

# 1. Introduction

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The National Science Foundation uses a variety of mechanisms to support faculty and academic researchers. One form of support— fellowships— provides financial assistance directly to individuals. The intent is to provide recipients with considerable latitude in planning the focus of their academic and research activities. Since 1983, NSF has sponsored or participated in five such fellowship programs for accomplished young tenure-track faculty.

## What is the PFF Program?

The Presidential Faculty Fellows (PFF) program was established in 1992 at the request of President George Bush to recognize and support the scholarly endeavors of young tenure-track faculty.<sup>3</sup> Administered by the National Science Foundation (NSF), the program provided grant recipients with \$100,000 per year for up to 5 years. Fellows could use PFF funding to (1) undertake self-designed, innovative research and teaching projects; (2) establish research and teaching programs; and (3) pursue other academic-related activities. By funding these activities, the Foundation sought to

- recognize, honor, and promote the integration of high-quality teaching and research in science and engineering fields;
- foster innovative and far-reaching developments in science and technology;
- create the next generation of academic leaders; and
- improve public understanding of the work of scientists and engineers.

Fellows were selected by the White House (following NSF's review process) on the basis of their contributions and accomplishments in the following three areas:<sup>4</sup>

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<sup>3</sup> PFF defined "tenure-track" positions as (1) any assistant professorship or higher at institutions that offer tenure, or (2) research and teaching positions at the assistant professor or higher level at institutions that do not offer tenure. Individuals holding research only (non-teaching) positions were not eligible for PFF. Furthermore, recipients were required to be U.S. citizens or permanent residents.

<sup>4</sup>These review criteria are taken from the PFF program's FY 1995 submission guidelines.

- **Competence and leadership as an educator** as evidenced by factors such as implementation of new curricula, design of new courses, significant educational books, refereed publications, papers presented at national or international meetings, honors, distinguished service, and contributions to the public understanding of science or engineering.
- **Competence and leadership as a researcher** as evidenced by factors such as definitive research accomplishments, refereed publications, technical books published, patent and software credits, significant technical papers presented at national or international meetings, honors, distinguished service, and recognition by the community for contributions to the public understanding of research by lay persons.
- **Impact of the nominee on his/her nominating institution** as evidenced by factors such as significant facilitation of cross-disciplinary research efforts, recognized contributions to educational reforms, and other noteworthy services to the institution and in the community on behalf of the institution.

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*PFF nominees  
represented some of  
the Nation's most  
outstanding young  
science and engineering  
faculty members.*

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Half of the 30 awards made in a given year were to faculty in engineering disciplines. The remaining awards were to faculty in science disciplines. Responsibility for oversight of a Fellow's activities was assigned to NSF program officers in the appropriate Directorate. Program management was the responsibility of the Foundation's Division of Graduate Education (DGE) in the Directorate for Education and Human Resources (EHR).

## **How Does PFF Compare to Other NSF Efforts to Support Young Tenure-Track Faculty?**

Over the past 15 years, the Foundation has used a series of grant programs to support promising young faculty at the beginning of their academic careers. These initiatives can be collectively called "young faculty fellowship programs" because of their focus on empowering faculty who are just beginning their academic careers. Since 1983, NSF has sponsored or participated in five such programs, including the Presidential Young Investigator (PYI), NSF Young Investigator (NYI), Presidential Faculty Fellows (PFF), Faculty Early Career

(CAREER), and Presidential Early Career Awards for Scientists and Engineers (PECASE).<sup>5</sup>

Initially, these initiatives were primarily designed to "improve the capabilities of academe to respond to the demand for highly qualified scientific and engineering personnel for academic and industrial research," as well as to "encourage and motivate a partnership between the private sector and the investigators, their institutions and the federal government" (Program Announcement for the Presidential Young Investigator Awards, 1990). With time, these fellowship programs took on the added purpose of recognizing and promoting the integration of research and education. While the approaches of these programs have evolved over time, the underlying vision and core strategies have remained the same. Specifically, each of the young faculty fellowship programs has been used to develop intellectual capital, strengthen the physical infrastructure of the Nation's colleges and universities, foster the integration of research and education, and promote partnerships.

