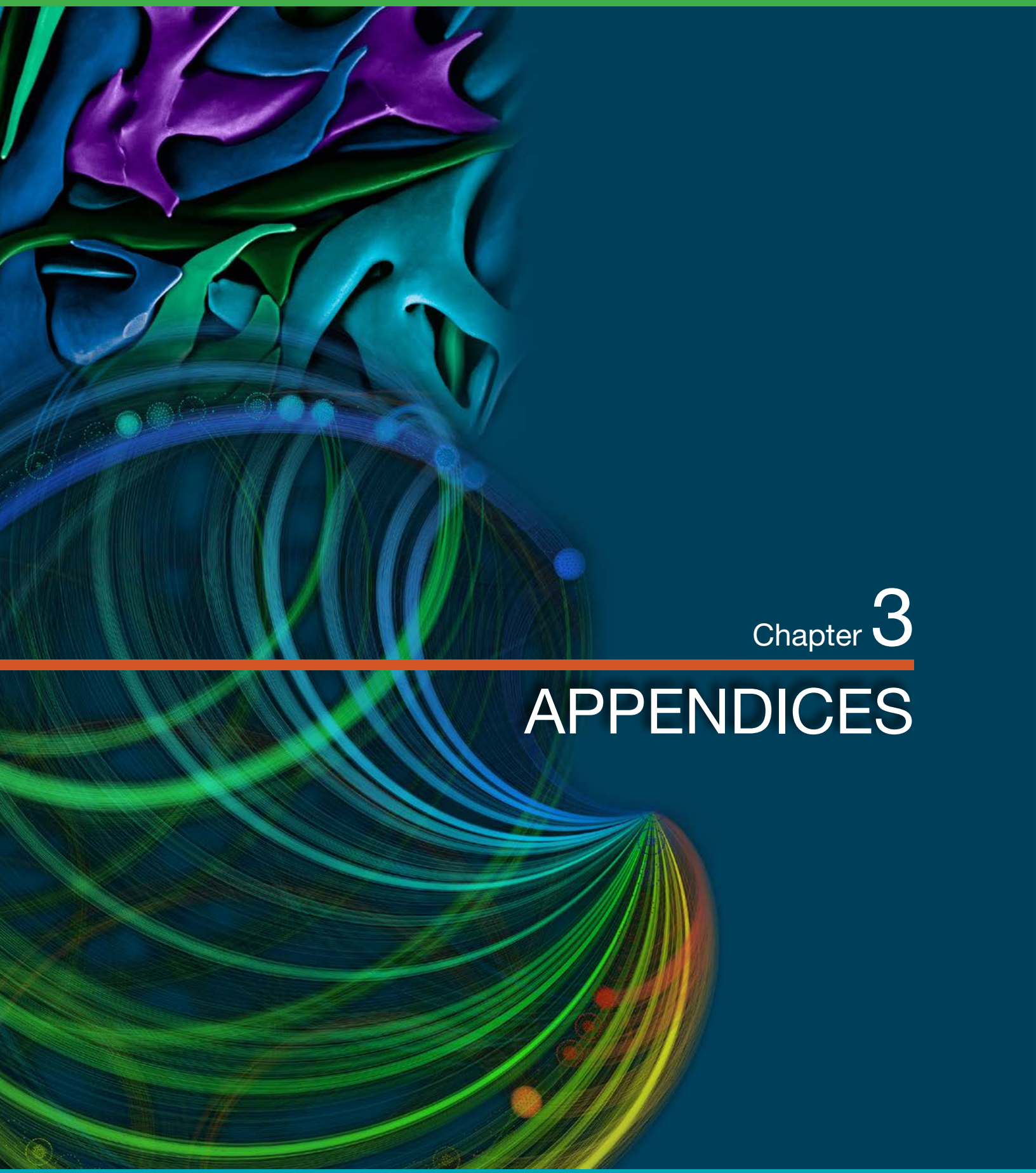

Chapter 3

APPENDICES

Summary of FY 2017 Financial Statement Audit and Management Assurances

Table 3.1 – Summary of Financial Statement Audit

Audit Summary					
Audit Opinion	***Unmodified***				
Restatement	***No***				
Material Weakness	Beginning Balance	New	Resolved	Consolidated	Ending Balance
Total Material Weaknesses	***0***	-	-	-	***0***

Table 3.2 – Summary of Management Assurances

Effectiveness of Internal Control over Financial Reporting (FMFIA § 2)					
Statement of Assurance	*Unmodified*				
	Beginning Balance	New	Resolved	Consolidated	Ending Balance
Total Material Weaknesses	*0*	-	-	-	*0*
Effectiveness of Internal Control over Operations (FMFIA § 2)					
Statement of Assurance	*Unmodified*				
	Beginning Balance	New	Resolved	Consolidated	Ending Balance
Total Material Weaknesses	*0*	-	-	-	*0*
Conformance with Financial Management System Requirements (FMFIA § 4)					
Statement of Assurance	*Systems conform to financial management system requirements*				
	Beginning Balance	New	Resolved	Consolidated	Ending Balance
Total Non-Conformances	*0*	-	-	-	*0*
Compliance with Section 803(a) of the Federal Financial Management Improvement Act (FFMIA)					
	Agency	Auditor			
1. System Requirements	*No lack of compliance noted*				
2. Accounting Standards	*No lack of compliance noted*				
3. U.S. Standard General Ledger at Transaction level	*No lack of compliance noted*				

National Science Foundation
FY 2017 Payment Integrity Reporting

The Improper Payments Information Act of 2002 (IPIA; Pub. L. 107-300), as amended by the Improper Payments Elimination and Recovery Act of 2010 (IPERA; Pub. L. 111-204), and the Improper Payments Elimination and Recovery Improvement Act of 2012 (IPERIA; Pub. L. 112-248), require agencies to annually report information on improper payments to the President and Congress through their annual Performance Accountability Reports (PARs) or AFRs. More detailed information on improper payments and all of the information previously reported in the AFR that is not included in the FY 2017 AFR can be found at https://paymentaccuracy.gov/.

I. Payment Reporting

Not applicable.

II. Recapture of Improper Payments Reporting

a. Payment Recapture Audits Narrative

NSF did not conduct payment recapture audits during FY 2017. On September 30, 2015, the OMB agreed with NSF's analysis that it would not be cost effective for the agency to conduct a recapture audit program.

b. Programs Excluded from the Payment Recapture Audit Program

In FY 2015 NSF determined that it would not be cost effective to conduct recapture audits of its single grants program and other activities (contracts, charge cards, and payments to employees). In accordance with Circular A-123 Appendix C Part I.D "Requirements for Effective Estimation and Remediation of Improper Payments" on September 28, 2015, NSF notified OMB and the NSF Inspector General of this decision and included supporting analysis. OMB agreed with NSF's determination.

The FY 2015 analysis used to determine that a payment recapture audit program was not cost effective leveraged the results of the work performed under IPERA, audits, grant monitoring programs, and internal control reviews. All consistently demonstrated that there was not a significant risk of unallowable costs/improper payments within NSF's single grant program and other activities, For FY 2017 NSF reviewed current year results from the similar data sources as used in the 2015 analysis in order to insure there were no significant changes.

The IPERA risk review for FY 2016 was completed during December 2016 and used qualitative factors to assess NSF's singular grant program and other activities. The risk assessment found no significant risk of improper payments. This was consistent with the agency's history of low improper payments. NSF will complete a qualitative risk assessment of improper payments for FY 2018.

In FY 2017, the NSF OIG issued external audits that had total questioned costs of $3.8 million. In addition, the Single Audit Act requires financial statement audits of non-federal entities receiving or administering grant awards with federal expenditures exceeding $750,000 during its fiscal year. NSF is required to review the audit reports of recipients of its funding to determine whether necessary corrective actions are adequate and implemented in response to audit report findings and recommendations.

In FY 2017, NSF identified single audits requiring resolution with total questioned costs of $2.1 million. NSF completed resolution of a total of 210 audit reports (18 OIG audits and 192 single audits) with total questioned costs of $10.7 million; of this amount, NSF ultimately disallowed costs totaling $2.3 million.

NSF has invested significant resources in its grant monitoring program. As a key component of the agency's grant monitoring program NSF completes advanced monitoring activities. Monitoring activities include desk reviews, site visits, and Business Systems Reviews of NSF's large facilities construction and operation. These activities provide assurance to the agency that grant recipient institutions managing higher-risk awards possess adequate policies, processes, and systems to properly manage federal awards. As part of the grants monitoring program, NSF tested grant payments for unallowable costs. The testing found that the estimated unallowable costs for grants paid through the Award Cash Management Service (ACM$) were considerably below the improper payment criteria of 1.5 percent of program outlays and $10 million of all program activity payments.

The NSF Risk Management and Assurance team's annual review of internal controls included the following business processes: procure-to-pay, pay and benefits, charge cards, grants management, large facility oversight and information technology. The review examined the design, operating efficiency and effectiveness of key controls throughout the review areas. NSF issued an unmodified statement of assurance for its internal controls.

c. Payment Recapture Audit Reporting

NSF did not conduct payment recapture audits during FY 2017.

d. Overpayments Recaptured Outside of Payment Recapture Audits

NSF collected remittances outside of payment recapture audits related to the following: payment reviews or audits; OIG reviews; Single Audit reports; and self-reported overpayments. These are reflected in the table labeled "Improper Payment Recaptures without Audit Programs."

Table 3.3 – Improper Payment Recaptures without Audit Programs

(Dollars in Millions)

Overpayments Recaptured outside of Payment Recapture Audits			
Program or Activity	**Amount Identified**	**Amount Recaptured**	**Percent Recaptured**
Grants	$8.518	$7.943	93.2%
Contracts	$0.096	$0.097	101%
Travel	$0.004	$0.004	100%
Purchase Cards	$0.000	$0.000	N/A
Payroll and Other	$0.121	$0.082	67.8%
TOTAL	**$8.739**	**$8.126**	**93%**

e. How Overpayments Recaptured through Payment Recapture Audits Were Used

Not Applicable.

III. Agency Improvement of Payment Accuracy with the Do Not Pay

NSF actively participates in OMB's Do Not Pay (DNP) initiative to reduce improper payments through the implementation of pre-award and post-payment activities. During the pre-award review process for all grants and cooperative agreements, the agency has incorporated DNP safeguards that complement NSF's existing policies and procedures for award management. NSF also has automated the reviews and centralized the pre-award verification. This has created efficiency gains by reducing the workload for manual verification.

NSF uses the Department of Treasury to disburse all funds. NSF payments are compliant with the Treasury's Payment Application Modernization format and are screened against the following data sources: Social Security Death Master File (DMF) [public information] and the GSA System for Award Management (SAM) Exclusion Records [restricted information]. Any subsequent matches are viewable in the Treasury Do Not Pay Portal for adjudication purposes. No additional data sources are available in the Treasury payment integration process at this time. In FY 2017, 52,903 payments totaling over $6.9 billion were screened through the Treasury Do Not pay process (Table 3.4). NSF had one positive match for DMF and no positive match for SAM.

Implementation of the Treasury's Payment Application Modernization screening process has reduced the number of false positives from over 550 in the combined fiscal years 2014 – 2016 to zero in FY 2017. This has produced resource savings for the agency from not having to manually research each false positive using the Do Not Pay online portal.

Table 3.4 – Results of the Do Not Pay Initiative in Preventing Improper Payments

(Dollars in Millions)

	Number of payments reviewed for possible improper payments	Dollars of payments reviewed for possible improper payments	Number of payments stopped	Dollars of payments stopped	Number of potential improper payments reviewed and determined accurate	Dollars of potential improper payments reviewed and determined accurate
Reviews with the Do Not Pay databases	52,903	$6,884.55	0	$0	0	$0
Reviews with databases not listed in IPERIA as Do Not Pay databases	N/A	N/A	N/A	N/A	N/A	N/A

IV. Barriers

Not applicable.

V. Accountability

Not applicable.

VI. Agency Information Systems and Other Infrastructure

Not applicable.

VII. Sampling and Estimation

Not applicable.

Fraud Reduction Report

The Fraud Reduction and Data Analytics Act (FRDAA) of 2015, P.L. 114-186, requires agencies to improve Federal agency financial and administrative controls and procedures to assess and mitigate fraud risks, and to improve Federal agencies' development and use of data analytics for the purpose of identifying, preventing, and responding to fraud, including improper payments.

In FY 2017, NSF initiated implementation of the FRDAA requirements by conducting a fraud risk assessment of travel and purchase credit cards, developing a fraud risk profile for those programs, and creating a proof of concept for developing a data analytics capability to better identify potential risk exposures in the travel and purchase card programs. NSF used the Green Book and leading practices from the Fraud Risk Management Framework methodology as the basis for the fraud risk profile and the broader fraud risk management strategy. GAO's Fraud Risk Management Framework outlines how to develop a fraud risk profile and the necessity of prioritizing risks determined to be the highest priority in order to better achieve agency objectives.

