

Report  
on the  
National Science Foundation's  
Merit Review Process  
Fiscal Year 2017



## **NSB Preface to 2017 Merit Review Report**

The National Science Board (NSB) is pleased to receive the 2017 Merit Review Report (MRR) from the National Science Foundation (NSF). The Board relies on these annual reports to help it discharge its responsibility to ensure the integrity, quality, accountability, and transparency of NSF policies and processes. Recognizing that information on merit review processes is of interest and value to a variety of NSF constituents, we share the report widely. Most MRRs from 1996 onwards are available at <https://www.nsf.gov/nsb/publications/pubmeritreview.jsp>.

### **The NSF Merit Review Process**

The merit review process is at the heart of the NSF enterprise. It is designed to ensure that, as far as possible, sound scientific judgment guides funding decisions; that deliberations are open minded and thoughtful; that biases and conflicts are excluded; and that proposers receive constructive and useful feedback from reviews, panels, and program officers. The Board affirms that NSF is committed to transparency, accountability, and continual improvement of the merit review process at every stage. Program Officers (POs) ensure that reviewers, both internal and external, are well-qualified and that advice from reviewers, among other factors, is taken into consideration when PO funding recommendations are made. Division Directors review every funding recommendation, including the quality of the review process and the justifications. For each Division, Committees of Visitors review the program funding decisions and portfolios every 4-5 years to assess the integrity and effectiveness of the process. They may also recommend improvements. At NSF, suggested innovations and improvements are explored, often by means of pilot programs, and the results are systematically assessed before being recommended for wide adoption.

It is also important to recognize that the NSF Merit Review process depends on the voluntary commitment of an enormous amount of time and intellectual work by members of science and engineering communities. In FY 2017, 33,966 expert reviewers either served on panels, provided one or more ad hoc reviews, or both. They came from a wide range of educational and research institutions.

### **NSF Portfolio of Awards**

NSF awards propel scientific advancement in the nation, constitute solid investments in the nation's future STEM workforce, and can make substantial contributions to the economic strength of local communities. The creative and transformational projects that are encouraged by this environment are limited only by the available funding. Our U.S. research communities submit far more proposals with substantial research and educational promise than NSF can support. A significant number of proposals rated 'very good' or better have to be declined each year. In 2017, the funding requests for such proposals totaled \$3.8 billion.

In FY 2017, NSF received 49,415 proposals for funding, similar to FY 2015 and FY 2016. After review, it made 11,447 new competitive awards. NSF dispersed \$7.1 billion for research and education programs to approximately 2,000 colleges, universities, schools, businesses, and other research organizations in all 50 states, the District of Columbia, and three territories. NSF research grants supported 64,000 people in FY 2017, including more than 31,000 graduate students and post docs throughout the U.S.

## **Design of the 2017 MRR – A Report in Transition**

NSF has submitted information about its merit review process to the Board annually since the late 1970s. Over this period, the MRR has expanded to include more information, often in response to input from the Board and the community. At the same time, little has been deleted. The report has grown somewhat long, complicated, and hard to work with. In order to make the information more transparent and useable, NSB and NSF have recently begun considering improvements to the Merit Review Report and, in August 2017, the Board approved a plan for the Foundation to provide reports biannually, rather than annually. The intent was to give NSF staff and the Board the opportunity to improve the design of the basic report in ways that would enhance its utility for the Foundation and all constituents, and also to develop accompanying in-depth reports on selected topics in off years.

As NSF and NSB worked toward these goals, it became clear that a more effective way to regularly inform the Board and other stakeholders would be to summarize key information in a more concise narrative in the MRR accompanied by an expanded Merit Review webpage. The narrative Report would give a high-level view of the results for each year while the webpage would enable readers to explore topics of particular interest. NSF staff and the Board will also devote more effort to understanding topics of special interest, including some that may emerge from the more accessible new structure.

With all this in mind, the Board and Foundation have agreed that NSF will resume producing annual reports rather than biannual. The new format will, in effect, make the MRR a “living document” wherein the background data and tables can be updated with relative ease. Moving toward this vision, the current 2017 Report provides key information in a somewhat more condensed narrative format than reports from the recent past. The 2018 Report will reflect the beginnings of the new “living document” MRR.

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# FY 2017 Report on the National Science Foundation's Merit Review Process

## I. Executive Summary

This report includes data and related information about the National Science Foundation (NSF or the Foundation) Merit Review Process for fiscal year (FY) 2017. NSF acted on 49,415 competitively reviewed full proposals in FY 2017, comparable to the number acted on in FY 2016 (49,285). The Foundation made 11,447 awards in FY 2017, resulting in a funding rate of 23%, with 430 fewer awards made than in FY 2016. NSF's overall proposal funding rate for competitively reviewed full proposals has remained between 22% and 24% since 2010. Funding rates vary among directorates; in FY 2017 they ranged from 19% in Engineering to 32% in Geosciences.<sup>1</sup>

In FY 2017, approximately 82% of NSF's competitively reviewed full proposals were research proposals. The funding rate for research proposals was 21% overall, with directorate rates ranging from 30% in Geosciences to 18% in Engineering. The funding rate for research proposals from early-career PIs was 18%, compared to 22% for other PIs. The funding rates for research proposals from men and women were similar, 21% and 23% respectively. Overall, the funding rate for research proposals from White PIs was 24%, while rates for proposals from Hispanic or Latino PIs, Black/African-American PIs, and Asian PIs were 21%, 19%, and 17%, respectively.

In terms of individual investigators, the funding rate for Principal Investigators (PIs) across the last three years - the average duration for a research grant - was 39%. That is, of PIs who submitted one or more research proposals between 2015 and 2017, 39% received an award in that period. Over that three-year period, the average number of research proposals submitted to obtain an award was 2.4.

The mean annual research award amount was \$169,324 and the mean duration of an award was 2.9 years. If graduate students were included in an award, the mean level of graduate student support was \$30,766. NSF research awards supported 26,693 graduate students and 4,442 post-doctoral associates in 2017, as well as 33,296 senior research personnel. The average number of months of salary support for individual PIs or Co-PIs per research grant per year in FY 2017 was 0.7 months for single-PI and 0.6 months for multiple-PI awards, only half of the support provided in research grants for PIs in 2007.

Most proposals submitted to NSF are externally reviewed by one of three methods: a review panel only, ad hoc reviewers + a panel, or ad hoc reviewers only. In FY 2017, 68% of proposals were reviewed by panel only, 24% by ad hoc + panel, and 4% by ad hoc only. Following

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<sup>1</sup> The Office of International Science and Engineering and the Office of Integrative Activities are not included in this comparison.

Foundation policy, about 4% of proposals were not reviewed externally. These included EARly-concept Grants for Exploratory Research (EAGER) proposals that enable program officers to support what they judge to be potentially transformative early-stage research and Grants for Rapid Response Research (RAPID) as well as small grants for travel or workshops.

NSF's goal is to inform at least 75% of PIs of funding decisions within six months of receipt of their proposals.<sup>2</sup> In FY 2017, the Foundation suspended this "time to decision" goal to accommodate the additional work associated with the relocation of its headquarters from Arlington, VA to Alexandria, VA. In FY 2017, 71% of all proposals were processed within six months.

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<sup>2</sup> NSF FY 2016 Annual Performance Plan.

## II. 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."<sup>3</sup> NSF is the only federal agency whose mission includes support for all fields of fundamental science and engineering, except for medical sciences. NSF achieves its unique mission by making merit-based awards to over 2,000 colleges, universities, primary and secondary school systems, businesses, informal science organizations and other research organizations throughout the US.

A National Science Board (NSB) policy, endorsed in 1977 and amended in 1984 and 2017, requests that the NSF Director submit a biennial report on the NSF merit review process. The most recent report described the FY 2016 merit review process. This *FY 2017 Report on the NSF Merit Review Process* is an "off-year" report. It uses a shorter format and summarizes a core set of data for FY 2017. **Section III** of the report provides summary data about proposals, awards, and funding rates. **Section IV** provides information about the process by which proposals are reviewed and awarded.

### A. The Merit Review Process

All proposals reviewed by NSF are evaluated using the two NSB-approved criteria: *Intellectual Merit* and *Broader Impacts*. These are stated in Part I of the *NSF Proposal and Award Policies and Procedures Guide*.<sup>4</sup> The Intellectual Merit criterion encompasses the potential to advance knowledge. The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes. Programs may have additional review criteria particular to the goals and objectives of the program. All relevant review criteria are described in the program announcement or solicitation.

About 96% of NSF's proposals are evaluated by external reviewers as well as by NSF staff. On average, NSF proposals are reviewed by 3-5 reviewers, depending on the type of review mechanism used and the nature of the proposals. Each reviewer is chosen for specific types of expertise and adds different points of view to the decision-making process. Reviewers provide written reviews that describe the strengths and weaknesses of proposals in the context of the NSB merit review criteria. NSF program officers make funding recommendations to award or decline proposals after scientific, technical and programmatic review and consideration of appropriate factors such as portfolio balance and the amount of funding available. **Section IV** and **Appendix 8** of this report describe in detail the processes by which merit reviews are conducted as well as the principles and criteria that guide review and decision making. The integrity of the merit review process is assessed by external Committees of Visitors (**Appendix 11**) every 4 - 5 years.

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<sup>3</sup> 42 U.S.C. §1862, available at <https://www.law.cornell.edu/uscode/text/42/1862>.

<sup>4</sup> The *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) applicable in FY 2017 from October 1, 2016, to January 29, 2017, is available at: [https://www.nsf.gov/pubs/policydocs/pappguide/nsf16001/nsf16\\_1.pdf](https://www.nsf.gov/pubs/policydocs/pappguide/nsf16001/nsf16_1.pdf). The version of the PAPPG applicable for the remainder of FY 2017 may be found at: [https://www.nsf.gov/pubs/policydocs/pappg17\\_1/nsf17\\_1.pdf](https://www.nsf.gov/pubs/policydocs/pappg17_1/nsf17_1.pdf).



Approximately 4% of proposals fall into special categories that are, by NSF policy, exempt from external review and may be internally reviewed only, such as proposals for conferences, EARly-concept Grants for Exploratory Research (EAGERs), Grants for Rapid Response Research (RAPIDs) (see **Section III.G** and **Appendix 7**), and proposals submitted through the Research Advanced by Interdisciplinary Science and Engineering (RAISE) mechanism.

## **B. Proposals and Awards**

NSF's annual portfolio of funding actions (award or decline) is associated with proposals, requests for supplements, Intergovernmental Personnel Act agreements, and contracts. Proposals are further divided into two types, full proposals and preliminary proposals. This report focuses on full proposals. In general, we will refer to these simply as proposals unless it is necessary to distinguish them from preliminary proposals. Information on preliminary proposals may be found in **Appendix 9**.

**Section III.A** focuses on competitively reviewed proposals that are research proposals. The research proposal category includes proposals for what are considered typical research projects and consists of a large subset (82%) of the competitively reviewed proposals. **Sections III.B – F** summarize data on all competitively reviewed proposals.

Proposal funding rate refers to the proportion of proposals acted on in a fiscal year that resulted in awards. For example, if a directorate processed 8,000 proposals in the year, making 2,000 awards and declining the remaining 6,000, the “proposal funding rate” for that directorate in that year would be 25%.

Directorates are often referred to by their acronyms<sup>5</sup>: BIO (Biological Sciences), CISE (Computer and Information Science and Engineering), EHR (Education and Human Resources), ENG (Engineering), GEO (Geosciences), MPS (Mathematical and Physical Sciences), and SBE (Social, Behavioral and Economic Sciences). Some tables and figures include data pertaining to the Office of International Science and Engineering and the Office of Integrative Activities,<sup>6</sup> abbreviated as OISE and OIA, respectively. In some tables, these two program offices are referred to collectively as OD since they form part of the Office of the Director rather than a directorate (see **Appendix 14** for NSF's organizational chart).

Another acronym used is STEM: Science, Technology, Engineering, and Mathematics.

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<sup>5</sup> A list of acronyms is provided in **Appendix 15**. In FY 2017, the Division of Advanced Cyberinfrastructure (ACI) and the Division of Polar Programs (PLR) were renamed the Office of Advanced Cyberinfrastructure (OAC) and Office of Polar Programs (OPP) but remain part of their parent directorates, CISE and GEO respectively. Data for these units are not separately broken out in this report.

<sup>6</sup> Effective April 6, 2015, the Section for International Science and Engineering within the Office of International and Integrative Activities became a staff office, the Office of International Science and Engineering (OISE), within the Office of the Director (OD Memorandum 15-09). With this change, the name of what had been known as the Office of International and Integrative Activities (IIA) reverted to the Office of Integrative Activities (OIA). Except where noted, the text, tables and figures within this report reflect the nomenclature in effect at the end of FY 2017.

### III. Proposals and Awards

#### A. Data on Research Grants

“Research grant” is used by NSF to represent a typical research award, particularly with respect to the award size. Not included in this category are awards such as centers and facilities, grants for equipment, instrumentation, conferences and symposia, grants in the Small Business Innovation Research program, and education and training grants.

#### A1. Research Proposal, Award, & Funding Rate Trends

**Table 1** provides the research proposal, award, and funding rate<sup>7</sup> trends. The number of new awards made in FY 2017 (8,553) was 2.6% lower than in FY 2016 (8,782). The number of research proposals acted on decreased by 0.9%; the funding rate for research proposals declined by less than one half per cent, remaining at 21%.<sup>8,9</sup> Note that a proposal is included in a given fiscal year based on whether the action (division director’s recommendation to award or decline)<sup>10</sup> was taken that year, not whether the proposal was received in that year.

**Table 1. Research Proposals, Awards and Funding Rates**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Proposals</b>	33,705	33,643	35,609	42,225	41,840	38,490	39,249	38,885	40,869	41,034	40,678
<b>Awards</b>	7,415	6,999	10,011	8,639	7,759	8,061	7,652	7,926	8,993	8,782	8,553
<b>Funding Rate</b>	22%	21%	28% <sup>11</sup>	20%	19%	21%	19%	20%	22%	21%	21%

Source: NSF Enterprise Information System, 10/01/17.

#### A2. Research Grant Size and Duration

In FY 2017, the annualized median award size was \$133,309, a 0.1% decrease from FY 2016 in nominal dollars, and the annualized mean award amount was \$169,324, a 2.3% decrease from FY 2016. The nominal and inflation-adjusted average annual award sizes are shown in **Figure 1**.

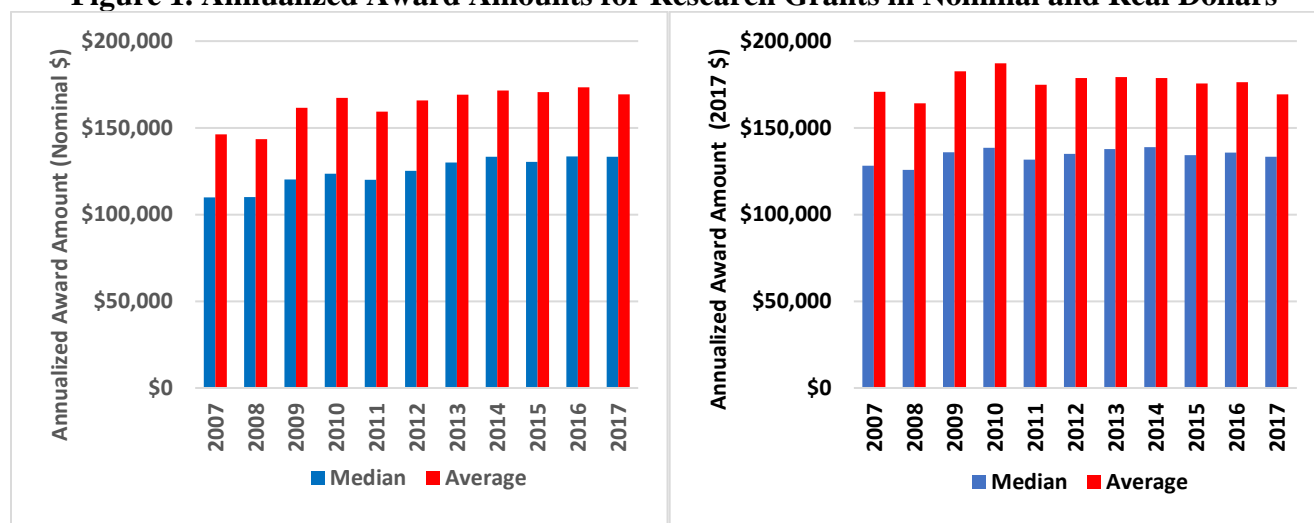
<sup>7</sup> This report uses the term “proposal funding rate” to refer to the rate at which submitted proposals are successful in obtaining funding.

<sup>8</sup> The ratio of funding rates between FY 2017 and FY 2016 is 0.981 [ = (8,553/40,678) ÷ (8,782/41,034) ].

<sup>9</sup> EAGER and RAPID proposals, which have a high funding rate, were approximately 2.1% of the research proposals. If these are removed, then the funding rate for research proposals is reduced from 21.0% to 19.8%.

<sup>10</sup> The merit review process is managed by NSF’s program units (divisions and offices) and is completed when the division director or office head concurs with a program officer’s recommendation to award or decline a proposal. For simplicity, this step will be referred to as completion of an award or decline action on a proposal. If that action is to recommend that an award be made, further processing takes place within the Office of Budget and Financial Administration before an award is issued by NSF. More details may be found in **Section IV.B**.

<sup>11</sup> Results for FY 2009 and FY 2010 include funding actions made possible by the \$3 billion additional appropriation that NSF received under the American Recovery and Reinvestment Act (ARRA). Approximately \$2.5 billion of the ARRA appropriation was obligated in FY 2009. The remainder was obligated in FY 2010, primarily as facilities awards.

**Figure 1. Annualized Award Amounts for Research Grants in Nominal and Real Dollars**

Source: NSF Enterprise Information System, 10/01/17 and Office of Management and Budget Historical Table 10.1 "Gross Domestic Product and Deflators Used in the Historical Tables: 1940–2023", <https://www.whitehouse.gov/wp-content/uploads/2018/02/hist10z1-fy2019.xlsx>, accessed on 11/05/18. Real dollars use FY 2017 as a baseline. FY 2009 and FY 2010 include ARRA funding.

In real (i.e., inflation-adjusted) dollars, the FY 2017 annualized mean award amount (\$169,324) was 4% lower than the FY 2016 amount (\$176,350).<sup>12</sup> The mean annual award size in *nominal* dollars increased by 15.8% from FY 2007 to FY 2017. The mean annual award size in *real* dollars fluctuated over the same period and was 0.8% lower in FY 2017 than in FY 2007. The ARRA appropriation made possible an increase in average annual award size in FY 2009 and FY 2010, relative to FY 2008.

Data on award size organized by NSF directorate for the past decade are presented in **Appendix 1**. There is considerable variation between directorates; for example, BIO, CISE and GEO award larger research grants on average, while ENG, MPS and SBE award smaller grants.

As **Table 2** shows, the average award duration has remained relatively constant at 3 years.<sup>13</sup>

**Table 2. Mean Award Duration for Research Grants**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Duration (Years)</b>	2.9	3.0	3.0	2.9	2.9	2.9	3.0	3.0	2.9	2.9	2.9

Source: NSF Enterprise Information System, 10/01/17.

### A3. Diversity of Participation

<sup>12</sup> Inflation-adjusted dollars were calculated using the Office of Management and Budget's Gross Domestic Product (GDP) (chained) Price Index. This deflator is updated by the Office of Management and Budget and is based on the U.S. Government fiscal year, October 1 to September 30. For this section and **Figure 1**, FY 2017 is the reference year (one FY 2017 dollar equals one real dollar).

<sup>13</sup> The number of years is rounded to one decimal place. This is the initial duration for new awards in each year and does not take into account no-cost extensions.

To advance the goals described in NSF's Strategic Plan<sup>14</sup>, an important strategy is broadening the participation in NSF's activities by members of groups that are currently under-represented in STEM. This includes ensuring the participation of researchers, educators and students from such groups in NSF's programs as well as preparing and engaging a diverse STEM workforce to participate at the frontiers of research and education. Demographic information about proposers is based on self-reported data. Not all proposers choose to disclose this information. For research proposals submitted in FY 2017, about 85%, 85%, 83% and 70% were submitted by PIs who provided information about their gender, race, ethnicity or disability status, respectively.

### Proposals from Various Racial and Ethnic Groups

Table 3 and 4 show the numbers of proposals and awards for various racial and ethnic groups.

**Table 3. Research Proposals, by Racial and Ethnic Group**

	Hispanic	Non-Hispanic	Unknown	TOTAL
American Indian or Native Alaskan	26	65	†	††
Asian	28	9,490	733	<b>10,251</b>
Black/African American	17	776	22	<b>815</b>
Native Hawaiian or Pacific Islander	0	17	†	††
White	1,048	20,428	1,416	<b>22,892</b>
Multi-racial	63	339	28	<b>430</b>
Unknown	419	1,144	4,609	<b>6172</b>
<b>TOTAL</b>	<b>1,601</b>	<b>32,259</b>	<b>6,818</b>	<b>40,678</b>

† = number less than 10; †† = row sum not available because a cell includes a number less than 10.

