FY 2019 MANAGEMENT CHALLENGE PROGRESS REPORT

Background
Under the Reports Consolidation Act of 2000, NSF's Inspector General is required to summarize what it considers to be the most significant management and performance challenges facing NSF in the coming year in a memo to the NSF Director. The management challenges are identified by NSF's Inspector General and announced at the beginning of each fiscal year. In response, the Director issues a memo to acknowledge receipt of the OIG Management Challenges and to provide a report on NSF's progress and achievements made over the prior year.

The OIG's challenges, NSF's response, and NSF's progress update towards addressing previously identified challenges are included in the annual Agency Financial Report (AFR) published in November on NSF's website.[1] This section provides NSF's progress report highlighting the significant actions taken in FY 2019 on the management challenges identified by NSF's Inspector General at the beginning of that fiscal year.

Enterprise Risk Management
Starting in FY 2018, NSF's Progress Report applied its Enterprise Risk Management framework to document its assessments of the inherent and residual risks for each of the OIG's Challenges, including actions to mitigate risks. NSF management's overview of the challenges presented represent NSF's view of the residual risk in light of the key actions NSF has already taken to address the OIG-identified challenge. Further, NSF management developed the anticipated milestones in consideration of NSF's strategic objectives, the risks inherent to NSF's work, and the key actions NSF has already taken to address those risks.

In response to NSF's incorporation of ERM principles in its FY 2018 report, the OIG updated its reporting format for FY 2019, and recognized NSF's progress by removing one Management Challenge cited for FY 2019, eliminating improper payments. In FY 2018, the OIG identified foreign talent plans as an emerging challenge area for FY 2019. OIG's inclusion of an emerging challenge in its FY 2019 Report enabled NSF to undertake responsive actions in FY 2019. The OIG made mitigating threats from foreign government talent recruitment programs a standalone challenge for FY 2020, and a progress report on this new challenge is included below.

FY 2019 Management Challenges
- Managing major multi-user research facilities
- Meeting Digital Accountability and Transparency Act of 2014 (DATA Act) reporting requirements
- Eliminating improper payments
- Managing the Intergovernmental Personnel Act (IPA) Program
- Managing the U.S. Antarctic Program
- Encouraging the ethical conduct of research

FY 2020 Management Challenges
- Managing major multi-user research facilities
- Meeting Digital Accountability and Transparency Act of 2014 (DATA Act) reporting requirements
- Managing the Intergovernmental Personnel Act (IPA) Program
- Managing the U.S. Antarctic Program
- Encouraging the ethical conduct of research
- Mitigating threats posed by foreign government talent recruitment programs

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[1] www.nsf.gov/about/performance

Mitigating Threats Posed by Foreign Government Talent Recruitment Programs
NSF lead: Office Head, Office of International Science and Engineering

<u>Summary of OIG Identified Challenge</u>
a) Foreign government talent recruitment programs designed to benefit the foreign state by obtaining information and technology from abroad have the potential to exploit the openness of American universities and threaten the integrity of U.S. research initiatives. Talent recruitment programs target individuals with expertise in cutting-edge science, including NSF-funded researchers, merit review panelists, and career Federal employees or rotators who manage NSF's scientific programs.
b) Failure to disclose membership in such programs can have ramifications.
c) There is risk of fraud, waste, or abuse of NSF or other Government assets.

<u>NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge</u>
NSF is committed to sustaining Americas' innovation leadership, economic strength, and national security, including the basic research ecosystem that underpins it. The values of openness, transparency, merit-based competition, and reciprocal collaboration are essential to the functioning of that basic research ecosystem. The maintenance of a vibrant and diverse research community – including both domestic and international talent – is also essential. However, our science and engineering enterprise is put at risk when some foreign governments endeavor to benefit from the global research ecosystem without upholding these values. Certain foreign-government-sponsored talent recruitment programs create new risks to the integrity of the ecosystem, including to NSF's mission and merit-review process. Faced with such a risk, NSF is responding.

The White House Office of Science and Technology Policy (OSTP) launched the Joint Committee on the Research Environment (JCORE) under the National Science and Technology Council on May 6, 2019, including a subcommittee on research security co-chaired by NSF. Under the leadership of OSTP, U.S. science funding agencies are committed to taking a risk-based approach to strike an appropriate balance between fostering the open and internationally collaborative environment that has contributed to the success of the U.S. research enterprise and mitigating emerging threats to the integrity of that enterprise. NSF also co-chairs a second JCORE subcommittee on coordinating administrative requirements for research across the science funding agencies, including those associated with research security. NSF is not the only agency or party involved in this important challenge, but we have a vital role to play. We work closely with other U.S. government science agencies to share policies and practices, and regularly engage with the academic research community to hear their concerns about this emerging challenge and clarify our positions, policies, and procedures.

<u>NSF's Corrective Measures to Address the Challenge</u>
Demonstrated Progress Through Agency Actions Taken in FY 2019
• Released a Dear Colleague Letter on Research Protection to the research community from Director Córdova.
• Co-chaired the White House's National Science and Technology Committee's JCORE subcommittee on research security; co-chaired the JCORE subcommittee on coordinating administrative requirements for research; engaged regularly with other U.S. agencies that fund basic research – including NIH, DOE, and USDA—and the State Department on science and security.
• Appointed top NSF leadership (i.e., the Head of the Office of International Science and Engineering) as the NSF lead on science and security; established a working group of Senior Executive Service-level leaders from relevant NSF Directorates and the Office of the Director; took a risk-based approach to protecting the basic research ecosystem.

