National Science Foundation

ROTATOR STUDY

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A report from the Evaluation and Assessment Capability Section of the National Science Foundation

About the Evaluation and Assessment Capability Section

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About this report

This report was prepared by the Evaluation and Assessment Capability Section of the Office of Integrative Activities at the National Science Foundation. It was written by Christina Freyman based on existing data and analyses provided by Lindsey Moraz in NSF's Division of Human Resource Management (HRM). Turquoise Bowen performed quality assurance.

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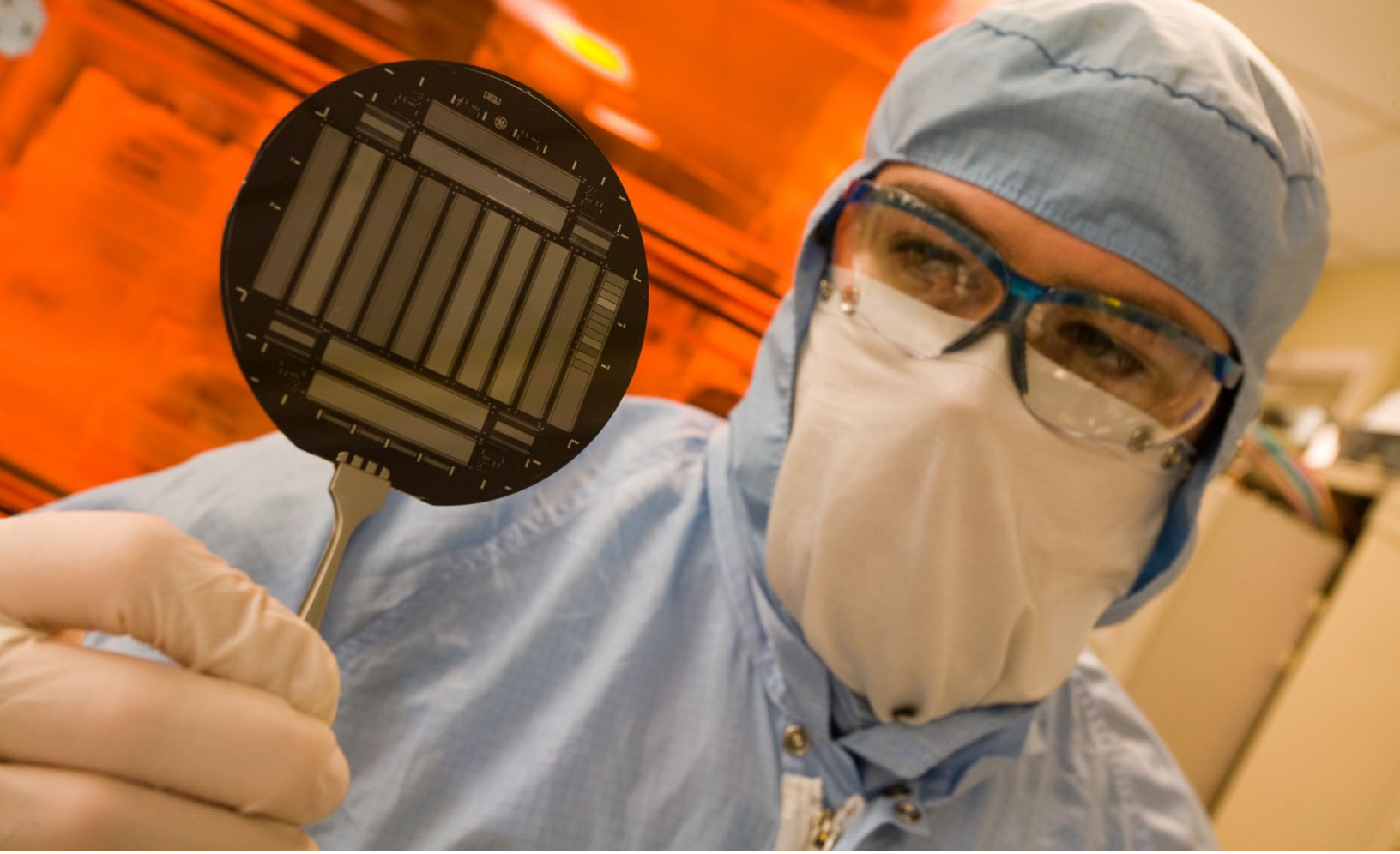