To conduct the risk assessment, NSF reviewed internal controls and policy documentation for the travel and purchase card programs, administered surveys, conducted interviews, and facilitated focus groups with staff from various divisions within NSF. This input was used to evaluate charge card program risks. In addition to the risk assessment, NSF developed and employed various data analytics to examine travel and purchase card data. The analytics enabled NSF to identify trends in the data and build prototype dashboards that could aid in NSF's monitoring of travel and purchase cards.

The fraud risk assessment covered the types of potential fraud, fraud risk factors and possible responses to fraud risks. The risk assessment demonstrated that NSF is committed to combating fraud and enabled NSF to create a plan for regular fraud risk assessments. NSF is considering adoption of analytic activities to improve monitoring activities, and will collaborate across business functions to help insure implementation of new control activities. As NSF's fraud risk assessment program matures, the risk assessment methodology developed for the charge card project will be used as a model for application in other NSF business areas such as grants, payments to employees and contracts. For FY 2018, NSF plans to conduct a fraud risk assessment within the grants area.

Management Challenges for the National Science Foundation in Fiscal Year 2018

October 12, 2017

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

AT A GLANCE

Management Challenges for the National Science Foundation in Fiscal Year 2018

October 12, 2017

WHY WE DID THIS REPORT

The *Reports Consolidation Act of 2000* (Public Law 106-531) requires the Office of Inspector General to annually update our assessment of NSF's most serious management and performance challenges and the agency's progress in addressing those challenges.

WHAT WE FOUND

NSF leads the world as an innovative agency dedicated to advancing science. Beyond its scientific mission, as a Federal agency, NSF must be a responsible steward of taxpayer dollars and spend scarce research funds properly. Inattention to its fiscal and administrative responsibilities can compromise NSF's ability to reach its fullest potential. This year, we have identified six areas representing challenges NSF must continue to address to better accomplish its mission:

- Major Multi-User Research Facilities Management
- Business Operations Management
- Management of the *Intergovernmental Personnel Act* Program
- Management of the United States Antarctic Program
- Cybersecurity and Information Technology Management
- Encouraging the Ethical Conduct of Research

Most of these challenges are longstanding, and we are encouraged by the actions NSF has taken to address them during this fiscal year. Effective responses to these challenges will help position NSF to ensure the integrity of NSF-funded projects, to spend research funds in the most effective and efficient manner, and to maintain the highest level of accountability over taxpayer dollars.

AGENCY RESPONSE TO *MANAGEMENT CHALLENGES FOR 2017*

In its *FY 2017 Management Challenges Progress Report*, NSF provided a management overview, significant milestones for FY 2017, and anticipated milestones for the challenges identified in our *Management Challenges for the National Science Foundation in FY 2017* report.

FOR FURTHER INFORMATION, CONTACT US AT (703) 292 7100 OR OIG@NSF.GOV.

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

MEMORANDUM

DATE: October 12, 2017

TO: Dr. Maria Zuber
Chair
National Science Board

Dr. France Córdova
Director
National Science Foundation

FROM: Allison C. Lerner
Inspector General
National Science Foundation

SUBJECT: Management Challenges for the National Science Foundation in Fiscal Year 2018

Attached for your information is our report, *Management Challenges for the National Science Foundation in Fiscal Year 2018*. A summary of the report will be included in the National Science Foundation *Agency Financial Report*.

If you have questions, please contact me at (703) 292-7100.

Attachment

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

TABLE OF CONTENTS

ABBREVIATIONS

AICA	*American Innovation and Competitiveness Act of 2017*
AIMS	Antarctic Infrastructure Modernization for Science
America COMPETES Act	*America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act*
ASC	Antarctic Support Contract
DATA Act	*Digital Accountability and Transparency Act of 2014*
IPA	*Intergovernmental Personnel Act*
IPERA	*Improper Payments Elimination and Recovery Act of 2010*
IR/D	Independent Research/Development
IT	information technology
NAPA	National Academy of Public Administration
NARA	U.S. National Archives and Records Administration
OMB	Office of Management and Budget
OPP	Office of Polar Programs
RCR	Responsible Conduct of Research
Treasury	U.S. Department of Treasury
USAP	United States Antarctic Program

Introduction

This report presents our assessment of NSF's major management and performance challenges for fiscal year 2018. As required by the *Reports Consolidation Act of 2000*,[1] we update our assessment of management challenges annually. In this report, we summarize what we consider the most critical management and performance challenges to NSF, and we assess the Foundation's progress in addressing those challenges.

NSF leads the world as an innovative agency dedicated to advancing science. Its awards have led to many discoveries that have contributed to the country's and the world's economic growth. Beyond its scientific mission, as a Federal agency, NSF must be a responsible steward of taxpayer dollars and spend scarce research funds properly. Inattention to its fiscal and administrative responsibilities can compromise NSF's ability to reach its fullest potential.

This year, we have identified six areas representing challenges NSF must continue to address to better accomplish its mission. We have compiled this list based on our audit and investigative work; general knowledge of the agency's operations; and evaluative reports of others, including the U.S. Government Accountability Office and NSF's various advisory committees, contractors, and staff. The following list represents six areas of the most critical management and performance challenges for the Foundation:

- Major Multi-User Research Facilities Management
- Business Operations Management
- Management of the *Intergovernmental Personnel Act* Program
- Management of the United States Antarctic Program
- Cybersecurity and Information Technology Management
- Encouraging the Ethical Conduct of Research

This year's list leads with challenges faced in managing large facilities, or major multi-user research facilities[2] — an inherently risky portfolio due to the complex nature of these facilities, the associated high construction and operating costs, and the need to apply equal emphasis on sound business practices and innovative science in the awarding of cooperative agreements for such facilities. This is not a new challenge, and NSF has improved its oversight over its major facilities over the past few years. NSF is now challenged to implement all of its new controls, which we explore in the specific challenge section.

In the business operations challenge, we identify that ensuring that payments are proper at the time they are initiated continues to be a challenge for NSF because grant recipients are generally not required to provide supporting documentation in order to receive payments from the agency. Issues with accountability and transparency are further compounded due to the need for NSF to monitor awardees that "pass through" funds to subrecipients. NSF continues to be challenged to implement controls over

[1] Pub. L. No. 106-531
[2] The term "major multi-user research facility," or "major facility," is synonymous with the term "large facility," used previously in our reports. The new terminology better aligns with the *American Innovation and Competitiveness Act* (Pub. L. No. 114-329), signed into law on January 6, 2017.

the spending of grant funds that ensure transparency and accountability but do not unduly encumber awardees and Federal program officers.

While a core part of the Foundation's business operations, cybersecurity and information technology (IT) management is highlighted as a standalone challenge area this year. The protection of its information systems against unauthorized access or modification is critical to NSF's ability to carry out its mission. NSF's FY 2016 *Agency Financial Report* contained the first instance of an IT-related significant deficiency in internal control over financial reporting. NSF has taken steps to address the deficiency and should continue to take steps to improve IT controls over financial reporting.

We have also removed two challenges identified in previous periods from this year's list. In the past, we had a challenge focused on grants administration, which is integral to the Foundation's mission, and, accordingly, what processes and operations we review. However, due to its broad nature, instead of distinguishing grants administration as its own challenge this year, we instead have incorporated specific aspects of grant administration where we see issues in more narrowly focused challenge areas. In addition, as NSF successfully completed its relocation to its headquarters in Alexandria, Virginia, we no longer consider NSF's move to a new building as a challenge area and have removed it from the list. Although NSF has completed its move, we will continue to monitor associated challenges, such as with records management, which we include as a business operations management challenge.

Finally, while not designated as a challenge area, we continue to focus resources on other areas of high risk within grants administration, including the Small Business Innovation Research program, which provides equity-free funding and entrepreneur support at the earliest stages of research.

We are encouraged by NSF's progress in its efforts to address its most serious management and performance challenges. Effective responses to these challenges will help position NSF to ensure the integrity of NSF-funded projects, to spend research funds in the most effective and efficient manner, and to maintain the highest level of accountability over taxpayer dollars.

Major Multi-User Research Facilities Management

Overview

NSF's major multi-user research facility (major facility) portfolio is inherently risky due to the complex nature of these facilities and the associated high construction and operating costs. In FY 2016, NSF spent $241 million constructing major facilities and more than $1 billion operating them. These major facilities are state-of-the art infrastructure for research and education and include telescopes, ships, distributed networks, and observatories. NSF has improved its oversight over its major facilities, but challenges remain with implementing all of NSF's new controls.

Challenges for NSF

Since 2010, we have issued nearly 60 reports raising concerns with NSF's oversight of its major facility portfolio. Our reports highlight concerns with oversight including unsupported proposal budgets, lack of

incurred cost audits, lack of controls over management fees and contingency, and the absence of certified or validated earned value management systems. In addition to our reports, at the request of the NSF Director and the National Science Board, the National Academy of Public Administration (NAPA) examined NSF's use of cooperative agreements for major facilities and benchmarked its practices against other, similar Federal agencies. NAPA's December 2015 report[3] concluded that "[i]t is clear that, in the past, NSF has prioritized the innovative scientific aspects of large facility construction projects; the agency now needs to apply equal emphasis on increased internal management of the business practices critical to enhanced oversight and project success."

In addition, our May 2017 report, *NSF Needs Stronger Controls Over Battelle Memorial Institute Award for the National Ecological Observatory Network*,[4] found NSF strengthened some controls over the Battelle award, such as reviewing the reasonableness of certain proposed costs and retaining a portion of contingency. However, NSF did not fully comply with all of its new policy and implementing guidance. For example, NSF awarded funding to Battelle before completing the cost proposal review documents, and NSF waived or did not require full compliance with management fee policies and/or implementing guidance. Specifically, NSF allowed management fee to be used for charitable contributions and, at award issuance, based management fee on a percentage of total estimated project cost.

OIG Assessment of NSF Progress

Over the past few years, NSF has worked diligently to address our and NAPA's recommendations. As a result of NSF's progress, NSF's oversight of major facility construction agreements was no longer reported as a significant deficiency in NSF's FY 2016 financial statement audit. Only two suggestions for improvement remained in the FY 2016 management letter related to NSF's oversight of contingency. NSF has strengthened controls over its major facility portfolio through the development of several new policies and procedures. For example, NSF is now required to:

- Retain a portion of the awardee's contingency funds;
- Periodically conduct incurred costs audits of its major facility awardees;
- Complete a cost proposal review document prior to award to document its review of the reasonableness of proposed costs;
- Obtain a required independent cost review of an awardee's proposal budget;
- Conduct earned value management system verification and validation reviews; and
- Review proposed management fee uses prior to award and require awardees to track management fee expenditures.

We are encouraged by NSF's new policies and procedures; its challenge is now ensuring consistent implementation of its expanded controls. As previously discussed, our 2017 report found NSF strengthened some controls over the Battelle award, but NSF did not fully comply with all of its new policy and implementing guidance.

[3] *National Science Foundation: Use of Cooperative Agreements to Support Large Scale Investment in Research*, December 2015
[4] OIG Report No. 17-3-004, May 12, 2017

Further, as NSF implements its new policies and procedures, it may find it necessary to revise some controls due to new legislation or awardee feedback. For example, the *American Innovation and Competitiveness Act of 2017*[5] (AICA) requires many actions we recommended in prior reports to further strengthen NSF's controls. We are monitoring NSF's progress in implementing the controls required by the Act. In addition, on July 31, 2017, NSF revised its management fee policies and procedures due to awardee feedback. As NSF continues to revise its controls, it should ensure it does not decrease the accountability and safeguards built into the original strengthened procedures.

Moving forward, we will continue to invest resources in evaluating NSF's oversight of major facilities. As of October 2017, we are reviewing NSF's controls to ensure that major facility awardees properly charge project expenditures to construction or operations awards so that these award funds are used as intended, as well as reviewing NSF's efforts to ensure that awardees oversee their subrecipients, including those associated with major facilities.

Business Operations Management

Overview

NSF is a small agency in terms of staff, but one with a significant appropriation and a broad portfolio of responsibilities. To fulfill its mission, NSF selects and administers productive investments in research and the Nation's science infrastructure. Specifically, for FY 2017, NSF received appropriations of more than $7.1 billion to fund research and related activities; major research facilities; and education in science, mathematics, and engineering — while receiving $330 million for agency operations and award management.

Selecting and funding great science is the agency's primary mission. However, with responsibility for billions of dollars and a diverse portfolio of projects, NSF leadership cannot afford to overlook the importance of its financial and administrative operations. Effective executives and administrators in such operations are critical to NSF's success, as are strong systems and controls over such functions. In addition, it is critical that NSF oversee grantees' processes and controls regarding financial compliance of subrecipients. The "business" side of NSF faces a set of challenges aimed at improving the organization's management controls over payments, information security, recordkeeping, and reporting. Simply stated, NSF is challenged to deliver both scientific and organizational excellence.