- Increased capacity by hiring a new Program Manager who reports to the Head of the Office of International Science and Engineering with expertise in science and security as well as foreign talent programs.
- Issued a policy making it clear that NSF personnel and IPAs detailed to NSF cannot participate in foreign government talent recruitment programs; released a memo on research protection announcing the personnel policy to all NSF staff from Chief Operating Officer Crim.
- Issued a note to NSF staff reminding everyone that government ethics regulations require accurate and timely financial disclosure reports and that Federal ethics rules apply to both our career and rotator personnel.
- Analyzed the problem internally and with the assistance of external expertise; commissioned the independent scientific advisory group JASON to conduct a study on fundamental research and national security with the direction that it should include recommendations on ways for NSF and grantee institutions to achieve the best balance between scientific openness and security.
- Sought best practices through sessions with the National Science Board, the Advisory Committee on International Science and Engineering, and the Advisory Com mittee to the Directorate for Biological Sciences.
- Clarified requirements in the draft Proposal and Award Policies and Procedures Guide (PAPPG) regarding submission of information on:
  - Current and pending support
  - Professional appointments
  - Responsible and ethical conduct of research and the peer review process
- Communicated to the research community to increase awareness of the risks and compliance with the requirements; clarified PAPPG requirements and NSF's positions, policies, and procedures through presentations to multiple research community groups including the National Council of University Research Administrators, Council on Government Relations, Federal Demonstration Partnership, American Association of Universities, and National Academies of Science, Engineering and Medicine's Committee on Science, Engineering, Medicine, and Public Policy.
- Continue to communicate all of our actions and updates to our committees of jurisdiction in the House and Senate.

NSF's Anticipated Action Plan Milestones
- Continue coordinating with the U.S. interagency including through supporting and complementing OSTP's actions, co-chairing the JCORE subcommittee on research security, and advancing work along the subcommittee's four lines of effort:
  - Coordinating outreach and engagement with federal agencies, academic research institutions, companies, non-governmental organizations, researchers, and students.
  - Establishing and coordinating disclosure requirements for participating in the federally-funded research enterprise.
  - Developing best practices for academic research institutions, in collaboration with academia, professional societies, and other organizations.
  - Developing methods for identification, assessment, and management of risk in the research enterprise.
- Release the final 2020 PAPPG, including clarifications regarding disclosure requirements, along with publishing in the Federal Register responses to public comments on the draft PAPPG.
- Streamline the process for providing disclosures to NSF by implementing electronic formats for submission of biographical sketches and current and pending support information.
- Anticipate receipt of independent third-party report from JASON related to fundamental research and national security; convene Senior Executive Service-level leaders from relevant NSF Directorates to

evaluate the recommendations and, where appropriate, begin implementing; share the report publicly via the NSF website and encourage grantee institutions to consider its recommendations.

- Finalize a required training course for all NSF staff that defines the problem and why disclosure of all sources of support is vital to maintaining our robust research ecosystem and protecting taxpayer dollars.
- Continue and finalize actions taken in FY 2019.

Managing Major Multi-User Research Facilities
Co-Leads: Chief Financial Officer and Chief Officer for Research Facilities

Summary of OIG Identified Challenge
a) Manage inherent risk associated with previously highlighted concerns including unsupported proposal budgets, management fees and contingency funds, and the absence of certified earned value management systems.
b) Strengthen controls around subrecipients, subrecipient risk assessments and proper charging of construction and operations expenditures.
c) Manage the risk of cost or schedule increases for major facilities in construction.

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge
NSF understands the importance of its role in overseeing recipients' on-going management of major facility awards. The agency also recognizes the importance of assessing prospective recipients' capabilities for managing major facilities prior to award. Over the past several years, NSF has been in the process of strengthening its policies and procedures as illustrated below. This includes an annual Major Facilities Portfolio Risk Assessment to determine the necessary reviews and audits to be conducted by the Office of Budget, Finance and Award Management's (BFA) Large Facilities Office (LFO) and Cooperative Support Branch (CSB) within the Division of Acquisition and Cooperative Support (DACS). In close cooperation with NSF program offices, LFO and CSB conduct these reviews to safeguard NSF's significant, long-term investments in supporting the scientific endeavor. NSF leadership has shown its commitment to oversight in the past several years by strengthening the LFO and in establishing the Chief Officer for Research Facilities (CORF) position in the Office of the Director. The governance structure currently in place continues to help ensure consistent implementation of NSF's expanded controls for major facilities oversight.

NSF has recently undergone two Government Accountability Office (GAO) reviews related to its oversight of major facilities. The June 2018 report entitled *National Science Foundation: Revised Policies on Developing Costs and Schedules Could Improve Estimates for Large Facilities* (GAO-18-370) recommended that NSF should revise its policies for estimating and reviewing the costs and schedules of major facility projects to better incorporate the best practices in GAO's guides. The March 2019 report entitled *National Science Foundation: Cost and Schedule Performance of Large Facilities Construction Projects and Opportunities to Improve Project Management* (GAO-19-227) recommended that NSF conduct a workforce gap analysis for project management competencies, ensure recipients provide lessons learned and best practices to NSF, and establish criteria for recipient project management competencies to be incorporated into NSF's review process. NSF agreed with the GAO recommendations and has Corrective Action Plans (CAPs) in place as described below.

Based on NSF's risk-based evaluation of this Management Challenge, coupled with activities already completed and those planned for FY 2020, NSF has determined that the residual risk impact for cost overruns is "very low" and the likelihood is "low." NSF is confident that its current and planned policies and procedures related to major facility cost and schedule oversight adequately consider and balance risk, resources, benefit to the science community, and stewardship of federal funds.

NSF's Corrective Measures to Address the Challenge
Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years
Strengthened controls over NSF's major facility portfolio in FY 2016 and FY 2017 based on the 2015 National Academy of Public Administration report recommendations and requirements in the American Innovation and Competitiveness Act of 2017 (AICA):
• Retaining a portion of the project budget contingency.

- Periodically conducting cost incurred audits.
- Completing reasonableness review of proposed costs in alignment with GAO good practices.
- Obtaining independent cost estimate reviews of the proposed construction and operations budgets in accordance with GAO good practices.
- Conducting earned value management system verification, validation and acceptance.
- Reviewing proposed fees for prohibited items and requiring Recipients to track fee expenditures.
- Developed the Major Facilities A-123 Oversight Process Narrative to summarize NSF's oversight processes.
- Revised the *Large Facilities Manual* (LFM) to incorporate new guidance for recipients related to cost estimating and analysis in accordance with GAO good practices.