NEATEC prepares technicians for careers in the technologically advanced semiconductor manufacturing facilities expanding in the Northeastern U.S. Credit: Photo from ATE Centers Impact 2011 (www.atecenters.org)

Abstract

The Intergovernmental Personnel Act (IPA) enables scientists, engineers, and educators from other government agencies, non-profit organizations, and colleges and universities to join the National Science Foundation (NSF) as temporary staff members. In 2018, a Government Accountability Office (GAO) report noted that individuals who serve under the IPA program (colloquially known as "IPAs") bring benefits to the government but at a greater cost when compared to peer federal government employees. The report also raised questions about the contribution of rotator programs toward NSF's goals. Recent analysis suggests that IPAs contribute to NSF's goals of increasing the diversity of NSF's workforce and deepening connections with institutions throughout the nation, as measured by the characteristics of IPAs and their institutions. As of FY 2019, these benefits come with a cost savings to the Federal government due to a pilot that required cost sharing by IPA institutions and an increase in costs of peer federal employees. As of FY 2020, NSF adopted cost sharing as a permanent policy. Ongoing monitoring indicates that the cost savings continue to be realized.

Background

Intergovernmental Personnel Act at NSF

The Intergovernmental Personnel Act (IPA) of 1970 (42 U.S.C. 4701 et seq.) allows for scientists, engineers, and educators from other government agencies, non-profit organizations, and colleges and universities to join the National Science Foundation (NSF) as temporary staff members. The Office of Personnel and Management (OPM) highlights various advantages of employing IPAs, including to strengthen the management capabilities of federal agencies and to assist in the transfer of and use of "new technologies and approaches to solving governmental problems" (Office of Personnel and Management, n.d.).

Many internal NSF presentations echo OPM's statements. These presentations list the following IPA programmatic goals:

- Bring fresh perspective to NSF
- Ensure that NSF is at the frontier of science and engineering (S&E)
- Expand scientific networks for the rotator
- Transfer knowledge from NSF back to the IPA's home institution
- Provide mentorship
- Increase communication between NSF and the institution
- Provide a public service to the research community
- Bolster the connections and credibility of NSF
- Raise awareness and increase communication
- Provide effective scientific leadership and management of NSF's programs

Interns at the Marine Advanced Technology Education (MATE) Center located at Monterey Peninsula College in Monterey, California, learn about the information technology and networking systems on ships. Credit: Photo from ATE Impacts 2018–2019 book (https://ateimpacts.net/book)

In 2004, the National Academy of Public Administration (NAPA) published a panel report for the U.S. Congress and NSF. This panel reviewed various topics, including the use of rotators in key positions. The panel gathered data and interviewed a small set of stakeholders. The panel found that "(1) NSF has attracted well-qualified scientists with substantial and diverse experience to serve in these critical positions, (2) their use is consistent with the practices of other scientific organizations, and (3) their use should be continued" (National Academy of Public Administration, 2004).

The NSF Office of Inspector General (OIG) released a report in 2013 (National Science Foundation Office of Inspector General, 2013) highlighting that, on average, individuals employed under the IPA program cost the government more than similar federal employees due to the following reasons:

- IPAs are not subject to the government pay cap.
- Fringe benefit rates are higher than for government employees.
- IPAs receive per diem and travel support for independent research programs.
- IPAs receive lost consulting fees and rebates on state taxes if coming from a tax-free state.
- Few universities participated in the 15% requested cost share of the IPA's salary because it was voluntary.