**Table 4. Research Awards, by Racial and Ethnic Group**

	Hispanic	Non-Hispanic	Unknown	Funding Rate
American Indian or Native Alaskan	†	21	†	<b>24%</b>
Asian	†	1,637	111	<b>17%</b>
Black/African American	†	147	†	<b>19%</b>
Native Hawaiian or Pacific Islander	†	†	†	††
White	221	4,848	333	<b>24%</b>
Multi-racial	15	77	†	<b>22%</b>
Unknown	87	199	837	<b>18%</b>
<b>Funding Rate</b>	<b>21%</b>	<b>21%</b>	<b>19%</b>	

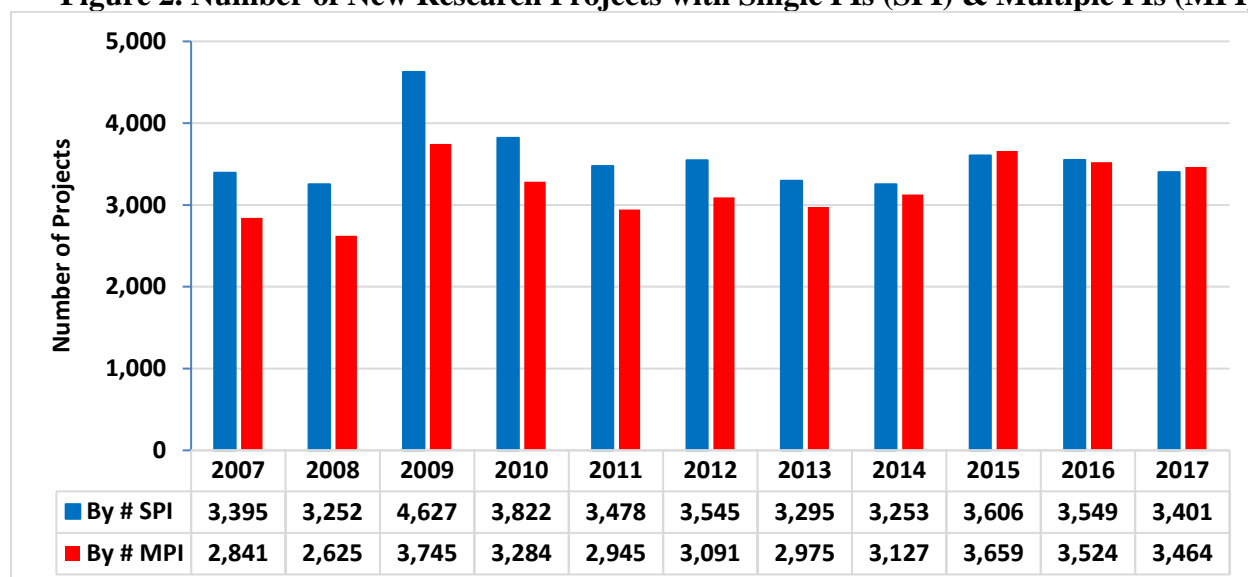
† = number less than 10; †† = too few proposals and awards to compute a funding rate.

#### **A4. Number of Investigators per Research Project**

Figure 2 shows the number of new research projects with single PIs (SPI) compared to the number of new research projects with multiple PIs (MPI). Some of the MPI projects are associated with multiple awards, each to a different collaborating institution.

<sup>14</sup>NSF Strategic Plan for Fiscal Years (FY) 2018-2022 <https://www.nsf.gov/pubs/2018/nsf18045/nsf18045.pdf>.

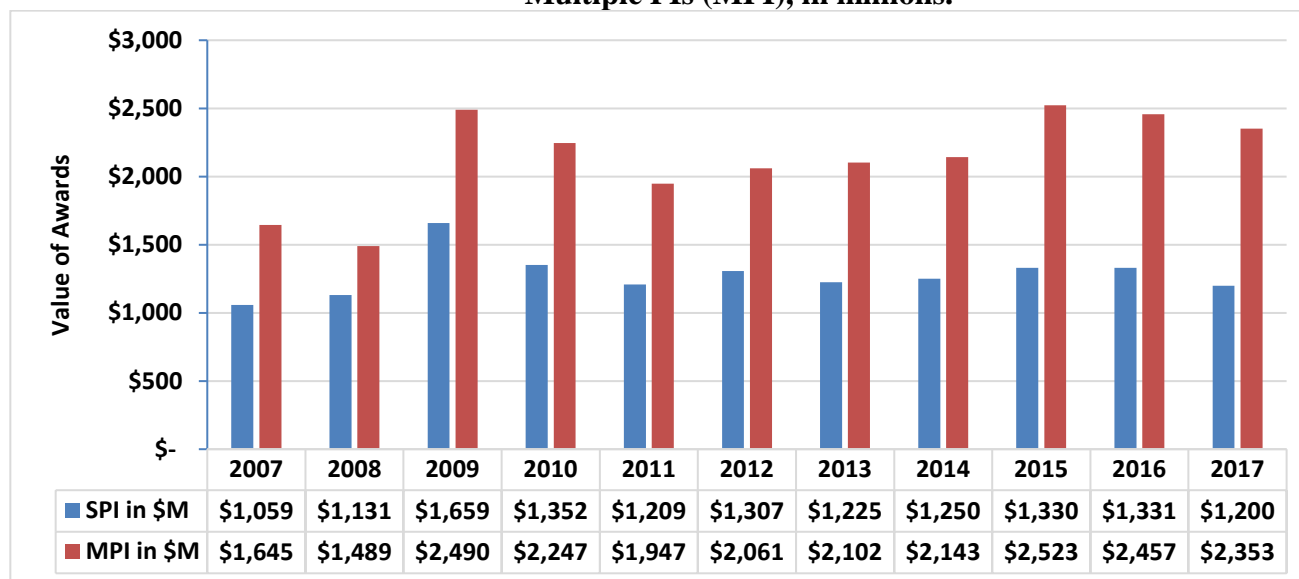
**Figure 2. Number of New Research Projects with Single PIs (SPI) & Multiple PIs (MPI)**



Source: NSF Enterprise Information System, 10/01/17.

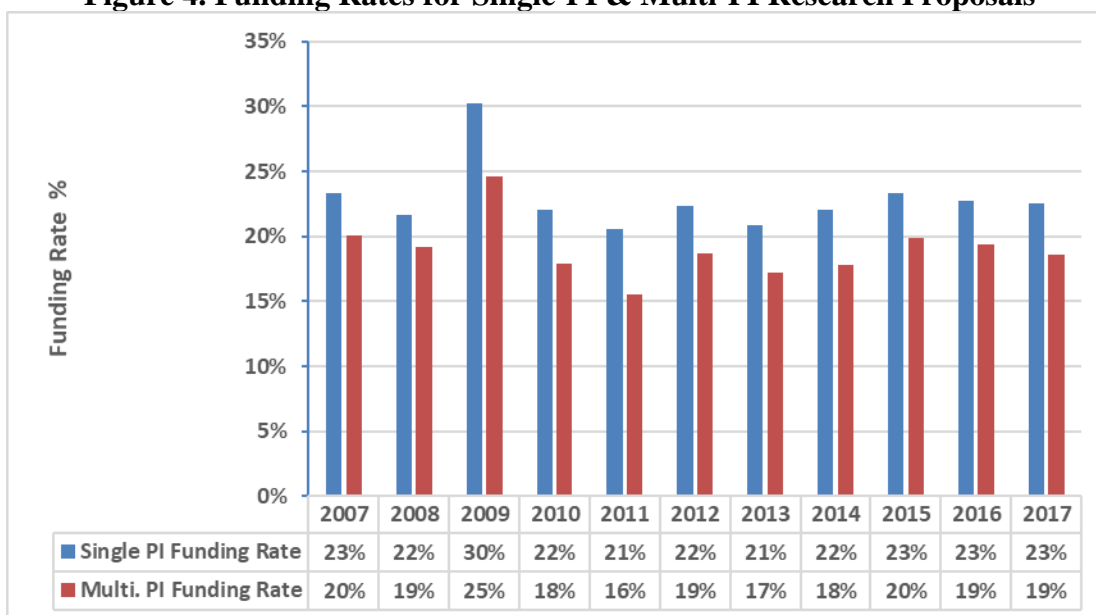
As in FY 2016 and FY 2015, the numbers of MPI projects and SPI projects funded were approximately the same. **Figure 3** shows the total amount of funds awarded to SPI and MPI research projects.

**Figure 3. Award Amounts of Research Projects with Single PIs (SPI) & Multiple PIs (MPI), in millions.**



Source: NSF Enterprise Information System, 10/01/17.

**Figure 4** shows the funding rates for SPI and MPI research proposals (as distinct from projects). The difference between the SPI and MPI funding rates has varied over the last ten years, but the SPI funding rate has been consistently higher.

**Figure 4. Funding Rates for Single-PI & Multi-PI Research Proposals**

Source: NSF Enterprise Information System, 10/01/17.

#### A5. Number of Research Grants per PI

**Table 5** shows that most PIs (80%) have one research grant, with only 5% of PIs having three or more grants. The data are averaged over the three-year period 2015 - 2017.

**Table 5. Number of Grants per PI, by percentage of PIs**

	One	Two	Three	Four or more
Fiscal Years 2015-2017	80%	15%	3%	2%

Source: NSF Enterprise Information System, 10/01/17.

#### A6. Number of People Supported on Research Grants

**Table 6** shows the number of graduate students, post-doctoral associates, and senior personnel supported on NSF research grants.<sup>15</sup> These data were extracted from the budget details of research grants active in the year indicated.

**Table 6. Number of People Supported on NSF Research Grants**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	% Change, 2007 - 2017
Senior Personnel	26,176	26,494	33,536	33,650	35,523	39,862	32,829	31,650	33,831	35,326	33,296	27%
Postdocs	4,034	3,909	5,580	4,653	4,751	4,596	4,447	4,286	4,586	4,460	4,442	10%
Graduate Students	22,777	22,936	33,371	24,554	24,855	25,550	25,161	26,317	26,882	27,099	26,693	17%

Source: NSF Enterprise Information System, 10/01/17.

<sup>15</sup> The research grant category does not include most individual post-doctoral fellowships, NSF Graduate Research Fellowship awards (2,000 per year; 2010-2017), and other individual awards to graduate students. However, most NSF-supported post-doctoral associates and graduate students are supported as part of research grants.

The absolute numbers of post-doctoral associates and graduate students supported peaked in FY 2009, as a result of NSF policy on the use of ARRA funding, and has declined since then. From FY 2016 to FY 2017, the number of graduate students supported by research grants decreased by 1.5% while the number of post-doctoral associates remained approximately the same.

**Appendix 2** provides data on the levels of support in research grants for graduate students and post-doctoral associates.

#### A7. Average Number of Months of Budgeted Salary Support for Single-PI & Multi-PI Research Grants

**Figure 5** shows the mean number of months of salary support per individual for PIs and co-PIs in the award budgets of single-PI and multiple-PI research grants. From FY 2007 through FY 2012, PIs on multiple-PI awards consistently averaged fewer months of support than single PIs. Since then, the levels of support have typically been approximately equal for both types of grant. Exceptions were FY 2015, when the average number of months of support per PI or Co-PI on multiple-PI awards was more than 5% greater than the support for PIs on single-PI awards and FY 2017, when it was 10% lower. (See **Appendix 2** for directorate or office level data on months of support.) The number of per-individual PI/co-PI months of support per grant has dropped considerably since the period prior to 2003. In FY 2017, support was approximately half of the levels a decade earlier. The data by directorate in **Appendix 2** show that, in comparison to NSF as a whole, ENG awards tend to provide fewer months of salary support for PIs and Co-PIs, approximately half the NSF average.

**Figure 5. Average Number of Months of Salary for Single-PI & Multi-PI Research Grants**

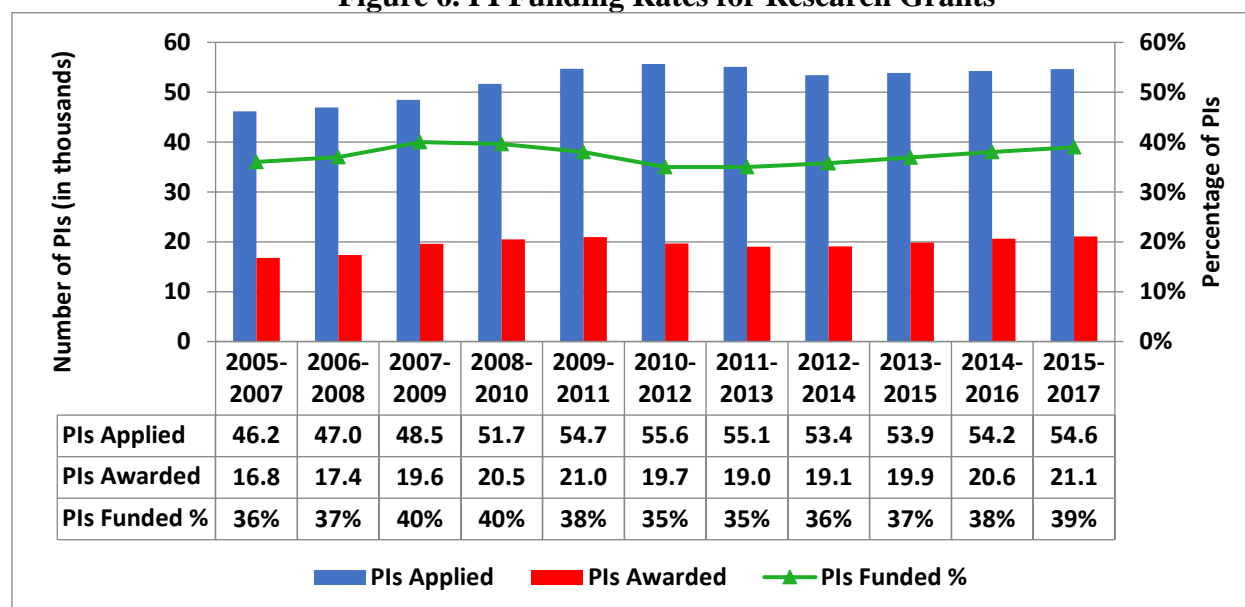


Source: NSF Report Server, 01/10/17.

## A8. Principal Investigator Funding Rates

**Figure 6** shows the funding rate (the green curve) for PIs in a three-year period (the number of investigators receiving a research grant divided by the number of investigators submitting proposals in the same three-year window). The number of PIs submitting proposals grew over the first part of the past decade causing the funding rate of PIs to decline. The decline in PI funding rate was temporarily reversed by the funds appropriated under ARRA but then resumed, reaching a low in FY 2011 – FY 2013. Since then, the rate has recovered and is approaching the level seen in FY 2008 – FY 2010.

**Figure 6. PI Funding Rates for Research Grants**



Source: NSF Enterprise Information System, 10/6/16.

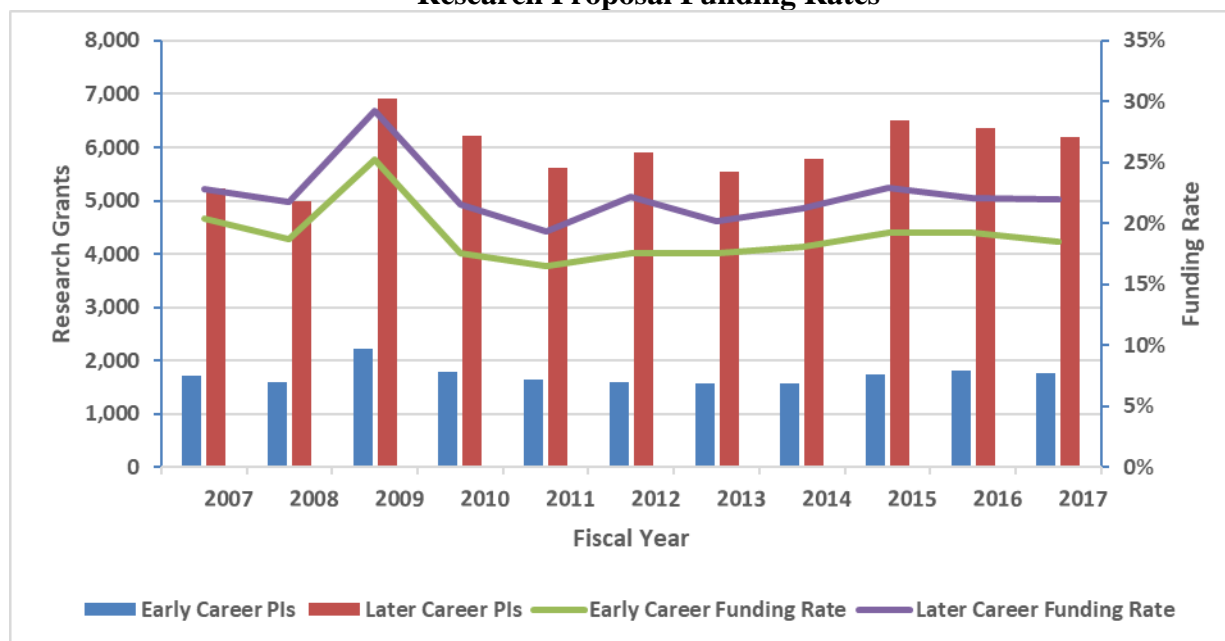
In 2015-2017, PIs who received an award submitted, on average, 2.4 proposals per award received. 61% of PIs who submitted proposals during the three-year period did not receive any research award. A decade earlier, in 2005 – 2007, the corresponding numbers were 2.2 proposals per award and 64% of PIs not receiving an award, even though the number of PIs who submitted proposals in 2015-2017 was 18% higher than the number in 2005-2007.

## A9. Early and Later Career PIs

**Figure 7** and **Figure 8** indicate the number and percentage of NSF PIs of research awards that are in the early or later stages of their careers. An early career PI is defined as someone within seven years of receiving his or her last degree at the time of the award. In this report, PIs who received their last degree more than seven years before the time of their first NSF award are considered later career PIs. The funding rate for later career PIs, 22%, was approximately the same as in FY 2016, but the funding rate for early career PIs, 18%, decreased by 1% in FY 2017, increasing the gap between the two slightly (**Figure 7**). The percentage of research awards to early career PIs remained approximately steady at 22% in FY 2017 (**Figure 8**).

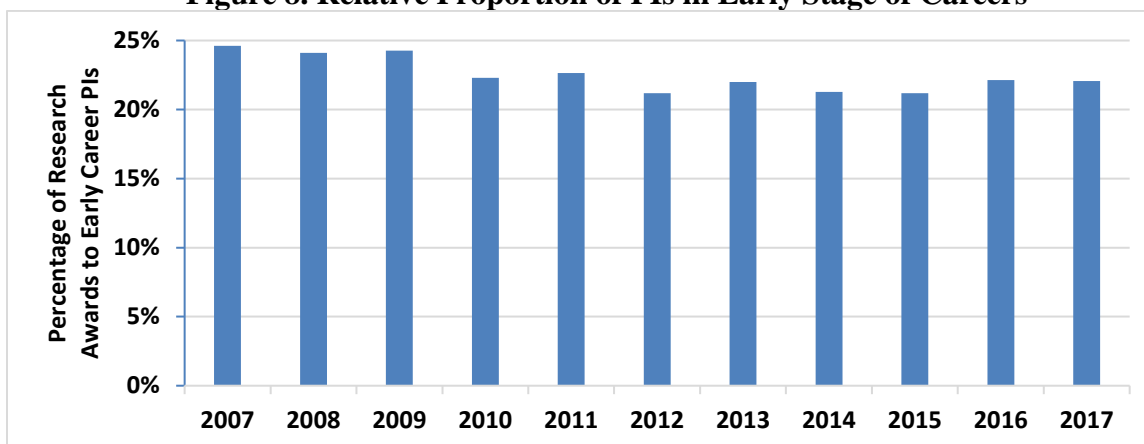


**Figure 7. Research Grants Awarded to PIs in Early & Later Stages of Career and Research Proposal Funding Rates**



Source: NSF Enterprise Information System, 10/01/17.

**Figure 8. Relative Proportion of PIs in Early Stage of Careers**



Source: NSF Enterprise Information System, 10/01/17.

## **B. Competitive Proposals, Awards, and Proposal Funding Rates**

The larger collection of all competitive proposals acted on by NSF in FY 2017 includes, in addition to research proposals, proposals for centers and facilities, grants for equipment, instrumentation, conferences and symposia, grants in the Small Business Innovation Research program, Small Grants for Exploratory Research (through FY 2009), and education and training grants. For this collection, **Table 7** shows the change in the number of proposals, number of awards, and proposal funding rates through time.<sup>16</sup>

NSF completed action on 49,415 proposals in FY 2017, a 0.3% increase from FY 2016, resulting in 11,477 awards, a 3.6% decrease from FY 2016. Consequently, in FY 2017 the proposal funding rate was 23%, a 1% decrease from FY 2016. The funding rate has been relatively stable over the past eight years, remaining between 22% and 24%. **Appendix 3** provides proposal, award, and funding rate data by NSF directorate and office.

**Table 7. NSF Proposal, Award, and Proposal Funding Rates**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Proposals</b>	44,577	44,428	45,181	55,542	51,562	48,613	48,999	48,051	49,620	49,285	49,415
<b>Awards</b>	11,463	11,149	14,595	12,996	11,192	11,524	10,829	10,958	12,007	11,877	11,447
<b>Funding Rate</b>	26%	25%	32%	23%	22%	24%	22%	23%	24%	24%	23%

Source: NSF Enterprise Information System, 10/01/17.

