,196	472	259	20,465	29	63	11
	Proposals	3,225	72	77	3,076			
	Rev/Prop	6.6	6.6	3.4	6.7			
ENG	Reviews	44,374	3,634	636	40,104	386	451	32
	Proposals	9,037	659	168	8,210			
	Rev/Prop	4.9	5.5	3.8	4.9			
GEO	Reviews	29,010	23,035	3,688	2,287	176	40	36
	Proposals	4,425	3,209	788	428			
	Rev/Prop	6.6	7.2	4.7	5.3			
MPS	Reviews	46,372	12,802	8,885	24,685	251	282	88
	Proposals	7,216	1,614	2,024	3,578			
	Rev/Prop	6.4	7.9	4.4	6.9			
OCI	Reviews	680	9	42	629	5	10	0
	Proposals	125	1	7	117			
	Rev/Prop	5.4	9.0	6.0	5.4			
OISE	Reviews	2,442	316	1,312	814	117	36	41
	Proposals	595	43	346	206			
	Rev/Prop	4.1	7.3	3.8	4.0			
OPP	Reviews	4,802	3,955	438	409	36	6	9
	Proposals	739	561	99	79			
	Rev/Prop	6.5	7.0	4.4	5.2			
SBE	Reviews	24,742	18,068	701	5,973	296	51	27
	Proposals	4,224	2,725	177	1,322			
	Rev/Prop	5.9	6.6	4.0	4.5			
Other	Reviews	48	12	35	1	0	19	0
	Proposals	9	1	7	1			
	Rev/Prop	5.3	12.0	5.0	1.0			

Source: NSF Enterprise Information System as of October 5, 2006.

Notes:

- The “Not Externally Reviewed” category includes award and decline actions on proposals that were not externally reviewed, such as SGER and workshop proposals. The “Returned without Review” and “Withdrawn Proposal” categories include proposals that were neither awarded nor declined.
- The proposal totals shown in the “All Methods” category do not include the proposals shown in the “Not Externally Reviewed” category.
- There were 38,881 panel summaries in FY 2006. The review counts in the “all methods”, “mail + panel” and “panel-only” columns include both individual reviews and panel summaries.
- Withdrawn proposals include only those that underwent merit review.

Appendix 11
Methods of NSF Proposal Review
FY 1993 – 2006

FY	Total	Mail + Panel		Mail-Only		Panel-Only		Not Externally Reviewed	
	Proposals	Proposals	Percent	Proposals	Percent	Proposals	Percent	Proposals	Percent
2006	42,352	14,349	34%	3,895	9%	22,384	53%	1,724	4%
2005	41,722	13,919	33%	3,656	9%	22,735	54%	1,412	3%
2004	43,851	13,345	31%	4,496	10%	24,553	56%	1,457	3%
2003	40,075	12,683	32%	4,579	11%	21,391	53%	1,388	3%
2002	35,164	11,346	32%	4,838	14%	17,616	50%	1,364	4%
2001	31,942	9,367	29%	5,460	17%	15,751	49%	1,364	4%
2000	29,507	9,296	32%	6,048	20%	12,886	44%	1,277	4%
1999	28,579	8,918	31%	6,452	23%	12,046	42%	1,163	4%
1998	28,422	8,486	30%	6,974	25%	11,396	40%	1,566	6%
1997	30,258	8,812	29%	7,855	26%	12,109	40%	1,482	5%
1996	30,199	8,562	28%	7,812	26%	12,490	41%	1,335	4%
1995	30,432	8,400	28%	8,581	28%	11,912	39%	1,539	5%
1994	30,336	7,059	23%	8,687	29%	12,986	43%	1,604	5%
1993	30,038	7,032	23%	8,886	30%	12,338	41%	1,782	6%

Source: NSF Enterprise Information System as of October 1, 2006.