In response to the OIG report, in FY 2017 NSF began pilot testing two policy changes to achieve cost savings. First, NSF stopped paying lost consulting fees and limited NSF-supported trips for independent research. In addition, NSF implemented a one-year pilot requiring a 10% cost share by an IPA's home institution unless a formal waiver was granted. After a year, NSF conducted a review of cost savings and effects on pilot participants. The review resulted in NSF initially extending the cost sharing pilot into FY 2018.

A 2018 GAO report (National Science Foundation, NSF Corrective Action Plan in Response to GAO Report) detailed NSF's progress on addressing costs and management oversight of the IPA program at NSF. The report stated that NSF achieved cost savings through the cost share pilot but did not publish any conclusions on how the IPA program contributes to NSF's human capital goals. Instead, GAO recommended that the NSF Director of Human Resource Management evaluate the contributions of the IPA and Visiting Scientist, Engineer and Educator rotator programs toward NSF's human capital goals and the contributions the programs have made toward achieving programmatic results (U.S. Government Accountability Office, 2018). NSF responded with a corresponding corrective action plan, stating that NSF will build on existing reviews to "evaluat[e] the contribution of the rotator program toward advancing the progress of science" (National Science Foundation, 2018). This report is a response to that recommendation. It covers data sources, summarizes descriptive analyses conducted by NSF, and presents conclusions.

Data sources and methods

NSF Division of Human Resource Management (HRM) provided data for the following two groups:

- IPA appointees
- Federal employees with the following characteristics: (1) in a research directorate, (2) full-time, (3) a job family of business operations, STEM, or managerial with pay plans of AD04, AD05, and all SES equivalents

The analysis presented in this report relies heavily on descriptive statistics included in IPA annual reports, with one exception. The analysis of the specific aggregations of racial and national origin data presented here is new.