## **C. Diversity of Participation**

**Table 8** provides data on proposal, award, and funding rates by proposer characteristics (gender, under-represented ethnic or racial group, disability, new and prior PI status). Gender, disability, ethnic and racial data are based on self-reported information. About 85% of individuals who were PIs provided gender information, 86% identified a specific race (or mix of races) and 82% identified a specific ethnicity. Overall, 84% of proposals were from people who provided gender information,<sup>17</sup> 87% were from people for whom either the race or ethnicity was known,<sup>18</sup> and 68% were from people who provided information about disability status. The under-represented ethnic/racial PIs category in **Table 8** includes American Indian /Alaska Native, Black/African American, Hispanic or Latino, and Native Hawaiian/Pacific Islander. It does not include non-Hispanic Asian or White PIs.

<sup>16</sup> The category of actions associated with “competitively reviewed proposals” excludes actions on preliminary proposals, contracts, IPA agreements, continuing grant increments, Graduate Research Fellowship applications, and similar categories.

<sup>17</sup> As a group, the funding rate for PIs who do not indicate their gender tends to be consistently lower than PIs that do. For example, in FY 2017, the funding rate for PIs whose gender was not known was 19%.

<sup>18</sup> However, for only 79% of proposals was the information sufficient to determine whether or not the PI belonged to an under-represented racial or ethnic group. (Some report only one of race or ethnicity.)

**Table 8. Proposals, Awards and Funding Rates, by PI Type<sup>19</sup>**

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
All PIs (data from Table 7)	Proposals	44,577	44,428	45,181	55,542	51,562	48,613	48,999	48,051	49,620	49,285	49,415
	Awards	11,463	11,149	14,595	12,996	11,192	11,524	10,829	10,958	12,007	11,877	11,447
	Funding Rate	26%	25%	32%	23%	22%	24%	22%	23%	24%	24%	23%
Female PIs	Proposals	9,197	9,431	9,727	11,903	11,488	10,795	11,152	11,142	11,444	11,598	11,322
	Awards	2,493	2,556	3,297	2,982	2,602	2,775	2,556	2,669	3,007	3,032	2,962
	Funding Rate	27%	27%	34%	25%	23%	26%	23%	24%	26%	26%	26%
Male PIs	Proposals	32,650	32,074	32,091	38,695	35,211	32,932	32,866	31,625	32,411	31,528	30,046
	Awards	8,451	7,986	10,437	9,080	7,739	7,816	7,316	7,286	7,810	7,512	6,930
	Funding Rate	26%	25%	33%	23%	22%	24%	22%	23%	24%	24%	23%
PIs from underrepresented racial or ethnic groups	Proposals	2,798	2,762	2,945	3,613	3,441	3,291	3,303	3,268	3,383	3,331	3,403
	Awards	713	670	889	812	735	718	651	681	788	778	806
	Funding Rate	25%	24%	30%	22%	21%	22%	20%	21%	23%	23%	24%
New PIs <sup>20</sup>	Proposals	16,445	16,483	16,840	21,545	19,238	17,943	17,635	17,405	18,276	18,348	18,757
	Awards	3,151	3,132	4,174	3,620	2,976	3,063	3,013	3,108	3,320	3,510	3,319
	Funding Rate	19%	19%	25%	17%	15%	17%	17%	18%	18%	19%	18%
Prior PIs	Proposals	27,660	27,424	28,341	33,997	32,324	30,670	31,364	30,646	31,344	30,937	30,658
	Awards	8,202	7,892	10,421	9,376	8,216	8,461	7,816	7,850	8,687	8,367	8,128
	Funding Rate	30%	29%	37%	28%	25%	28%	25%	26%	28%	27%	27%
PIs with Disabilities	Proposals	448	448	470	545	543	483	488	468	562	496	491
	Awards	104	109	149	108	107	134	122	99	120	110	120
	Funding Rate	23%	24%	32%	20%	20%	28%	25%	21%	21%	22%	24%

Source: NSF Enterprise Information System, 10/01/17 and 11/02/17.

### **Gender**

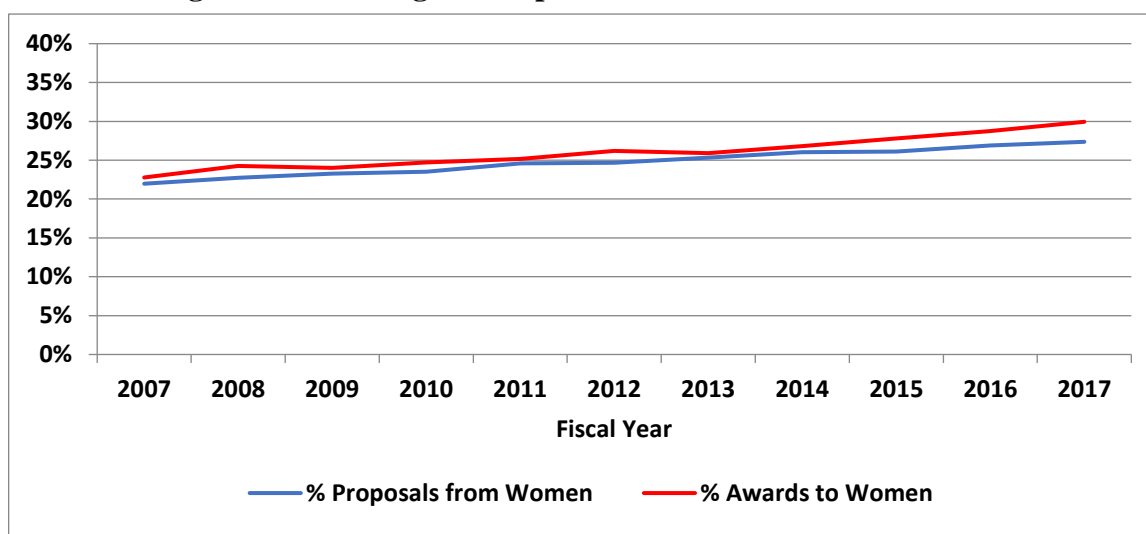
In general, while fewer proposals are received from women than men, the funding rate for female PIs is slightly higher than that for male PIs. The proportion of proposals from female PIs was 27.4% in FY 2017 and the proportion of awards to women was 29.9%.<sup>21</sup>

<sup>19</sup> Some of the awards in FY 2009 and FY 2010 were funded with a special appropriation made under the American Recovery and Reinvestment Act. See the FY 2015 Merit Review Report for additional details.

<sup>20</sup> In FY 2009, in conjunction with NSF's implementation of the American Recovery and Reinvestment Act, NSF revised its definition of a new PI; this became, "A new PI is an individual who has not served as the PI or Co-PI on any award from NSF (with the exception of doctoral dissertation awards, graduate or post-doctoral fellowships, research planning grants, or conferences, symposia and workshop grants)." This definition is used here. Previously, a new PI was considered to be any individual who had not previously been a PI on any NSF award.

<sup>21</sup> This is calculated as a percentage of the number of proposals from PIs who provided information about gender. The proportions for PIs from other under-represented groups are calculated similarly except that, in **Figure 10**, the number of PIs who provided information sufficient to determine whether they belong to an under-represented racial or ethnic group has been estimated for the years FY 2007 – FY 2009, by using the same fraction of PIs as was found in FY 2010. Based on fluctuations seen in FY 2010 – FY 2013, it is estimated that this may introduce errors in the percentages of proposals and awards from under-represented racial or ethnic groups that have an absolute magnitude of less than 0.05%, much less than the variation seen in **Figure 10**. Data in **Figure 11** are treated in a similar way.

**Figure 9. Percentage of Proposals from and Awards to Women**



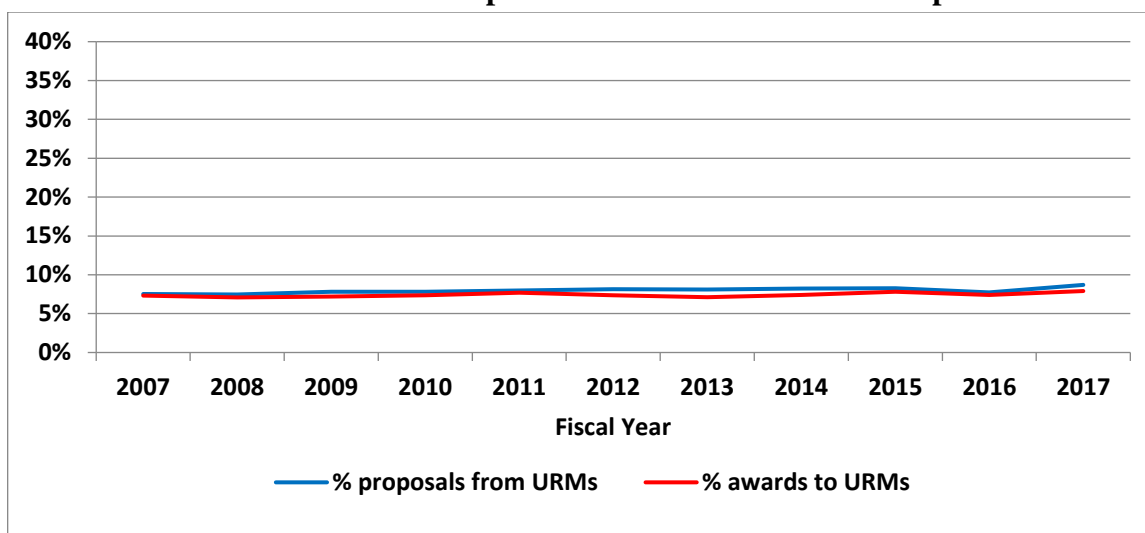
Source: NSF Enterprise Information System, 10/01/17.

As may be seen in **Figure 9**, over the past decade, there has been a relatively slow increase in the proportion of proposals submitted by women and a corresponding increase in the proportion of awards to women. The proportion of awards to women has remained slightly higher than the proportion of proposals from women. **Appendix 4** provides proposal, award, and funding rate information by directorate by PI gender.

#### **Under-represented Racial or Ethnic Groups**

The funding rate for PIs from under-represented racial or ethnic groups (URMs), 23.7%, is comparable to the average funding rate over all PIs, 23.2%. The proportion of proposals from such PIs remains low (see **Figure 10**), with a slight upward trend over the last 10 years.

**Figure 10. Percentage of Proposals from and Awards to Researchers from Under-Represented Racial or Ethnic Groups**



Source: NSF Enterprise Information System, 10/1/17.

**Table 9** provides data on proposal, award and funding rates by PI race and ethnicity. Very few PIs identify themselves as belonging to the categories American Indian/Alaska Native or Native Hawaiian/Pacific Islander. Because of the small numbers involved, the year-to-year fluctuations in funding rates for these groups tend to be greater than for other ethnic groups. The proportion of submissions from under-represented racial and ethnic groups in FY 2017 (8.7%)<sup>22</sup> is smaller than their representation in the U.S. population but similar to their representation in the full-time faculty of academic institutions (8.3%).<sup>23</sup>

**Table 9. Proposals, Awards and Funding Rates, by PI Race and Ethnicity**<sup>24</sup>

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
American Indian/Alaska Native	Proposals	97	91	88	118	129	83	113	103	104	99	134
	Total Awards	32	23	29	28	36	18	28	36	25	29	39
	Funding Rate	33%	25%	33%	24%	28%	22%	25%	35%	24%	29%	29%
Black/African American	Proposals	1,034	997	1,022	1,280	1,201	1,154	1,124	1,123	1,102	1,134	1,135
	Total Awards	240	246	298	270	243	263	203	204	233	264	266
	Funding Rate	23%	25%	29%	21%	20%	23%	18%	18%	21%	23%	23%
Native Hawaiian/Pacific Islander	Proposals	26	30	23	38	42	40	32	30	30	41	30
	Total Awards	6	8	8	10	11	6	5	5	2	7	5
	Funding Rate	23%	27%	35%	26%	26%	15%	16%	17%	7%	17%	17%
Asian	Proposals	8,801	8,952	9,550	11,626	10,829	10,382	10,511	10,538	11,148	11,623	11,552
	Total Awards	1,801	1,780	2,465	2,124	1,907	1,914	1,887	1,925	2,256	2,168	2,166
	Funding Rate	20%	20%	26%	18%	18%	18%	18%	18%	20%	19%	19%
White	Proposals	30,676	30,217	29,975	36,153	33,200	30,596	30,766	29,624	30,099	29,031	27,804
	Total Awards	8,499	8,153	10,499	9,306	7,826	8,020	7,372	7,390	7,902	7,748	7,170
	Funding Rate	28%	27%	35%	26%	24%	26%	24%	25%	26%	27%	26%
Multiracial	Proposals	279	284	337	512	433	448	439	425	495	508	550
	Total Awards	81	76	112	118	99	113	110	114	151	124	143
	Funding Rate	29%	27%	33%	23%	23%	25%	25%	27%	31%	24%	26%
Hispanic or Latino	Proposals	1,639	1,611	1,755	2,092	2,019	1,934	1,956	1,921	2,053	1,950	1,993
	Total Awards	433	382	533	476	438	412	401	411	495	459	460
	Funding Rate	26%	24%	30%	23%	22%	21%	21%	21%	24%	24%	23%

Source: NSF Enterprise Information System, 10/01/17 and NSF Report Server, April 11, 2017.

Among racial and ethnic groups that submitted more than 1,000 proposals in FY 2017, the funding rate is highest for the groups White (26%) and Black/African American and Hispanic or Latino (23% each). It is lowest for Asian (19%).

<sup>22</sup> The ratio of the number of PIs in an under-represented racial or ethnic minority to the total number of PIs who provided sufficient information to determine whether they belonged to such a minority.

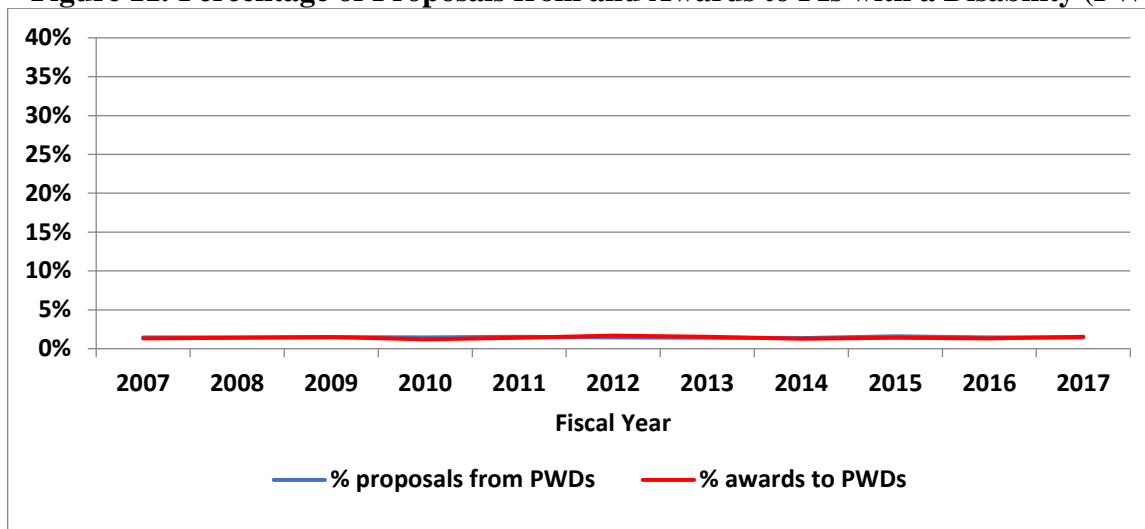
<sup>23</sup> Data for full-time faculty members of institutions of higher education who hold doctorates in physical sciences, mathematics, computer sciences, life sciences, psychology, social sciences, or engineering. Available at <http://www.nsf.gov/statistics/2016/nsb20161/uploads/1/8/at05-15.pdf> (“Science and Engineering Indicators 2016.”)

<sup>24</sup> This table differs from a similar one included in reports for years up to FY 2011. Before FY 2012, individuals who identified a race and indicated that they were Hispanic or Latino were only counted in the Hispanic or Latino category. Beginning in FY 2012, such individuals are included in both the appropriate racial group and in Hispanic or Latino. Previously, except for those who were Hispanic or Latino, individuals who identified multiple races were not included in the table. A “multiracial” category has been added to the table.

### PIs with a Disability

The proposal funding rate for PIs identifying themselves as having a disability is slightly higher (by 1%) than the overall funding rate for all PIs (**Table 8**).

**Figure 11. Percentage of Proposals from and Awards to PIs with a Disability (PWDs)**

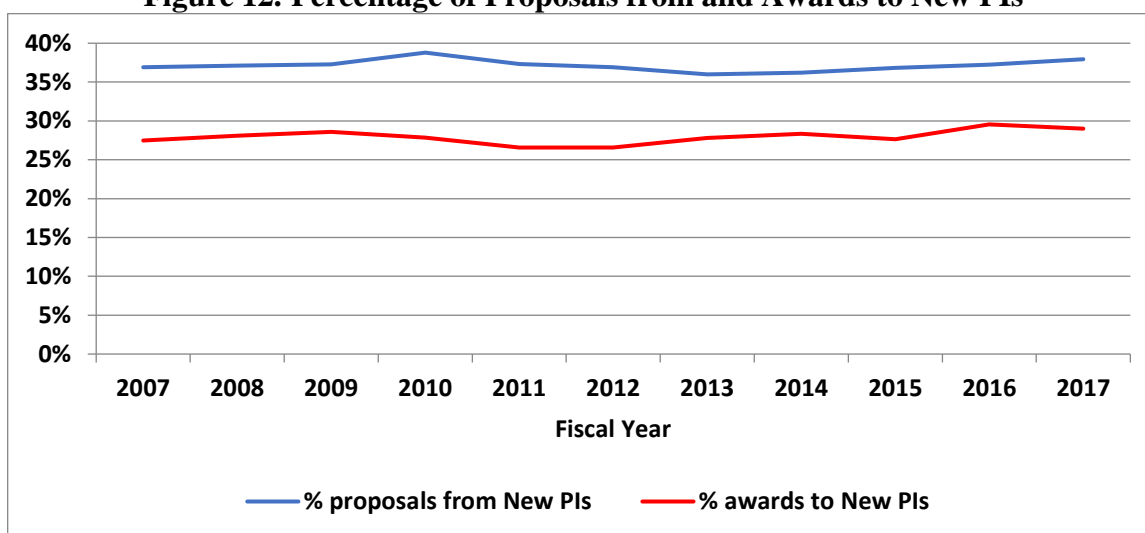


Source: NSF Enterprise Information System, 10/01/17.

Unlike women and under-represented racial and ethnic groups, the proportion of proposals that come from PIs with a disability has remained relatively steady from FY 2007 to FY 2017 (**Figure 11**) and was approximately 1.5% in both FY 2007 and FY 2017.<sup>25</sup>

### New PIs

**Figure 12. Percentage of Proposals from and Awards to New PIs**



Source: NSF Enterprise Information System, 10/01/17.

<sup>25</sup> In FY 2017, approximately 68% of competitively reviewed proposals were from PIs who indicated whether they had a disability. Of these, 1.5% reported that they did have a disability.

The funding rate for PIs who have not previously had an NSF award is lower than that for PIs who have previously submitted a funded NSF proposal (18% compared to 27%; see **Table 8**). In FY 2017, the proportion of proposals from new PIs was 38% (**Figure 12**). Since FY 2001, this number has fluctuated between approximately 36% and 39%. The funding rate of new PIs decreased slightly in FY 2017 to 18% from 19% in FY 2016. The funding rate of prior PIs remained steady at 27%.

#### **D. Types of Awards**

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. A grant is the primary funding mechanism used by NSF. A grant may be funded as either a standard award (in which funding for the full duration of the project, generally 1-5 years, is awarded in a single fiscal year) or a continuing award (in which funding of a multi-year project is provided in, usually annual, increments).

The use of standard and continuing grants allows NSF flexibility in balancing current and future obligations. For continuing grants, the initial funding increment is accompanied by a statement of intent to continue funding the project in subsequent increments (called "continuing grant increments" or CGIs)<sup>26</sup> until the project is completed. Continued funding is subject to NSF's judgment of satisfactory progress, availability of funds, and receipt and approval of required annual reports. As shown below in **Table 10**, in FY 2017, NSF devoted 40% of its total budget to new standard grants and 10% to new continuing grants.

Cooperative agreements are used when the project requires substantial agency involvement during the project performance period (e.g., research centers and multi-user facilities).

Contracts are used to acquire products, services and studies (e.g., program evaluations) required for NSF or other government use.

**Table 10. Percentage of NSF Funding by Type of Award**

<b>CATEGORY</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
<b>Standard Grants</b>	26%	28%	44%	37%	34%	35%	35%	39%	39%	41%	40%
<b>New Continuing</b>	14%	13%	8%	13%	11%	11%	12%	10%	10%	10%	10%
<b>CGIs and Supplements</b>	26%	26%	18%	18%	23%	22%	22%	20%	18%	16%	17%
<b>Cooperative Agreements</b>	22%	23%	21%	23%	23%	23%	23%	22%	22%	22%	22%
<b>Other</b>	11%	11%	9%	9%	9%	10%	8%	8%	11%	11%	11%

Source: NSF Enterprise Information System, 4/11/18. Percentages may not sum to 100 due to rounding.

ARRA awards were generally made as standard grants. "Other" includes contracts, fellowships, interagency agreements, and IPA agreements.

<sup>26</sup> While the original award is a competitive action, the continuing grant increment is a non-competitive grant.

### E. Awards by Sector and Type of Institution

In FY 2017, of the program funds awarded by NSF, approximately 78% went to academic institutions, 10% to non-profit and other organizations, 8% to for-profit businesses, and 3% to Federal agencies and laboratories (Table 11).