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### **Presidential Young Investigator Program**

The first of the young faculty fellowship programs was the Presidential Young Investigator (PYI) program. Initiated in 1983, the program was primarily designed to (1) improve the capacity of colleges and universities to produce highly qualified science and engineering personnel for academic and industrial research, and (2) encourage and motivate partnerships between faculty and other sectors, e.g., private industry and government.

Between 1984 and 1989, the program provided funding to 1,256 young faculty (an average of 140 individuals per year). As shown in Exhibit 1-1, individuals were nominated by their institutions and received an annual base award of \$25,000 for up to 5 years. In an effort to encourage and motivate partnerships, recipients could also obtain up to \$37,500 from NSF in one-to-one matching funds (matched funds could come from private industry, nonprofit organizations, or local/state governments). Eligible institutions could put forward faculty members who had received a Ph.D. within 6 years of nomination. Additional rules stipulated that nominees could not have been in a tenure track position for more than 4 years. There were no limitations on the number of nominations that could be made by an institution.

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<sup>5</sup>The Foundation has also sponsored a series of fellowship programs for outstanding researchers and teachers, including the Alan T. Waterman Award, NSF Postdoctoral Fellowships, and NSF Visiting Professorships for Women.

**Exhibit 1-1. — Summary of NSF programs designed to support young tenure-track faculty:  
1983-present**

Program	Years active	Type of nomination	Award characteristics				
			Matching option with industry	Maximum annual federal amount	Length	Type	Maximum number of awards per year
PYI	1983-92	Institution	Yes	\$62,500	5 years	Fixed	200
NYI	1992-96	Institution	Yes	\$62,500	5 years	Fixed	200
PFF	1992-2000	Institution	No	\$100,000	5 years	Fixed	30
CAREER	1995-	Self	Yes	\$40,000- \$100,000	4-5 years	Variable <sup>1</sup>	350
PECASE <sup>2</sup>	1997-	Government agency	No	\$100,000	5 years	Fixed	60

<sup>1</sup>Funding amount varies by field.

<sup>2</sup>The PECASE program is a multi-agency initiative that provides support to young tenure-track faculty. NSF selects its nominees for PECASE from a group of its most meritorious CAREER awardees.

SOURCE: NSF program documentation.

### **NSF Young Investigator Program**

In 1991, PYI was replaced by the NSF Young Investigator Program (NYI). This programmatic change was made because the prestige associated with the term “Presidential” was not consistent with the large number of participants in the PYI program. Like the PYI awards, NYI grants consisted of a \$25,000 base award with an optional one-to-one matching of partnership funds up to a maximum of \$37,500, bringing the total federal portion of the annual award to \$62,500. In addition, like PYI, institutions could nominate an unrestricted number of eligible faculty members in any given year.

### **Presidential Faculty Fellows Program**

The PFF program, inaugurated in 1992, differed from its predecessors in four important respects. First, it provided grant recipients with considerably more financial assistance (\$100,000 per year for up to 5 years).<sup>6</sup> Second, PFF was used to support considerably fewer individuals (30 per year, compared with 150-200 per year for PYI and NYI). Third, whereas the PYI and NYI programs had been created to foster cooperation between government and industry, the PFF program did not include this component. Fourth, while NSF oversaw the selection process,

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*PFF carried more financial impact and prestige than its predecessors.*

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<sup>6</sup>Some fellows were originally PYI or NYI nominees. Their awards were converted to PFF and, as a result, they received only funds remaining from the original award.

the final decision and announcement of candidates was made by the White House. As such, PFF carried considerably more financial impact and prestige than its predecessors.

The PFF program made awards to 120 individuals between 1992 and 1995. In FY 1996, the Foundation stopped making new PFF awards. As is discussed below, the PFF program was replaced by the Foundation's participation in the Presidential Early Career Awards for Scientists and Engineers (PECASE) program.

### **Presidential Early Career Awards for Scientists and Engineers Program**

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*The PECASE award is the "highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers."*

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In February 1996, President Clinton announced the Presidential Early Career Awards for Scientists and Engineers (PECASE) program. The program, administered by the National Science and Technology Council, accepts nominations for young investigators from 10 federal agencies.<sup>7</sup> According to a program announcement, the PECASE award is the "highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers." The program's purpose is to (1) recognize demonstrated excellence and promise of future success in scientific or engineering research; (2) foster innovative and far-reaching developments in science and technology; (3) increase awareness of careers in science and engineering; (4) recognize the scientific missions of participating agencies; (5) enhance connections between fundamental research and national goals; and (6) highlight the importance of science and technology for the Nation's future.