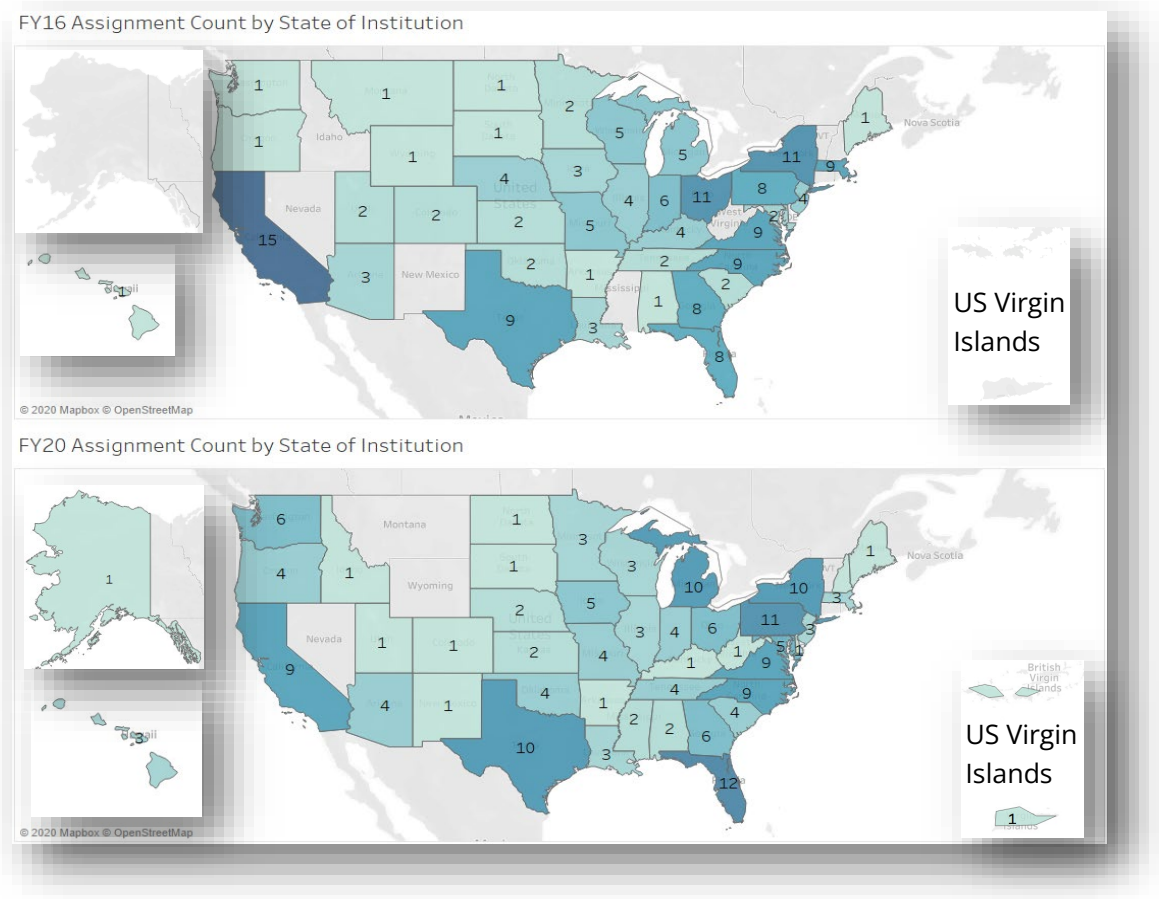
Results

Geographic diversity

The National Science Board's (NSB) Vision 2030 includes a focus on expanding the geography of innovation, saying, "Americans from every state must benefit from the progress of science and engineering and have access to high-quality STEM education and S&E careers" (National Science Board, 2020). Unlike other science-focused agencies, NSF has one location in the suburbs of Washington, D.C. Historically, NSF brought scientists and engineers from all over the country to staff its headquarters. Rotators, by definition, leave NSF after their brief period of service, and the vast majority return to their home institutions. These individuals contribute to their regional innovation economies and provide scientific leadership and mentorship in their local communities.

IPAs come from nearly every state (Exhibit 1), and the rotation mechanism allows for the distribution to change over time. The geographic diversity of IPAs increased over time, as shown by the reduction in the number of states not represented among NSF IPAs from 11 states in FY 2016 to 6 in FY 2020 (National Science Foundation, 2020). In general, the distribution roughly reflects the distribution of institutions of higher education; states with more institutions of higher education also have more IPAs. The geographic diversity of IPAs suggests that the IPA program is helping NSF expand knowledge in science, engineering, and learning geographically and is helping address the NSB's 2030 goal of expanding the geography of innovation.

Exhibit 1. Number of NSF IPAs by state of home institution and fiscal year (National Science Foundation, 2020). States with no numbers have zero IPAs in FY 2020 at NSF.