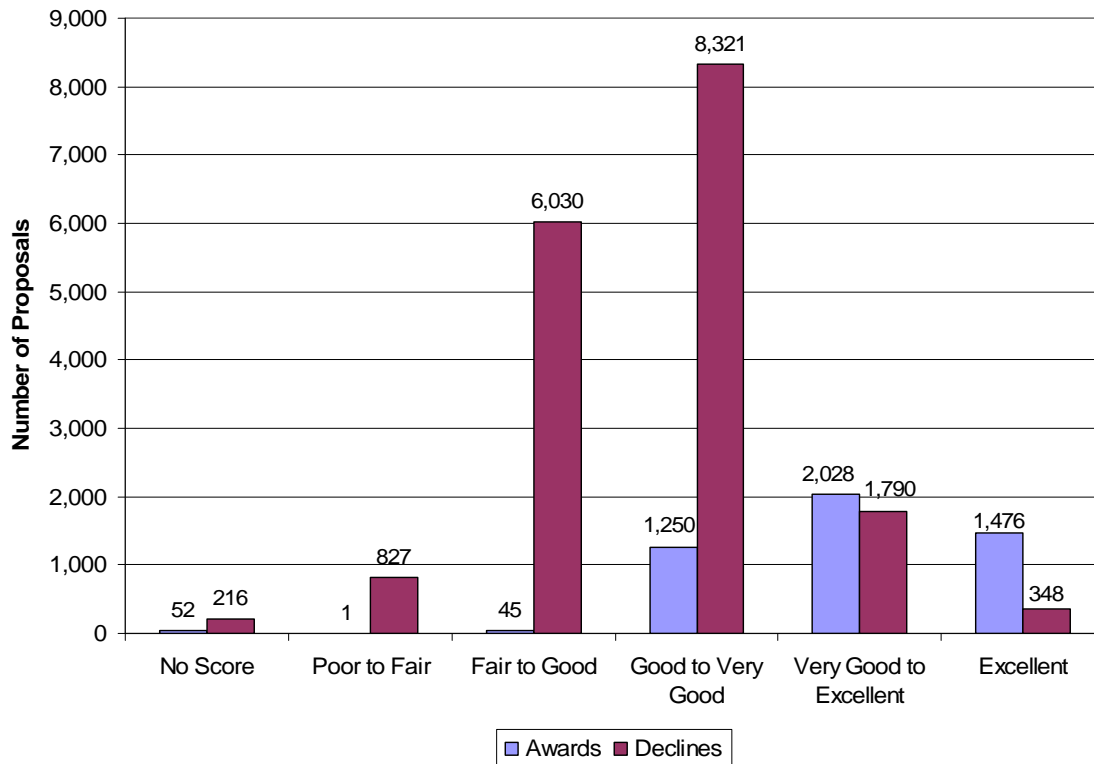
Panel-Only includes cases where panel was mailed proposal for review prior to panel.

Appendix 12
Methods of NSF Proposal Review, By Directorates
FY 2006

Directorate	Total	Mail + Panel		Mail-Only		Panel-Only		Not Externally Reviewed	
	Proposals	Proposals	Percent	Proposals	Percent	Proposals	Percent	Proposals	Percent
NSF	42,352	14,349	34%	3,895	9%	22,384	53%	1,724	4%
BIO	6,618	5,237	79%	90	1%	1,094	17%	197	3%
CISE	4,843	227	5%	112	2%	4,273	88%	231	5%
EHR	3,254	72	2%	77	2%	3,076	95%	29	1%
ENG	9,423	659	7%	168	2%	8,210	87%	386	4%
GEO	4,601	3,209	70%	788	17%	428	9%	176	4%
MPS	7,467	1,614	22%	2,024	27%	3,578	48%	251	3%
OCI	130	1	1%	7	5%	117	90%	5	4%
OISE	712	43	6%	346	49%	206	29%	117	16%
OPP	775	561	72%	99	13%	79	10%	36	5%
SBE	4,520	2,725	60%	177	4%	1,322	29%	296	7%
Other	9	1	11%	7	78%	1	11%	0	0%

Source: NSF Enterprise Information System as of October 5, 2006.