**Table 11. Distribution of Funds by Type of Organization**

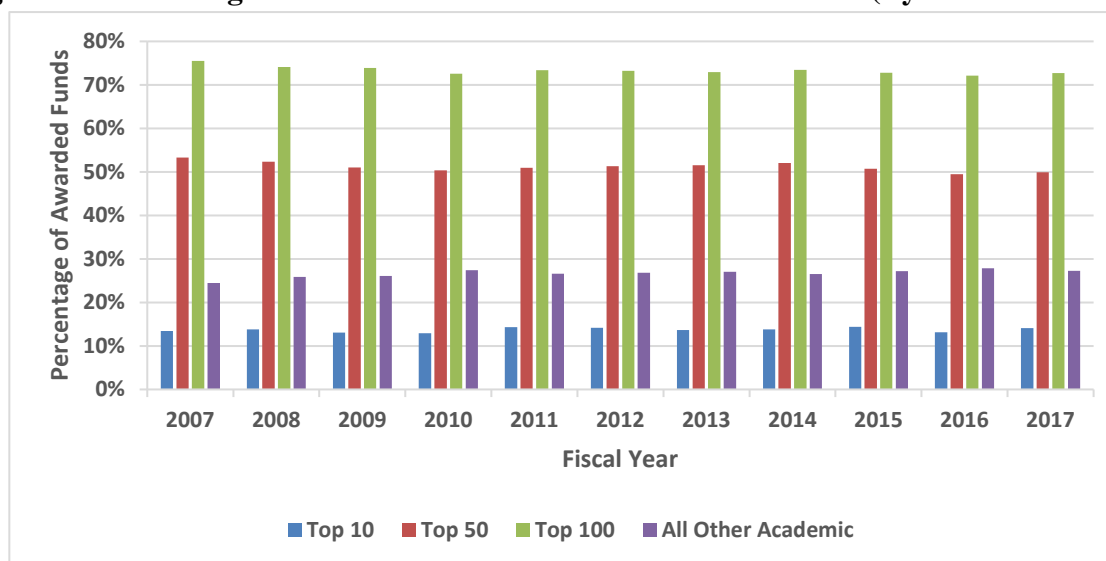
Sector/Institution	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Academic Institutions	76%	76%	76%	77%	77%	80%	81%	81%	78%	76%	78%
Non-Profit and Other Organizations	15%	13%	13%	11%	13%	12%	11%	11%	11%	13%	10%
For-Profit	7%	8%	6%	6%	6%	5%	6%	5%	8%	8%	8%
Federal Agencies and Laboratories	3%	3%	4%	5%	5%	3%	3%	3%	3%	3%	3%

Source: NSF Enterprise Information System, 10/01/17. Percentages may not sum to 100 due to rounding. In FY 2015, some private, non-profit organizations, previously included in the For-Profit category were moved to Non-Profit and Other Organizations.

**Figure 13** shows how funds to academic institutions are distributed. Academic institutions are categorized according to the proportion of NSF funding received (i.e., grouping those receiving the largest proportion of NSF funding – the top 10, 50, and 100 academic institutions).

The Foundation tracks proposal funding rates for different types of academic institutions. For FY 2017, the average proposal funding rate was 25% for the top 100 Ph.D.-granting institutions (classified according to the amount of FY 2017 funding received). In comparison, the rate was 18% for Ph.D.-granting institutions that are not in the top 100 NSF-funded category. The proposal funding rate was 23% for four-year institutions<sup>27</sup> and 28% for two-year institutions. For minority-serving institutions, the FY 2017 proposal funding rate was 21%.

**Figure 13. Percentage of Awarded Funds to Academic Institutions (By Amount Received)**



Source: NSF Enterprise Information System, 10/01/17.

<sup>27</sup> Four-year institutions are those granting bachelor degrees, regardless of whether they also offer graduate degrees.



The Foundation promotes geographic diversity in its programs. For example, the mission of the Established Program to Stimulate Competitive Research (EPSCoR) is to assist the NSF in its statutory function “to strengthen research and education in the sciences and engineering, including independent research by individuals, throughout the United States, and to avoid undue concentration of such research and education.”<sup>28</sup> The EPSCoR program was designed for those jurisdictions that have historically received lesser amounts of NSF Research and Development funding. In FY 2017, 24 states, the Commonwealth of Puerto Rico, the U.S. Virgin Islands and Guam were eligible to participate in aspects of the program. **Appendix 5** provides data on proposals, awards, and proposal funding rates for the EPSCoR jurisdictions.

### Outreach

NSF made several outreach presentations to institutions across the country in an effort to help increase their participation and success in NSF programs:

- Two in-person Grants Conferences were held in Pittsburgh, PA and Louisville, KY. These Foundation-wide conferences were organized by the Policy Office in the Division of Institution and Award Support. Each two-day conference brings about twenty-five NSF representatives from all sectors of the Foundation to meet with faculty and administrators from around the nation to bring clarity to topics surrounding proposal preparation, the merit review process, and award administration issues.
- Five “NSF Days,” organized by the Office of Legislative and Public Affairs, were held in Bangor, ME; Chapel Hill, NC; Laramie, WY; West Hartford, CT; and Washington, DC, hosted by University of Maine, University of North Carolina – Chapel Hill, University of Wyoming, University of St. Joseph, and the State University System of Florida, respectively.

NSF hosts informational booths at scientific meetings such as the annual meeting of the American Association for the Advancement of Science. In addition, several directorates host booths at conferences for members of under-represented groups in STEM, including the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), American Indian Science and Engineering Society (AISES), and the Annual Biomedical Research Conference for Minority Students (ABRCMS). NSF outreach to scientists and engineers from under-represented groups also includes activities such as attendance at workshops for tribal colleges and other minority-serving institutions. Outreach workshops are sponsored by individual NSF directorates, as well as by EPSCoR and other NSF-wide programs. Program officers frequently conduct outreach when visiting institutions or participating in scientific meetings.

### **F. Time to Decision (Proposal Dwell Time)**

It is important for principal investigators to receive a timely funding decision. Since FY 2015, NSF has aimed to inform at least 75% of PIs of funding decisions (i.e., award or decline) within

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<sup>28</sup> 42 U.S.C. §1862, <https://www.law.cornell.edu/uscode/text/42/1862>. EPSCoR was previously known as the Experimental Program to Stimulate Competitive Research. The name was changed in accordance with P.L. 114-329, the American Innovation and Competitiveness Act.

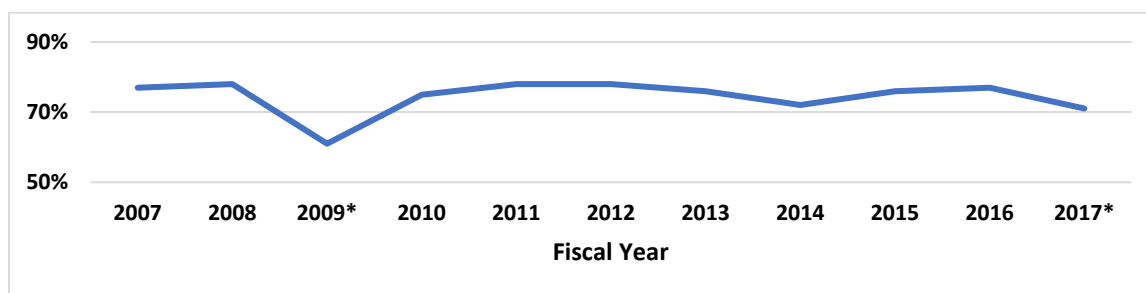
six months of the proposal deadline, target date, or receipt date, whichever is later. The dwell time performance goal was suspended in FY 2009 and FY 2017. In FY 2017, the dwell time goal of 75% was suspended due to the relocation of NSF's headquarters building from Arlington, VA, to Alexandria, VA. In FY 2017, NSF informed 71% of applicants of funding decisions within six months. In FY 2009, the NSF dwell time performance goal (then, 70%) was suspended for the last three quarters to delay processing proposals that would have been declined due to lack of funding. This enabled some of these proposals to be funded with the ARRA appropriation.

**Table 12. Proposal Dwell Time: Percentage of Proposals Processed Within Six Months**

2007	2008	2009*	2010	2011	2012	2013	2014	2015	2016	2017*
77%	78%	61%	75%	78%	78%	76%	72%	76%	77%	71%

Source: NSF Enterprise Information System, 10/01/17. \* Dwell-time goal suspended in FY 2009 and FY 2017.

**Figure 14. Percentage of Proposals Processed within Six Months**



\* Dwell time goal suspended

## **G. Mechanisms to Encourage Transformative Research**

All NSF programs encourage and support potentially transformative research proposals. NSF also has several mechanisms particularly developed to encourage the submission of certain types of potentially transformative research proposals. These include EARly-concept Grants for Exploratory Research (EAGER), Creativity Extensions, and Accomplishment-Based Renewals.<sup>29</sup> Information on the latter two types of awards may be found in **Appendix 6**.

### **G1. Small Grants for Exploratory Research (SGER), EARly-concept Grants for Exploratory Research (EAGER) and Grants for Rapid Response Research (RAPID)**

From FY 1990 through January 2009, the Small Grants for Exploratory Research (SGER) option permitted program officers to make small-scale grants without formal external review. The SGER funding mechanism was replaced in 2009 with two separate funding mechanisms,

<sup>29</sup> The Proposal and Award Policies and Procedures Guide effective January 30, 2017 (NSF 17-1) introduced a new category of proposal intended to encourage transformative research. This is called Research Advanced by Interdisciplinary Science and Engineering (RAISE). The former Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE) program has been phased out.

EAGER and RAPID, in part to emphasize the importance of funding both potentially transformative research and research requiring an urgent response:

- **Early-concept Grants for Exploratory Research (EAGER)**

The EAGER funding mechanism is used to support exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches. The work may be considered especially "high-risk/high-payoff" in the sense that it, for example, involves radically different approaches, applies new expertise, or engages novel disciplinary or interdisciplinary perspectives. Requests may be for up to \$300,000 and up to two years duration.

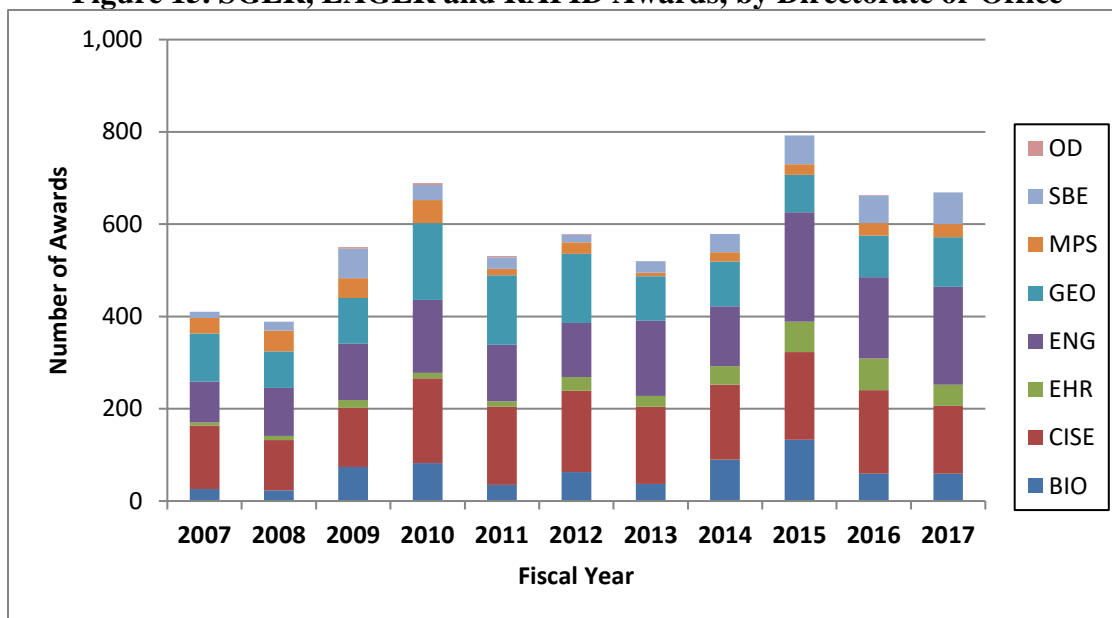
- **Grants for Rapid Response Research (RAPID)**

The RAPID funding mechanism is used for proposals 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. Requests may be for up to \$200,000 and of one year in duration.

EAGER and RAPID proposals are commonly reviewed using only internal reviewers. Program officers may also elect to obtain external reviews to inform their decision. The PI is informed if the proposal will be reviewed externally.

**Figure 15** shows the number of SGER, EAGER and RAPID awards from 2007 to 2017 by Directorate. Additional information on SGER, RAPID, and EAGER awards is in **Appendix 7**.

**Figure 15. SGER, EAGER and RAPID Awards, by Directorate or Office**



Source: NSF Enterprise Information System, 10/01/17.

For years prior to FY 2013, data for the Office of Polar Programs (OPP) and the Office of Cyberinfrastructure (OCI) are included in the numbers for GEO and CISE. Data for OISE and OIA are combined into the category OD, barely visible in **Figure 15**.

There is considerable variation across directorates in the use of EAGER and RAPID awards. (See **Appendix 7**.) For example, during the past two years, CISE and ENG received far more EAGER proposals than any other directorate. RAPID proposals are proportionally more common in GEO than in other directorates.

In their use of EAGER and RAPID awards, the directorates fall into clusters (see **Table 13**). Since their introduction, CISE, ENG and GEO have received the most EAGER and RAPID proposals and made the most awards. In the past five years, together these directorates accounted for almost 70% of these proposals and 69% of the awards. SBE, EHR and MPS accounted for 19% of EAGER and RAPID proposals and 19% of the awards. BIO received 11% of the proposals and made 12% of the awards. EHR, MPS and BIO had the largest average EAGER and RAPID award sizes in FY 2017. GEO made the smallest EAGER and RAPID awards, on average, in FY 2017.

**Table 13. Investments in EAGER and RAPID awards FY 2013 – FY 2017, by Directorate**

	ENG	CISE	GEO	BIO	SBE	EHR	MPS
% of FY 13-17 awards	28.5%	26.3%	14.6%	11.7%	7.9%	7.6%	3.3%
FY 13-17 investment (\$ million)	124	146	42	76	28	50	23
FY 17 investment (\$ million)	28.5	23.2	9.5	10.8	8.6	11.6	5.9
Mean FY 17 award (\$ thousand)	134	158	88	183	125	253	211

In addition, in FY 2017, NSF made seven Research Advanced by Interdisciplinary Science and Engineering (RAISE) awards. RAISE is a type of proposal that may be used to support bold, interdisciplinary projects whose:

- Scientific advances lie in great part outside the scope of a single program or discipline, such that substantial funding support from more than one program or discipline is necessary;
- Lines of research promise transformational advances; and
- Prospective discoveries reside at the interfaces of disciplinary boundaries that may not be recognized through traditional review or co-review.

To receive funding as a RAISE-appropriate project, all three criteria must be met.

## IV. The NSF Merit Review Process

### A. Merit Review Criteria

The National Science Board (NSB) approved the use of the two NSF merit review criteria in FY 1998 and modified the criteria to promote potentially transformative research in FY 2007. In FY 2012, the NSB revised the elements to be considered by reviewers in the application of the merit review criteria and articulated the principles upon which the criteria are based.<sup>30</sup> The language in the *Proposal and Award Policies and Procedures Guide*, describing the merit review criteria and the underlying principles, was revised to incorporate the recommendations from the NSB.<sup>31</sup> This revised language applies to proposals submitted on or after January 14, 2013 and is reproduced in **Appendix 8**.

The two NSF merit review criteria are Intellectual Merit and Broader Impacts. The Intellectual Merit criterion encompasses the potential to advance knowledge. The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes. Programs may have additional review criteria particular to the goals and objectives of the program. All relevant review criteria are described in the program announcement or solicitation.

NSF returns without review (RWR) proposals that fail to separately address both merit review criteria within the Project Summary (effective as of FY 2003). In addition, proposals are returned without review if they duplicate an existing award, are not responsive to the funding opportunity to which they were submitted, do not comply with the requirements of the Proposal and Award Policies and Procedures Guide and/or specific solicitation, as well as in a number of other circumstances.

### B. Description of the Merit Review Process

The NSF merit review process includes the steps listed below (and depicted in **Figure 16**):

- The proposal arrives electronically and is assigned to the appropriate program(s) for review. Some programs include preliminary proposals as part of the application process. See **Appendix 9** for more information about preliminary proposals. Proposals that do not comply with NSF regulations (Chapter IV.B of the *Proposal and Award Policies and Procedures Guide*) may be returned without review. (See **Table 14** and **Appendix 10**.)

**Table 14. Proposals Returned Without Review (RWR)**

Fiscal Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Number of Proposals RWR	1505	1287	1741	2628	1794	1813	1871	1659	1843	1399	1144
Percent of all Proposal Decisions	3.3%	2.8%	3.7%	4.5%	3.4%	3.6%	3.7%	3.3%	3.6%	2.8%	2.3%

Source: NSF Report Server, 04/11/18.

<sup>30</sup> *The National Science Foundation's Merit Review Criteria: Review and Revisions*. (2011) NSB/MR-11-22.

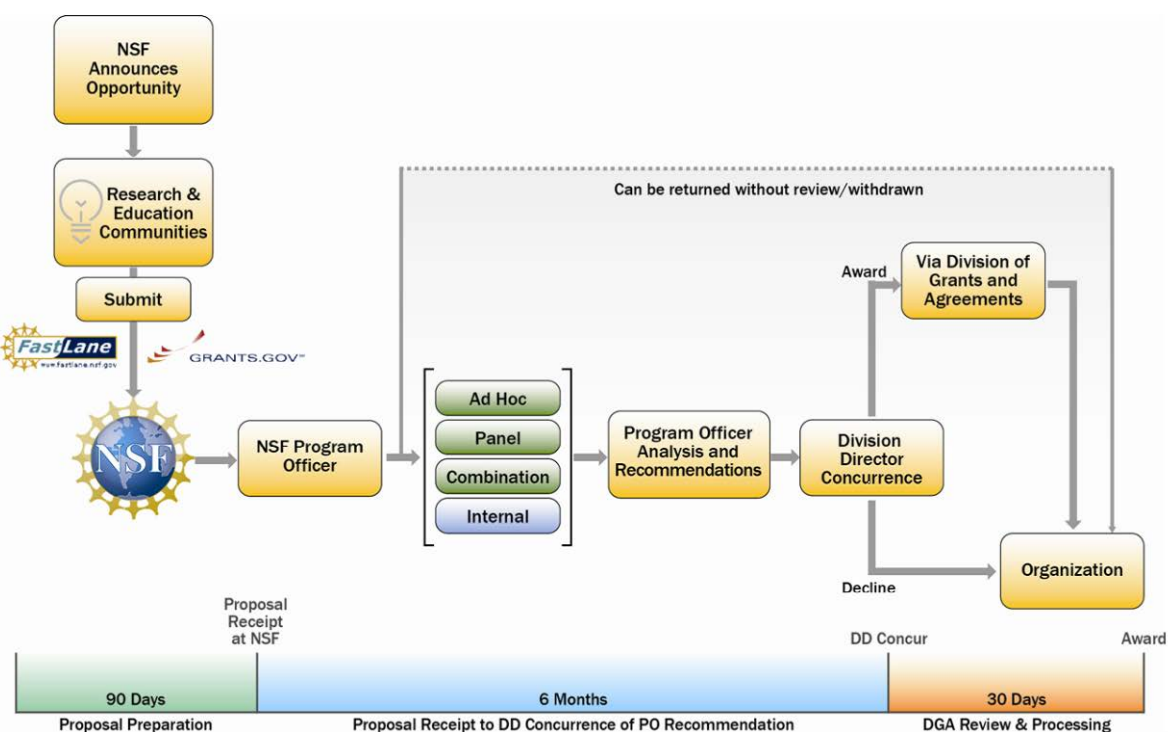
<sup>31</sup> The NSF *Proposal and Award Policies and Procedures Guide* (PAPPG), is available at: [http://www.nsf.gov/pubs/policydocs/pappg18\\_1/nsf18\\_1.pdf](http://www.nsf.gov/pubs/policydocs/pappg18_1/nsf18_1.pdf).

NSF improved electronic pre-submission checks of proposals to help PIs ensure that their proposals comply with NSF requirements, reducing the number of proposals returned without review.

- The program officer (or team of program officers) is responsible for the following:
  - *Determining the appropriate level of merit review.* (Some proposal types do not require external review; e.g., EAGER, RAPID, RAISE, and proposals for small conferences, workshops, or symposia.)
  - *Selecting ad hoc reviewers and panel members.* The NSF guidelines for the selection of reviewers are designed to ensure selection of experts who can give program officers the proper information needed to make a recommendation in accordance with the NSB-approved merit review criteria. Optimally, reviewers have:
    1. Special knowledge of the science and engineering subfields involved in the proposals to be reviewed to evaluate competence, intellectual merit, and utility of the proposed activity. Within reasonable limits, reviewers' fields of specialty should be complementary within a reviewer group.
    2. Broader or more generalized knowledge of the science and engineering subfields involved in the proposals to be reviewed to evaluate the broader impacts of the proposed activity. Reviewers with broad expertise are required for proposals involving substantial size or complexity, broad disciplinary or multidisciplinary content, or significant national or international implications.
    3. Broad knowledge of the infrastructure of the science and engineering enterprise, and its educational activities, to evaluate contributions to societal goals, scientific and engineering personnel, and distribution of resources to organizations and geographical areas.
    4. To the extent possible, diverse representation within the review group. The goal is to achieve a balance among various characteristics. Important factors to consider include: type of organization represented, demographics, experience, and geographic balance.
  - *Checking for conflicts of interest.* In addition to checking proposals and selecting appropriate reviewers with no apparent potential conflicts, NSF staff members provide reviewers guidance and instruct them how to identify and declare potential conflicts of interest. All NSF program officers and division directors receive annual conflict of interest training.
  - *Synthesizing the comments of the reviewers and review panel* (if reviewed by a panel), as provided in the individual reviews and panel summaries.
  - *Recommending action to award or decline the proposal,* after scientific, technical and programmatic review and consideration of appropriate factors such as portfolio balance and the amount of funding available.