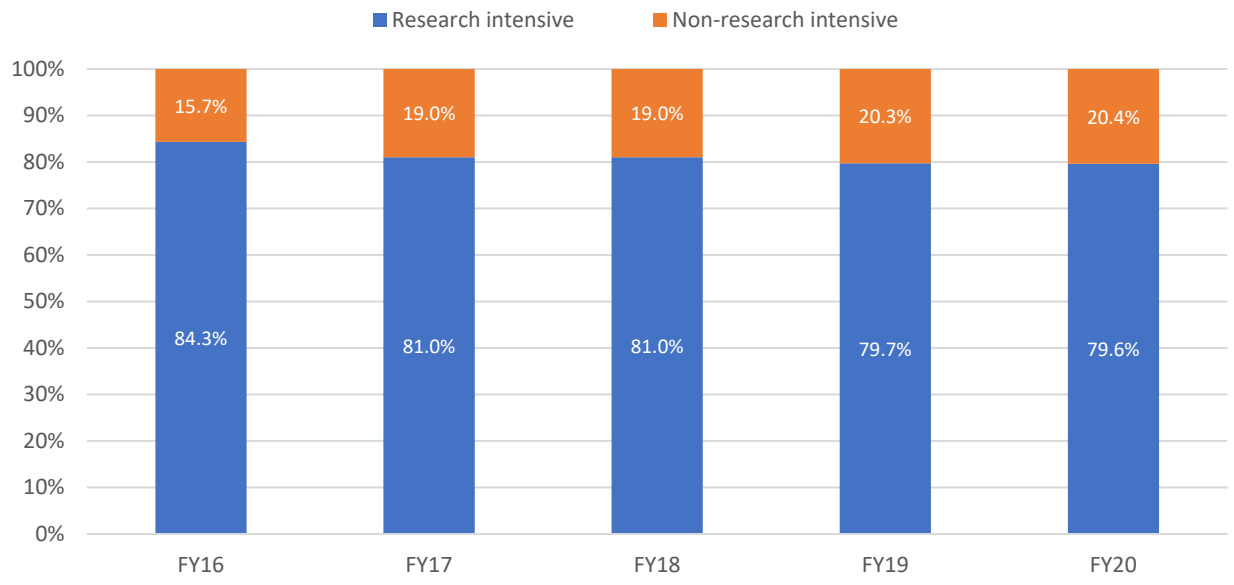


Institution diversity

Expanding the different types of institutions that engage with NSF can increase diversity demographically as institutions differ among these characteristics. Since rotators, upon returning home, can serve as ambassadors for NSF, rotators from diverse institutions may help diversify the pool of future partners. This can be measured through the Carnegie Classifications of Institutions of IPA appointees, such as research universities, baccalaureate colleges, etc. (The Carnegie Classification of Institutions of Higher Education, n.d.).

As shown in Exhibit 2, rotators come from a variety of institutions, and that variety has increased year over year. In FY 2020, IPAs from Historically Black Colleges and Universities (HBCUs) made up 1.5% of assignments, about the same as the FY 2016 value of 1.6%. The percentage of IPAs from "R1s" (universities with the highest research activity) has decreased from 68% in FY 2016 to 63% in FY 2020. Individuals from institutions other than doctorate institutions (i.e., not R1, R2, or R3) increased from 15.7% in FY 2016 to 20.4% in FY 2020 (National Science Foundation, 2020). This suggests an increasing diversity in the background of IPAs beyond the traditional high research universities, to include those employed at institutions that grant only bachelor's degrees or bachelor's and master's degrees as well as institutions outside the traditional academic institution universe.

Exhibit 2. Carnegie Classification of IPA assignments by home institution (National Science Foundation, 2020)



Note: The research intensive category includes institutions with R1, R2, and R3 classifications. The remainder of the institutions are categorized as non-research intensive and include associates colleges: high transfer-mixed traditional/nontraditional; baccalaureate colleges: arts & sciences focus; baccalaureate/associates colleges: mixed baccalaureate/associate's; M 1; M 2; M 3; special focus four-year: engineering schools; special focus four-year: other technology-related schools; tribal colleges; and non-Carnegie institutions.

Demographic diversity

When compared to similar NSF federal employees for FY 2020, individuals on IPA assignments are more likely to be an ethnic or racial minority. As shown in the table below, 26% of comparable federal employees are an ethnic or racial minority compared to 36% of IPAs.[1] In the same time period, the share of employees who are underrepresented minorities in STEM[2] is close in both groups: 11% among IPAs and 12.5% among a comparable group of NSF federal employees, which reflects an increase in this diversity measure for IPAs from 4.3% in FY 2016.