FY 2018 Progress:
- Appointed CORF in the Office of the Director to address full life-cycle oversight, including strategic portfolio issues and promoting agency-wide acceptance of policies and procedures related to major facility oversight.
- Appointed an Accountable Directorate Representative (ADR) in each Directorate with major facilities and formed the Major Facilities Working Group (consisting of the ADRs) to review and socialize policies and procedures related to major facility oversight.
- Formed the Facilities Governance Board to approve major facility oversight policies and procedures at the agency level.
- Reinstituted the MREFC Panel as the Facilities Readiness Panel (FRP) to access only technical readiness for advancement through the Design Stage and into the Construction Stage.
- Revised the Integrated Project Team (IPT) Standard Operating Guidance (SOG) to include facilities in the Operations Stage.
- Developed the *Minimum Core Competency for Oversight of Major Facilities* SOG to codify the minimum competencies for the core IPT members.
- Conducted an independent third-party review of NSF's strengthened policies and procedures related to cost surveillance.
- Updated the *DACS/CSB Standardized Cost Analysis Guidance* SOG to include assessment of schedule due to the potential impact on costs.
- Revised and aligned BFA SOGs related to standardized cost analysis and pre-award budget reviews to specifically address AICA requirements and GAO good practices.

Demonstrated Progress through Agency Actions Taken in FY 2019
- Finalized *Selection of Independent Cost Estimate Review*s SOG already implemented in practice as part of the CAP for GAO-18-370.
- Revised the *Major Facilities Guide* (MFG), formerly the LFM, to incorporate GAO good practices on costs and to reserve a new section (4.3) on Schedule Development, Estimating, and Analysis as part of the CAP for GAO-18-370 and to include a requirement for Segregation of Funding Plans (section 3.4) and guidance on Final Construction Reviews (section 2.4.2).
- Received notification in September 2019 from GAO that the analysis by the GAO engineering sciences team found that NSF's practices in the new Major Facilities Guide and internal standard operating guidance fully meet GAO good practices.
- Drafted the *Major Facilities Oversight Reviews* SOG to more fully utilize external review panels in addressing elements of cost and schedule as part of the CAP for GAO-18-370.

- Received the independent third-party report related to cost surveillance; developed an implementation plan to address the findings and recommendations.
- Revised SOG 16-4 *DACS/CSB Standardized Cost Analysis Guidance* and SOG 17-3 *Guidance on Pre-and Post-Award Cost Monitoring Procedures for Large Facility Construction and Operations Awards Administered by CSB* to align with the AICA.

NSF's Anticipated Action Plan Milestones
- Initiate major facilities portfolio workforce gap analysis as part of Program Management Improvement Accountability Act (PMIAA) implementation and the CAP for GAO-19-227.
- Revise Major Facilities Cooperative Agreement Supplemental Terms and Conditions (and any major facility contract terms and conditions) to require recipients to participate in NSF's Knowledge Management Program as part of the CAP for GAO-19-227.
- Finalize the new *Major Facilities Oversight Reviews* SOG to more fully utilize external review panels in addressing elements of cost and schedule and to evaluate the competencies of Recipient Key Personnel (GAO-18-370 and GAO-19-227).
- Draft the new MFG Section 4.3, *Schedule Development, Estimating, and Analysis* and release for public comment.
- Draft new MFG Section on *Key Personnel* and release for public comment as part of CAP for GAO-19-227.

Meeting DATA Act Reporting Requirements
Lead: Chief Financial Officer and Office Head, OIRM

Summary of OIG Identified Challenge
NSF must report DATA Act information in accordance with government-wide financial data standards developed and issued by the Office of Management and Budget (OMB) and the U.S. Department of the Treasury.

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge
Each quarter, NSF successfully submits all DATA Act-required data to the U.S. Department of Treasury to be easily accessible to the public through USASpending.gov. In addition to these submissions, which began in April 2017, NSF is an integral part of the government-wide Chief Financial Officers Council (CFOC) and Council of Inspectors General on Integrity and Efficiency (CIGIE) communities that have worked collaboratively to ensure new OMB guidance and Treasury protocols appropriately align with audit community standards. Both councils are working to enhance not only the quality of government-wide spending data, but also the government's ability to assess that quality. As a result of this work, NSF implemented a data quality plan that is based on a government-wide model and conducted a risk assessment demonstrating that it has implemented internal controls to mitigate the risks associated with maintaining and publishing inaccurate spending data. NSF continues to deploy top leadership commitment to the management of its DATA Act program, including the agency CFO who serves as the Senior Accountable Official (SAO), the Deputy CFO, an executive-level Steering Committee, and several additional high-level executives and senior staffers.

In FY 2019, NSF continued to take actions in accordance with the recommendations from the NSF OIG's audit of NSF's FY 2017 second quarter spending data that were resolved and closed in FY 2018. These actions made progress to address the OIG finding that the data did not meet the then-current OMB quality requirements for accuracy, completeness and timeliness, noting that some of the errors were due to NSF reporting while others were caused by government-wide reporting issues. NSF conducted a root cause analysis of its challenges and noted that many of the OIG-identified errors were government-wide in nature and beyond NSF's control. NSF implemented a CAP after the FY 2017 audit, ultimately resolving all recommendations and the OIG has closed them all. Indeed, in the description of the FY 2019 DATA Act Management Challenge, the OIG noted that it is "encouraged by NSF's actions to improve its DATA Act reporting."

NSF has had a recognized history of outstanding government-wide DATA Act-related collaboration. In FY 2019, NSF intensified its leadership and engagement in this area not only to support government-wide DATA Act-related activities, but also to ensure that the developing standards in this area evolved to align with best practices and good governance for agencies like NSF. In FY 2019, NSF collaborated and led government-wide activities implementing now-current guidance, OMB M-18-16, updating Appendix A to OMB Circular No. A-123, Management of Reporting and Data Integrity Risk. This new guidance superseded prior DATA Act guidance and created a requirement for agencies to develop data quality plans that include management assurance of the quality of agency data.