The review process is overseen by the cognizant division director, or other appropriate NSF official. Program officer recommendations are reviewed by the division director, or other designated official before the funding recommendation is made. Large awards may receive additional levels of review. The Director's Review Board examines award recommendations with an average annual award amount of 2.5% or more of the awarding division's annual budget (prior year current plan). The NSB reviews recommended awards with an annual award amount at or above 1% of the awarding directorate's prior year current plan or 0.1% of NSF's prior year total budget, whichever is greater.<sup>32</sup> In FY 2017, the NSB authorized 4 new funding items.

**Figure 16. Diagram of the NSF Merit Review Process**



If the program recommendation is for an award and final division/office or other programmatic approval is obtained, then the recommendation goes to the Division of Grants and Agreements (DGA) or the Division of Acquisition and Cooperative Support (DACS) for review of business, financial and policy implications. After the completion of this review, a final decision is made to fund or decline the proposal.

NSF has several external oversight and advisory mechanisms that are designed to ensure the continuing integrity and efficiency of the merit review process.

<sup>32</sup>Other items requiring NSB prior approval include any awards from the Major Research Equipment and Facilities Construction (MREFC) account. The NSB and the Director consult on programs that either represent a significant long-term investment of program resources, particularly if funded as an ongoing NSF-wide activity, or involve substantive policy, interagency, or international issues.

- Every 4-5 years, External Committees of Visitors (COVs) assess each major NSF program or division. COVs examine the integrity and efficiency of merit review processes and the structure of the award portfolio.
- Directorate and office Advisory Committees review COV reports and responses from directorates and offices and provide guidance to the Foundation. The COV reports and NSF responses are publicly available on the [NSF website](#).

External oversight and committees are comprised of scientists, engineers, administrators, and educators, from academia, other non-profit organizations, and industry, as appropriate. Additional information about COVs and NSF Advisory Committees is given in **Appendix 11**.

### **C. Program Officer Recommendations**

The narrative comments and summary ratings provided by external reviewers are essential inputs to program officers who use their professional judgment to make award and decline recommendations to NSF senior management.

NSF program officers are experts themselves in the scientific areas that they manage. They have advanced educational or professional training in science or engineering (e.g., a Ph.D., P.E., or equivalent credentials) and relevant experience in research, education, and/or administration. They are expected to produce and manage a portfolio of awards that addresses a variety of considerations and objectives. When making funding recommendations, 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 and education 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 resources; and
- Geographic distribution.

In addition, decisions on a given proposal are made in the context of both other current proposals and previously funded projects.



#### **D. Review Information for Proposers and the Reconsideration Process**

Proposers receive notification of the award/decline decision on their proposals, unattributed verbatim copies of peer reviews, and a copy of the panel summary when a panel review was conducted. A statement that explains the broader context within which their proposal was reviewed is also sent. Program officers are expected to provide additional information to proposers in writing or by phone 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 that additional information, the proposer is not satisfied that the proposal was fairly handled and reasonably reviewed, he or she may request formal reconsideration. Information about the reconsideration process is included in decline notifications.<sup>33</sup> A reconsideration request can be based on the proposer's perception of procedural errors or on disagreements over the substantive issues dealt with by reviewers. If the relevant NSF assistant director or office head upholds the original action, the applicant's institution may request a second reconsideration from the Foundation's Deputy Director. In years when NSF does not have a Senate-approved Deputy Director, the second reconsideration decision is provided by the Chief Operating Officer.

NSF declines approximately 38,000 proposals per year and receives 25 - 50 requests (0.1%) for formal reconsideration annually. The number of requests for formal reconsideration and resulting decisions at both the Assistant Director (first level) and Deputy Director (second level) from FY 2007 through FY 2017 are displayed in **Appendix 12**. NSF received 26 requests for directorate-level reconsideration in FY 2017. Six of these were also reviewed at the second level. All 26 decline decisions were upheld.

#### **E. Methods of External Review**

The Foundation's merit review process relies on the use of knowledgeable experts from outside NSF. As stated in the *Proposal and Award Policies and Procedures Guide*, proposals usually receive at least three external reviews. Under some circumstances, the requirement for external review can be waived.<sup>34</sup>

NSF programs obtain external peer review by three principal methods: (1) "ad-hoc-only," (2) "panel-only," and (3) "ad hoc + panel" review.

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<sup>33</sup> Certain types of proposal actions are not eligible for reconsideration. See NSF *Proposal and Award Policies and Procedures Guide* IV-3 at [https://www.nsf.gov/pubs/policydocs/pappg18\\_1/nsf18\\_1.pdf](https://www.nsf.gov/pubs/policydocs/pappg18_1/nsf18_1.pdf).

<sup>34</sup> Exemptions that program officers may choose to exercise, for example, include proposals for EAGER, RAPID, RAISE, and certain categories of workshop and symposium proposals. See **Appendix 7** for more information about EAGER and RAPID proposals.

In the “ad-hoc-only” review method, reviewers are sent links to proposals and asked to submit their reviews to NSF through FastLane, NSF’s web-based system for electronic proposal submission and review.

“Panel-only” refers to the process of soliciting reviews from panelists who convene in person or virtually to discuss their reviews and provide advice as a group to the program officer.

Many proposals submitted to NSF are reviewed using a combination of these two processes. Programs that employ the “ad hoc + panel” review process have developed several different configurations, such as:

- Ad hoc reviewers submit reviews before the panel convenes; the panel’s discussion is informed by the ad hoc reviews.
- A panel meets to discuss proposals. The panel and/or program staff may identify proposals where additional reviewing expertise would be helpful. After the panel, appropriate reviewers are asked to submit ad hoc reviews to supplement the panel’s advice.

The total numbers of individual, narrative reviews and the average numbers of reviews per proposal obtained by the three different review methods are presented in **Table 15**.<sup>35</sup>

**Table 15. Reviews per Proposal, FY 2017**

	<b>All Methods</b>	<b>Ad Hoc + Panel</b>	<b>Ad-Hoc-Only</b>	<b>Panel-Only</b>
Reviews*	184,752	57,052	7,481	120,219
Proposals	47,364	11,896	1,864	33,604
Rev/Prop	3.9	4.8	4.0	3.6

Source: NSF Enterprise Information System, 10/01/17.

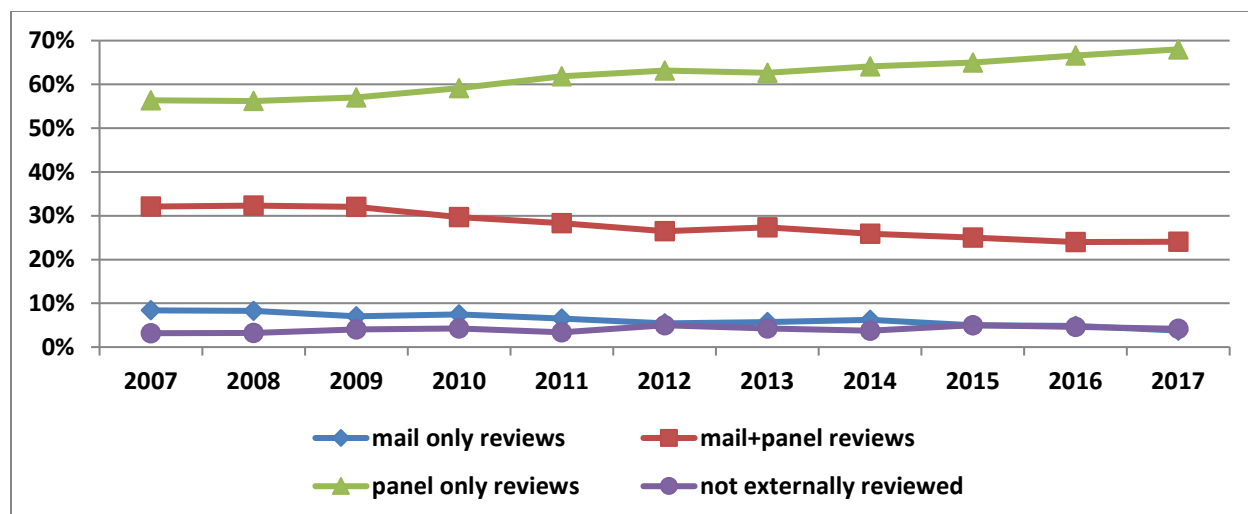
The ad-hoc-plus-panel method had the highest number of reviews per proposal, averaging 4.8, while the panel-only method averaged 3.6. Directorate-level data for FY 2017 are presented in **Appendix 10**.

In addition, site visits (on-site and reverse-site) by NSF staff and external members of the community are often used to review proposals for facilities and centers. NSF program officers are given discretion in the specific use of review methods, subject to approval by the division director or other appropriate NSF official.

The use of various review methods has changed markedly over time, as shown in **Figure 17**. **Appendix 13** provides FY 2017 data on the review methods used by directorates and offices.

<sup>35</sup> The table only shows reviews written by individuals. Panel discussions may, and often do, include the input of reviewers who have read the proposal but have not been asked to provide a separate written review. A panel summary therefore often represents a review perspective that is larger than that which is captured in the written reviews. The number of reviews per proposal in the last line of the table therefore underestimates the amount of reviewer input when a panel is part of the review process.

\* Only written reviews prepared by individuals, whether an ad hoc reviewer or a panelist, are counted in **Table 15**.

**Figure 17. FY 2007-2017 Trend, NSF Review Method**

Source: NSF Enterprise Information System, 10/01/17.

The trends in **Figure 17** show an increase in the number of panels. Panels allow reviewers to discuss and compare proposals. The panel review process has the advantage that different perspectives can be discussed and integrated, if appropriate. Using only panels in the review process tends to reduce proposal processing time (time-to-decision), compared to ad hoc only reviews. For example, in FY 2017, 72% of all proposals reviewed by panel only were processed within six months, compared to 68% for ad hoc + panel and 61% for ad hoc only.<sup>36</sup> In FY 2016, the corresponding numbers were 80%, 68% and 61%.

One advantage of ad hoc review is that the expertise of the reviewers can be more precisely matched to the proposal. The ad hoc + panel review process combines the in-depth expertise of ad hoc review with the comparative analysis of panel review.

The average number of proposals that a panelist is asked to review in a funding cycle is considerably higher than the number of reviews asked of an ad hoc reviewer. This high workload may deter some individuals who would otherwise be willing to participate in the review process.

## **F. Data on Reviewers**

The Foundation maintains a central electronic database of more than 464,000 reviewers who may be asked to participate in ad hoc or panel reviews. Program officers frequently add new reviewers to this database.

Approximately 33,966 individuals served on panels, conducted an ad hoc review for one or more proposals, or served in both functions for proposals for which an award or decline decision was

<sup>36</sup> The lower value for “ad hoc only” may reflect the fact that a number of the programs that use this method do not have submission deadlines, rather than a direct consequence of the method of obtaining reviews.

made in FY 2017. Of these, approximately 14,265 (42%) served as panelists (of whom about 2,638 also served as ad hoc reviewers) and 19,701 (58%) served as ad hoc reviewers only. Approximately 6,774 (20%) of these reviewers had never reviewed an NSF proposal before.

Reviewers were from all 50 states as well as the District of Columbia, Guam, Puerto Rico and the US Virgin Islands. Approximately 3,460 reviewers were from outside the United States by address of record.<sup>37</sup> Reviewers were from a range of institutions, including two-year and four-year colleges and universities, Master's level and Ph.D.-granting universities, industry, for-profit and non-profit institutions, K-12 systems, informal science institutions, and government. NSF also maintains data on numbers of reviewers from each state, territory, and country as well as by type of institution.

The NSF library continually updates its resources to help NSF staff identify reviewers. This includes the collection and sharing of potential reviewer data from associations that work with under-represented groups in science and engineering. Reviewers are also identified through literature searches and professional activities. Some NSF divisions actively solicit new reviewers through their web-pages and outreach activities. Chapter III.B of the *Proposal and Award Policies and Procedures Guide* describes how NSF program officers select reviewers.

Participation in the merit review process is voluntary. It brings with it increased familiarity with NSF programs, knowledge of the state of research and education nationally, and increased awareness of the elements of a competitive proposal. Panelists are reimbursed for expenses, but ad hoc reviewers receive no financial compensation. For proposals in FY 2017, NSF requested 56,820 ad hoc reviews, of which there were 39,994 positive responses.<sup>38</sup> This 70% response rate is similar to that for the prior two years. The response rate varies by program.

### **G. Reviewer Proposal Ratings and the Impact of Budget Constraints**

All funded proposals are determined to be highly meritorious based on a combination of individual reviews, panel deliberations and program officer evaluations.

Over 90% of proposals are reviewed by a panel of experts (**Figure 17**). A panel clusters proposals into groups based on a discussion of the proposals. These in-depth discussions can uncover weaknesses that might not have been reflected in the initial reviews or identify strengths in proposals that might not have been rated highly by the initial reviewers.

The expertise of the NSF program officer making the final recommendation is an important voice in the process. Program officers look not only at the ratings provided by reviewers but also

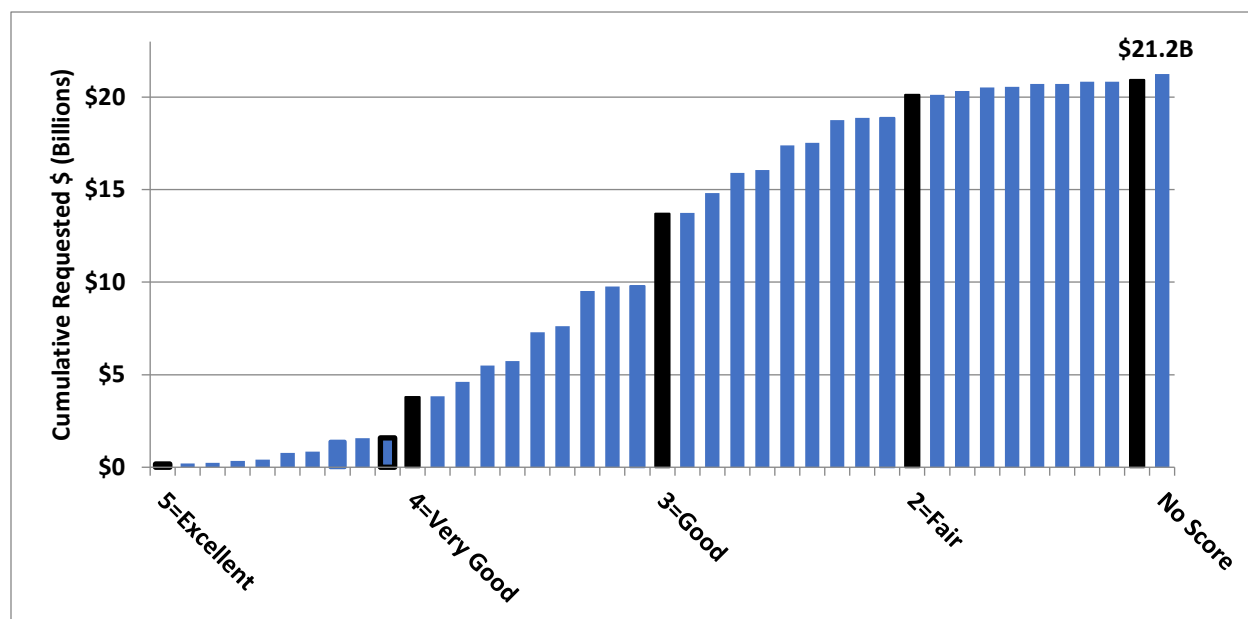
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<sup>37</sup> In recent years, there has been a steady decline in the proportion of reviewers from outside the United States. The proportion of such reviewers has declined as follows: FY 2010 – 15.6%; FY 2011 – 14.3%; FY 2012 – 12.7%; FY 2013 – 12.3%; FY 2014 – 12.3%; FY 2015 – 11.3%; FY 2016 – 10.8%; FY2017 – 10.2%.

<sup>38</sup> This number tracks requests that are recorded in the Proposal and Reviewer System (PARS). For example, when potential reviewers are sent a formal invitation via eCorrespondence, the reviewer is entered in PARS. Some potential reviewers are first invited informally by email or telephone. If they decline this initial invitation, there is usually no follow-up in eCorrespondence. Numbers given here reflect the rate of positive responses to formal invitations and overestimate the practical positive response rate.

weigh the *comments* that reviewers provide on the intrinsic merits of proposals. Program officers also take into consideration other factors that might not have been considered by expert reviewers. For example, proposals for innovative new ideas often use methods or techniques that might be considered risky by reviewers and panelists. Such “risky” proposals may result in transformative research that accelerates the pace of discovery. Although program officers consider concerns about risk expressed by panels, they also see the value of funding potentially transformative research. Even if the program officer decides not to fully fund the proposal, proposals that do not review well in a panel due to methods that are unproven or risky, can be given small awards to allow enough work for a “proof of concept.” Program officers will also consider broader impacts that might not be obvious to reviewers, such as an infrastructure need that will serve a large number of people. There are many dimensions of portfolio balance that may influence the final recommendation. Program officers strive to fund proposals from diverse institution types across all 50 states, from both new and experienced investigators.

**Figure 18. Cumulative Requested Amounts for Declined Proposals by Average Reviewer Rating for FY 2017 (dollars in billions)**



Source: NSF Enterprise Information System, 10/01/17

A large number of potentially fundable proposals are declined each year. As shown in **Figure 18**, approximately \$1.6 billion was requested for declined proposals that had received ratings at least as high as the average rating (4.1 out of 5.0) for all awarded proposals. Approximately \$3.8 billion was requested for declined proposals that were rated Very Good or higher in the merit review process. These declined proposals represent a rich portfolio of unfunded opportunities, proposals that, if funded, may have produced substantial research and education benefits.

## **H. Program Officer Characteristics**

**Table 16** shows information about NSF’s program officers. The number of program officers increased to 509 from 506 in FY 2016. All incoming NSF program officers receive training in the merit review process.

**Table 16. Distribution of NSF Program Officers by Characteristics**

<b>Program Officers</b>	<b>Total</b>	<b>Percent</b>
<b>Total</b>	<b>509</b>	<b>100%</b>
<b><i>Gender</i></b>		
Male	289	57%
Female	220	43%
<b><i>Race and Ethnicity</i></b>		
Racial or Ethnic Minority	138	27%
Non-Minority	371	73%
<b><i>Employment</i></b>		
Permanent	284	56%
Visiting Scientists, Engineers & Educators (VSEE)	40	8%
Temporary	53	10%
Intergovernmental Personnel Act (IPA)	132	26%

Source: NSF Division of Human Resource Management. Data are for the end of FY 2017.

Program officers can be permanent NSF employees or non-permanent employees. As shown in **Table 16**, 56% are permanent program officers and 44% are not permanent. 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 supported through grants to their home institutions under the terms of the Intergovernmental Personnel Act (IPA). In FY 2017, the number of permanent program officers increased by 19 relative to FY2016 and the number of IPAs decreased by 7. Relative to FY2016, the proportion of VSEEs remained constant at 8% of the total, and the proportion of IPAs decreased from 28% to 26%.

Compared to FY 2016, the numbers of program officers who are women or members of a racial or ethnic minority grew by 1 and 4, respectively. At the end of FY 2017, approximately 43% of program officers were female and approximately 27% were from a racial or ethnic minority.

# Appendices

## Appendix 1 - Median and Mean Annualized Award Amounts for Research Grants, by Directorate or Office (Nominal Dollars in Thousands)

		Fiscal Year										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>NSF</b>	Median	\$110	\$110	\$120	\$124	\$120	\$125	\$130	\$133	\$130	\$133	\$133
	Mean	\$146	\$143	\$162	\$167	\$159	\$166	\$169	\$172	\$171	\$173	\$169
<b>BIO</b>	Median	\$142	\$150	\$161	\$171	\$178	\$177	\$182	\$178	\$186	\$200	\$198
	Mean	\$182	\$180	\$200	\$222	\$226	\$214	\$228	\$217	\$237	\$243	\$223
<b>CISE</b>	Median	\$92	\$94	\$110	\$118	\$141	\$150	\$161	\$166	\$161	\$155	\$156
	Mean	\$120	\$131	\$169	\$172	\$174	\$206	\$204	\$199	\$187	\$198	\$187
<b>ENG</b>	Median	\$100	\$100	\$100	\$100	\$100	\$107	\$103	\$112	\$103	\$102	\$107
	Mean	\$116	\$112	\$120	\$122	\$119	\$125	\$122	\$131	\$122	\$124	\$125
<b>GEO</b>	Median	\$93	\$89	\$101	\$100	\$116	\$125	\$141	\$141	\$144	\$150	\$150
	Mean	\$137	\$122	\$153	\$134	\$162	\$170	\$193	\$201	\$183	\$185	\$190
<b>MPS</b>	Median	\$106	\$105	\$113	\$115	\$111	\$117	\$116	\$120	\$125	\$122	\$120
	Mean	\$130	\$133	\$138	\$150	\$141	\$143	\$130	\$141	\$149	\$142	\$138
<b>OIA</b>	Median	\$160	\$146	\$391	\$391	\$393	\$170	\$156	\$171	\$713	\$156	\$152
	Mean	\$130	\$146	\$366	\$431	\$379	\$178	\$948	\$173	\$554	\$514	\$260
<b>OISE</b>	Median	\$47	\$30	\$25	\$50	\$49	\$50	\$31	\$49	\$82	\$83	\$84
	Mean	\$157	\$29	\$33	\$198	\$60	\$200	\$53	\$142	\$149	\$102	\$318
<b>SBE</b>	Median	\$94	\$100	\$101	\$100	\$98	\$98	\$101	\$109	\$112	\$117	\$119
	Mean	\$115	\$116	\$114	\$116	\$113	\$120	\$139	\$134	\$138	\$136	\$146

Source: NSF Enterprise Information System, 10/1/17.