Table 1. Percentages and counts of IPA appointees and federal employees by racial and national origin

National origin and race	FY 2016		FY 2017		FY 2018		FY 2019		FY 2020	
	IPAs	Feds	IPAs	Feds	IPAs	Feds	IPAs	Feds	IPAs	Feds
Hispanic or Latino	0.5%	5.6%	0.0%	5.7%	1.5%	5.9%	2.0%	6.7%	1.5%	6.6%
Not Hispanic or Latino										
American Indian, Alaskan Native, Native Hawaiian	0.0%	0.7%	0.0%	0.7%	0.0%	0.7%	0.0%	0.7%	0.0%	0.4%
Asian	20.5%	11.4%	20.7%	11.6%	22.6%	12.7%	23.3%	12.4%	23.9%	12.9%
Black or African American	3.8%	6.8%	6.9%	6.9%	6.2%	6.3%	5.9%	6.2%	9.5%	5.5%
Two or more races	0.0%	0.2%	0.6%	0.2%	1.0%	0.5%	0.5%	0.5%	1.0%	0.9%
White	75.1%	74.9%	70.7%	74.2%	67.7%	73.2%	67.3%	73.0%	63.7%	73.1%
No information given	0.0%	0.5%	1.1%	0.7%	1.0%	0.7%	1.0%	0.5%	0.5%	0.7%
Total (counts)	185	414	174	422	195	426	202	434	201	457

Cost reduction

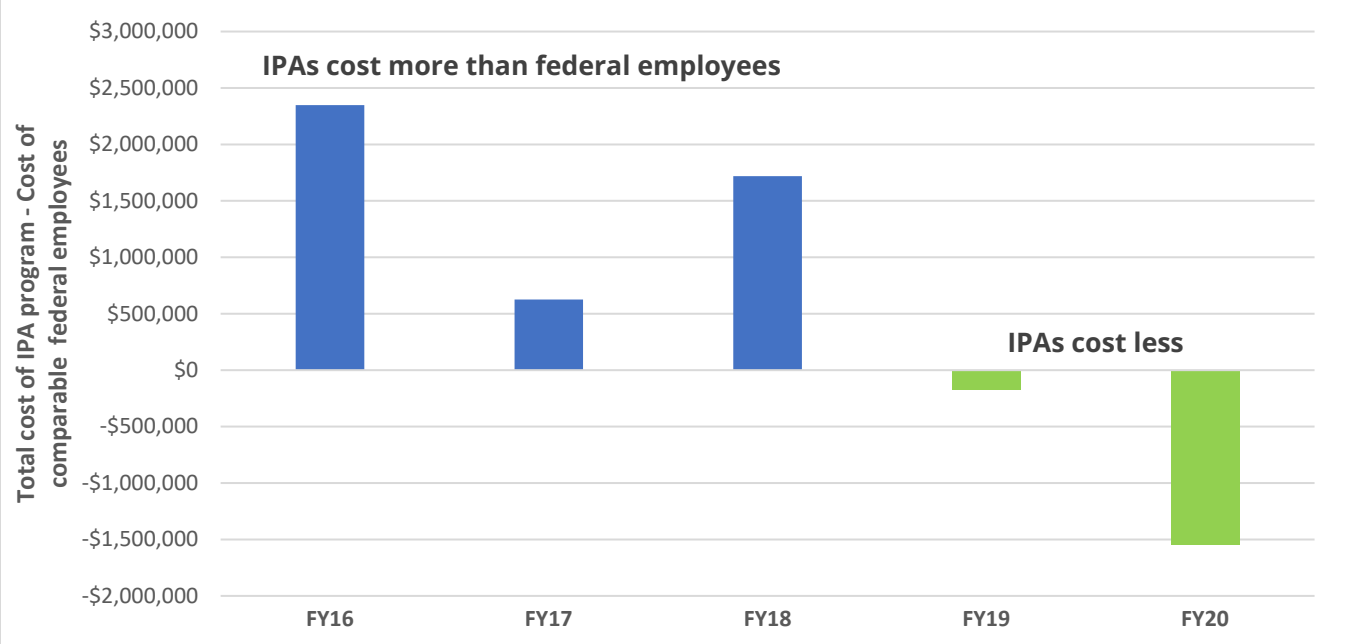
In response to the 2013 OIG report, NSF enacted two policy changes to reduce the cost of IPA appointments to the Foundation. First, NSF stopped reimbursing lost consulting income. Second, NSF started requiring each IPA's institution to share in the cost of the IPA's salary and fringe benefits. This reflects the idea that a rotation to NSF benefits the institution as well. For example, the individual returns with knowledge of NSF that they share with others at the institution. Before the 2017 pilot, a cost share of 15% was requested but not required. Therefore, in FY 2016, only 50% of IPA assignments included the home institution sharing in the cost of the IPA appointment (also known as a cost share). Starting in the FY 2017 pilot, a 10% cost share was required for new IPA assignments unless a waiver was obtained. As a result, every year, more institutions shared in the cost of IPA appointments—in FY 2019 87% of all IPA assignments included a cost share. Starting on January 21, 2020, the pilot became policy. In FY 2020, 90% of all IPA assignments had a cost share (National Science Foundation, 2020).