NSF's progress on the DATA Act has been aided by the NSF Deputy CFO and other staff deeply engaging in supporting the activities relating to the Audit Collaboration Working Group of the CFOC and CIGIE. NSF was a major contributor in developing the Data Quality Plan Playbook, which serves as a reference guide for agencies designing their data quality plans. The CFOC also collaborated with GAO and CIGIE as they developed new audit guidelines and standards consistent with the new OMB guidance. In addition, the NSF Division Director for BFA's Division of Institution and Award Support and other NSF senior staff supported the government-wide financial assistance community's work to develop a framework for the required data quality plans, which NSF leveraged to prepare its own plan.

As part of its work to achieve reasonable assurance for internal controls over DATA Act reporting, NSF leveraged enterprise risk management to assess the risk of reporting inaccurate data to Treasury. Based on this evaluation and considering the causes analyzed and actions that NSF has taken to date, NSF believes that its risk of reporting inaccurate, incomplete, and untimely data has been mitigated.

NSF's Corrective Measures to Address the Challenge
Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years
Developed and implemented CAP in response to the FY 2017 audit with the following actions:

- Examined processes identified as potential audit risks, identified ways to improve or strengthen the processes, and documented changes in NSF's standard operating procedures.
- Submitted corrections for data errors identified in the audit.
- Included comments with NSF's submissions to explain legitimate differences between File C (Award and Financial Detail) and Files D1/D2 (Financial Assistance and Procurement Award and Awardee Attributes).
- Reviewed submission process with the internal controls team and identified opportunities for improvement.
- Performed policy review of the application of "legitimate differences" guidance to warnings when linking Files C to D1/D2.
- Worked closely with the DATA Act Audit Collaboration Working Group of the CFOC and CIGIE to identify issues to improve DATA Act implementation and clarify government-wide guidance and audit standards.
- Worked with a subgroup of the Financial Assistance Committee for E-Government (FACE) in collaboration with a DATA Act Internal Control subgroup of the CFOC to provide a solid framework and data quality plan template that agencies can leverage and customize to develop their own data quality plans.
- Initiated implementation of OMB Circular A-123 Appendix A, requiring agencies to maintain a data quality plan that considers the incremental risks to data quality in federal spending data and any controls that would manage such risks. NSF's data quality plan will leverage the existing plans for the Financial (Files A-C) and Procurement (File D1) data as well incorporate the new data quality requirements for the Financial Assistance (File D2) data.
- Reviewed SharePoint processes to ensure all required BFA Division Director validations are complete, properly labelled, and available for SAO review.

Demonstrated Progress through Agency Actions Taken in FY 2019

- Devoted the staff resources to actively participate in the CFOC DATA Act Information Model Schema (DAIMS) workgroup on data quality improvements, which is a cross-agency group led by Treasury for introducing potential improvements to the DAIMS specifications for improving data quality on USASpending.gov. NSF worked to get the issue with zip codes resolved and incorporated into DAIMS v1.3 specifications.
- Continued ongoing work, through the NSF Deputy CFO and staff, with the joint working group of the CFOC and the CIGIE to provide input and recommendations around the next iteration of DATA Act policies, internal control, and audit guidance to OMB, Treasury, and CIGIE.
- Committed the NSF Deputy CFO to leading a subgroup on internal controls, serving as primary author of a government-wide DATA Act Playbook, and actively participating in developing best practices for financial assistance data quality.
- Instituted processes to monitor and independently validate the effectiveness and sustainability of its data quality measures. The NSF DATA Act Work Group (DAWG) worked with appropriate

stakeholders from the Internal Controls and Enterprise Risk Management groups in developing and executing a data quality plan that defines NSF's FY 2019 approach to achieve reasonable assurance for internal control over quarterly DATA Act reporting. The plan was prepared in accordance with OMB M-18-16, Appendix A to OMB Circular No. A-123.

- Conducted a risk assessment of the 57 essential reporting elements related to procurement, financial management and financial assistance data and submission processes and reviewed related system controls and Standard Operating Procedures (SOPs).
- Performed analysis of NSF's submission warnings to provide warning rationales, counts, and frequency of each identified warning during the execution phase of the data quality plan. This practice will continue with each quarterly submission and be reported in the annual assurance document.
- Updated documentation of DATA Act processes including, the DATA Act SOPs, Financial Assistance Broker Submission Standard Operating Guidance (FABS SOG), and NSF Acquisition Manual.
- Continued to monitor system processes to ensure data integrity and accuracy.
- Remained up-to-date with Treasury DAIMS specifications by making appropriate changes as well as introduced operational improvements to FABS file generation.
- Created a desk guide for the NSF Contracts Branch that includes step-by-step instructions intended to reduce recurring data errors.
- Added additional dry run and pre-validations between data submission quarters to increase accuracy.
- Incorporated lessons learned from feedback on data submissions to improve accuracy and efficiencies.

NSF's Anticipated Action Plan Milestones
- Implementing a SharePoint tool to assist in quarterly DATA Act submission process by tracking Division Director assurances and the SAO certification.
- Continuing to work closely with OMB, Treasury, and intra-governmental groups.
- Continuing to refine our validation and submission process.
- Continuing stewardship collaboration with NSF OIG and GAO to cooperate with and support their audit responsibilities and to resolve any recommendations through implementing a corrective action plan.

Eliminating Improper Payments
Lead: Chief Financial Officer

<u>Summary of OIG Identified Challenge</u>
a) There is a risk of fraud, waste, or abuse of NSF or other government assets. In addition, this challenge involves an operation that is related to key initiatives of the President.
b) NSF's risk assessment process needed significant improvements to ensure that the agency thoroughly assesses and documents its risk of improper payments, and
c) addresses the limitations in NSF's analysis of the OMB risk factors.