Appendix 13
Distribution of Average Reviewer Ratings
Panel-Only Reviewed, FY 2006

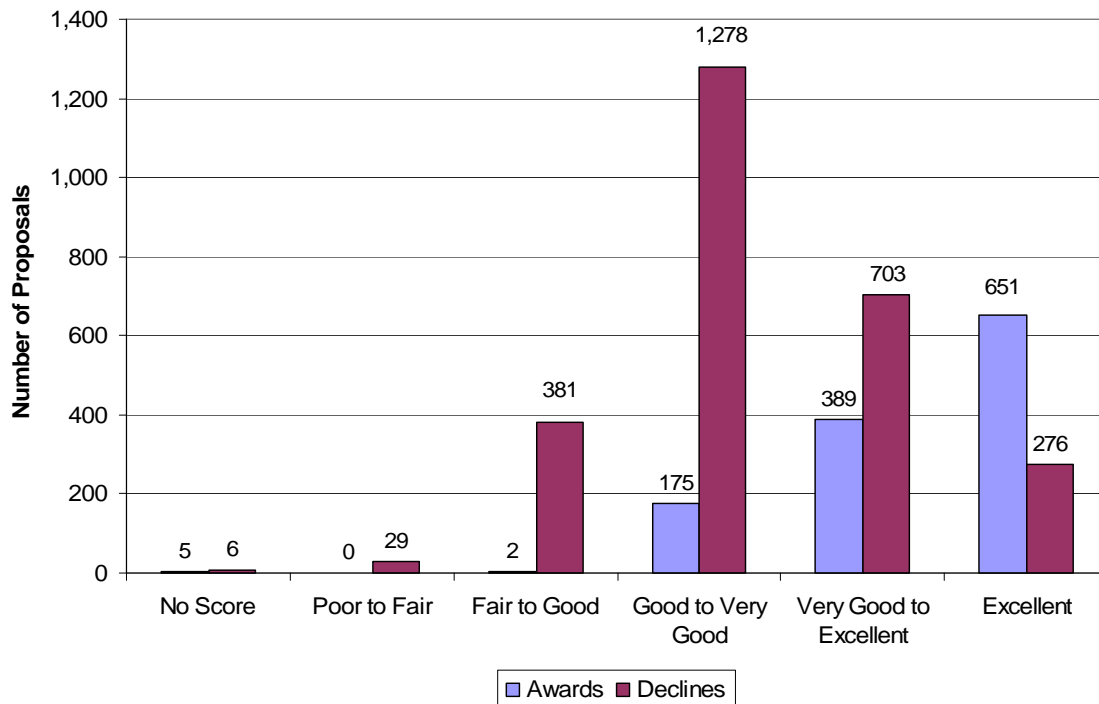


Source: NSF Enterprise Information System as of October 5, 2006.

Note:

- Number of FY 2006 Proposals – 17,532 Declines, 4,852 Awards

Appendix 14
Distribution of Average Reviewer Ratings
Mail-Only Reviewed, FY 2006

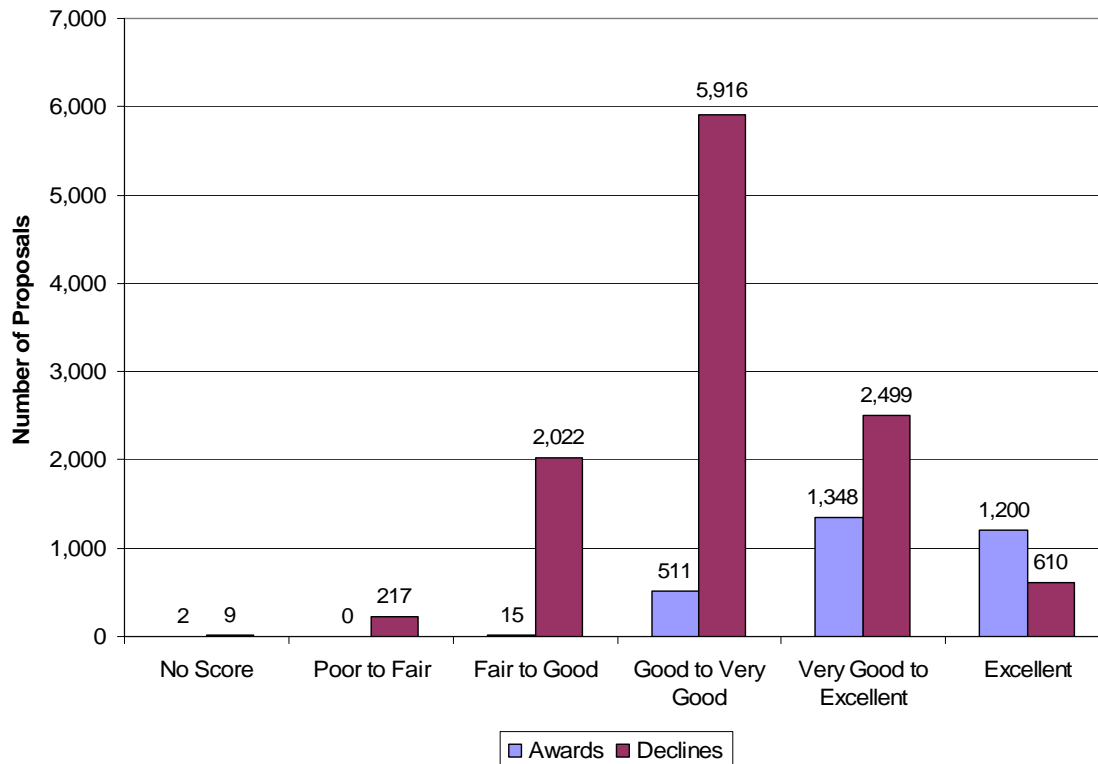


Source: NSF Enterprise Information System as of October 5, 2006.

Note:

- Number of FY 2006 Proposals – 2,673 Declines, 1,222 Awards

Appendix 15
Distribution of Average Reviewer Ratings
Mail and Panel Reviewed, FY 2006



Source: NSF Enterprise Information System as of October 5, 2006.

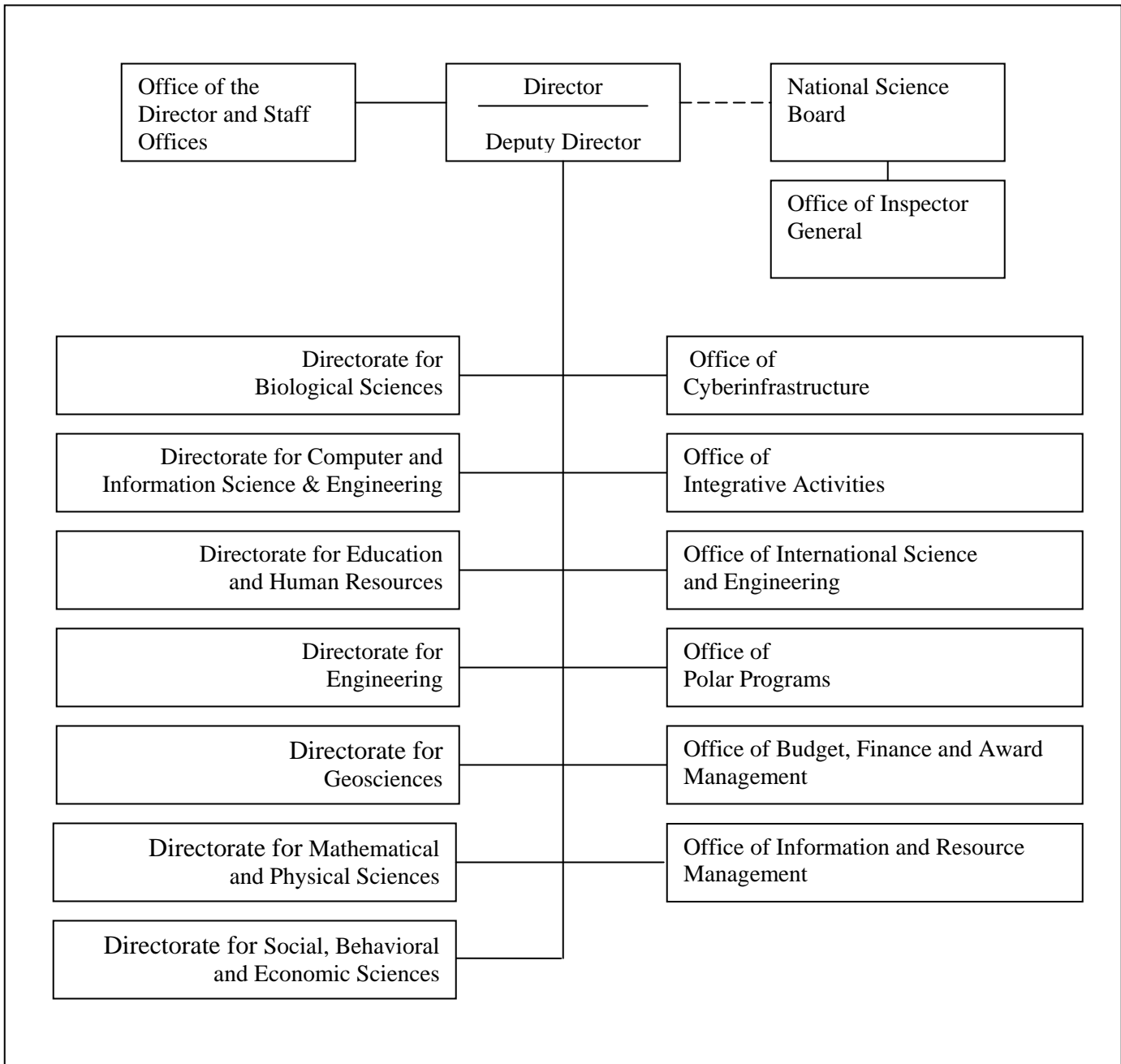
Note:

- Number of FY 2006 Proposals – 11,273 Declines, 3,076 Awards

Appendix 16
Accomplishment Based Renewals

In an accomplishment based renewal, the project description is replaced by copies of no more than six reprints of publications resulting from the research supported by NSF (or research supported by other sources that is closely related to the NSF-supported research) during the preceding three- to five-year period. In addition, a brief (not to exceed four pages) summary of plans for the proposed support period must be submitted. All other information required for NSF proposal submission remains the same. The proposals undergo merit review in the tradition of the specific program. In 2006 there were 106 requests for accomplishment based renewals, 33 of which were awarded.

Appendix 17 National Science Foundation Organization Chart



Appendix 18 Terms & Acronyms

<u>Acronym</u>	<u>Definition</u>
AC	Advisory Committee
AD	NSF Assistant Director
BFA	Office of Budget, Finance and Award Management
BIO	Directorate for Biological Sciences
CAREER	Faculty Early Career Development Program
CGI	Continuing Grant Increments
CISE	Directorate for Computer and Information Science and Engineering
COV	Committee of Visitors
EHR	Directorate for Education and Human Resources
EIS	Enterprise Information System
ENG	Directorate for Engineering
EPSCoR	Experimental Program to Stimulate Competitive Research
FTE	Full-Time Equivalent
FY	Fiscal Year
GEO	Directorate of Geosciences
GPRA	Government Performance and Results Act
IPAs	Temporary employees hired through Intergovernmental Personnel Act
IPS	Interactive Panel System
MPS	Directorate for Mathematical and Physical Sciences
NSF	National Science Foundation
OCI	Office of Cyberinfrastructure
ODS	Online Document System
OIG	Office of Inspector General
OISE	Office of International Science & Engineering
OMB	Office of Management and Budget
OPP	Office of Polar Programs
PARS	Proposal, PI and Reviewer System
PI	Principal Investigator
R&RA	Research and Related Activities
SBE	Directorate for Social, Behavioral and Economic Sciences
SGER	Small Grant for Exploratory Research
VSEE	Visiting Scientists, Engineers and Educators