Challenges for NSF

Finding and Eliminating Improper Payments

NSF has consistently faced challenges in ensuring that payments are proper at the time they are initiated because grant recipients are generally not required to present supporting documentation, such as invoices and receipts, to receive payments from the agency. As a result, NSF issues almost $7 billion

[5] Pub. L. No. 114-329

annually in grant and cooperative agreement payments without verification. Instead, NSF relies almost completely on the recipients' systems of internal control to ensure that only proper payments are requested and that any improper payments are identified and corrected by the recipient.

In May 2016, we issued a report[6] on NSF's compliance with the *Improper Payments Elimination and Recovery Act of 2010*[7] (IPERA) requirements for FY 2015. Although we concluded that NSF technically complied with the requirements of IPERA, we identified substantial concerns with the depth, substance, and documentation of the NSF risk assessment. Specifically, we found significant limitations in NSF's analysis of six of the nine Office of Management and Budget (OMB) risk factors and its assessment of NSF payments to employees.

With respect to the first concern, properly evaluating risks that could contribute to improper payments depends on collecting accurate, relevant information by asking the right questions of the appropriate personnel. We found that in some instances the interviews conducted did not address areas of known risks in sufficient detail, and at times raised concerns about why some questions were asked and not others. We also found that NSF sometimes accepted answers at face value and did not obtain key information to support the information provided.

With respect to the second limitation, NSF did not thoroughly assess payments to employees. The agency did not conduct IPERA-specific testing on payroll in FY 2015 or interview staff in NSF's Division of Human Resource Management, the division responsible for administering salary and benefits, to discuss any of the nine OMB risk factors during the IPERA risk assessment. As a result of these limitations, NSF's risk assessment may not have fully explored the agency's susceptibility to improper payments. We made eight recommendations to strengthen NSF's future IPERA risk assessments. NSF generally agreed with the recommendations, and plans to undertake corrective action to improve its IPERA risk assessment process.

According to the *Standards for Internal Control in the Federal Government*, "Internal control is a process effected by an entity's oversight body, management, and other personnel…." It further states that "…management designs control activities so that all transactions are completely and accurately recorded." NSF's challenges in this area are to develop an internal control process that provides reasonable assurance that payments are proper at the time they are made and to develop a sound process for assessing its risk of improper payments.

Promoting Accountability and Transparency

The *Digital Accountability and Transparency Act of 2014*[8] (DATA Act) required Federal agencies, including NSF, to report financial and payment data by May 2017 in accordance with data standards, definitions, and guidance established by the U.S. Department of Treasury (Treasury) and OMB to foster greater transparency over Federal spending. The DATA Act also includes oversight requirements for

[6] *NSF's Compliance with the Improper Payments Elimination and Recovery Act for FY 2015*, OIG Report No. 16-3-005, May 12, 2016
[7] *Improper Payments Elimination and Recovery Act of 2010*, Pub. L. No. 111-204
[8] Pub. L. No. 113-101

Inspectors General to assess the completeness, timeliness, quality, and accuracy of data submitted by the agencies; our first such review must be completed by November 2017.

Evolving Federal guidance and the late release of the Department of Treasury's system that tests and validates agency data and the patches to the software program used by NSF and other agencies for financial systems — all factors beyond NSF's control — were challenges to NSF's DATA Act implementation. The necessary modifications to agency systems and processes, human resource constraints, and the lack of a clear source of funding for NSF's DATA Act implementation efforts were also challenges.

Monitoring of Subrecipients

Transparency and oversight of NSF funds passed through to subrecipients also pose a challenge to NSF's business operations. It is NSF's responsibility to make sure that prime recipients are properly overseeing subrecipients. For example, NSF is challenged to ensure that its awardees review sufficient cost information to demonstrate that subrecipients' costs are allowable, fair, and reasonable.

Managing the Government's Records

OMB and the U.S. National Archives and Records Administration (NARA) issued a directive[9] in 2012, which required Federal agencies to eliminate paper and use electronic recordkeeping to the fullest extent possible and take specific actions by appointed dates to reform the policies and practices for the management of records. In 2014, Congress amended the *Presidential Records Act* and the *Federal Records Act* regarding the preservation, storage, and management of Federal records.[10]

Although NSF has until December 31, 2019, to comply with the memorandum issued by OMB and NARA to manage permanent electronic Federal records in electronic format to the fullest extent possible, in October 2017, NSF completed its relocation to a new headquarters building with less office space available for the storage of paper, supplies, and equipment. Accordingly, NSF undertook several initiatives to reduce the amount of paper, supplies, and equipment it uses and stores. These initiatives include continual contract services with a vendor to retire and scan paper records onsite; services with the relocation vendor to recommend and pilot an electronic records management system including scanning and digitizing paper records; and an agency-wide campaign since July 2016 with a goal to dispose of 500,000 pounds of excess supplies, equipment, paper, and trash before the relocation.

As the agency continues to pursue efforts to reduce its paper files, it must guide staff to distinguish between official records and nonrecord materials and personal papers. NSF is required to retain and destroy official records in accordance with record retention schedules approved by NARA. Our recent audit on records management determined that NSF implemented some records management actions to reduce the amount of paper records, but NSF's planning has not been sufficient, and NSF risks not

[9] *Managing Government Records Directive*, Memorandum M-12-18, August 24, 2012
[10] *Presidential and Federal Records Act Amendments of 2014*, Pub. L. No. 113-187, 128 Stat. 2203

completing its scanning/digitization project efficiently.[11] In addition, because only approximately 36 percent of NSF employees had taken records management training as of August 2017, there is a risk that staff may have inadvertently discarded official records before the relocation. We have made several recommendations to improve records management.

OIG Assessment of NSF Progress

NSF plans to perform a 3-year IPERA qualitative risk assessment by FY 2018, which we will review. During this 3-year cycle, NSF will continue to collect information for this risk assessment by leveraging the work completed as part of the OMB Circular A-123, Appendix A, and financial reporting assessment process. In addition, NSF will use the results of its award financial monitoring testing process to complement its IPERA assessment and develop a policy and procedure to clearly document the agency's risk assessment.

NSF implemented the DATA Act in April 2017, before the statutory May 2017 deadline. It submitted financial and award data for publication on USASpending.gov as required by the DATA Act for the second and third quarters of FY 2017. Our ongoing audit, which will be completed in November 2017, will assess the completeness, timeliness, quality, and accuracy of NSF's FY 2017 second quarter data; it will also assess NSF's implementation and use of the Government-side financial data standards established by Treasury and OMB.

Regarding subrecipient monitoring, we are conducting an audit of NSF's oversight of grantees' subrecipient monitoring, as previously discussed. The audit, required by the AICA, will review NSF's policies and procedures governing the monitoring of pass-through entities with respect to subrecipients.

With respect to records management, NSF is updating its records management policies, guidance, and training — including for electronic records — and hired a new records management official in FY 2016. NSF has agreed to take several actions as a result of our electronic records management report, including agreeing to update its records management training course and require all NSF personnel who create, receive, access, or use Federal records to complete initial records management training within 60 days of employment and annual refresher training at least once each fiscal year. However, NSF needs to implement additional actions to prepare agency staff to meet NARA directives by 2019.

Management of the Intergovernmental Personnel Act Program

Overview

To further the agency's mission of supporting science and engineering research and education, NSF draws scientists, engineers, and educators from academia, industry, or other eligible organizations on rotational assignment to supplement its workforce. All non-permanent appointments are Federal employees, except for individuals under the *Intergovernmental Personnel Act*[12] (IPA), who are paid

[11] *NSF's Relocation to its New Headquarters Location — Records Management*, OIG Report No. 17-3-003, Sept. 28, 2017
[12] Pub. L. No. 91-648

through grants and remain employees of their home institutions. Accordingly, these temporary staff members can have a heightened risk of conflicts of interest while they are working at NSF. NSF's reliance on individuals appointed under the IPA — hereafter referred to as IPAs — is significant.

Challenges for NSF

NSF benefits from IPAs' contributions, but it also faces challenges in managing the IPA program. For example, because individuals can serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions. As of September 2017, IPAs led 5 of NSF's 7 science directorates and 17 of 29 divisions.[13] Thus, the majority of the positions responsible for providing leadership and direction to accomplish the agency's mission were held by temporary employees.

In our June 2017 report, *NSF Controls to Mitigate IPA Conflicts of Interest,*[14] we found that although NSF has implemented internal controls to identify and mitigate IPA conflicts of interest, some of the controls could be strengthened, and additional controls may improve NSF's ability to identify or mitigate IPA conflicts of interest. Specifically, NSF's information system does not restrict conflicted parties from accessing proposal and award information, and rules on submitting proposals while at NSF are not clear or consistently enforced. In addition, NSF did not always ensure a substitute negotiator was named when negotiating awards with former IPAs or fully track completion of exit briefings for departing IPAs.

NSF's reliance on IPAs also comes with a high cost because IPAs are not subject to Federal pay and benefits limits. In 2015, NSF paid 22 IPAs more than the maximum rate of pay for Senior Executive Service. NSF paid nearly $8.9 million for salary, fringe benefits, lost consulting, and per diem for 27 executive-level IPAs in 2015. In light of these costs, the AICA requires NSF to report annually to Congress written justification for any IPA paid at a rate that exceeds the maximum rate of pay for the Senior Executive Service. In addition, the Act requires NSF to submit to Congress one year after the Act's enactment a report on NSF's efforts to control costs associated with IPAs, including how NSF implemented our recommendations.

In addition, NSF's Independent Research/Development (IR/D) program permits NSF staff, including IPAs, to engage in research projects while they are at NSF. IPAs participating in IR/D activities usually return to their home institutions to continue existing research projects. Of 250 working days in a year, IR/D participants can spend up to 50 days (20 percent of their work time) on research at their home institutions. In October 2016, NSF issued a policy change limiting IPA travel to the home institution under the IR/D program to 12 trips per year. The amount of time IPAs spend at their home institutions — rather than at NSF — raises concerns about their ability to fulfill their responsibilities at NSF and to be fully engaged in the agency's mission.

[13] There were vacancies in leadership positions for one science directorate and five divisions.
[14] OIG Report No. 17-2-008, June 8, 2017

OIG Assessment of NSF Progress

In response to our 2017 report, NSF has agreed to take corrective actions to strengthen controls over IPA conflicts of interests, including reassessing controls to ensure staff do not have access to awards and proposals for which they are conflicted; ensuring that staff obtain exit interviews; and clarifying and enforcing its rules on the submission of preliminary proposals by current employees and IPAs.

In response to recommendations in our 2013 audit report, *Audit of Cost Associated with NSF's Use of Intergovernmental Personnel Act Assignees*,[15] NSF established an IPA Steering Committee in April 2016 to analyze IPA costs and identify cost savings. In November 2016, the NSF Chief Human Capital Officer provided the National Science Board a status briefing of IPA program changes, which include NSF beginning a pilot program requiring 10 percent cost sharing of IPA salary and fringe benefits for new agreements in FY 2017 that was expected to save $2.8 million. NSF also eliminated lost consulting as a cost reimbursable to IPAs, with a cost savings expected of $400,000 annually.

Management of the United States Antarctic Program

Overview

NSF, through the United States Antarctic Program (USAP), manages U.S. scientific research in Antarctica. The Antarctic Support Contract (ASC) and its subcontractors provide logistical support in a variety of areas — from laboratory management and food services to IT and other support functions — that make NSF research possible in one of the most remote areas of the world. The ASC was awarded to Lockheed Martin in December 2011 and is NSF's largest contract, valued at nearly $2 billion over 13 years. In August 2016, Leidos Holdings, Inc. and Lockheed Martin's Information Systems & Global Solutions business segment merged. As a result of the merger, Leidos now holds the ASC. Challenges include ensuring a successful transition of the ASC project, modernizing the largest research station in Antarctica, and managing the heightened risks that come with the remote and isolated environment. In addition, NSF has indicated to us that it will apply its new major multi-user research facility policies and procedures, which typically apply to cooperative agreements, to the ASC, which follows the Federal Acquisition Regulation. As previously discussed, ensuring consistent implementation of its new policies and procedures is a new challenge for NSF.

Challenges for NSF

Ensuring a successful transition of the ASC project, together with its subcontractors, is a challenge for NSF. It is essential for NSF to have strong cost controls, especially through reorganizations and mergers, to protect the Federal Government against unwarranted increases in ASC costs and to oversee costs incurred under the ASC and its subcontracts.

[15] OIG Report No. 13-2-008, March 20, 2013

NSF has three sites — Port Hueneme, California; Punta Arenas, Chile; and Christchurch, New Zealand — where inventory is stored and maintained prior to shipment to Antarctica. The Port Hueneme facility alone handles approximately 40 million pounds of cargo each year. Sound management of the acquisition, storage, and shipment of inventory is critical to controlling cost, operational efficiency, and mission readiness. Management needs accurate data to make informed decisions regarding budgeting, financial management, and logistical and operational management. Inventory stored at these sites is at particular risk due to the large volume of material, long logistical lead time, and remoteness from the USAP program headquarters.