Within NSF, nominees are selected from among the most noteworthy individuals funded through the CAREER program. If a CAREER awardee is also granted a PECASE award, the total award is adjusted to the maximum funding level of \$500,000 over 5 years. In 1997, 20 of the 60 PECASE awardees were CAREER recipients. The remaining 40 PECASE awardees were spread across seven of the other participating agencies.

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<sup>7</sup>The 10 agencies participating in the PECASE program are the National Science Foundation, National Aeronautics and Space Administration, Environmental Protection Agency, Department of Veterans Affairs, Department of Health and Human Services (National Institutes of Health), Department of Energy (Energy Research Programs, Defense Programs), Department of Defense (U.S. Air Force, U.S. Army, U.S. Navy), Department of Agriculture (National Research Initiative, Agricultural Research Service, Forest Service), Department of Commerce (National Oceanic and Atmospheric Administration, National Institute of Standards and Technology), and Department of Transportation.

## Faculty Early Career Development (CAREER) Program

With the termination of the PFF program in 1996, along with other Directorate-specific initiatives,<sup>8</sup> the CAREER program became the Foundation's primary means for supporting young tenure-track faculty. Initiated in FY 1995, the CAREER program shared PFF's goals of supporting junior faculty and encouraging the synthesis of education and research. Specifically, the objectives of the CAREER program are to:<sup>9</sup>

- Serve the national interest by encouraging faculty to become both highly productive researchers and dedicated and effective educators.
- Provide a visible and effective program of support for new faculty emphasizing the planning and development of a full academic career, while requiring applicants to meet normal standards of merit-reviewed research proposals.
- Continue the Foundation's visible commitment to the equitable support of women, underrepresented minorities, and persons with disabilities with a well-defined process of accountability.
- Simplify the administration and evaluation of Foundation support for junior faculty.

Unlike PFF, however, the duration and amount of CAREER funding could differ across awardees. Specifically, the CAREER program provides awards ranging from \$200,000 to \$500,000 over a 4- to 5-year period. According to the CAREER management plan, the duration and amount of any given CAREER award should reflect the grantee's discipline and research/teaching objectives. In addition:

- The number of annual awards increased significantly over PFF, from 30 to 350. However, the proportional distribution by race and gender was nearly identical.
- CAREER offers some grant recipients supplemental funding of up to \$25,000 if they collaborate with industrial, governmental, or nonprofit entities.
- Unlike PFF, which required that nominations be made at the institution level, CAREER accepts applications from individual faculty members with departmental endorsement.

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<sup>8</sup>CAREER replaced the NSF Young Investigator Award, the ENG/CISE Research Initiation Award (NIA), and the Research Initiation Award component of the Minority Research Initiation Program.

<sup>9</sup>Source: CAREER management plan.

## Similarities and Differences among NSF's Young Faculty Fellowship Programs

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*All of the young faculty fellowship programs shared two important goals: recognizing scholars who demonstrate the promise of continued excellence in their field early in their careers, and encouraging continued excellence by underwriting their research and other academic activities.*

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Although the young faculty fellowship programs reflect similar philosophies and strategies, there are important differences among them. NYI and PYI, for example, focused largely on research, while PFF and later programs emphasized excellence in teaching as well. PFF and PECASE made relatively few NSF awards each year (30 and 20, respectively), while other programs made between 200 and 350. Young faculty can nominate themselves or be nominated by their institutions for CAREER awards. PECASE Fellows are nominated by the federal agencies participating in the program. Nominations for other young faculty fellowship programs were made exclusively by institutions of higher education. These differences notwithstanding, all of the young faculty fellowship programs shared two important goals: recognizing scholars who demonstrate the promise of continued excellence in their field early in their careers, and encouraging continued excellence by underwriting their research and other academic activities.

## Study Purpose and Methodology

### Exhibit 1-2.— Data sources

**Official NSF memoranda and materials.** This review included program announcements and guidelines (for PFF and other Foundation programs that target young tenure-track faculty), annual PFF management plans, minutes and findings from PFF nomination review panels, and a DGE report on Fellows' activities and accomplishments.