[1] Ethnic or racial minority includes the ethnicity category of Hispanic or Latino and the following racial categories of non-Hispanic or Latino: American Indian, Alaskan Native, Native Hawaiian; Asian; Black or African American; and two or more races.

[2] Underserved in STEM grouping includes the ethnicity category of Hispanic or Latino and the following racial categories of non-Hispanic or Latino: American Indian, Alaskan Native, Native Hawaiian and Black or African American.

The effective cost difference between an IPA appointee and a federal employee has inverted over the past five years (see Exhibit 3). For FY 2015 through 2018, the cost of the IPA program was higher per IPA than a comparison group of federal government employees. In FY 2019 and FY 2020, the IPA program cost less per IPA than a similar federal employee.[3] The reduction can be attributed to at least two factors. First, during the same time, the cost of comparable federal employees increased at a larger rate than the cost of comparable IPA appointees. Second, as the phased implementation of the mandatory cost share progressed, the cost share rose steadily from 6% in FY 2016 to 10% in FY 2020.

Exhibit 3. Cost difference between the IPA program and a comparable group of federal government employees by fiscal year (National Science Foundation, 2020)



Note: The population for federal employees is limited to the following: research directorates only; full-time staff only; job family = business operations with pay plan and grade = AD04, AD05, and all SES equivalents; job family = STEM with pay plan and grade = AD04, AD05, and all SES equivalents; and job family = managerial with pay plan = non-GS employees.

While reducing the cost of the IPA program to the Foundation is certainly a goal in itself, requiring cost sharing in the IPA program may also help the Foundation strengthen partnerships between NSF and institutions. An institution agreeing to a cost share may signal that they believe that the person they are loaning to the government will achieve the IPA programmatic goal of bringing back valuable knowledge to the institution. In addition, it may signal their support of the IPA representing their institution at NSF.

[3] These data only compare costs associated with salary and benefits. Per diem and Independent Research/Development (IR/D) costs were not included. Other costs incurred by or for feds were also not included, such as travel or incentive awards.

Conclusion

The IPA program appears to help NSF advance science by providing a path for NSF to meet its goals at a lower cost than would otherwise be possible. IPAs gain experience at NSF and return to their home state, helping NSF expand the geography of their reach beyond the sole location in the Washington, D.C., area and promote partnerships and collaborations with NSF. IPAs have increased in diversity over time as measured by the geographic location and institutional characteristics, such as research intensity of their institutions, and by select demographic characteristics of IPAs. As of FY 2019, these benefits came with a cost savings to the Federal government due to an increase in cost share by IPA institutions and an increase in costs of peer federal employees. Ongoing monitoring indicates that the cost savings continue to be realized.

University of Connecticut undergraduate Nico Wright at work in Professor Michael Pettes' mechanical engineering laboratory.
Credit: Photography by Roger Castonguay/Defining Studios

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