NSF will also face the challenge of modernizing McMurdo Station, the largest research station in Antarctica. The Antarctic Infrastructure Modernization for Science (AIMS) project is a major capital investment effort to ensure that McMurdo Station remains a viable platform for supporting Antarctic science for the next 35 to 50 years. AIMS, once fully developed and funded, will take approximately 10 years to complete through a series of large contracts. A major prerequisite for AIMS is that its planning and construction process have minimal impact on the science that will continue to take place there. Another prerequisite is obtaining the necessary funding from Congress. It is also important for NSF to apply lessons learned through its major facility work as it proceeds with this new construction project.

Finally, our 2015 report, *Audit of Health and Safety in the U.S. Antarctic Program*,[16] noted that misconduct in the Antarctic creates a heightened threat due to the remote and isolated environment.

OIG Assessment of NSF Progress

Regarding fiscal oversight of the ASC, NSF is obtaining an incurred cost audit of a large ASC subcontractor who billed approximately $46.5 million for 2012 and 2013.

In response to our 2015 audit report, NSF developed its *Process for Reporting and Reviewing Code of Conduct Violations*, which states that each year the Office of Polar Programs (OPP) will send a request to all USAP employing organizations and NSF's on-site representatives (for grantees) for a report of all significant instances of misconduct in Antarctica for the previous 12 months. OPP managers will convene to review all submitted reports and determine and document in a consolidated report whether any participants should be banned. We recognized this as a needed start towards OPP's ability to compile statistics on the occurrence of misconduct incidents and to identify any actions that need to be taken with respect to such incidents.

Cybersecurity and Information Technology Management

Overview

NSF depends on IT resources and systems to process, maintain, and report essential information. NSF staff and grantees must be able to rely on the integrity, availability, and reliability of the information

[16] OIG Report No. 15-2-009, July 2, 2015

contained in NSF financial and other IT systems. The agency is challenged to protect its information systems and IT resources as well as to manage records and applications on mobile devices.

Challenges for NSF

Protecting Agency Information and IT Resources

The protection of its information systems against unauthorized access or modification is critical to NSF's ability to carry out its mission. NSF's FY 2016 *Agency Financial Report* contained the first instance of an IT-related significant deficiency in internal control over financial reporting. Specifically, NSF did not take effective measures to authorize and recertify access for two financial feeder systems and to monitor privileged users'[17] actions for its core financial system and one of its feeder systems. Without these access controls, there is an increased risk of unauthorized transactions and unauthorized changes to data, audit logs, and configurations that remain undetected and affect the integrity of financial transactions.

In addition to IT security weaknesses related to its financial systems, NSF continues to experience long-standing issues that warrant increased attention, particularly with regard to the systems supporting the USAP. Although IT infrastructure updates are included in the AIMS project, NSF and USAP staff stated that ongoing budget constraints and the need to prioritize health and safety needs have limited NSF's ability to address these issues and to effectively modernize the USAP IT infrastructure. NSF management should allocate appropriate resources to correct these weaknesses and ensure that USAP systems and information are adequately protected.

Managing Records and Applications on Mobile Devices

NSF has not finalized its guidance related to the use of smartphone applications that support encryption or prevent the automatic deletion of messages for work-related communications, although it has been working to complete the guidance since NARA issued its memo on this topic in March 2017. In our July 2017 report, *NSF Could Strengthen Key Controls over Electronic Records Management*,[18] we identified that NSF has the capability to monitor the use of smartphone applications on NSF-owned mobile devices, but does not actively monitor their use. This allowed some NSF employees to download smartphone applications that support encryption or automatic deletion of text messages without consulting appropriate officials as required. In addition, NSF does not have a way to capture text messages on NSF-owned mobile devices or social media messages.

Without effective measures to capture text and social media messages or monitor the use of smartphone applications, NSF cannot ensure it is complying with Federal requirements and guidance for electronic records management. NSF could strengthen information system controls by either blocking applications it deems untrustworthy or allowing the use of only approved applications that it deems trustworthy and

[17] Privileged users are database and operating system administrators.
[18] OIG Report No. 17-2-009, July 6, 2017

in line with its mission. NSF has an application approval process for its laptop and desktop computers, but it could provide a similar guide for mobile devices.

OIG Assessment of NSF Progress

NSF has taken steps to address the significant deficiency reported in the FY 2016 *Agency Financial Report*. The agency has improved its monitoring and reviewing of audit logs related to its core financial system and has updated its process for renewing access to one of its financial feeder systems. However, areas for improvement remain regarding reviewing and granting new access to financial feeder systems as well as monitoring audit logs. NSF should continue to take steps to improve IT controls over financial reporting.

NSF has also begun to take steps to address the infrastructure issues at USAP. The McMurdo Master Plan, part of the AIMS project, lists several IT-related upgrades, including major renovations to the IT & Communications building (and the subsequent relocation of the data center) as well as modernization of telephone systems. NSF management should allocate appropriate resources to correct these weaknesses and ensure that USAP systems and information are adequately protected.

Regarding mobile device management, NSF has not issued guidance related to the use of smartphone applications that support encryption or the ability to automatically delete messages after they are read or sent for work-related communications. However, in response to our July 2017 report, NSF has agreed to implement controls to prevent prohibited applications from being downloaded onto NSF-issued mobile devices without authorization and to implement quarterly monitoring of applications installed on such devices by March 2018.

Encouraging the Ethical Conduct of Research

Overview

Research misconduct — plagiarism, data fabrication, and data falsification — damages the scientific enterprise, is a potential misuse of public funds, and undermines the trust of citizens in Government-funded research. It is imperative to the integrity of research funded with taxpayer dollars that NSF-funded researchers carry out their projects with the highest ethical standards. For this reason, it is essential that NSF continue to recognize the importance of its Responsible Conduct of Research (RCR) requirement, which it implemented in 2010, to help minimize the risk of unethical conduct.

Challenge for NSF

The scientific enterprise is based on a foundation of trust. If the trust is found to have been misplaced as a result of unethical or unprofessional conduct on the part of scientists, the impact of that breakdown is

not limited to the research community alone — it can undermine the relationship between science and society as a whole.[19]

Our investigations continue to substantiate allegations of fabrication, falsification, and plagiarism in NSF-funded research. We also continue to receive allegations related to violations of NSF peer review confidentiality, false representations in résumés, false representations of publications in annual/final reports, and fraudulent or otherwise improper use of grant funds. The number and variety of ethical issues identified in our investigative activities illustrate the importance of emphasizing research integrity as a core value — not only at the student level, but at the faculty level as well.

In accordance with the *America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act of 2007*[20] (America COMPETES Act), NSF requires that each institution submitting a proposal certify that it has a plan to provide appropriate training and oversight in the ethical conduct of research to all undergraduates, graduate students, and postdoctoral researchers who will be supported by NSF to conduct research. The institutions are responsible for verifying that the training has been received. However, NSF left it to the institutions to define the content of the training programs and provided no guidance as to what constitutes appropriate training. In our review of a sample of institutional RCR training plans,[21] issued in July 2017, we found that some institutions had not developed a training plan. Most institutions in our review responded to the RCR mandate by utilizing online training modules, although some research suggests that many of the online ethics training programs currently available are less effective than programs that use a hybrid of online and face-to-face training.

While most of the institutions we sampled complied with NSF's RCR requirements, almost one quarter of the institutions did not initially do so. In light of that finding and the related observations we made during the course of our review, it appears that NSF's awardees could benefit from NSF providing written guidelines or templates for universities to follow, as requested by the America COMPETES Act's report language, and from the sharing of best practices with the broader community.

OIG Assessment of NSF Progress

In response to our July 2017 report, the NSF Director issued an Important Notice[22] to all institutions reminding them of the requirement to have an RCR plan. However, we believe that greater guidance to institutions is warranted. NSF has a unique opportunity to encourage institutions to incorporate best practices into their RCR programs. We also believe NSF should encourage institutions to extend their RCR programs to faculty, as our investigation statistics suggest they too are vulnerable to committing research misconduct. Such actions will help minimize the risk of unethical or unprofessional conduct by such individuals and, in so doing, help protect the relationship between science and society as a whole.

[19] *On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition*, 2009
[20] Pub. L. No. 110-69
[21] OIG Tracking No. PR12030006, *OIG Review of Institutions' Implementation of NSF's Responsible Conduct of Research Requirements*, July 25, 2017
[22] NSF Office of the Director Important Notice No. 140, *Training in Responsible Conduct of Research – A Reminder of the NSF Requirement*, August 17, 2017

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OFFICE OF THE
DIRECTOR

MEMORANDUM

DATE: October 20, 2017

TO: Ms. Allison Lerner
Inspector General, National Science Foundation

FROM: Dr. France Córdova
Director, National Science Foundation

SUBJECT: Acknowledgement of the Inspector General's FY 2018 Management Challenges Memorandum and Transmittal of NSF's Progress Report on the FY 2017 Management Challenges

This serves to acknowledge receipt of your report dated October 12, 2017, summarizing what the Office of Inspector General (OIG) considers to be the most serious management and performance challenges facing the National Science Foundation (NSF). These challenges are: managing major multi-user research facilities; managing NSF's business operations; managing NSF's Intergovernmental Personnel Act (IPA) program; managing the U.S. Antarctic program; cybersecurity and information technology management; and encouraging the ethical conduct of research. Your memorandum has been shared with NSF's executives and senior officers, and we will continue to address these issues through collaborative, cross-agency communication and action.

This memorandum also provides you with NSF's progress report highlighting the significant actions taken in FY 2017 on the management challenges outlined in your October 17, 2016, memorandum. The report provides anticipated next steps and will serve as a prospective guide for many of the actions planned for FY 2018.

As always, NSF remains committed to serving the research community effectively, to continually improving stewardship across the agency, and to safeguarding Federal funds awarded by NSF in support of the agency's mission. We look forward to continuing to work with your office to achieve these goals.

Enclosure

cc: Chair, National Science Board
Chair, National Science Board, Committee on Oversight
Acting Chief Financial Officer

National Science Foundation (NSF)
FY 2017 Progress Report on OIG Management Challenges

CHALLENGE: Establishing Accountability over Large Cooperative Agreements

LEAD: BILL KINSER, BRANCH CHIEF (BFA/DACS/CSB)

NSF Management Overview: The Office of Inspector General (OIG) challenge relates to NSF's oversight of major facilities construction and operations cooperative agreements. The Foundation currently utilizes end-to-end oversight policies and procedures to ensure adequate stewardship over federal funds for the full project life-cycle. These activities are carried out starting with the day-to-day oversight by the Science and Engineering Directorates and the Office of Budget, Finance and Award Management (BFA) and extend through the decisional and governing responsibilities of the Office of the Director (O/D) and the National Science Board (NSB). The Major Research Equipment and Facility Construction (MREFC) Panel provides additional oversight of the design stage, which includes readiness for advancement and establishing the performance baseline for construction. Within BFA, the Large Facilities Office (LFO) develops policies and procedures related to large facilities, provides assistance to the program offices, and assures that policies, procedures, and good practices are being followed. Other BFA assurance units include the Cooperative Support Branch within the Division of Acquisition and Cooperative Support (DACS/CSB) and the Division of Institution and Award Support's Cost Analysis and Pre-award Branch (DIAS/CAP), which supports cost analysis and other pre-award activities in an advisory capacity to CSB.

NSF has been continuously enhancing its pre-award and post-award oversight of major facilities in construction and operations since June 2014. These enhancements are documented in the latest revision of the Large Facilities Manual (LFM) and internal Standard Operating Guidance (SOG). The December 2015 report by the National Academy of Public Administration (NAPA) supported NSF's use of cooperative agreements. However, the report also noted that NSF should "apply equal emphasis to increased internal management of the business practices critical to the enhanced oversight and project success" in order to bring them into balance with the science and technical aspects of oversight.