<u>NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge</u>
NSF addressed the OIG's recommendations from the previous OIG reports. As a result, the OIG has determined that NSF was in compliance with the Improper Payment Elimination and Recovery Act (IPERA) risk for the years 2015 through 2018. This validates that NSF has taken the steps necessary to demonstrate compliance and effectiveness in the agency's implementation of IPERA. NSF has:
• Demonstrated strong commitment and top leadership support to incorporate risk management concepts into business processes and management functions.
• Participated in the government-wide working group for the cross-agency priority goal on Getting Payments Right.
• 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.
• Developed and completed a corrective action plan in July 2016 that addressed the root causes of the IPERA reporting issue, implemented solutions, and completed all OIG recommendations.
• Developed a corrective action plan following the FY 2018 IPERA Performance Audit.
• Established processes to monitor and validate the effectiveness and sustainability of the corrective measures.
• Incorporated corrective measures into policy and process documentation.

<u>NSF's Corrective Measures to Address the Challenge</u>
Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years
• Developed and published a SOG for improper payments risk reviews incorporating the nine IPERA risk factors and additional considerations from the OIG review report.
• Completed improper payments risk reviews for FY 2016 and FY 2017. The risk reviews included input from subject matter experts for grants, contracts, charge cards, and payments to employees. Both reviews concluded that NSF did not have a significant risk of improper payments.
• OIG inspection of the FY 2016 and FY 2017 risk reviews found NSF in compliance with IPERA requirements.
• Collaborated with the OIG, BFA, and program offices on risk reduction activities including completion of an initial fraud risk assessment for grants under the Fraud Reduction and Data Analytics Act.
• Completed an improper payments risk assessment for FY 2018 that built on the improper payments risk reviews completed during FY 2016 and FY 2017.

Demonstrated Progress through Agency Actions Taken in FY 2019
• Conducted advanced and baseline grant monitoring activities including grant payment testing.
• Operated, evaluated, and reported on an effective internal controls program providing assurance that NSF controls over grants and grant payment processes are properly designed and operating effectively.

- Completed an IPERA risk review during FY 2019 as a continuation of NSF's three-year risk assessment cycle following standard operating guidance establishing a validated measure of performance in terms of monitoring improper payment risk. OIG found that NSF complied with IPERA reporting requirements based on review of NSF's Agency Financial Report and risk assessment. This is the fourth consecutive year NSF has been found compliant.
- Completed action items set forth in the CAP from the FY 2018 IPERA Performance Audit.

NSF's Anticipated Action Plan Milestones
- Continue advanced and baseline grant monitoring activities including grant payment testing.
- Continue internal controls program activities to provide assurance that NSF controls for its payment processes are operating effectively.
- Continue collaboration with the OIG on risk reduction activities.
- Continue to improve improper payments risk assessment and reporting compliance activities.

Managing the IPA Program
Co-Leads: Assistant Director, BIO and Office Head, OIRM

<u>Summary of OIG Identified Challenge</u>
a) Because individuals serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions filled by IPAs.
b) IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).
c) IPAs are not subject to Federal pay and benefits limits.

<u>NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge</u>
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 areas. Many of these rotators remain involved in their professional research and development activities while working at NSF through participation in the IR/D program, which is managed by the NSF IR/D Council.

NSF takes a proactive approach in the management of the IPA Program to appropriately consider and mitigate inherent risks associated with its execution.

Demonstrated Top Leadership Commitment:
The IPA Steering Committee reports directly to NSF Director France A. Córdova and Chief Operating Officer (COO) F. Fleming Crim and has been in place since April 2016. The IPA Steering Committee is comprised of senior-level leadership across the agency, namely a Chair and Vice-Chair who are part of the agency's Senior Executive Service (SES), the Chairs of the NSF Executive Resources Board (ERB) and IR/D Council, Head of the Office of Diversity and Inclusion, and four at-large members, including two SES and two executive-level IPAs.

The IPA Steering Committee is charged with ensuring NSF is best utilizing the IPA hiring authority. It advises the Foundation's senior leadership on matters that directly concern policy on the use of the IPA Program, and on common approaches to budgeting and implementation of the program. It also regularly reports on its oversight and stewardship of the IPA Program, including costs associated with the program, to the Director and COO, to OMB, and to Congress, pursuant to the AICA.

Capacity:
The IPA Steering Committee is supported in the execution of its responsibilities by various NSF units with key expertise for risk management, reporting, and accountability, including BFA, the OIRM's Division of Human Resource Management, the Office of General Counsel (OGC), the Office of Legislative and Public Affairs, and the Office of Integrative Activities.

Demonstrated Progress:
NSF is constantly improving its management of the IPA Program and addressing the management challenges identified by the OIG as well as other agency-identified risks and challenges. In this way, NSF is ensuring the program fully supports the mission of the agency and the nation's interests. Indeed, NSF believes that the steps taken to date as described above have reduced the inherent risk substantially, such that the residual risk is acceptable to the agency.

<u>NSF's Corrective Measures to Address the Challenge</u>
Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years

a) <u>Because individuals serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions filled by IPAs.</u>
   - Ensured there is a "bench" of staff ready for developmental detail assignments to vacant executive positions through the Federal Executive Institute (FEI), American University Executive Leadership Program, Harvard Business School Leadership Training, Individual Development Plans, and NSF Academy Leadership Development Program.
   - Implemented the New Executive Transition Program (NeXT) in 2009 to onboard employees and IPAs transitioning into executive-level positions to help new executives reach full performance as quickly as possible by developing executive knowledge about NSF mission, culture, organization, people, and business processes.
   - Instituted mandatory and optional training for Program Officers, including IPAs, on NSF's Merit Review process which teaches how research proposals are evaluated and how to execute the Program Officer role.
   - Created a parallel performance management system in 2014 for IPAs to ensure clarity in setting expectations and providing feedback on performance.
   - Established a knowledge transfer process in 2015 that exiting executives can use to transfer knowledge and information to incoming executives.
   - Implemented a required three-day supervisory training and development course in 2015 called Federal Supervision at NSF designed to assist new federal supervisors (including IPAs) in understanding their roles and all the requirements pertaining to federal human capital management.
   - Established a Steering Committee for Policy and Oversight of the IPA Program (IPA Steering Committee) in April 2016 to serve as the primary body for considering policy on NSF's use of IPAs, and to oversee common approaches to budgeting and implementation of the IPA program.
   - Conducted analysis (January 2018) on IPA years of service and found that, on average, IPA executives serve 3.1 years at NSF and are 3 times more likely to stay for 3-4 years compared to staff-level IPAs. Non-executives serve, on average, 2.3 years at NSF. Per OPM, the average time a career SES spends in a position is 3.4 years and non-career SES is 1.7 years.[2]
   - Engaged with the GAO on an inquiry into the turnover of IPAs.