EHR is not included in this table since the number of awards included in the “research grant” category is small relative to the number of education awards managed by that directorate.

**Appendix 2 - Mean Levels of PI, Graduate Student and Post-Doctoral Associate Support in Research Grants**

**Table 2.1 Mean Number of Months of Salary Support per PI/co-PI for Single- and Multi-PI Research Grants, by Directorate or Office**

Directorate or Office	Type of Award	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NSF	Single PI Grants	1.4	1.3	1.2	1.1	1.0	0.9	0.8	0.8	0.7	0.7	0.7
	Multi-PI Grants	1.3	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.8	0.7	0.6
	NSF Average	1.3	1.3	1.2	1.1	1.0	0.9	0.8	0.8	0.8	0.7	0.7
BIO	Single PI Grants	2.0	1.8	1.3	1.2	1.3	1.1	1.0	1.0	0.9	0.9	0.7
	Multi-PI Grants	2.0	1.7	1.6	1.2	1.1	1.1	1.3	1.0	1.1	0.9	0.7
	BIO Average	2.0	1.8	1.4	1.2	1.2	1.1	1.1	1.0	0.9	0.9	0.7
CISE	Single PI Grants	0.9	0.7	0.8	0.8	0.9	0.7	0.7	0.7	0.6	0.6	0.6
	Multi-PI Grants	0.7	0.5	0.6	0.6	0.8	0.7	0.6	0.7	0.5	0.5	0.5
	CSE Average	0.8	0.6	0.7	0.7	0.9	0.7	0.6	0.7	0.6	0.6	0.6
EHR	Single PI Grants	1.6	2.0	1.6	1.9	1.7	1.4	1.4	1.0	0.9	0.8	0.7
	Multi-PI Grants	1.5	1.2	1.6	1.8	2.2	1.7	1.0	0.9	0.8	0.7	0.8
	EHR Average	1.5	1.5	1.6	1.8	2.1	1.6	1.1	0.9	0.8	0.7	0.8
ENG	Single PI Grants	1.2	0.9	0.9	0.4	0.4	0.6	0.4	0.3	0.4	0.4	0.3
	Multi-PI Grants	0.8	0.7	0.7	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	ENG Average	1.0	0.8	0.8	0.4	0.4	0.5	0.4	0.3	0.4	0.3	0.3
GEO	Single PI Grants	1.3	1.1	1.0	1.1	1.0	1.0	0.9	1.0	1.0	0.9	0.8
	Multi-PI Grants	1.3	1.2	1.1	1.1	1.0	1.3	1.3	1.2	1.2	1.1	1.2
	GEO Average	1.3	1.1	1.1	1.1	1.0	1.1	1.0	1.1	1.0	1.0	0.9
MPS	Single PI Grants	1.3	1.3	1.5	1.3	1.3	1.1	1.0	1.0	0.8	0.8	0.8
	Multi-PI Grants	1.5	1.4	1.5	1.2	1.2	0.9	0.9	0.9	0.9	0.8	0.7
	MPS Average	1.3	1.4	1.5	1.3	1.3	1.0	1.0	1.0	0.9	0.8	0.8
OIA	Single PI Grants	8.6	3.3	0.4	2.4	1.3	1.2	1.1	1.2	0.8	1.0	0.4
	Multi-PI Grants	4.5	N/A	1.1	0.4	0.2	N/A	N/A	0.7	N/A	0.4	0.6
	OIA Average	6.5	3.3	1.0	1.1	0.9	1.2	1.1	0.8	0.8	0.5	0.5
OISE	Single PI Grants	0.5	N/A	1.0	0.3	2.2	0.3	0.8	0.5	0.6	0.6	0.3
	Multi-PI Grants	0.9	1.0	0.9	1.8	0.8	0.7	0.5	0.5	0.8	0.7	0.6
	OISE Average	0.9	1.0	1.0	1.4	1.1	0.6	0.7	0.5	0.7	0.7	0.6
SBE	Single PI Grants	1.6	2.0	1.5	1.7	1.2	1.2	1.1	1.1	1.1	1.0	1.1
	Multi-PI Grants	1.4	1.1	1.0	1.3	0.9	0.9	1.2	1.2	1.6	1.4	0.6
	SBE Average	1.5	1.7	1.4	1.6	1.1	1.1	1.1	1.2	1.3	1.1	0.9

Source: NSF Enterprise Information System, 10/1/17 and NSF Report Server 4/10/18.



**Table 2.2 Mean Annualized Graduate Student Support on Research Grants**

	Mean Annualized Level of Graduate Student Support per Research Grant <sup>39</sup>	
Fiscal Year	All Research Grants	Research Grants with Graduate Student Support
2007	\$14,811	\$20,411
2008	\$15,415	\$21,100
2009	\$16,907	\$22,684
2010	\$15,780	\$22,086
2011	\$17,182	\$24,259
2012	\$19,884	\$28,101
2013	\$20,937	\$29,101
2014	\$21,028	\$29,381
2015	\$20,842	\$29,875
2016	\$21,408	\$30,657
2017	\$21,440	\$30,766

Source: NSF Report Server 4/12/18.

**Table 2.3 Mean Annualized Post-Doctoral Associate Support on Research Grants**

	Mean Annualized Level of Post-Doctoral Researcher Support per Research Grant	
Fiscal Year	All Research Grants	Research Grants with Post-Doc. Support
2007	\$4,491	\$25,814
2008	\$4,214	\$24,998
2009	\$4,718	\$26,747
2010	\$5,183	\$28,587
2011	\$5,377	\$29,639
2012	\$5,992	\$35,593
2013	\$6,060	\$34,674
2014	\$5,492	\$34,142
2015	\$5,970	\$35,889
2016	\$5,894	\$36,339
2017	\$5,680	\$36,700

Source: NSF Report Server 4/12/18.

<sup>39</sup> Not all research grant proposals request support for graduate students. This table shows the total amount of annualized graduate student support in research grants divided, respectively, by the total number of research grants and by the total number of research grants that include graduate student support.

**Appendix 3 - Proposals, Awards and Funding Rates, by Directorate or Office**

		Fiscal Year										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NSF <sup>40</sup>	Proposals	44,577	44,428	45,181	55,542	51,562	48,613	48,999	48,051	49,620	49,285	49,415
	Awards	11,463	11,149	14,595	12,996	11,192	11,524	10,829	10,958	12,007	11,877	11,447
	Funding Rate	26%	25%	32%	23%	22%	24%	22%	23%	24%	24%	23%
BIO	Proposals	6,728	6,598	6,578	8,059	7,439	5,269	5,934	4,784	5,119	5,206	5,005
	Awards	1,303	1,291	1,823	1,556	1,310	1,293	1,250	1,272	1,379	1,330	1,142
	Funding Rate	19%	20%	28%	19%	18%	25%	21%	27%	27%	26%	23%
CISE	Proposals	6,048	6,067	6,001	7,317	6,702	7,703	7,821	7,434	8,032	8,299	8,722
	Awards	1,699	1,449	1,926	1,755	1,527	1,749	1,616	1,680	1,886	1,918	1,819
	Funding Rate	28%	24%	32%	24%	23%	23%	21%	23%	23%	23%	21%
EHR	Proposals	4,248	3,887	3,699	5,055	4,660	4,281	4,501	4,049	4,242	4,423	4,294
	Awards	903	1,111	1,009	930	807	889	793	701	830	915	899
	Funding Rate	21%	29%	27%	18%	17%	21%	18%	17%	20%	21%	21%
ENG	Proposals	9,574	9,643	10,611	13,226	12,314	11,338	10,738	11,878	12,326	12,570	13,028
	Awards	1,955	1,966	2,688	2,375	2,064	2,065	2,212	2,145	2,504	2,499	2,455
	Funding Rate	20%	20%	25%	18%	17%	18%	21%	18%	20%	20%	19%
GEO	Proposals	5,567	5,101	4,991	5,614	5,187	5,243	6,087	5,790	5,812	4,999	4,793
	Awards	1,711	1,563	2,226	1,970	1,705	1,637	1,565	1,487	1,463	1,526	1,520
	Funding Rate	31%	31%	45%	35%	31%	31%	26%	26%	25%	31%	32%
MPS	Proposals	7,315	7,837	7,883	9,411	8,796	9,006	8,903	8,855	9,133	9,199	8,848
	Awards	2,360	2,269	3,122	2,669	2,352	2,523	2,201	2,343	2,593	2,432	2,334
	Funding Rate	32%	29%	40%	28%	27%	28%	25%	26%	28%	26%	26%
OIA	Proposals	24	21	109	200	138	44	98	78	91	102	117
	Awards	23	17	36	89	25	14	27	29	36	30	54
	Funding Rate	96%	81%	33%	45%	18%	32%	28%	37%	40%	29%	46%
OISE	Proposals	776	910	781	1,042	1,214	951	484	677	582	313	298
	Awards	353	357	428	395	404	333	245	307	275	236	194
	Funding Rate	45%	39%	55%	38%	33%	35%	51%	45%	47%	75%	65%
SBE	Proposals	4,284	4,364	4,525	5,618	5,112	4,776	4,433	4,506	4,283	4,174	4,310

<sup>40</sup> Several organizational changes occurred over the decade. Data from prior years have been realigned with the organizational structure in effect for FY 2017 in order to show historical trends. A realignment in FY 2013 moved the Office of Polar Programs (OPP) and OCI from the Office of the Director to GEO and CISE, respectively, preserving their identity as separate divisions. Additionally, the Office of International Science & Engineering (OISE) and the Office of Integrative Activities (OIA) became the Office of International and Integrative Activities (OIIA). In a further realignment, in FY 2015, OIIA was again separated into the Office of International Science & Engineering (OISE) and the Office of Integrative Activities (OIA). See **Appendix 14**.

		Fiscal Year										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	Awards	1,143	1,126	1,337	1,257	998	1,019	920	994	1,041	991	1,030
	Funding Rate	27%	26%	30%	22%	20%	21%	21%	22%	24%	24%	24%
Other 41	Proposals	13		3			2					
	Awards	13		0			2					
	Funding Rate	100%		0%			100%					

Source: NSF Enterprise Information System, 10/01/17.

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<sup>41</sup> The 'Other' category includes, for example, non-contract awards made on behalf of the Office of the Inspector-General. The following are not included in the FY 2017 statistics: 4,900 Continuing Grant Increments, 3,164 Supplements, and 371 Contracts.

### Appendix 4 - Proposals, Awards and Funding Rates, by PI Gender

**Table 4.1 – FY 2017 Proposals, Awards and Funding Rates, by PI Gender\***

		<b>Total</b>	<b>Female</b>	<b>Male</b>	<b>Unknown</b>
NSF	Proposals	49,415	11,322	30,046	8,047
	% of Total		23%	61%	16%
	Awards	11,447	2,962	6,930	1,555
	Funding Rate	23%	26%	23%	19%
BIO	Proposals	5,005	1,551	2,858	596
	% of Total		31%	57%	12%
	Awards	1,142	385	671	86
	Funding Rate	23%	25%	23%	14%
CISE	Proposals	8,722	1,550	5,765	1,407
	% of Total		18%	66%	16%
	Awards	1,819	359	1,182	278
	Funding Rate	21%	23%	21%	20%
EHR	Proposals	4,294	1,618	1,823	853
	% of Total		38%	42%	20%
	Awards	899	380	366	153
	Funding Rate	21%	23%	20%	18%
ENG	Proposals	13,028	2,202	8,354	2,472
	% of Total		17%	64%	19%
	Awards	2,455	509	1,518	428
	Funding Rate	19%	23%	18%	17%
GEO	Proposals	4,793	1,274	3,025	494
	% of Total		27%	63%	10%
	Awards	1,520	417	969	134
	Funding Rate	32%	33%	32%	27%
MPS	Proposals	8,848	1,507	6,131	1,210
	% of Total		17%	69%	14%
	Awards	2,334	435	1,648	251
	Funding Rate	26%	29%	27%	21%
OIA	Proposals	117	35	59	23
	% of Total		30%	50%	20%
	Awards	54	13	30	11
	Funding Rate	46%	37%	51%	48%
OISE	Proposals	298	95	141	62
	% of Total		32%	47%	21%
	Awards	194	72	73	49
	Funding Rate	65%	76%	52%	79%
SBE	Proposals	4,310	1,490	1,890	930
	% of Total		35%	44%	22%
	Awards	1,030	392	473	165
	Funding Rate	24%	26%	25%	18%

Source: NSF Enterprise Information System, 10/1/17.

\*Demographic data are voluntarily self-reported by the PI. In FY2017, approximately 83.7% of competitive proposals and 85.4% of research proposals were from PIs who provided gender information. “Total” is the count of unique proposals. Columns are counts of proposals from PIs in the corresponding category.

**Table 4.2 - FY2017 Research Proposals, Awards and Funding Rates, by PI Gender**

		<b>Total</b>	<b>Female</b>	<b>Male</b>	<b>Unknown</b>
NSF	Proposals	40,678	9,274	25,450	5,954
	% of Total		23%	63%	15%
	Awards	8,553	2,164	5,370	1,019
	Funding Rate	21%	23%	21%	17%
BIO	Proposals	3,997	1,212	2,316	469
	% of Total		30%	58%	12%
	Awards	824	282	484	58
	Funding Rate	21%	23%	21%	12%
CISE	Proposals	8,389	1,470	5,553	1,366
	% of Total		18%	66%	16%
	Awards	1,547	294	1,010	243
	Funding Rate	18%	20%	18%	18%
EHR	Proposals	3,135	1,268	1,243	624
	% of Total		40%	40%	20%
	Awards	542	254	211	77
	Funding Rate	17%	20%	17%	12%
ENG	Proposals	9,753	1,783	6,660	1,310
	% of Total		18%	68%	13%
	Awards	1,801	401	1,182	218
	Funding rate	18%	22%	18%	17%
GEO	Proposals	4,434	1,170	2,831	433
	% of Total		26%	64%	10%
	Awards	1,325	351	861	113
	Funding rate	30%	30%	30%	26%
MPS	Proposals	7,753	1,273	5,407	1,073
	% of Total		16%	70%	14%
	Awards	1,852	338	1,305	209
	Funding rate	24%	27%	24%	19%
OIA	Proposals	58	17	30	11
	% of Total		29%	52%	19%
	Awards	10	2	5	3
	Funding rate	17%	12%	17%	27%
OISE	Proposals	150	37	97	16
	% of Total		25%	65%	11%
	Awards	46	14	29	3
	Funding rate	31%	38%	30%	19%
SBE	Proposals	3,009	1,044	1,313	652
	% of Total		35%	44%	22%
	Awards	606	228	283	95
	Funding rate	20%	22%	22%	15%

Source: NSF Enterprise Information System, 10/1/17.

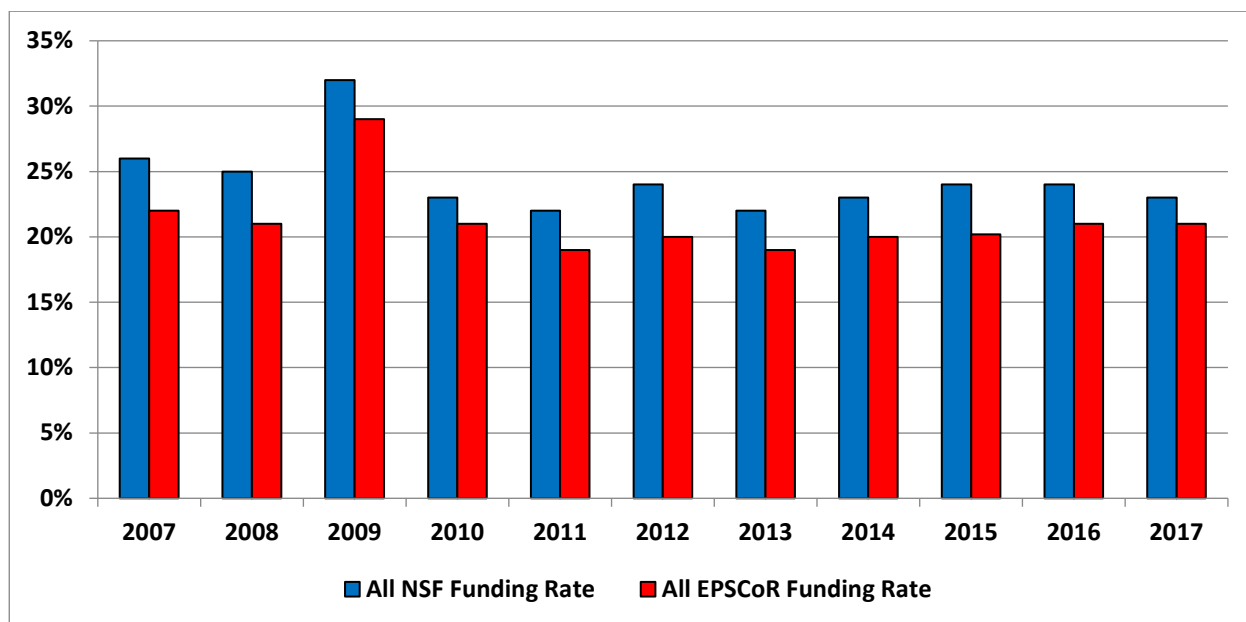
## Appendix 5 - EPSCoR: Jurisdictions, Proposal, Award, and Funding Data

Twenty-four states, the Commonwealth of Puerto Rico, Guam and the U.S. Virgin Islands were eligible to participate in aspects of the NSF Established Program to Stimulate Competitive Research (EPSCoR) program in FY 2017.<sup>42</sup> 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, Vermont, West Virginia, and Wyoming.

In FY 2017, the NSF EPSCoR program invested \$24.92 million in co-funding 136 NSF awards. This investment was leveraged with \$37.29 million from NSF Directorates and other Offices for a total investment of \$62.21 million. Since 1998, when the co-funding initiative was formally established, approximately 4,450 co-funded awards have been made. The latter represent a total NSF investment of about \$1.7 billion of which \$650 million was co-funding provided by the EPSCoR program.

**Figure 5.1** shows the change over time for the proposal funding rate of EPSCoR jurisdictions relative to the overall NSF proposal funding rate for all of the United States.

**Figure 5.1 - Overall Proposal Funding Rates for EPSCoR Jurisdictions and Overall NSF Proposal Funding Rates**



Source: EPSCoR Office 8/30/18.

<sup>42</sup> In January 2017, the EPSCoR program was renamed the Established Program to Stimulate Competitive Research. Previously, it had been the Experimental Program to Stimulate Competitive Research.

**Table 5.1** shows the number of proposals, awards, and proposal funding rates for EPSCoR jurisdictions. Below the name of the EPSCoR jurisdiction is the year in which the jurisdiction joined EPSCoR.