Additional progress made in FY 2017, along with future implementation milestones, are described below.

a. Ensure adequate oversight of large facilities awards, including operations awards. Ensure that the emphasis on science results does not come at the expense of sound business practices, noting NAPA's call for equal emphasis on these two objectives.	**NSF's Significant Milestones in FY 2017** • Revised the Large Facilities Manual (NSF 17-066) to codify American Innovation and Competitiveness Act (AICA) requirements and other newly-strengthened oversight requirements for NSF and Recipients. • In accordance with AICA and BOAC Subcommittee recommendations, named the NSF Chief Operating Officer (COO) as the agency "Senior Accountable Official" for major facilities oversight. • Implemented process for conducting incurred cost audits and accounting system audits led by CSB. • Socialized new oversight requirements with major facilities community at annual Large Facilities Workshop (May 2017). • Revised the A-123 Major Facilities Oversight Process Narrative. • Implemented a new combined annual CSB/LFO major facilities portfolio risk assessment in draft form (June 2017) to increase engagement and collaboration between CSB, LFO, and Programs in assessing risk and selecting cooperative agreement Recipients for review activities including audits.
	NSF's Anticipated Milestones:

	• Finalize internal Standard Operating Guidance for joint CSB/LFO annual portfolio risk assessment (Fall 2017). • Consider OD staffing requirements to support COO as Senior Accountable Official and periodic Directorate-level major facilities briefings with COO. (Fall 2017)
b. Ensure access to quality Earned Value Management (EVM) data; validate the EVM report that awardees provide and require that EVM systems be certified.	**NSF's Significant Milestones in FY 2017** • Codified and implemented Earned Value Management System (EVMS) Verification, Acceptance and Surveillance procedures (LFO SOG 17-2). • Completed EVMS Acceptance on DKIST and LSST projects. • Completed Verification Review of the Regional Class Research Vessel (RCRV) project EVMS.
	NSF's Anticipated Milestones: • Complete acceptance of RCRV project EVMS prior to initiating physical ship construction (Spring 2018). • Conduct EVMS Verification Review on the Antarctic Infrastructure Modernization for Science (AIMS) project (December 2017).
c. Implement new policy changes based on NAPA and OIG recommendations to ensure effective oversight.	**NSF's Significant Milestones in FY 2017** • Closed nearly 50 of the 55 OIG recommendations (90%) related to oversight of major facilities dating back to 2012. • Received BOAC NAPA Implementation Subcommittee Report and began consideration/implementation of recommendations (March 2017). • Initiated BOAC Subcommittee on Cost Surveillance to assess NSF's strengthened policies and procedures (June 2017). • Developed and implemented revised internal policies and procedures related to "fee" (July 2017).
	NSF's Anticipated Milestones: • Develop and implement new internal policies and procedures related to management reserve (Fall 2017). • Implement formal Lessons Learned program (preparing pilot for launch at Large Facilities Workshop; May 2018). • Enhance documentation and formalization of NSF Communities of Practice (PO Forum Charter; Fall 2017). • Implement NSF-wide "Core Competency" staff requirements (Standard Operating Guidance) related to major facilities oversight (Fall 2017). • Strengthen MREFC Panel oversight role (full life-cycle) based on BOAC subcommittee recommendations (Pilot new "Major Facilities Panel" concept in Q1 CY 2018).

	• Revise and implement internal policies and procedures related to NSF cost analysis, and independent cost estimate reviews based on American Innovation and Competitiveness Act (AICA) requirements (Fall 2017).

CHALLENGE: Management of NSF's Business Operations — Improper Payments

LEAD: MICHAEL WETKLOW, DIVISION DIRECTOR (BFA/DFM)

NSF Management Overview: NSF Management does not consider improper payments to be a significant risk to NSF's mission, programs, or operations. In May 2017 the NSF OIG issued a report on NSF's compliance with the Improper Payment Elimination and Recovery Act (IPERA) requirements for FY 2016. The OIG concluded the NSF complied with the requirements of IPERA and had addressed all recommendations from the previous OIG report. This was the second consecutive report finding NSF in compliance with IPERA reporting requirements. The May 2017 OIG report had no recommendations and no resolution tracking requirements. The two reports validate that NSF has taken the steps necessary to demonstrate compliance and effectiveness in the agency's implementation of IPERA. In summary, NSF has:

- Demonstrated strong commitment and top leadership support to incorporate risk management concepts into business processes and management functions;
- Ensured that NSF has the people and resources to effectively comply with IPERA by assigning a senior staff associate responsible for coordinating and integrating risk management and program integrity activities;
- Executed an action plan that addressed the root cause of the IPERA reporting issue, implemented solutions, and completed all OIG recommendations;
- Established processes to monitor and validate the effectiveness and sustainability of the corrective measures; and
- Incorporated corrective measures into policy and process documentation.

The milestones listed below describe NSF's efforts to maintain and monitor IPERA compliance.

Improper Payments:	**NSF's Significant Milestones in FY 2017**
a. i) Address significant limitations in NSF's analysis of six of the nine White House Office of Management and Budget (OMB) risk factors, and ii) improve assessment of	• Developed and published standard operating guidance (SOG) BFA 2017-1 on November 10, 2016 for improper payments risk reviews incorporating the nine IPERA risk factors and additional considerations from the OIG review report. • Completed an improper payments risk review for FY 2016. The risk review included input from subject matter experts for grants, contracts, charge cards, and payments to employees. • Received OIG inspection of the FY 2016 risk review, which found NSF in compliance with the requirements of IPERA.

NSF payments to employees, e.g. payroll testing and interviewing HRM regarding administering salary and benefits. OIG has made eight recommendations to strengthen NSF IPERA risk assessments.	**NSF's Anticipated Milestones** • Update the improper payments risk review SOG by providing additional details for the process to obtain and group fiscal year disbursements and refine the evaluation of the SME input on the nine IPERA risk factors. Publish the update by November 1, 2017. • Complete an improper payments risk review for FY 2017 outlays per the SOG (planned for early FY 2018). • Plan and conduct an improper payments risk assessment for FY 2018 by December 31, 2018.

CHALLENGE: Management of NSF's Business Operations Information & IT Resources

LEAD: DOROTHY ARONSON, DIVISION DIRECTOR (OIRM/DIS)

NSF Management Overview: NSF is aware that the availability of IT resources and security posture of its information technology (IT) systems is of critical importance to the Foundation's ability to carry out its mission, particularly in a year in which NSF is relocating its headquarters.

NSF employs tools and technology in its Information Security Continuous Monitoring (ISCM) program to continuously monitor the network availability and security posture. As part of the ISCM program NSF implemented the Department of Homeland Security (DHS) Continuous Diagnostic and Mitigation (CDM) tools and technology to monitor the network.

The IT security program is evaluated yearly by an independent organization in accordance with the Federal Information Security Management Act (FISMA). NSF has been proactive in reviewing security controls and identifying areas to strengthen the program, including incorporation of information gained and lessons learned from the FISMA report.

The Office of Polar Programs (OPP) U.S. Antarctic Program (USAP) proactively monitors its network to ensure compliance with security requirements. OPP allocates appropriate resources to the USAP IT security program to address information security requirements and FISMA review findings.

Information & IT Resources *b. i) Before the move in FY 2017, NSF should increase the timing and robustness of IT testing, and after the move, NSF should ensure agency information and IT resources remain available, secure, and*	**NSF's Significant Milestones in FY 2017** <u>NSF Move</u> • Continued to maintain a detailed move plan for IT systems and services with comprehensive IT applications testing and validation, including user testing, as IT services are transitioned to the new headquarters building. • Completed the electronic move of applications, databases and servers, and validation testing successfully in June 2017. • Completed the physical server move and validation testing successfully in July 2017. • Utilized information security continuous monitoring (ISCM) resources, tools, and strategies to ensure continued availability of services and applications during the stabilization period following NSF's staff moves in late summer/early fall 2017.

complete. Efforts may be assisted by using information security continuous monitoring (ISCM) strategies.
ii) Allocate appropriate resources to correct IT weaknesses related to the U.S. Antarctic Program (USAP) and ensure the systems and information are adequately protected.
	U.S. Antarctic Program (USAP)
	• The Office of Polar Programs (OPP):
	  ○ Completed a thorough review of USAP IT security program controls to ensure compliance with federal guidance and risk management and adequacy of risk management plans.
	  ○ Allocated appropriate resources to the USAP IT security program to address information security findings identified in the annual FISMA review.
	  ○ Documented redundancy capabilities to IG auditors to demonstrate resiliency of the USAP network and re-evaluate a longstanding finding to close the original issue.
	  ○ Initiated a disaster recovery plan to document actions in the event of a contingency. OPP is also planning to complete a business impact analysis to validate their approach to service recovery.

	NSF's Anticipated Milestones • Continue to monitor the availability, responsiveness, and security of agency IT resources during and after the move to the new headquarters, utilizing information security continuous monitoring (ISCM) strategies in support of these activities. • Continue to address identified IT security weaknesses through USAP program funding.

CHALLENGE: Management of NSF's Business Operations Transparency & Accountability (DATA Act)

LEAD: TERESA GRANCORVITZ, SENIOR ACCOUNTABLE OFFICIAL (BFA/OAD)

NSF Management Overview: NSF successfully implemented the Digital Accountability and Transparency Act (DATA Act) on April 28, 2017. The DATA Act is a government-wide initiative led by OMB and the U.S. Department of Treasury (Treasury) to standardize and publish the federal government's wide variety of reports and data compilations related to spending: financial management, payments, budget actions, procurement, and assistance. NSF senior agency officials were aware of the Act early on, and when the legislation passed, NSF moved immediately to leverage its resources to prepare for implementation. At NSF, the DATA Act has been a cross-agency initiative with early leadership from the NSF Office of the Director supported by subject matter experts in BFA and the Office of Information and Resource Management (OIRM) for implementation support, and an internal governance structure that included an executive-level steering committee, a DATA Act Working Group (DAWG) and a DATA Act Project Management Office (PMO). The Senior Accountable Official (SAO) is presently the Acting Chief Financial Officer (CFO) and Office Head of BFA.

Additionally, NSF collaborated with its OIG around stewardship and supported the OIG in its efforts to publish a DATA Act readiness review by November 2016. OIG staff have consistently had access to all DATA Act-related materials through meetings, interviews and the DAWG SharePoint site. NSF implemented all of the OIG project management-related recommendations and took steps to address ongoing OIG concerns around human resources planning.

Government-wide, NSF staff have represented the agency in connection with DATA Act-related activities, including the Financial Assistance Committee for E-government (FACE); the Data Standards Committee, an Executive-level interagency group representing the budget, financial assistance and procurement communities charged with making recommendations on issues of government-wide data standardization; the Procurement Committee for E-government; and numerous additional DATA Act-related workshops, meetings and small-group strategy sessions with OMB, Treasury, and other CFO Act agencies. These collaborations have been key to NSF's DATA Act implementation success.

NSF success is also attributable to its risk-based approach to implementation. The agency actively took steps to identify and mitigate risks and evaluated multiple approaches to ensure on time compliance. No major system changes were required in order for NSF to meet the deadline. Going forward, the agency will work towards operationalizing the DATA Act submission and will continue its successful and on time implementation. The DAWG will continue to foster strong internal, executive-level and government-wide communication, as needed, and will continue to support the OIG as needed in its upcoming DATA Act audit scheduled for publication by November 2017.

DATA Act	**NSF's Significant Milestones in FY 2017**
c. Achieve successful implementation of the DATA Act despite evolving federal guidance, the late release of Treasury's production-ready broker, the late release of iTRAK software patches, limited available agency FTE, the potential that NSF's relocation may impact	• Developed and implemented a Corrective Action Plan in response to OIG Readiness Review. • Developed human resources tracking document maintained on SharePoint in response to ongoing OIG DATA Act staffing concerns. • Generated and tested Award Submission Portal (ASP) data file per Treasury's evolving specifications from FY 2016 Q3 through FY 2017 Q1. • Developed a business intelligence solution for generating ASP submission and correction files using the award data from the Awards system and System for Award Management (SAM) information from iTRAK data extracts, for submitting NSF's financial assistance data to USASpending.gov. • Complied with ASP submission requirements to USASpending.gov starting with January 2017 data submission.

DATA Act activities, and the lack of a clear funding source for NSF's DATA Act implementation efforts.	• Implemented initial Oracle patch for award attributes and modified award system interfaces with iTRAK to populate the following attributes: Procurement Instrument Identifier (PIID), Parent Award Identifier (PAID), Federal Award Identification Number (FAIN), and Unique Record Identifier (URI). • Uploaded financial assistance and procurement files to populate the award attributes in iTRAK. • Implemented Oracle patch for main DATA Act functionality to configure mappings and generate files that are required to be submitted to Treasury's production-ready broker (Broker) for subsequent public reporting of financial data. [These files are: file A (Appropriations Account Data), B (Object Class and Program Activity Data), and C (Award Financial Data).] • Developed custom solution (alternative, back-up approach) that leverages existing iTRAK reports and NSF tools to generate files A, B, and C, and reconciliation reports to mitigate risk of not having the Oracle patches ready for DATA Act compliance by May 2017. • Developed Program Activity mappings to crosswalk iTRAK file B data with Program Activity Codes from the Program and Financing (P&F) Schedule in the President's Budget Appendix. • Generated files A, B, and C using the custom solution. • Performed Broker testing by uploading agency-generated files A, B, and C. • Performed Broker testing by extracting data for files D1 (Award and Awardee Attributes for Procurement), D2 (Award and Awardee Attributes for Financial Assistance), E (Additional Awardee Attributes), and F (Sub-award Attributes). • Performed Broker testing in order to validate files A through F to facilitate certification of NSF's data. • Implemented custom solution to generate files A, B, C, and reconciliation reports, and submitted files A - F prior to the DATA Act compliance date of May 2017. • Achieved compliance with May 2017 DATA Act implementation deadline. • Received the Secretary's Certificate of Appreciation from the U.S. Department of the Treasury in recognition of NSF's outstanding commitment to collaboration while implementing the DATA Act on June 28, 2017. • Documented standard operating procedures for generation, certification, and submission of files A- F. • Engaged with OIG and responded to the OIG Provided by Client (PBC) List with requested materials in support of the OIG DATA Act audit report to be published in November 2017. • Provided agency source data to Government Accountability Office (GAO) and answered questions to support GAO's mandated government-wide DATA Act Data Quality Review; NSF data that had been posted on beta.USASpending.gov was included in the sample of government-wide data GAO pulled to conduct its review.