b) <u>IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).</u>
   - Established the IR/D Council in October 2011 to develop and monitor internal controls related to the IR/D Program, including tracking the time spent on IR/D activities. Data from these internal controls are disseminated to NSF senior management quarterly for use in managing the IR/D Program within each organization.
   - Developed an IR/D Guide in 2012 to clearly communicate NSF policies on the use of IR/D, including the possibility that participation in the IR/D Program could be curtailed if it compromised the completion of NSF duties.
   - Designated IR/D experts in each Directorate/Office who receive annual training to ensure that NSF policies are implemented appropriately.
   - Instituted a requirement that all IR/D plans provide an explanation of how the IR/D activities enhance the requestor's ability to perform NSF duties.
   - Published a revised IR/D Guide in January 2017 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

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[2] https://www.opm.gov/policy-data-oversight/senior-executive-service/facts-figures/#url=Demographics

combine other NSF official business and/or telework with these trips to more efficiently use of those travel dollars.
- Delivered a "Benefits of the NSF IR/D Program" report to the NSF Deputy Assistant Directors (DADs) in March 2018 highlighting the value of IR/D in recruitment, research currency, and ethics protection.
- Submitted the IR/D Annual Report to the DADs (November 2018), indicating that on average 75% of IPAs participated in IR/D, up from 72% in the prior year. On average, IPA IR/D plans requested 38 days of IR/D, yet only 19 days were used. As of October 2018, active IR/D plans for IPAs totaled $1.48M requested with an expected actual spend of approximately $750,000.

c) IPAs are not subject to Federal pay and benefits limits.
- NSF initiated a pilot requiring 10% cost sharing by IPAs' home institutions of their academic-year salaries and fringe benefits (per NSF Bulletin 16-11). This pilot applies to all new IPA agreements initiated in FY 2017 and beyond, including those for executive and program level staff. Additionally, NSF eliminated reimbursement for lost consulting.
- Received notice from the OIG in February 2017 closing the sole open audit recommendation related to IPA costs because of cost reduction efforts undertaken by NSF.
- Extended the cost-share pilot into FY 2018 to continue to evaluate the effectiveness of the 10% cost-share requirement. An evaluation of the effectiveness of the pilot launched in FY 2017 indicated a cost-share percentage increase from 7.2% in FY 2016 to 7.9% in FY 2017, which resulted in an average cost-share increase of almost $5,000 per IPA assignment.
- Engaged with the GAO on the salary reimbursements associated with IPAs. NSF does not set the salaries for rotators who are detailed to NSF using the IPA authority because their salaries are set by their home institutions.
- Submitted to Congress responses to the AICA (P.L. 114-329 Section 111 on Personnel Oversight) regarding the Justifications for Rotator Pay Exceeding the SES Pay Max and Evaluation of the Cost-sharing Pilot (January 2018).

Demonstrated Progress through Agency Actions Taken in FY 2019
a) Because individuals serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions filled by IPAs.
- Delivered the first IPA Program Annual Report to the Director of NSF. This report provides annual data and trend analyses on various aspects related to the use of IPAs at NSF for use by the Director and NSF senior managers in assessing and overseeing the program.
- Developed the CAP response to the GAO report, *A Workforce Strategy and Evaluation of Results Could Improve Use of Rotating Scientists, Engineers, and Educators* (GAO-18-533).

b) IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).
- Monitored time spent on IR/D by both permanent and rotating staff, and provided quarterly data to NSF senior managers to ensure appropriate oversight of IR/D.
- Performed yearly data check to assure that no IPA IR/D participant travel was paid by NSF in excess of 12 trips per year.

c) IPAs are not subject to Federal pay and benefits limits.
- Extended the cost-share pilot into FY 2019 to continue to evaluate the effectiveness of the 10% cost-share requirement. A cost analysis of the IPA pilot launched for FY 2017 indicated a cost-share percentage increase from 7.2% in FY 2016 to 9.1% in FY 2018.

- Submitted to Congress annual responses to the AICA (P.L. 114-329 Section 111 on Personnel Oversight) on the Justifications for Rotator Pay Exceeding the SES Pay Max.

NSF's Anticipated Action Plan Milestones
a) Because individuals serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions filled by IPAs.
   - Submit the IPA Program Annual Report covering the prior fiscal year to the Director of NSF.
   - Integrate activities associated with the CAP in response to GAO-18-533 into Renewing NSF goal 1 Adapting the Workforce to the Work.

b) IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).
   - Provide quarterly data to NSF senior managers to ensure appropriate oversight of IR/D time and travel by both permanent and rotating staff.
   - Continue to perform yearly data check to assure that there are no IPA IR/D participants where NSF payment of travel to their home institutions exceeds 12 trips per year.

c) IPAs are not subject to Federal pay and benefits limits.
   - Submit to Congress annual responses to the AICA on the Justifications for Rotator Pay Exceeding the SES Pay Max.

Managing the U.S. Antarctic Program (USAP)
Co-Leads: Assistant Director, GEO, and Office Director, Polar Programs

<u>Summary of OIG Identified Challenge</u>
a) Fiscal oversight of the Antarctic Support Contractor (ASC) and its subcontractors.
b) Management of inventory.
c) Health and safety of research and contractors.
d) Modernization of facilities in the Antarctic Infrastructure Modernization for Science (AIMS) Project.

<u>NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge</u>
NSF—through the Office of Polar Programs (OPP) in the Directorate for Geosciences (GEO)—funds and manages the U.S. Antarctic Program (USAP). The USAP supports United States' research and national policy goals in the Antarctic. The inherent risks associated with Antarctica's remote location, extreme environment, and the short period of time during which the continent is accessible has led to management challenges for NSF in the areas of: a) fiscal oversight of the ASC and its subcontractors; b) management of inventory; c) health and safety of researchers and contractors; and d) modernization of facilities in the AIMS project.