**Table 5.1 – Proposal Funding Rates, by EPSCoR Jurisdiction**  
(Date under the state name is the year the state joined EPSCoR)

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>All NSF</b>	Awards	11,463	11,149	14,595	12,996	11,192	11,524	10,829	10,958	12,007	11,877	11,447
	Proposals	44,577	44,428	45,181	55,542	51,562	48,613	48,999	48,051	49,620	49,285	49,415
	Funding Rate	26%	25%	32%	23%	22%	24%	22%	23%	24%	24%	23%
<b>All EPSCoR Juris-dictions</b>	Awards	1,653	1,564	2,474	2,181	1,846	1,960	1,897	1,892	1,980	1,676	1,457
	Proposals	7,392	7,349	8,476	10,513	9,640	9,680	9,766	9,477	9,679	7,815	7,041
	Funding Rate	22%	21%	29%	21%	19%	20%	19%	20%	20%	21%	21%
<b>Alabama -1985</b>	Awards	86	85	148	119	98	110	94	102	85	102	116
	Proposals	508	489	606	708	614	669	647	665	583	607	655
	Funding Rate	17%	17%	24%	17%	16%	16%	15%	15%	15%	17%	18%
<b>Alaska -2000</b>	Awards	75	52	77	65	71	65	60	50	49	59	61
	Proposals	246	204	186	235	213	199	221	205	246	193	169
	Funding Rate	30%	25%	41%	28%	33%	33%	27%	24%	20%	31%	36%
<b>Arkansas -1980</b>	Awards	58	36	41	60	40	33	46	33	30	35	45
	Proposals	244	197	194	276	246	229	260	207	184	196	222
	Funding Rate	24%	18%	21%	22%	16%	14%	18%	16%	16%	18%	20%
<b>Delaware -2003</b>	Awards	67	68	77	80	70	79	70	67	64	80	50
	Proposals	283	283	244	295	292	278	287	283	273	301	257
	Funding Rate	24%	24%	32%	27%	24%	28%	24%	24%	23%	27%	19%
<b>Guam -2012</b>	Awards	†	†	†	†	†	†	†	†	†	†	†
	Proposals	2	5	3	7	5	8	7	4	6	2	3
	Funding Rate	†	†	†	†	†	†	†	†	†	†	†
<b>Hawaii -2001</b>	Awards	74	73	109	99	80	60	54	68	62	78	64
	Proposals	276	276	277	379	285	281	282	294	267	285	234
	Funding Rate	27%	26%	39%	26%	28%	21%	19%	23%	23%	27%	27%
<b>Idaho -1987</b>	Awards	34	44	44	35	37	47	41	35	37	41	40
	Proposals	161	201	168	199	202	185	214	230	234	206	203
	Funding Rate	21%	22%	26%	18%	18%	25%	19%	15%	16%	20%	20%
<b>Kansas -1992</b>	Awards	78	82	88	92	88	91	65	67	94	71	92
	Proposals	404	387	399	464	423	402	393	389	407	396	430
	Funding Rate	19%	21%	22%	20%	21%	23%	17%	17%	23%	18%	21%
<b>Kentucky -1985</b>	Awards	60	62	78	81	64	63	58	68	69	83	59
	Proposals	330	300	356	429	437	434	391	401	399	399	377
	Funding Rate	18%	21%	22%	17%	15%	15%	15%	17%	17%	21%	16%

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>Louisiana</b> <b>-1987</b>	Awards	96	98	132	149	102	88	91	74	99	91	88
	Proposals	495	471	583	715	621	484	463	402	460	459	470
	Funding Rate	19%	21%	27%	21%	16%	18%	20%	18%	22%	20%	19%
<b>Maine</b> <b>-1980</b>	Awards	58	65	60	58	42	46	52	48	50	44	42
	Proposals	200	199	172	190	209	182	211	201	189	175	185
	Funding Rate	29%	33%	35%	31%	20%	25%	25%	24%	26%	25%	23%
<b>Mississippi</b> <b>-1987</b>	Awards	40	34	76	72	42	43	28	32	40	47	43
	Proposals	251	271	301	358	287	264	262	260	240	256	224
	Funding Rate	16%	13%	25%	20%	15%	16%	11%	12%	17%	18%	19%
<b>Montana</b> <b>-1980</b>	Awards	61	57	78	51	35	50	50	45	51	52	59
	Proposals	238	232	207	251	222	204	214	183	210	183	229
	Funding Rate	26%	25%	38%	20%	16%	25%	23%	25%	24%	28%	26%
<b>Nebraska</b> <b>-1992</b>	Awards	51	54	64	56	60	40	59	51	59	58	62
	Proposals	250	255	248	324	309	258	305	281	307	300	326
	Funding Rate	50%	21%	26%	17%	19%	16%	19%	18%	19%	19%	19%
<b>Nevada</b> <b>-1985</b>	Awards	50	43	61	39	37	29	33	58	40	42	38
	Proposals	231	261	232	295	263	236	217	245	230	266	281
	Funding Rate	22%	16%	26%	13%	14%	12%	15%	24%	17%	16%	14%
<b>New Hampshire</b> <b>-2004</b>	Awards	60	58	108	76	61	75	64	64	65	74	62
	Proposals	240	230	251	311	282	280	273	295	253	285	256
	Funding Rate	25%	25%	43%	24%	22%	27%	23%	22%	26%	26%	24%
<b>New Mexico</b> <b>-2001</b>	Awards	104	102	115	105	91	69	81	76	88	107	92
	Proposals	401	444	389	506	416	399	404	398	474	449	379
	Funding Rate	26%	23%	30%	21%	22%	17%	20%	19%	19%	24%	24%
<b>North Dakota</b> <b>-1985</b>	Awards	15	19	31	35	23	18	21	26	20	32	21
	Proposals	139	158	141	171	161	161	172	174	171	185	150
	Funding Rate	11%	12%	22%	20%	14%	11%	12%	15%	12%	17%	14%
<b>Oklahoma</b> <b>-1985</b>	Awards	66	67	112	74	79	68	59	69	68	76	76
	Proposals	338	378	420	457	460	384	394	339	388	372	377
	Funding Rate	20%	18%	27%	16%	17%	18%	15%	20%	18%	20%	20%
<b>Puerto Rico</b> <b>-1985</b>	Awards	32	24	37	34	19	9	8	16	15	22	14
	Proposals	153	148	183	203	163	153	105	86	102	90	111
	Funding Rate	21%	16%	20%	17%	12%	6%	8%	19%	15%	24%	13%
<b>Rhode Island</b> <b>-2004</b>	Awards	127	129	176	148	131	146	127	138	131	132	125
	Proposals	390	357	350	442	400	393	399	404	361	349	351
	Funding Rate	33%	36%	50%	33%	33%	37%	32%	34%	36%	38%	36%
<b>South Carolina</b> <b>-1980</b>	Awards	122	87	152	136	108	117	115	97	117	98	103
	Proposals	523	470	527	671	650	562	594	585	603	556	565
	Funding Rate	23%	19%	29%	20%	17%	21%	19%	17%	19%	18%	18%



		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>South Dakota -1987</b>	Awards	21	20	31	33	24	20	28	32	25	24	23
	Proposals	97	116	132	184	162	150	163	135	139	150	155
	Funding Rate	22%	17%	23%	18%	15%	13%	17%	24%	18%	16%	15%
<b>U.S. Virgin Islands -2002</b>	Awards	†	†	†	†	†	†	†	†	†	†	†
	Proposals	4	5	1	3	11	5	8	7	3	10	11
	Funding Rate	†	†	†	†	†	†	†	†	†	†	†
<b>Vermont -1985</b>	Awards	26	27	42	23	22	24	21	22	18	24	27
	Proposals	129	144	120	126	121	90	89	104	96	133	127
	Funding Rate	20%	19%	35%	18%	18%	27%	24%	21%	19%	18%	21%
<b>West Virginia -1980</b>	Awards	21	25	33	27	21	32	22	23	37	29	28
	Proposals	128	119	130	160	151	163	158	159	187	169	175
	Funding Rate	16%	21%	25%	17%	14%	20%	14%	14%	20%	17%	16%
<b>Wyoming -1985</b>	Awards	26	27	44	35	31	20	18	24	27	21	21
	Proposals	91	121	123	146	122	105	115	129	129	128	119
	Funding Rate	29%	22%	36%	24%	25%	19%	16%	19%	21%	16%	18%

Source: All-NSF data - NSF Enterprise Information System, 10/1/17; EPSCoR jurisdiction data - NSF Budget Internet Information System, October 2017. † = award numbers suppressed to maintain privacy.

## Appendix 6 - Accomplishment-Based Renewals and Creativity Extensions

### 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, together with information on human resources development at the post-doctoral, graduate and undergraduate levels. All other information required for NSF proposal submission remains the same. The proposals undergo merit review in the tradition of the specific program. In FY 2017, there were 44 requests for accomplishment-based renewals, 18 of which were awarded. **Table 6.1** shows the number of accomplishment-based renewals by directorate or office.

### Creativity Extensions

A program officer may recommend the extension of funding for certain 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 attack adventurous, "high-risk" opportunities in the same general research area, but not necessarily covered by the original/current award. Awards eligible for such an extension are generally three-year continuing grants. Special Creativity Extensions are normally initiated by the NSF program officer based on progress during the first two years of the grant.<sup>43</sup> In FY 2017, 16 Special Creativity Extensions were awarded.

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<sup>43</sup> From NSF's Proposal and Award Policies & Procedures Guide, [https://www.nsf.gov/pubs/policydocs/pappg17\\_1/pappg\\_6.jsp#VID3d](https://www.nsf.gov/pubs/policydocs/pappg17_1/pappg_6.jsp#VID3d).

**Table 6.1 - Accomplishment-Based Renewals, by Directorate or Office**

Directorate or Office		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NSF	Award	27	28	40	34	19	30	19	14	29	17	18
	Decline	70	51	54	52	43	41	52	35	44	35	26
	Mean Ann. Awd	\$146,658	\$164,211	\$225,438	\$150,171	\$253,026	\$255,959	\$414,467	\$174,227	\$137,480	\$199,034	\$171,270
BIO	Award	4	3	5	8	3	2	4	3	2	0	3
	Decline	25	13	16	11	6	3	6	5	2	4	7
	Mean Ann. Awd	\$82,697	\$62,444	\$123,533	\$151,999	\$344,742	\$78,815	\$835,142	\$298,359	\$189,961	N/A	\$156,044
CISE	Award	1	1	2	1	0	0	2	0	1	5	1
	Decline	3	1	0	2	2	2	1	0	0	1	0
	Mean Ann. Awd	\$37,500	\$60,010	\$267,851	\$272,833	N/A	N/A	\$819,996	N/A	\$233,333	\$369,350	\$140,000
EHR	Award	2	2	3	3	1	2	0	1	0	0	2
	Decline	6	3	7	6	5	4	4	4	6	3	2
	Mean Ann. Awd	\$117,877	\$390,611	\$361,873	\$304,579	\$33,352	\$530,633	N/A	\$354,796	N/A	N/A	\$442,664
ENG	Award	2	1	1	1	2	4	3	3	6	1	0
	Decline	13	6	13	7	5	7	10	2	9	9	1
	Mean Ann. Awd	\$83,542	\$54,117	\$124,977	\$152,483	\$121,725	\$194,881	\$207,017	\$45,309	\$105,606	\$50,000	N/A
GEO	Award	8	8	10	8	4	12	5	1	6	7	6
	Decline	4	3	3	8	4	3	6	9	8	3	0
	Mean Ann. Awd	\$74,091	\$113,891	\$343,864	\$144,094	\$143,699	\$234,306	\$222,092	\$118,252	\$126,876	\$131,244	\$140,437
MPS	Award	10	12	16	11	8	10	5	6	14	3	4
	Decline	16	19	12	13	15	18	21	14	15	14	14
	Mean Ann. Awd	\$253,195	\$219,868	\$188,219	\$115,657	\$354,936	\$297,020	\$155,611	\$155,854	\$139,064	\$171,330	\$109,747
SBE	Award	0	1	3	1	1	0	0	0	0	1	2
	Decline	3	6	3	3	5	4	4	1	3	1	2
	Mean Ann. Awd	N/A	\$76,993	\$67,808	\$75,789	\$82,187	N/A	N/A	N/A	N/A	\$224,440	\$138,476
OD	Award				1	0				0		
	Decline				2	1				1		
	Mean Ann. Awd				\$50,000	N/A				N/A		

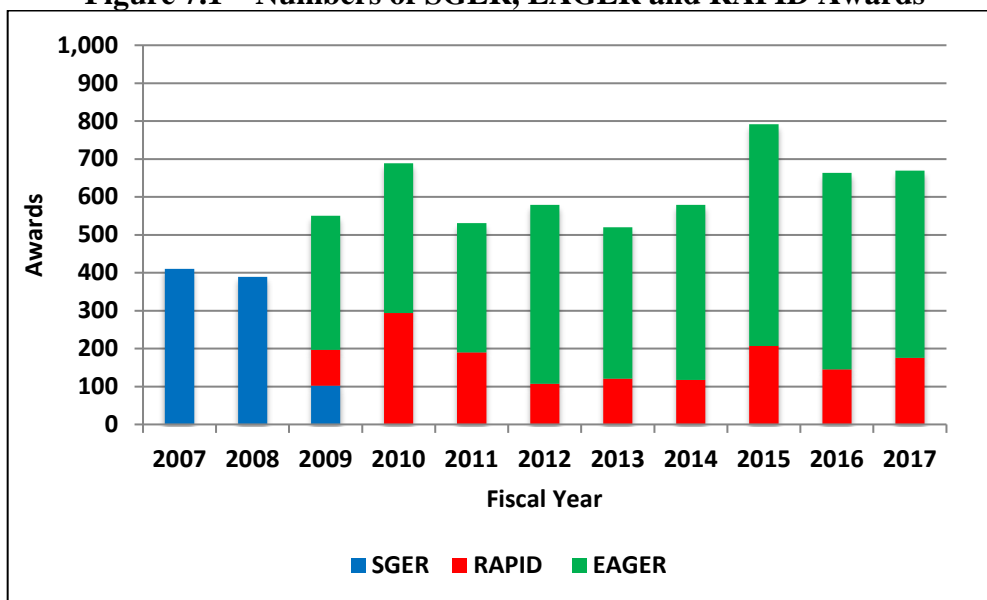
Source: NSF Enterprise Information System, 10/01/17. "N/A" = No accomplishment-based renewals awarded.

Mean annual award size is based on the annualized award size of each award. The latter is the total awarded, including supplements, divided by the award duration, including extensions. Since supplements and extensions occur post-award, the mean annual award amount for each directorate in prior years may change with time.

## Appendix 7 - Small Grants for Exploratory Research (SGER), EARly-concept Grants for Exploratory Research (EAGER), and Grants for Rapid Response Research (RAPID)

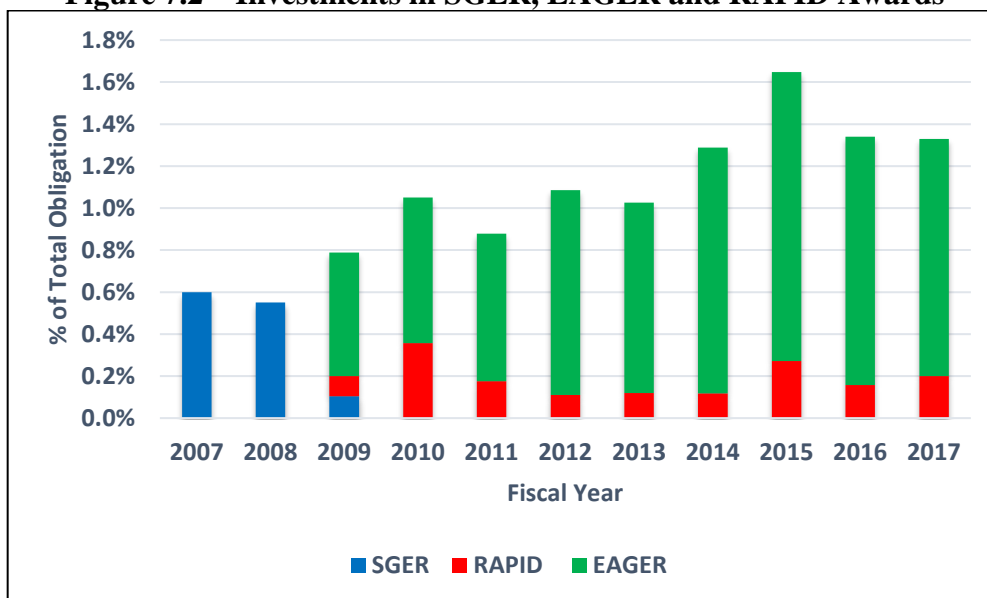
Figures 7.1, 7.2 and Table 7.1 provide funding trends for EAGERS, RAPIDs, and SGERs. Effective January 2009, the SGER funding mechanism was replaced by two separate funding mechanisms EAGER and RAPID, so FY 2009 includes all three types of awards.

**Figure 7.1 – Numbers of SGER, EAGER and RAPID Awards**



Source: Source: NSF Enterprise Information System 10/01/17 and 4/12/18.

**Figure 7.2 – Investments in SGER, EAGER and RAPID Awards**



Source: NSF Enterprise Information System 10/01/17 and 04/12/18.

**Table 7.1 - Early-concept Grants for Exploratory Research (EAGER) and Grants for Rapid Response Research (RAPID): Funding Trends, by Directorate or Office**

		2012		2013		2014		2015		2016		2017	
		RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER
<b>NSF</b>	Proposals	114	519	123	441	127	537	238	743	155	765	182	681
	Awards	107	472	121	399	117	462	207	585	145	518	176	493
	Funding Rate	94%	91%	98%	90%	92%	86%	87%	79%	94%	68%	97%	72%
	Total \$ (Millions)	\$7.9	\$70.3	\$8.4	\$64.2	\$8.6	\$85.0	\$20.3	\$103.0	\$12.1	\$90.7	\$14.8	\$83.6
	% of Obligations	0.1%	1.0%	0.1%	0.9%	0.1%	1.2%	0.3%	1.4%	0.2%	1.2%	0.2%	1.1%
	Average \$ (1000s)	\$74	\$149	\$70	\$161	\$73	\$184	\$98	\$176	\$84	\$175	\$84	\$170
<b>BIO</b>	Proposals	14	54	13	32	17	80	38	117	25	44	22	40
	Awards	13	50	12	25	13	77	29	104	19	40	22	37
	Funding Rate	93%	93%	92%	78%	76%	96%	76%	89%	76%	91%	100%	93%
	Total \$ (Millions)	\$1.2	\$9.0	\$1.5	\$6.1	\$1.4	\$19.1	\$3.9	\$19.7	\$2.8	\$10.4	\$2.4	\$8.3
	% of Obligations	0.1%	1.2%	0.2%	0.8%	0.2%	2.3%	0.5%	2.6%	0.3%	1.2%	0.3%	1.1%
	Average \$ (1000s)	\$89	\$181	\$124	\$243	\$111	\$247	\$134	\$190	\$150	\$260	\$111	\$225
<b>CISE</b>	Proposals	11	173	2	171	3	193	37	209	5	257	18	239
	Awards	10	166	2	165	3	159	27	163	5	176	18	129
	Funding Rate	91%	96%	100%	96%	100%	82%	73%	78%	100%	68%	100%	54%
	Total \$ (Millions)	\$1.2	\$28.1	\$0.1	\$27.6	\$0.4	\$28.9	\$3.3	\$27.8	\$0.8	\$33.7	\$1.7	\$21.5
	% of Obligations	0.1%	3.0%	0.0%	3.0%	0.0%	3.2%	0.4%	3.1%	0.1%	3.6%	0.2%	2.3%
	Average \$ (1000s)	\$116	\$169	\$45	\$168	\$144	\$182	\$121	\$170	\$168	\$192	\$92	\$167
<b>EHR</b>	Proposals	5	48	5	33	3	50	21	81	27	72	7	54
	Awards	5	25	5	19	3	37	21	45	26	43	7	39
	Funding Rate	100%	52%	100%	58%	100%	74%	100%	56%	96%	60%	100%	72%
	Total \$ (Millions)	\$0.7	\$6.3	\$0.8	\$4.9	\$0.7	\$9.4	\$2.1	\$10.8	\$1.5	\$8.1	\$1.6	\$10.0
	% of Obligations	0.1%	0.6%	0.1%	0.5%	0.1%	1.0%	0.2%	1.1%	0.1%	0.8%	0.2%	1.0%
	Average \$ (1000s)	\$146	\$252	\$153	\$258	\$231	\$253	\$100	\$239	\$57	\$188	\$228	\$257
<b>ENG</b>	Proposals	12	109	38	134	35	108	41	258	24	273	38	220
	Awards	10	107	38	125	34	96	34	203	21	155	36	176
	Funding Rate	83%	98%	100%	93%	97%	89%	83%	79%	88%	57%	95%	80%
	Total \$ (Millions)	\$0.4	\$12.7	\$1.8	\$16.4	\$1.6	\$14.6	\$3.3	\$33.7	\$1.2	\$22.7	\$2.8	\$25.7
	% of Obligations	0.1%	1.5%	0.2%	2.0%	0.2%	1.7%	0.4%	3.7%	0.1%	2.5%	0.3%	2.8%
	Average \$ (1000s)	\$42	\$119	\$49	\$131	\$47	\$152	\$97	\$166	\$56	\$146	\$78	\$146
<b>GEO</b>	Proposals	63	93	47	51	51	47	55	27	45	48	60	54
	Awards	61	89	47	49	51	46	55	26	45	45	57	51
	Funding Rate	97%	96%	100%	96%	100%	98%	100%	96%	100%	94%	95%	94%
	Total \$ (Millions)	\$3.8	\$8.2	\$3.1	\$5.0	\$3.0	\$5.1	\$3.7	\$3.5	\$3.5	\$5.2	\$3.0	\$6.5
	% of Obligations	0.3%	0.6%	0.2%	0.4%	0.2%	0.4%	0.3%	0.3%	0.3%	0.4%	0.2%	0.5%
	Average \$ (1000s)	\$62	\$92	\$66	\$103	\$60	\$112	\$68	\$135	\$78	\$115	\$52	\$127
<b>MPS</b>	Proposals	2	29	2	9	1	20	6	21	0	28	1	39
	Awards	1	24	2	6	1	19	6	17	0	27	1	27
	Funding Rate	50%	83%	100%	67%	100%	95%	100%	81%	N/A	96%	100%	69%
	Total \$ (Millions)	\$0.0	\$4.3	\$0.3	\$2.3	\$0.2	\$3.5	\$0.9	\$3.5	\$0.0	\$6.0	\$0.1	\$5.8

	2012		2013		2014		2015		2016		2017	
	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER
% of Obligations	0.0%	0.3%	0.0%	0.2%	0.0%	0.3%	0.1%	0.2%	0.0%	0.4%	0.0%	0.4%
Average \$ (1000s)	\$23	\$181	\$163	\$386	\$209	\$183	\$151	\$207	N/A	\$224	\$79	\$216
<b>SBE</b>												
Proposals	7	11	16	11	17	39	40	30	28	43	36	35
Awards	7	9	15	10	12	28	35	27	28	32	35	34
Funding Rate	100%	82%	94%	91%	71%	72%	88%	90%	100%	74%	97%	97%
Total \$ (Millions)	\$0.6	\$1.2	\$0.6	\$1.3	\$1.0	\$4.2	\$3.1	\$3.4	\$2.1	\$4.2	\$3.2	\$5.4
% of Obligations	0.2%	0.5%	0.2%	0.5%	0.4%	1.6%	1.1%	1.3%	0.8%	1.5%	1.2%	2.0%
Average \$ (1000s)	\$80	\$130	\$40	\$132	\$81	\$151	\$88	\$127	\$74	\$130	\$91	\$160
<b>OD</b>												
Proposals	0	2	0	0	0	0	0	0	1	0	0	0
Awards	0	2	0	0	0	0	0	0	1	0	0	0
Funding Rate	N/A	100%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total \$ (Millions)	\$0.1	\$0.4	\$0.4	\$0.5	\$0.3	\$0.5	\$0.0	\$0.6	\$0.2	\$0.4	\$0.1	\$0.2
% of Obligations	0.0%	0.2%	0.1%	0.2%	0.1%	0.2%	0.0%	0.2%	0.0%	0.1%	0.1%	0.2%
Average \$ (1000s)	N/A	\$196	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: NSF Enterprise Information System, 10/01/17 and 04/12/18. No distinction is made between funds obligated by a directorate to awards managed by that directorate and funds obligated by a directorate as co-funding for awards managed by other directorates. OD obligation totals include co-funding by EPSCoR and the Office of International Science and Engineering.