	NSF's Anticipated Milestones • Transition financial assistance (file D2) reporting from the existing ASP to comply with Treasury's DATA Act Information Model Schema (DAIMS) v1.1 and Financial Assistance Broker Submissions (FABS) scheduled in September 2017 and DAIMS v2.0 in Spring 2018. • Continue to use the custom solution to generate files A, B, C, and reconciliation reports, and submit files A – F on a quarterly basis until a decision is made on how to move forward with the Oracle patches. • Continue to refine and document all DATA Act-related business processes and Standard Operating Procedures (SOPs). • Continue to provide information to GAO and OIG in connection with DATA Act reviews.

CHALLENGE: Management of NSF's Business Operations Government Records

LEAD: WONZIE GARDNER, DIVISION DIRECTOR (OIRM/DAS)

NSF Management Overview: In 2012, OMB and the National Archives and Records Administration (NARA) issued a directive, OMB Memorandum M-12-18, Managing Government Records. This directive is consistent with a 2011 Presidential Memorandum requiring Federal agencies to reform the policies and practices for the management of physical records and to provide a framework for the management of electronic records.

GAO subsequently issued Report 15-339, dated May 14, 2015, "Information Management: Additional Actions Are Needed to Meet Requirements of the Managing Government Records Directive". NSF formulated a Corrective Action Plan (CAP) in response to the GAO report and is on schedule to meet all the planned actions enumerated in the CAP. Additionally, NSF hired a dedicated professional in its Records Management Section to oversee implementation of the CAP and efforts associated with the relocation of NSF's headquarters.

Government Records *d. Ensure compliance with the National Archives and Records Administration's 2012 directive to take specific reform actions by designated dates. In particular, meet deadlines associated with relocating NSF's headquarters by: i) ensuring appropriate training and guidance for employees; ii) updating NSF's record retention schedules to*	**NSF's Significant Milestones in FY 2017** • Revised the records management training course to comply with NARA Bulletin 2017-01, Agency Records Management Training Requirements in June 2017. The revised course will be required training for all staff on an annual basis. • Classified the Office of Inspector General's (OIG) electronic records as official records per the OIG Records Schedule (DAA-0307-2016-0003) as approved by the Archivist of the United States on January 6, 2017. • Scanned over 7,000 permanent and temporary records from August 2016 to August 2017 to reduce the footprint of hardcopy files ahead of NSF's move to its new headquarters. **NSF's Anticipated Milestones** • Update the records management policy that is dated October 1988 to comply with current NARA guidance and 36 CFR Chapter XII, Subchapter B - Records Management, and issue by March 31, 2018. • Complete an agency-wide records inventory by the end of FY 2018 to provide a foundation for developing file plans and additional records schedules as needed.

classify electronic records as official agency records; and iii) adhering to established agency schedule to review, scan, and digitize its paper records.	• Create an online training for the Electronic Records Management System (ERMS) and make it available in LearnNSF by December 31, 2017. • Destroy all records at the Federal Records Center (FRC) that have met their disposition date and are no longer required by the agency by the end of FY 2018, and continue to scan records to put in ERMS. Both activities will reduce annual storage costs at FRC. • Update remaining record schedules and classify electronic records as official agency records, and get approvals from the Archivist of the United States by the end of FY 2019.

CHALLENGE: Management of the IPA Program

LEAD: DIANNE CAMPBELL, DIVISION DIRECTOR (OIRM/HRM)

NSF Management Overview: NSF provides the opportunity for scientists, engineers, and educators to rotate into the Foundation as temporary Program Directors, advisors, and leaders. Rotators bring fresh perspectives from across the country and across all fields of science and engineering supported by the Foundation, helping influence new directions for research in science, engineering, and education, including emerging interdisciplinary fields. In fact, many of these rotators remain involved in their professional research while working at NSF through participation in the Independent Research/ Development (IR/D) program (managed by the NSF IR/D Council). Because NSF supports fundamental research at the frontiers of science and engineering, NSF relies on the synergy of federal employees and temporary staff for a constant infusion of new knowledge into the broad understanding of science, and a continuously improving structure of systematic and rigorous merit review. Federal and rotating staff and executives partner to ensure NSF stays abreast of and supports the very latest research ideas while ensuring stability and continuity of operations and strong stewardship and accountability of taxpayer resources. For example, federal Deputy Assistant Directors (DAD) provide continuity for rotating Assistant Directors (AD).

In April 2016, NSF Director France A. Córdova announced the establishment of a Steering Committee for Policy and Oversight of the IPA Program (IPA Steering Committee). The Steering Committee serves as the primary body for considering IPA-related policies, oversees common approaches to budgeting and implementation of the IPA program, and champions the effective use of IPAs, identifying the benefits they bring the agency and the actions taken by the agency to mitigate risks and costs. The IPA Steering Committee is Chaired by the Chief Human Capital Officer (CHCO) with membership consisting of the Chair of the NSF Executive Resources Board (ERB) and the Independent Research and Development (IR/D) Council; the Head of the Office of Diversity and Inclusion, and four at-large members, including two IPAs.

In June 2017, NSF's OIG issued the audit report, "NSF Controls to Mitigate IPA Conflicts of Interest." The report concluded that NSF had "implemented internal controls to identify and mitigate IPA conflicts of interest." NSF formulated a corrective action plan in response to the OIG's recommendations to strengthen and add additional controls.

The challenges that come with NSF's Intergovernmental Personnel Act (IPA) program are as follows: i) Almost constant turnover in staff at NSF, especially in senior leadership positions;	**NSF's Significant Milestones in FY 2017** • Issued a memorandum to NSF staff, including IPAs, in March 2017 reminding them of the importance of high ethical standards (Staff Memorandum OD 17-03); also issued a notice to supervisors, in August 2017, reminding them of their ethics responsibilities, specifically the responsibility to ensure the compliance of their subordinates, including IPAs, with the ethics rules (Staff Memorandum OD 17-17). • Initiated a pilot requiring 10% cost sharing by the IPA's home institution of the IPA's academic-year salary and fringe benefits (per NSF Bulletin 16-11), which applies to all new IPA agreements initiated in FY 2017, including those for executive- and program-

ii) Due to IR/D activities, the amount of time IPAs spend at their home institutions raises questions about their ability to fulfill their responsibilities at NSF and be fully engaged in the agency's mission; iii) It is critical that strong controls be in place to identify and mitigate IPA conflicts of interest; and iv) NSF's reliance on IPA's comes with a high cost. The number of IPAs and their cost (i.e., salaries, benefits, travel) have increased in the last 3 years. IPAs are not subject to federal pay and benefits limits.	level staff. Additionally, NSF will no longer provide for Lost Consulting payments. • Published a revised IR/D Guide in January 2017, via the IR/D Council, that includes guidance limiting NSF payment of IPAs' IR/D travel to their home institutions to 12 trips per year. The guidance encourages IPAs to combine other NSF official business and/or telework with these trips to get the most efficient use of those travel dollars. • Designed and began data collection for an evaluation, initiated in the Office of Integrated Activities (OIA), to determine the cost implications associated with the 10% cost-sharing pilot and determine to what extent the policy change impacts NSF's ability to recruit strong IPAs. • Closed the sole open OIG audit recommendation related to IPA costs. • Reviewed and updated core policies relating to IPAs in the NSF Personnel Manual. • Strengthened communication and implemented regular meetings between the Chief Operating Officer and Deputy Assistant Directors to reinforce and support leadership continuity. • Implemented a process for Chief Operating Officer review and AD/DAD discussion of IPA salary cases that exceed the Senior Executive Service cap.
	NSF's Anticipated Milestones • Develop an Integrated Workforce Strategy as part of NSF's Agency Reform activity. This workforce framework will aid in identifying the balance of Federal and Rotator Executive Resources within the Research Directorates. An initial draft will be submitted to the IPA Steering Committee in October 2017. • Deliver the cost sharing pilot evaluation to the IPA Steering Committee in November 2017. • Clarify and improve enforcement of policies on the submission of preliminary and new proposals while serving as an IPA and designation of a substitute negotiator for proposals submitted until one year after departure. • Implement an electronic separation clearance process that tracks completion of exit interviews where separating staff will acknowledge their responsibility for being familiar with post-employment restrictions.

CHALLENGE: Moving NSF Headquarters to a New Building

LEAD: BRIAN MACDONALD, SENIOR RELOCATION PROJECT OFFICER (OIRM/OAD)

NSF Management Overview: NSF began to occupy its new location in Alexandria, Virginia in August 2017 and is well-positioned to vacate its Arlington, Virginia locations by December 31, 2017. The NSF Relocation Office (NRO) is leading this effort and is charged with ensuring a successful outcome to NSF's expiring lease effort through the delivery of a next-generation NSF headquarters facility. NRO's mission is accomplished through input of the entire NSF staff through Directorate liaisons, the American Federation of Government Employees (AFGE) Union-Local 3403, the agency Relocation Executive Advisory Group (REAG), the General Services Administration (GSA), and other stakeholders to the project.

Through demonstrated leadership and disciplined project management, NRO continues to make significant progress in key areas to ensure project success and mitigate risks relating to scheduling delays, union negotiations, and records management. NRO has developed a detailed relocation plan and has also taken concrete steps to align the project's budget with its estimated cost.

Groundbreaking for the new NSF Headquarters was in January 2014, construction on the interior space began in April 2016, and the building was substantially complete to begin occupancy by NSF staff in August 2017. The new building will prominently reflect NSF's role nationally and internationally in the science and engineering community.

a. Ensure NSF has a complete, accurate, and updated schedule to meet the move deadlines before leases on the existing buildings expire at the end of 2017.

NSF's Significant Milestones in FY 2017

- Added NSF Relocation to the Director's Watch List in March 2017 and met with the Director six (6) times.
- Relocated the NSF data center and network from Arlington to Alexandria successfully prior to the relocation of staff.
- Installed the majority of NSF personal property designed for the new building (e.g. furniture, audio-visual equipment, information technology, and security equipment) prior to the relocation of staff.
- Prepared agency staff for the relocation:
    - Conducted numerous town halls and education sessions to advise staff on features and services in the new building as well as detailed packing guidelines and procedures for the physical move.
    - Created a dedicated relocation website on the NSF intranet that included answers to frequently asked questions, completed floor plans, transportation options to the new headquarters, neighborhood information, etc.
    - Shared multiple informational articles and videos on the relocation website and in NSF's weekly newsletter to keep staff apprised of all relocation-related news and updates.
- Reached agreement with our union partners on key issues (e.g., parking, physical relocation) during the third and final phase of negotiations.
- Substantially completed construction of the interior space. City of Alexandria has conducted its final inspections of the building.

NSF's Anticipated Milestones

- Complete the relocation to Alexandria successfully.
- Vacate and return Stafford I & II and the Rosslyn location to the landlords before December 31, 2017.