**Proposal and award documentation for each of the 120 PFF Fellows.** Each file generally contained a Fellow's curriculum vita and annual progress reports to NSF. Some of the files also contained newspaper articles and other media clippings that pertained to PFF-related activities.

This study focuses on PFF and describes the PFF-related experiences of the 120 faculty members who received financial support through the PFF program. As the smallest of the NSF programs that supported the professional development of young faculty, PFF was chosen for study in order to facilitate a more in-depth examination of program impacts. Additionally, PFF offered the additional feature of *not* requiring matching funds, thus allowing participants more freedom to pursue their chosen interests regardless of the availability of other funding sources.

The study addresses the following issues:

- What were the characteristics of PFF nominees and awardees?
- What types of activities have Fellows undertaken?
- What is the range of achievements that have been attained by Fellows?
- What lessons about the PFF program could be applied to future NSF initiatives?

This present study of PFF relied heavily on content analysis of existing materials to chronicle the activities and accomplishments of the 120 Fellows funded through the life of

the program. To some extent, it can be considered an experiment in data mining, an attempt at exploring the utility of trying to develop a rich understanding of a program's impact from routinely maintained documents. This approach had the added benefit of minimizing burden on the programs' principal investigators (PIs). Additionally, in fall 1998, current curriculum vitae were collected directly from Fellows, in order to provide a more up-to-date source of information on their activities and accomplishments. Exhibit 1-2 shows the sources of data drawn upon in this study.

Following the review and coding of documents, we contacted some of the Fellows to (1) clarify information that they had provided in their annual progress reports, and (2) gather more detail on their experiences and accomplishments. For example, Fellows were asked to describe how PFF expanded their vision and outlook, ways in which the program transformed their teaching and mentoring styles, and changes that could be made to improve the effectiveness and overall impact of the program. Finally, we interviewed the two NSF program officers who had been responsible for oversight and management of the PFF program. The purpose was to increase our understanding of the program's history, to obtain additional information on the experiences of PFF awardees, and to learn about the types of issues and questions that were routinely raised by Fellows.

It should be noted that the study is only intended to describe the *range* of activities and accomplishments reported by the 120 individuals who received PFF funding. Much of the study's information on PFF-related activities was derived from Fellows' annual progress reports to NSF. As would be expected, there was considerable variation in the quality of these self-reported chronologies. In some cases, Fellows used their progress reports to clearly illustrate how PFF had enhanced their teaching and research. In other cases, Fellows merely provided highly technical summaries of research activities that were being supported by PFF.

## Organization of the Report

Chapter 2 provides a description of the characteristics of Fellows and their home institutions. Chapter 3 provides information about the activities and accomplishments reported by the Fellows. Chapter 4 provides a summary and conclusions.

### Exhibit 1-2.— Data sources (continued)

#### **Fellows' curriculum vitae.**

Curriculum vitae were collected from Fellows in fall, 1998, to provide the most current information possible on Fellows' achievements and other career progress.

**Annual progress reports.** Fellows were required to submit annual progress reports that summarized their academic activities for the previous year. These reports, which were not to exceed three pages, generally included information about a Fellow's research accomplishments, courses taught, graduate students supervised, oral presentations, papers published, and community outreach activities. Annual progress reports were reviewed for 105 of the 120 Fellows who received PFF funding. For the remaining 15 Fellows, reports were not contained in the central PFF files and, therefore, were not included in our analysis.

**Web sites.** All of the Fellows' home pages were reviewed. The purpose was to obtain additional information about PFF-supported teaching and research activities.

**Fellows' products.** Products that were reviewed included congressional testimony, papers and reports on topics pertaining to science and technology, and Fellows' memoranda to DGE staff on how PFF had influenced their teaching and instruction.

#### **EHR Impact Database.**

Information from the EHR Impact Database was used to obtain information about Fellows' characteristics.<sup>1</sup>

<sup>1</sup>The EHR Impact Database was also used to generate data about the amount of financial support received by Fellows from NSF and other sources. However, these data were not used in this report because they were more reflective of planned expenditures rather than actual disbursements.