Through leadership commitments, dedication of staff and resources, corrective action planning, and monitoring implementation of plans, NSF has demonstrated significant progress in reducing the inherent risk to residual risk levels for USAP management that are well within acceptable ranges. The transition of the ASC responsibilities to Leidos has occurred without disruptions in operations or unwarranted increases in cost. Management controls and operating procedures are in place to monitor invoice processing, systems performance, indirect rates, and financial reporting for the USAP contractor. NSF performed root cause analyses of issues pertaining to the shipment and storage of property and inventory, and consequently developed and implemented process improvements. Routine NSF-led meetings are held with Leidos to emphasize prime contractor responsibilities to protect government property and inventory. All 2015 OIG misconduct-related action items, as expressed in the Audit of Health and Safety in the U.S. Antarctic Program, were closed by the OIG. NSF and USAP efforts continue to take positive steps to ensure USAP is well poised to address misconduct in the future through implementation of NSF processes for reporting and reviewing Code of Conduct violations. Additionally, NSF is closely monitoring Care Point's implementation of the selected pharmacy management software system. Planning and implementation of the modernization of McMurdo Station and other large facilities work in Antarctica are underway with cognizance by the National Science Board (NSB), OMB, and Congress. NSF successfully completed the AIMS Final Design Review (FDR) in Q1 of FY 2019, and the NSB authorized NSF to proceed with AIMS construction. NSF continues to engage the scientific community in efforts to minimize disruption that the AIMS construction process might have on Antarctic science. NSF developed a 5-year long-range capital plan to include lifecycle and real property investments for all Antarctic locations and is working to extend that plan to a 10-year horizon.

<u>NSF's Corrective Measures to Address the Challenge</u>
Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years
a) <u>Fiscal oversight of the Antarctic Support Contractor (ASC) and its subcontractors.</u>
   - Held routine executive meetings with Lockheed Martin leadership to understand the strategic rationale for the transition to Leidos and the impact to the ASC.
   - Began 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.
- Monitored the transfer of business systems from Lockheed Martin to Leidos. Subsequently, the Leidos DCMA Divisional Administrative Contracting Officer reviewed and approved Leidos' business systems.

b) <u>Management of inventory.</u>
- Conducted two detailed root cause analyses in response to early FY 2017 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 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 was implemented by November 2016.
- Directed 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.
- Continued to monitor cargo shipments during the August 2017 - February 2018 cycle.
- Conducted weekly NSF-led meetings with the prime contractor focused on protecting government property.

c) <u>Health and safety of research and contractors.</u>
- Code of Conduct:
  - Developed a process for reporting and reviewing Code of Conduct violations, which states that each year the 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 on-ice misconduct for the previous 12 months. **This audit action item (#1) regarding the USAP Code of Conduct was formally closed by the OIG on March 28, 2017.**
  - Continued to implement NSF process for reporting and reviewing Code of Conduct violations.
  - Updated Code of Conduct to clarify to the community the consequences (e.g., potential removal) of misconduct in Antarctica.
- Law Enforcement:
  - Oversaw NSF's law enforcement program's achievement of full compliance with all U.S. Marshals Service requirements for certification and training, and recommendations for law enforcement tools made by the Service.
  - Initiated planning for a future site visit to Antarctica, resources and schedules permitting. OPP had internal conversations with OGC and reached out to law enforcement organization contacts.
  - Reviewed the final report dated March 12, 2018, of a group of law enforcement officials who had conducted an on-site evaluation in February 2018. The Law Enforcement review and site visit assessed equipment and training for special deputies and reviewed other areas, such as legal jurisdiction, USAP law enforcement staffing, facilities, communications with the U.S.

Marshals Service, and detainment and transportation of suspects. The report contains recommendations and suggestions. **This audit action item (#3) regarding USAP Law Enforcement was formally closed by the OIG on June 12, 2018.**

- Breathalyzer Testing:
  - Procured breathalyzer units that do not require calibration. These units provide redundancy for the existing breathalyzer inventory. **This audit action sub-item (#4.2) regarding breathalyzer calibration was formally closed by the OIG on December 22, 2015.**
  - Continued to explore the advisability and feasibility of the OIG-recommended requirement for breathalyzer testing for all USAP participants.
  - Finalized a memo detailing the results of NSF exploration of the advisability and feasibility of implementing a requirement for breathalyzer testing for all USAP participants. NSF determined that since USAP supporting organizations have their own breathalyzer testing programs, the benefit of establishing and enforcing an NSF-managed breathalyzer program would not be worth the legal, contractual and financial obligations. NSF decided to accept the risk of not implementing its own breathalyzer program. **This audit action sub-item (#4.1) regarding the legality of requiring breathalyzer testing for all USAP participants was formally closed by the OIG on 02/05/2018.**

d) Modernization of facilities in the Antarctic Infrastructure Modernization for Science (AIMS) Project.
  - Continued progress on the 2012 Blue Ribbon Panel (BRP) recommendations, including investment in life-cycle acquisitions and infrastructure upgrades.
  - Addressed major infrastructure upgrades for McMurdo Station through the following design efforts:
    - Completed portions of designs for some of the AIMS project, including Core Facility and Utilities packages, and presented the designs to the MREFC Concept Design Review and Preliminary Design Review 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 Facility, and Palmer Pier Replacement projects.
    - Initiated construction of IT&C Primary Operations Center.
    - Completed presentation to the NSB, which resulted in the NSB's recommendation that the NSF Director or her designee include the AIMS project in a future budget request.
    - Completed ~ $2M in infrastructure investments in the Black Island Telecommunications Facility (BITF) to address BRP Recommendation 4.7-5, BITF risk management.
    - Issued a Sources Sought Notice on FBO.gov to apprise potential offerors on the AIMS project.
  - Continued internal coordination with LFO 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).
  - Authorized additional design to advance the AIMS design beyond bridging documents (35%). Initiated and completed necessary initial solicitation efforts for individual AIMS components.
  - Completed designs for and awarded IT&C Primary Addition for construction.
  - Initiated acquisition of major components of the Ross Island Satellite communications Earth Station to address BITF deficiencies.
  - Prepared for AIMS FDR, anticipated in Q1 of FY 2019.