CHALLENGE: Management of the U.S. Antarctic Program

LEAD: KELLY K. FALKNER, DIVISION DIRECTOR (GEO/PLR)

NSF Management Overview: Through the Office of Polar Programs in the Directorate for Geosciences, NSF funds and manages the U.S. Antarctic Program (USAP), which supports United States' research and national policy goals in the Antarctic. Given the remote location, extreme environment, and the short period of time during which the continent is accessible, significant challenges exist for ensuring the availability of necessary logistics, operations, and science support. There are also unique and internationally-linked environmental, health, and safety issues present at the remote location. In exercising its management responsibilities, NSF relies on internal staff with the requisite expertise as well as a network of contracted support and federal agency partners. Periodically, the program is reviewed by external panels of experts.

a. Ensure a successful transition from Lockheed Martin to Leidos as the Antarctic Support Contractor (ASC) together with their respective subcontractors by having strong cost controls to protect the government against unwarranted increases in ASC costs during a period of reorganization and mergers.	**NSF's Significant Milestones in FY 2017** • Held routine executive meetings with Lockheed Martin leadership to understand the strategic rationale for the transition to Leidos and the impact to the Antarctic Support Contract (ASC). • Started implementing the Novation Agreement processed by the Defense Contract Management Agency (DCMA) as the cognizant Federal Agency, which concluded that restructuring was in the best interest of the government. • Monitored Leidos' operations on legacy Lockheed Martin systems. The Accounting System, Estimating System, Material Management and Accounting System, Purchasing System, and Property System were approved by DCMA in a letter dated August 25, 2016. • The successful transition from Lockheed Martin to Leidos through a Reverse Morris Trust has resulted in decreased costs for ASC.
	NSF's Anticipated Milestones • Continue to monitor the ongoing transfer of business systems from Lockheed Martin to Leidos, which is expected to be complete by January 1, 2018. Subsequently, the Leidos DCMA Divisional Administrative Contracting Officer will review and approve Leidos business systems. • Continue to monitor invoices, Annual Program Plans, business system reviews (accounting, estimating, purchasing systems), indirect rates and financial reporting for the USAP contractor to ensure strong cost controls continue with the new entity.

b. Ensure modernization of McMurdo Station and upgrades to Palmer Station as they proceed to construction projects, capitalizing on lessons learned from NSF's large facility work as appropriate.	**NSF's Significant Milestones in FY 2017**
	• Continued progress on the 2012 Blue Ribbon Panel (BRP) recommendations, including investment in lifecycle acquisitions and infrastructure upgrades.
	• Addressed major infrastructure upgrades recommended by the BRP report for McMurdo Station through the following design efforts:
	  ○ Completed designs for the Antarctic Infrastructure Modernization for Science (AIMS) project, including Core Facility and Utilities packages, and presented the designs to the MREFC Preliminary Design Review (PDR) Panel.
	  ○ Completed designs of the Vehicle Equipment/Operations Center using NSF Research and Related Activities Funding.

	○ Continued design on the Information Technology & Communications (IT&C) Primary Operations Center, Lodging, and Palmer Pier Replacement Projects. ○ Completed presentation to the National Science Board (NSB), which resulted in the NSB's recommendation that the NSF Director or her designee include the AIMS project in a future budget request. • Issued a Sources Sought Notice on FBO.gov to apprise potential offerors on the AIMS project (https://www.fbo.gov/index?s=opportunity&mode=form&id=b1177342be2eaaf94c01809ece0e1854&tab=core&_cview=0). • Continued internal coordination with LFO in order to leverage institutional knowledge pertaining to previous large facilities work, including best practices and considerations outlined in NSF's Large Facilities Manual (NSF 17-066).
	NSF's Anticipated Milestones • Initiate and complete necessary solicitation efforts for individual AIMS components. • Complete designs for IT&C Primary Operations Center. • Conduct advance planning/design for Ross Island Earth Station (RIES). • Prepare for AIMS Final Design Review (FDR), anticipated in Q1 of FY 2019. • Continue to update the long range capital plan to include lifecycle and real property investments for all Antarctic locations.
c. Continue to provide oversight of costs incurred for medical expenses under the ASC and its subcontractors by providing guidance on what expenses are eligible for reimbursement.	**NSF's Significant Milestones in FY 2017** • Improved USAP participant guidance for Physical Qualification (PQ) exams by better stating required tests and warning of non-reimbursable costs. • Reviewed PQ requirements, along with the contractor, during the May 2017 medical retreat in preparation for the June 2017 medical review panel meeting.
	NSF's Anticipated Milestones • Continue to review and modify PQ requirements, including during the annual medical review panel meetings • Receive contractor assessments of PQ non-reimbursable charges and reports of participant confusion with PQ process in order to guide continuous improvement.
d. Continue to provide investment in the oversight of both small and larger invoiced costs from ASC until NSF is	**NSF's Significant Milestones in FY 2017** • Continued to apply invoice processing in accordance with the "Guidance and Instructions for Invoice Review and Processing" SOP. • Requested periodic, full listings of materials/items of less than $5,000 for review.

better assured of the USAP contractor's internal controls.	**NSF's Anticipated Milestones** • Continue to apply invoice processing in accordance with the "Guidance and Instructions for Invoice Review and Processing" SOP. • Perform a "deep dive" review of a random 10% of invoices. • NSF will continue to evaluate Leidos subcontractor billing processes. Leidos mechanisms to monitor and validate the accuracy of subcontractor billing and subsequent billing to NSF include random sampling, subcontractor rate analysis and bi-weekly and monthly billing reconciliation.
e. Continue to coordinate with the ASC to identify and control risks (e.g., loss or damage) of Antarctica-bound inventory stored and maintained at Port Hueneme, California; Punta Arenas, Chile; and Christchurch, New Zealand.	**NSF's Significant Milestones in FY 2017** • Conducted two detailed route-cause analyses in response to early FY17 failures, followed by process improvements. NSF directed the ASC to develop reports on the damaged science equipment and mishandled science samples explaining how and why the damage occurred, and to implement corrective actions to avoid such damage in the future. NSF then approved the action plans, and monitored contractor activity for effectiveness. • Modified contract policy so that going forward senior ASC management will be directly involved in all high value-science sample shipments to ensure minimum risk. Final approval for shipment must come from the senior transportation manager. • Ensured that appropriate mitigation for the risk of loss or damage would be implemented by November 2016.
	NSF's Anticipated Milestones • Direct NSF's annual assessment of ASC performance, which will identify cargo failures and contractor responses. Emphasis will be placed on opportunity costs of mishandled science samples and replacement costs of damaged inventory. Penalties will be considered in the contractor award fee. • Continue to monitor the next surge of cargo shipments, which began in August 2017 and will continue through February 2018. Weekly NSF-led transportation meetings will continue to emphasize ASC responsibility to protect government property and science samples.

CHALLENGE: Improving Grant Administration

LEAD: DALE BELL, DIVISION DIRECTOR (BFA/DIAS)

NSF Management Overview: As of June 30, 2017, the NSF award portfolio consisted of 41,877 active awards, representing $26.6 billion in obligated funds to 2,983 unique awardees. NSF accountability efforts span six award stages (proposal submission, merit review, pre-award financial review, post-award monitoring, award closeout, and audit follow-up) to ensure financial capability and accomplishment, non-financial administrative and programmatic compliance, and research performance. The foundation of NSF's accountability efforts is its suite of policy and procedural documents that incorporate federal regulations, legislative mandates, and agency-specific requirements; the translation of policies and procedures into business rules that are enforced through NSF's information technology systems; and a risk-based approach to financial and administrative monitoring. Baseline monitoring activities, which are conducted on most awards through standard, recurring, and automated processes, focus on post-award administration and financial transactions to identify exceptions and potential issues that may require scrutiny through advanced monitoring. Financial baseline monitoring is used to identify potential anomalies, inaccurate expenditure reporting, or evidence of a possible misunderstanding of, or non-compliance with, federal cash management requirements and/or NSF guidelines.

In FY 2017, major accomplishments in strengthening grant administration included: (1) implementation of the restructuring of NSF's Cost Analysis and Audit Resolution Branch into two separate units focused on pre- and post-award functions to better address continuing growth in complexity and breadth of oversight functions; (2) continuation of a multi-year effort to modernize NSF's Award System, which included implementation of functionality that enables program staff to seamlessly manage $860 million in funding increments to over 4,600 awards; and, (3) successfully piloting a new tool, Targeted Review Assessments (TRAs), that allows NSF to quickly assess areas of grants management and compliance, and to provide targeted necessary business assistance to the awardee community.

a. Implement controls over spending of grant funds that ensure transparency and accountability without unduly adding to the administrative burden of awardees and federal program officers.

NSF's Significant Milestones in FY 2017

- Fully implemented inter-agency Research Terms & Conditions (RTCs), in accordance with requirements of OMB's *Uniform Administrative Requirements, Cost Principle, and Audit Requirements for Federal Awards (Uniform Guidance).* RTCs create greater consistency in the administration of federal research awards and reduce awardee administrative burden.
- Refined and conducted FY 2017 baseline award monitoring of financial transactions across NSF's grant portfolio; explored feasibility of strengthening integration of baseline and advanced monitoring activities; and initiated baseline monitoring review of grants with little or no NSF's significant financial activity.
- Continued Federal Awardee Performance and Integrity Information System (FAPIIS) implementation. Issued the final Standing Operating Guidance for Pre-Award Reviews and Posting Terminations to ensure compliance in accordance with the *Uniform Guidance.*

NSF's Anticipated Milestones

- For FY 2018, NSF will initiate a fraud risk assessment within the grants program, continue to refine its Enterprise Risk Management (ERM) risk profile, and complete an improper payments risk assessment. As part of the fraud risk assessment NSF will explore opportunities to leverage data analytics to enhance monitoring activities and grants administration.
- Continue to implement legislative requirements: (1) standardization and publishing of reports and data on federal spending under the DATA Act; and (2) reporting NSF information on undispersed balances in grant awards expired more than two years under the Grant Oversight and New Efficiency (GONE) Act.

b. Take additional steps to oversee awardees that fall below the OMB Uniform Guidance Single Audit threshold of $750,000 in total federal expenditures.	**NSF's Significant Milestones in FY 2017** • Continued to fully implement the *Uniform Guidance* that raised the single-audit threshold to avoid duplication of effort across agencies, as well as created cost/time efficiencies and reduced administrative burden for awardees and the federal government. As intended under the *Uniform Guidance*, NSF focused efforts on organizations exposed to higher risk, reviewing as appropriate awardee records required for review by federal agencies, pass-through entities, and GAO throughout a broad array of pre- and post-award oversight efforts, especially advanced and baseline award monitoring activities. • Conducted annual NSF Risk Assessment to assess level of risk associated with awardees' portfolios to identify institutions for advanced monitoring; complemented findings with results from prior institution-based oversight activities as well as concerns identified by NSF program offices and the OIG. Continued emphasis on institutions with $2 million to $15 million in NSF funds that have historically demonstrated more difficulty in administering NSF awards than those managing larger award portfolios. • Conducted risk assessments of single audits for institutions receiving NSF funds to identify institutions with highest risk for more effective utilization of resources.
	NSF's Anticipated Milestones • Assess and, as needed, refine risk criteria (i.e., award-specific, institutional, prior monitoring activities and results, award administration, and program feedback) used in the annual NSF Risk Assessment to identify those awardees managing the highest risk portfolios, and targeting those institutions for advanced monitoring activities.
c. Ensure prime grant recipients provide oversight of sub-recipients' incurred cost submissions to demonstrate costs are allowable, fair and reasonable.	**NSF's Significant Milestones in FY 2017** • Piloted Targeted Review Assessment (TRA) methodology to assess compliance of 29 prime awardees' oversight of subrecipients per OMB *Uniform Guidance* (2 CFR 200.331). Provided feedback to awardees where minor issues were noted; required formal corrective actions for two awardees with more significant issues. • Provided the OIG with a summary of TRA findings; shared 10 TRA results and files with the OIG to inform its audit of NSF oversight of prime awardees with subrecipients in accordance with the *American Innovation and Competitiveness Act*.
	NSF's Anticipated Milestones • Review advanced monitoring subaward module for opportunities to upgrade assessment protocols based on TRA findings and *Uniform Guidance* requirements; as appropriate, incorporate feedback from OIG audit of NSF to enhance the subaward module for future oversight activities. • Update DIAS fact sheet on subrecipient monitoring with links to *Uniform Guidance* requirements for pass-through entities (including risk assessment of all subrecipients) consistent with above bullets. • Continue to require prime awardees to take corrective actions in cases requiring development and/or implementation of internal controls for subaward close-out, conduct of subrecipient risk assessments, and review of single audit reports ensuring compliance with OMB *Uniform Guidance*.

CHALLENGE: Encouraging the Ethical Conduct of Research LEADS: KELLINA HENDERSON-CRAIG, DEPUTY ASSISTANT DIRECTOR (SBE/OAD) WENDA BAUCHSPIES, PROGRAM DIRECTOR (SBE/SES)

NSF Management Overview: The responsible and ethical conduct of research is critical to ensure excellence, as well as public trust, in science and engineering. In accordance with Section 7009 of the America COMPETES Act (ACA) (42 U.S.C. §1862o–1) and recognizing the importance of ethical conduct of research, NSF requires that each institution submitting a proposal certify, under penalty of perjury, that it has a plan to provide appropriate training and oversight in the ethical conduct of research to all undergraduates, graduate students, and postdoctoral researchers who will be supported by NSF to conduct research. The plan must be available for review upon request and to ensure compliance, NSF includes, as a term and condition of its awards, that institutions are responsible for verifying that undergraduate students, graduate students, and postdoctoral researchers supported by NSF to conduct research have received training in the responsible and ethical conduct of research. NSF's implementation of the Responsible Conduct of Research (RCR) requirement recognizes the breadth of research disciplines the Foundation funds, as well as the diversity of the educational levels of the individual researchers the agency supports, to ensure that the training will be effective and appropriately tailored. Specific training needs may vary depending on specific circumstances of research or the specific needs of students intending to pursue careers in basic or applied science after completing their education. Accordingly, it is the responsibility of each institution to determine both the content and the delivery method for the training that will meet the institution's specific needs. Furthermore, each institution must decide if development of content or pedagogical method is required, or if appropriate content and training can be provided from some existing sources or capabilities, and take appropriate action to implement their decisions.