## Appendix 8 - Description of Merit Review Principles and Criteria<sup>44</sup>

### 1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary Federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These broader impacts may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and [have] a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

### 2. Merit Review Criteria

All NSF proposals are evaluated through [the] use of two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. Both criteria are to be given full consideration during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter

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<sup>44</sup> From NSF *Proposal and Award Policies and Procedures Guide*, [http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg\\_index.jsp](http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_index.jsp). Effective from January 14, 2013.

II.C.2.d.(i) contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d.(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to:
  - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
  - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well reasoned, well organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?



## Appendix 9 - Preliminary Proposals

Several NSF programs utilize preliminary proposals in an effort to reduce the workload of PIs and to increase the quality of full proposals. The number of preliminary proposals varies considerably as a result of competitions being held in a given fiscal year. For some programs, preliminary proposals are externally reviewed; other programs provide internal review only.

Decisions regarding preliminary proposals may be non-binding or binding. Non-binding decisions regarding preliminary proposals are recommendations; a PI may choose to submit a full proposal even if it has been discouraged. Binding decisions, however, are restrictive in that full proposals are only accepted from the preliminary proposal PIs invited to submit them. In general, programs obtain advice from external peer reviewers before making binding decisions about preliminary proposals.

### Number of Preliminary Proposals and Subsequent Actions

Fiscal Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total # Preliminary Proposals	2,842	3,203	3,856	2,883	965	5,135	4,691	4,911	4,251	4,584	4,564
Non-Binding (NB) Total *	1,540	669	1,140	1,384	357	459	457	92	1	239	602
NB Encouraged	662	333	519	636	128	222	296	29	0	122	268
NB Discouraged	878	336	621	748	229	237	161	63	1	117	334
Binding Total*	1,301	2,534	2,500	1,273	572	4,484	4,087	4,761	4,199	4,281	3,895
Binding Invite	252	572	685	372	245	1,236	942	1,083	1,045	1,124	1,172
Binding Non-invite	1,049	1,962	1,815	901	327	3,248	3,145	3,678	3,154	3,157	2,723

Source: NSF Report Server, April 11, 2017.

In FY 2012, the Directorate for Biological Sciences instituted a new requirement that PIs who wished to submit full proposals to the Divisions of Environmental Biology and Integrative Organismal Systems, in response to core program solicitations, the Research at Undergraduate Institutions solicitation, or the Long-term Research in Environmental Biology solicitation, must first submit a preliminary proposal. This pilot remained in effect through FY 2017.

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\* Non-binding and binding totals do not include preliminary proposals that have been withdrawn or returned without review.

**Appendix 10 - Mean Number of Reviews per Proposal, by Method  
and Directorate or Office - FY 2017**

		Methods of Review						
		All Methods	Ad Hoc + Panel	Ad Hoc Only	Panel Only	Internally Reviewed *	Returned without Review	Withdrawn Proposals
<b>NSF</b>	Reviews	184,752	57,052	7,481	120,219			
	Proposals	47,364	11,896	1,864	33,604	2,051	1,144	242
	Rev/Prop	3.9	4.8	4.0	3.6			
<b>BIO</b>	Reviews	21,098	13,767	83	7,248			
	Proposals	4,863	2,733	21	2,109	142	84	25
	Rev/Prop	4.3	5.0	4.0	3.4			
<b>CISE</b>	Reviews	33,128	3,160	452	29,516			
	Proposals	8,343	663	118	7,562	379	141	68
	Rev/Prop	4.0	4.8	3.8	3.9			
<b>EHR</b>	Reviews	17,156	1,144	394	15,618			
	Proposals	4,156	239	104	3,813	138	87	7
	Rev/Prop	4.1	4.8	3.8	4.1			
<b>ENG</b>	Reviews	43,908	2,659	534	40,715			
	Proposals	12,373	587	157	11,629	655	498	25
	Rev/Prop	3.5	4.5	3.4	3.5			
<b>GEO</b>	Reviews	20,955	16,584	1,853	2,518			
	Proposals	4,581	3,378	485	718	212	90	15
	Rev/Prop	4.6	4.9	3.8	3.5			
<b>MPS</b>	Reviews	29,338	6,472	3,543	19,323			
	Proposals	8,500	1,550	825	6,125	348	140	84
	Rev/Prop	3.5	4.2	4.3	3.2			
<b>OIA</b>	Reviews	429	275	23	131			
	Proposals	115	80	5	30	2	15	0
	Rev/Prop	3.7	3.4	4.6	4.4			
<b>OISE</b>	Reviews	857	201	10	646			
	Proposals	292	40	3	249	6	14	9
	Rev/Prop	2.9	5.0	3.3	2.6			
<b>SBE</b>	Reviews	17,883	12,790	589	4,504			
	Proposals	4,141	2,626	146	1,369	169	75	9
	Rev/Prop	4.3	4.9	4.0	3.3			

Source: NSF Enterprise Information System, 10/01/17.

\* The proposals totals shown in the “All Methods” category do not include the proposals shown in the “Internally Reviewed” category. Proposals that are not externally reviewed typically include RAPIDs, EAGERs, and small grants for travel and symposia. Beginning in 2017, they also include RAISE proposals.

The “Internally Reviewed” category includes award and decline actions for proposals that were reviewed by NSF experts in the relevant topical areas but did not receive external reviews, while the “Returned without Review” and “Withdrawn Proposals” categories reflect proposals that were neither awarded nor declined.

The counts of panel reviews do not include panel summaries. There were approximately 46,940 panel summaries in FY 2017.

Withdrawn proposals include only those that underwent merit review.

The reviews of an individual participating as both an ad hoc reviewer and a panel reviewer for the same proposal are counted as one review in this table.

## Appendix 11 - Oversight and Advisory Mechanisms

NSF relies on the judgment of external experts to provide advice and recommendations to maintain high standards of program support for research, education, and infrastructure; to facilitate policy deliberations, program development and management; to identify disciplinary needs and areas of opportunities; and to promote openness to the research and education community served by the Foundation.

- **Committees of Visitors.**

Committee of Visitors (COV) provide NSF with external expert judgments in two areas: (1) assessments of the quality and integrity of program operations; and (2) program-level technical and managerial matters pertaining to proposal decisions.

COV reviews are conducted at regular intervals of approximately four years for programs that award grants or cooperative agreements and whose main focus is the support of NSF research and education in science and engineering. The COVs evaluate the integrity and efficiency of the processes used for proposal review and program decision-making. In addition, the COVs examine program management and portfolio balance. The COV reports, written as answers and commentary to specific questions, are reviewed by Advisory Committees and then submitted to the directorates and the NSF Director. The recommendations of COVs are reviewed by management and taken into consideration by NSF when evaluating existing programs and future directions for the Foundation.<sup>45</sup>

- **Advisory Committees.**

Each directorate has an external advisory committee that typically meets twice a year. Advisory committees provide advice and recommendations about portfolio, provide a base of contact with the scientific community to inform NSF of the impact of its research support and NSF-wide policies on the scientific community, and provide broad input into long-range plans and partnership opportunities. They provide advice on program management, overall program balance, and other aspects of program performance. In addition to directorate advisory committees, NSF has several committees that provide advice and recommendation on specific topics: astronomy and astrophysics; environmental research and education; equal opportunities in science and engineering; direction, development and enhancement of innovations; and business and operations. They are typically composed of 15-25 experts who have experience relevant to the programs or topics and are broadly drawn from academia, industry, and government. As part of their mission, directorate and some other advisory committees review COV reports and staff responses.

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<sup>45</sup> The COV reports and directorate responses are available electronically at <http://www.nsf.gov/od/oia/activities/cov/covs.jsp>.

## Appendix 12 - Requests for Formal Reconsideration of Declined Proposals

		Fiscal Year										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<b>First Level Reviews (Assistant Directors):</b>												
<b>BIO</b>	Request	2	5	3	1	4	2	2	0	6	3	4
	- Upheld	2	5	3	1	3	0	2	0	4	3	4
	- Reversed	0	0	0	0	1	2	0	0	2	0	0
<b>CISE</b>	Request	1	0	0	2	3	5	1	4	2	1	3
	- Upheld	1	0	0	2	3	5	1	3	1	1	3
	- Reversed	0	0	0	0	0	0	0	0	1	0	0
<b>EHR</b>	Request	6	7	2	2	2	3	4	2	4 <sup>+</sup>	3	4
	- Upheld	6	7	2	2	2	3	4	2	4	3	4
	- Reversed	0	0	0	0	0	0	0	0	0	0	0
<b>ENG</b>	Request	3	3	3	11	8	5	7 <sup>**</sup>	11	3	5	8
	- Upheld	3	3	3	9	7	5	5	11	3	5	8
	- Reversed	0	0	0	2	1	0	1	0	0	0	0
<b>GEO</b>	Request	2	0	2	3	2	2	1	1	2	0	1
	- Upheld	2	0	1	3	2	2	1	1	2	0	1
	- Reversed	0	0	1	0	0	0	0	0	0	0	0
<b>MPS</b>	Request	16	14	9	14 <sup>^</sup>	11	22	12	12	10 <sup>++</sup>	8 <sup>^^</sup>	6
	- Upheld	15	14	7	12	11	21	11	12	10	8	6
	- Reversed	1	0	2	0	0	1	1	0	0	0	0
<b>SBE</b>	Request	0	2	1	1	0	0	0	0	1	0	0
	- Upheld	0	2	1	1	0	0	0	0	1	0	0
	- Reversed	0	0	0	0	0	0	0	0	0	0	0
<b>Other<sup>*</sup></b>	Request	3	0	1	0	0	1	0	0	0	1	0
	- Upheld	3	0	0	0	0	1	0	0	0	1	0
	- Reversed	0	0	1	0	0	0	0	0	0	0	0
<b>Second Level Reviews (Deputy Director):</b>												
<b>O/DD</b>	Request	1	3	2	3	3	6	1	3	7	4	6
	- Upheld	1	3	2	3	1	6	1	3	7	4	6
	- Reversed	0	0	0	0	2	0	0	0	0	0	0
<b>Total Reviews First &amp; Second Level</b>												
<b>NSF</b>	Request	34	34	23	37 <sup>^</sup>	33	46	28	33	35	25	32
	- Upheld	33	34	19	33	29	43	25	32	32	25	32
	- Reversed	1	0	4	2	4	3	2	0	3	0	0

Source: Office of the Director, 07/06/17.

\* From 2007 to 2012, the "Other" category includes OCI, OIA, OPP, and OISE. For FY 2013 and FY 2014, it included OIIA. From FY 2015, it included OIA and OISE.

<sup>^</sup> The number of decisions (upheld or reversed) may not equal the number of requests in each year due to carry over of a pending reconsideration request. <sup>^^</sup> One request received in FY 2016 was decided in FY 2017.

<sup>\*\*</sup> One reconsideration request was returned to the PI for failure to follow the procedure described in the *Proposal and Award Policies and Procedures Guide*.

<sup>+</sup> Includes a reconsideration of a Return Without Review action.

<sup>++</sup> Includes a reconsideration request received after the 90-day window.

**Appendix 13 - Methods of NSF Proposal Review, by Directorate or Office – FY 2017**

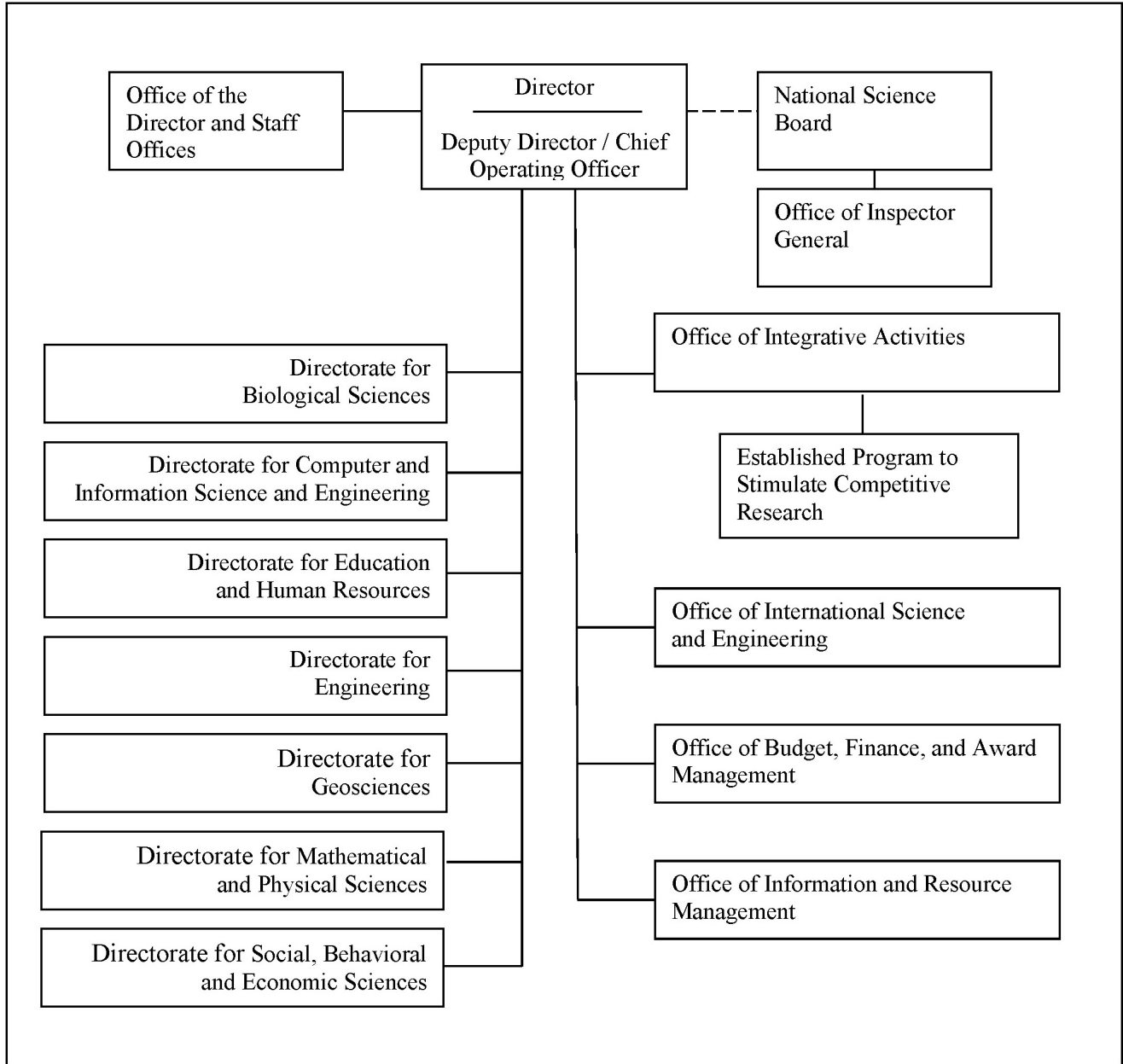
Directorate	Total Proposals	Ad Hoc + Panel		Ad Hoc Only		Panel Only		Internally Reviewed	
		Proposals	Percent	Proposals	Percent	Proposals	Percent	Proposals	Percent
NSF	49,415	11,896	24%	1,864	4%	33,604	68%	2,051	4%
BIO	5,005	2,733	55%	21	0%	2,109	42%	142	3%
CISE	8,722	663	8%	118	1%	7,562	87%	379	4%
EHR	4,294	239	6%	104	2%	3,813	89%	138	3%
ENG <sup>46</sup>	13,028	587	5%	157	1%	11,629	89%	655	5%
GEO	4,793	3,378	70%	485	10%	718	15%	212	4%
MPS	8,848	1,550	18%	825	9%	6,125	69%	348	4%
OIA	117	80	68%	5	4%	30	26%	2	2%
OISE	298	40	13%	3	1%	249	84%	6	2%
SBE	4,310	2,626	61%	146	3%	1,369	32%	169	4%

Source: NSF Enterprise Information System, 10/01/17.

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<sup>46</sup> This total includes Small Business Innovation Research Program and Small Business Technology Transfer Program proposals.

**Appendix 14 - National Science Foundation Organization Chart**



The figure shows the organizational structure in place at the end of FY 2017. Staff offices not explicitly shown include the Office of Diversity and Inclusion, the Office of the General Counsel, and the Office of Legislative and Public Affairs.

## Appendix 15 - Acronyms

<u>Acronym</u>	<u>Definition</u>
ACI	Division of Advanced Cyberinfrastructure
AGS	Division of Atmospheric and Geospace Sciences
ARRA	American Recovery and Reinvestment Act
AST	Division of Astronomical Sciences
BCS	Division of Behavioral and Cognitive Sciences
BFA	Office of Budget, Finance and Award Management
BIO	Directorate for Biological Sciences
CBET	Division of Chemical, Bioengineering, Environmental and Transport Systems
CCF	Division of Computing and Communication Foundations
CFR	Code of Federal Regulations
CGI	Continuing Grant Increment
CHE	Division of Chemistry
CISE	Directorate for Computer and Information Science and Engineering
CMMI	Division of Civil, Mechanical and Manufacturing Innovation
CNS	Division of Computer and Network Systems
COV	Committee of Visitors
CISE	Directorate for Computer and Information Science and Engineering
DBI	Division of Biological Infrastructure
DD	Division Director
DEB	Division of Environmental Biology
DGE	Division of Graduate Education
DMR	Division of Materials Research
DMS	Division of Mathematical Sciences
DRL	Division of Research on Learning in Formal and Informal Settings
DUE	Division of Undergraduate Education
EAGER	EARly-concept Grants for Exploratory Research
EAR	Division of Earth Sciences
ECCS	Division of Electrical, Communications and Cyber Systems
EEC	Division of Engineering Education and Centers
EF	Emerging Frontiers
EFRI	Emerging Frontiers in Research and Innovation
EHR	Directorate for Education and Human Resources
ENG	Directorate for Engineering
EPSCoR	Established Program to Stimulate Competitive Research
FY	Fiscal Year (October 1 – September 30)
GDP	Gross Domestic Product
GEO	Directorate for Geosciences
HRD	Division of Human Resource Development
IIA	Office of International and Integrative Activities



IIP	Division of Industrial Innovation and Partnerships
IIS	Division of Information and Intelligent Systems
IOS	Division of Integrative Organismal Systems
INSPIRE	Integrated NSF Support Promoting Interdisciplinary Research and Education
IPAs	Temporary employees hired through the Intergovernmental Personnel Act
IPS	Interactive Panel System
ISE	International Science & Engineering
K-12	Kindergarten to 12 <sup>th</sup> grade
MCB	Division of Molecular and Cellular Biosciences
MPI	Multiple PI
MPS	Directorate for Mathematical and Physical Sciences
MSI	Minority-Serving Institution
NSB	National Science Board
NSF	National Science Foundation
OAC	Office of Advanced Cyberinfrastructure
OCE	Division of Ocean Sciences
OCI	Office of Cyberinfrastructure
OD	Office of the Director
ODD	Office of the Deputy Director
OIA	Office of Integrative Activities
OISE	Office of International Science & Engineering
OPP	Office of Polar Programs
PAPPG	Proposal and Award Policies and Procedures Guide
PARS	Proposal, PI and Reviewer System
PI	Principal Investigator
PLR	Division of Polar Programs
PHY	Division of Physics
PWD	PI (or Person) With a Disability
RAPID	Grants for Rapid Response Research
RWR	Return Without Review
SBE	Directorate for Social, Behavioral and Economic Sciences
SCI	Division of Shared Cyberinfrastructure
SES	Division of Social and Economic Sciences
SGER	Small Grants for Exploratory Research
SMA	Office of Multidisciplinary Activities in the Directorate for Social, Behavioral and Economic Sciences
SPI	Single PI
STEM	Science, Technology, Engineering and Mathematics
URM	Under-Represented Minority
US	United States
VSEE	Visiting Scientists, Engineers and Educators