The National Academy of Sciences released a report on Fostering Integrity Research in the spring of 2017 that was supported by the Office of Inspector General of the National Science Foundation under Contract No. NSFCACS11P1173. The OIG Review of Institutions' Implementation of NSF's Responsible Conduct of Research Requirements was issued by the Office of Inspector General of the National Science Foundation. Both of these reports were discussed at the National Science Board in August 2017. NSF then issued an Important Notice No. 140 to Presidents of Universities and Colleges and Heads of Other National Science Foundation Grantee Organizations addressing Training in Responsible Conduct of Research – A Reminder of the NSF Requirement in August 2017. NSF and the NSB are committed to providing appropriate guidance to grantees and to ensuring the sharing of best practices in the responsible conduct of research.

NSF has been and continues to be actively engaged in enhancing the awareness of ethical conduct of research issues by NSF staff, as well as the U.S. and international scientific research and education communities by supporting the development of tools and resources to enhance the ability of research institutions to cultivate cultures of academic and research integrity. NSF's programmatic approach is a broad proactive measure that includes all Directorates in the funding of fundamental research that informs the scientific community and public about best practices in responsible conduct of research. Most notably, the Online Ethics Center (OEC) provides resources, including an Ethics Education Library that institutions can use to deliver effective training that is tailored to meet the needs of their research projects. NSF's cross-directorate program in which all NSF Directorates actively participate, Cultivating Cultures for Ethical STEM (CCE STEM), invests in innovative approaches to enhance research into ethical conduct of research issues that can build the capacity of institutions to develop appropriate ethical conduct of research plans as required by the America COMPETES Act. NSF is actively engaged in heightening the U.S. and international STEM community's awareness of these resources.

Provide more oversight on institutional implementation of Responsible Conduct of Research (RCR) requirements and provide meaningful guidance regarding RCR training.	**NSF's Significant Milestones in FY 2017** • Issued an Important Notice No. 140 to Presidents of Universities and Colleges and Heads of Other National Science Foundation Grantee Organizations addressing Training in Responsible Conduct of Research – A Reminder of the NSF Requirement in August 2017. • Continued to support research that provides answers to questions about creating responsible research communities. • Funded 28 awards in three Directorates under the Robust and Reliable Science Dear Colleague Letters. • Continued to share state of the art understanding of what approaches are most effective in outreach opportunities with NSF staff and the US and international scientific research and education communities. • Continued funding of the Online Ethics Center (OEC) website. OEC provides online resources to engineers, scientists, faculty, students and the public to understand and address ethically significant issues that arise in scientific and engineering practice and from new developments in science and engineering. • Hosted a CCE STEM Principal Investigators' Meeting for researchers working on ethics and the responsible conduct of research (September 2016). • Funded the workshop on "Qualitative Research Ethics in the Big-Data Era" in Arlington, VA (December 2016) held by Pennsylvania State University. The goal of the workshop was to contribute to improved understanding of issues arising from ethical management of big qualitative datasets in academia and in other national and international institutions that finance and conduct qualitative research. A special issue is being planned and developed to be published in 2018 in *American Behavioral Scientist.* The focus of the special issue is to advance a set of recommendations and guidelines for accountable and ethical management of qualitative data. • Funded the workshop on "Positive Research Integrity" at the University of Notre Dame, IN (March 2017). The goal of the workshop was to assemble researchers and practitioners of positive ethics, research integrity, philosophy, moral psychology, and character education to discuss how research integrity is perceived as both a research and educational area. A workshop summary and white paper will be produced and disseminated. • Funded the workshop on "Enhancing robustness and generalizability in the social and behavioral sciences" in Arlington, VA (March 2017) held by Northwestern University. The goal of this workshop was to develop some tools and guidelines to help researchers overcome barriers to broader sampling, and to incentivize doing so through better institutional support. A Sackler Colloquium entitled, "Pressing questions in the study of psychological and behavioral diversity", (September 2017) based upon the workshop will have its papers published in the Proceedings of the National Academy of Sciences. • Funded an ADVANCE Partnership project designed to transform teaching of research ethics of current and future geoscientists by addressing sexual harassment as scientific misconduct. • Funded a proposal, "RCN-UBE Incubator: Consortium for the Integration of Ethical Research Practices into Course-based Undergraduate Research Experiences in the Biological Sciences", at the University of Texas at El Paso to explore ethics and responsible conduct of research within the biological sciences.

	• Funded an EAGER proposal on "Ethical and Methodological Challenges in Social Media Research" at Texas State University - San Marcos to explore the ethical and methodological challenges of conducting human subjects research when recruitment is solicited through social media accounts. • Participated in Responsible Conduct of Research outreach (SBE leadership) at Howard University (July 2017). • Continued monitoring and oversight of CCE-STEM program activities, which included responsible conduct of research in STEM funding of one workshop at the University of California-Riverside; two institutional transformation grants, one at Virginia Polytechnic Institute and State University and the second at Indiana University; and four standard research grants covering scientific research writing; ethical research culture with community engagement; evaluation of RCR training; and different ethical orientations in STEM. • Initiated NSF practice requiring the agency's Chief Operating Officer to review research misconduct cases as they are identified.
	NSF's Anticipated Milestones • Continue to support and share research that provides answer to questions about creating responsible research communities, robust and reliable science, and best practices for ethical STEM. • Analyze the outcomes of the three workshops funded in FY 2017, which will include: (1) structured guidance for addressing the well-documented sampling bias that will contribute to broadening the sampling protocols for experimental behavioral science research; (2) a white paper on in critical thinking skills, recognizing ethical issues, navigating difficult situations, and cultivating interpersonal and communication skills for supporting positive research integrity; and (3) a set of recommendations and guidelines for accountable and ethical management of qualitative data. • Invite an SBE Distinguished Lecturer to NSF to speak on the responsible conduct of research. • As more research becomes available on best practices and factors influencing and shaping cultures of research integrity, NSF will develop as needed guidance for institutions concerning the range of appropriate training approaches. • Evaluate themes and common threads of identified misconduct cases, and compile and evaluate grantees' common responses to these cases and needs for additional RCR training.

Reduce the Footprint

NSF executed a six-week phased relocation from Arlington, Virginia to its new headquarters facility in Alexandria, Virginia in August 2017 and achieved full occupancy at the beginning of October 2017. As a result of the planned relocation from Arlington to Alexandria, in FY 2017, the agency did not make any major investments in the Arlington headquarters space, such as renovating or developing new and more flexible work spaces to address the demands for staff growth and more conference space. Instead, NSF continued to work with its facilities team to ensure maximum utilization of the available space.

The new headquarters reflects NSF's creative, forward-looking planning efforts to incorporate state-of-the-art flexible workspaces, functionally-based office and workspace standards, virtual technologies, cloud computing, and alternative workplace arrangements that will allow the agency to increase staff but not its real estate footprint over the next 15 years.

NSF was successful in its negotiations with OMB and GSA to remove the grantee property from its Federal Real Property Profile (FRPP) inventory. In response to this determination, NSF's Senior Real Property Officer (SRPO) submitted to GSA and OMB the list of grantee assets that NSF reported to the FRPP in FY 2015. This listing was used to manually establish a "Reduce the Footprint" baseline for NSF that excludes the grantee property for FY 2016, as noted below in Table 3.5. NSF was granted the following considerations:

1) NSF grantee properties will remain in the FY 2015 FRPP report to ensure consistency for the final year of "Freeze the Footprint" reporting.
2) NSF is no longer required to report grantee property in the FRPP database. This became effective for FY 2016 reporting (December 2016 FRPP inventory) and subsequent reporting years.

Table 3.5 – Reduce the Footprint Policy Baseline Comparison

Square Footage	FY 2015 Baseline	FY 2016	Change (FY 2015 Baseline FY 2016)
NSF Occupancy Agreements	597,354	597,354	0
Grantee Assets	663,238	0	-663,238
Total	**1,260,592**	**597,354**	**-663,238**

Awards to Affiliated Institutions

The following chart lists institutions affiliated with members of the National Science Board (NSB) in FY 2017.

Affiliated Institution[1]	Awards Obligated in FY 2017 (Dollars in thousands)
Arizona State University	70,184
California Institute of Technology	70,546
Cornell University	128,774
Georgetown University	8,822
Georgia Institute of Technology	71,334
Illinois Institute of Technology	5,967
Massachusetts Institute of Technology	95,587
Michigan State University	94,870
Purdue University	75,011
Stanford University	81,038
Tufts University	14,834
University of California – Berkeley	107,127
University of Colorado	86,283
University of Florida	51,945
University of Michigan	99,241
University of Oregon	19,298
Washington University	18,693
TOTAL	***$ 1,099,554***

[1] This table is provided solely in the interest of openness and transparency. NSB establishes the policies of NSF within the framework of applicable national policies set forth by the President and Congress. Federal conflict of interest rules prohibit NSB members from participating in matters where they have a conflict of interest or there is an impartiality concern without prior authorization from the designated agency Ethics Official. Individual NSF grant awards are made pursuant to a peer-review based process and most are not reviewed by the NSB. With regard to matters that are brought to the Board, NSB members are not involved in the review or approval of grant awards to their affiliated institutions. The table displaying Awards to Affiliated Institutions applicable to the previous fiscal year is available at https://www.nsf.gov/pubs/2017/nsf17002/pdf/nsf17002.pdf. Because of the regular turnover among NSB membership, the information in these tables is not directly comparable across years.

Patents and Inventions Resulting From NSF Support

The following information about inventions is being reported in compliance with Section 3(f) of the National Science Foundation Act of 1950, as amended [42 U.S.C. 1862(f)]. There were 1,530 NSF invention disclosures reported to NSF either directly or through the National Institutes of Health's iEdison database during FY 2017. Rights to these inventions were allocated in accordance with Chapter 18 of Title 35 of the United States Code, commonly called the "Bayh-Dole Act."

Acronyms

ACM$	Award Cash Management Service
ADA	Anti-Deficiency Act
AFR	Agency Financial Report
AICA	American Innovation and Competitiveness Act of 2017
AIMS	Antarctic Infrastructure Modernization for Science
AOAM	Agency Operations and Award Management
APR	Annual Performance Report
ASC	Antarctic Support Contract
BFA	Office of Budget, Finance and Award Management
BOAC	Business & Operations Advisory Committee
CCE STEM	Cultivating Cultures for Ethical STEM
CFO	Chief Financial Officer
CY	calendar year
DAS	Division of Administrative Services
DATA Act	Digital Accountability & Transparency Act
DIS	Division of Information Systems
DKIST	Daniel K Inouye Solar Telescope
DOL	Department of Labor
EHR	Education and Human Resources
ERM	Enterprise Risk Management
EVMS	Earned Value Management System
FASAB	Federal Accounting Standards Advisory Board
FBWT	Fund Balance with Treasury
FECA	Federal Employees' Compensation Act
FFMIA	Federal Financial Management Improvement Act of 1996
FFRDC	Federally Funded Research and Development Center
FISMA	Federal Information Security Management Act of 2002
FMFIA	Federal Managers' Financial Integrity Act of 1982
FTE	Full-Time Equivalent
FY	Fiscal Year
GAAP	Generally Accepted Accounting Principles
GAO	Government Accountability Office
GONE	Grants Oversight and New Efficiency (Act)
GPRA	Government Performance and Results Modernization Act of 2010
GSA	General Services Administration
H-1B	H-1B Nonimmigrant Petitioner Account
HRM	Division of Human Resource Management
IG	Inspector General
IP	Improper Payments
IPA	Intergovernmental Personnel Act
IPERA	Improper Payments Elimination and Recovery Act of 2010
IPERIA	Improper Payments Elimination and Recovery Improvement Act of 2012
IT	Information Technology
K-12	Kindergarten to Grade 12
LFM	Large Facilities Manual
LFO	Large Facilities Office
LIGO	Laser Interferometer Gravitational-Wave Observatory
LSST	Large Synoptic Survey Telescope
MREFC	Major Research Equipment and Facilities Construction
NAPA	National Academy of Public Administration
NEON	National Ecological Observatory Network
NSB	National Science Board
NSF	National Science Foundation
O/D	Office of the Director
OIG	Office of Inspector General
OIRM	Office of Information and Resource Management
OMB	Office of Management and Budget
OPM	Office of Personnel Management
PP&E	General Property, Plant, and Equipment
R&D	Research and Development
R&RA	Research and Related Activities
RCR	Responsible Conduct of Research
RSSI	Required Supplementary Stewardship Information
SAM	System for Award Management
SBR	Statement of Budgetary Resources
SFFAS	Statement of Federal Financial Accounting Standards
SSAE	Statement on Standards for Attestation Engagements
STEM	Science, Technology, Engineering, and Mathematics
USAP	United States Antarctic Program
USSGL	U.S. Standard General Ledger