- Continued to update the long-range capital plan to include lifecycle and real property investments for all Antarctic locations.

Demonstrated Progress through Agency Actions Taken in FY 2019

a) <u>Fiscal oversight of the Antarctic Support Contractor (ASC) and its subcontractors.</u>
- Continued 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.
- Completed incurred costs audit of Lockheed Martin; NSF is waiting for DCAA to execute the audit for Leidos.

b) <u>Management of inventory.</u>
- Directed 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.
- Continued to monitor cargo shipments during the August 2018 - February 2019 cycle.
- Conducted weekly NSF-led meetings with the prime contractor focused on protecting government property.
- OIG site visit to Antarctica was completed in November 2018 and a visit to Denver was completed in June 2019. The site visits included auditing of USAP property management processes.

c) <u>Health and safety of research and contractors.</u>
- <u>Code of Conduct:</u>
  - Continued to implement NSF process for reporting and reviewing Code of Conduct violations.
- <u>Law Enforcement:</u>
  - Completed law enforcement site visit to South Pole Station in FY19 Q2.
- <u>Pharmacy Management:</u>
  - Continued to monitor Care Point's implementation of a selected pharmacy management software system.

d) <u>Modernization of facilities in the Antarctic Infrastructure Modernization for Science (AIMS) Project.</u>
- Began construction of IT&C Primary Addition.
- Completed successful AIMS FDR in Q1 of FY 2019.
- Continued to engage the scientific community in efforts to minimize disruption that the AIMS planning and construction process might have on Antarctic science.
- Updated the long-range 5-year capital plan (FY20-24) to include lifecycle and real property investments for all Antarctic locations.
  - NSB authorized NSF to make contract modifications to begin AIMS construction.

<u>NSF's Anticipated Action Plan Milestones</u>

a) <u>Fiscal oversight of the Antarctic Support Contractor (ASC) and its subcontractors.</u>
- Continue to apply invoice processing in accordance with the current NSF Guidance and Instructions for Invoice Review and Processing SOP.
- Engage DCAA for a cost incurred audit of Leidos for the FY18 ASC contract.

b) <u>Management of inventory.</u>
- Monitor cargo during the upcoming shipment cycle (August 2019 - February 2020).
- Continue to conduct weekly NSF-led meetings with the prime contractor focused on protecting government property.

c) <u>Health and safety of research and contractors.</u>
- <u>Code of Conduct:</u>
  - Continue to implement the process for reporting and reviewing Code of Conduct violations.
  - Continue to update the Code of Conduct as circumstances warrant.
- <u>Law Enforcement:</u>
  - Perform law enforcement site visit at Palmer Station in FY20 Q1.
- <u>Pharmacy Management:</u>
  - Continue to monitor Care Point's implementation of the selected pharmacy management software system.

d) <u>Modernization of facilities in the Antarctic Infrastructure Modernization for Science (AIMS) Project.</u>
- Continue AIMS project management, to include areas of procurement, logistics, planning, and design.
- Extend the long-range Antarctic capital plan for lifecycle and real property investments to a 10-year horizon (FY21-30).

Encouraging the Ethical Conduct of Research
Lead: Chief Operating Officer

Summary of OIG Identified Challenge
a) Respond to broader definition of the Responsible Conduct of Research (RCR) which includes protecting the integrity of data; complying with relevant requirements; communicating openly with researchers, institutions, and funding agencies; mentoring; ensuring responsible authorship; managing conflicts of interests; and establishing research environments free of harassment.
b) Respond to encouragement to provide substantive guidance to the research community on mentoring and RCR training to accomplish the goals of the America COMPETES Act.
c) Foster the implementation of effective RCR training—including its content and how it is delivered— for all researchers, especially new members of the research community.

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge
The Responsible and Ethical Conduct of Research (RECR) is critical for excellence, as well as public trust, in science and engineering. NSF expressly defines this issue to be inclusive of both the responsible conduct and ethical conduct of research, recognizing a broad conceptualization of this topic. NSF does not tolerate research misconduct (RM) in proposing or performing research funded by NSF, in reviewing research proposals submitted to NSF, or in reporting research results funded by NSF. Allegations of RM are taken seriously and are investigated by NSF's OIG. The OIG refers completed investigations of RM to NSF for action. Upon determination of RM, NSF takes appropriate action against individuals or organizations.

Beyond NSF's RM role, NSF works to foster and maintain ethical research environments in which RECR is not only taught but practiced. RECR includes rigor and integrity, honest and objective peer review, protection of proprietary information and intellectual property, and treating students and colleagues with fairness and respect.

NSF leadership commits to RECR through increased programmatic investments, specifically the repositioned cross-directorate grants program, Ethical and Responsible Research, previously titled Cultivating Cultures for Ethical STEM; dedicated professional staff and senior executives in the Office of the Director and in the Research Directorates focused on ethics, research integrity, accountability, and research protection; and the oversight and stewardship of the revitalized Online Ethics Center at the National Academy of Engineering.

NSF's Corrective Measures to Address the Challenge
Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years
• Issued Important Notice No. 140, Training in Responsible Conduct of Research – A Reminder of the NSF Requirement, from the NSF Director on August 17, 2017.
• Published revisions to Proposal and Award Policies and Procedures Guide (PAPPG) to point to promising practices in RECR training, including the encouragement of faculty training.
• Conducted outreach to principal investigator and awardee community on promising practices in RECR training, including involvement of STEM faculty in teaching and mentoring.
• Revised the Cultivating Cultures for Ethical STEM (CCE-STEM) Program Solicitation to incorporate research on promising practices in RECR training.
• Renewed and refreshed the mission of the Online Ethics Center to develop communities of promising practices in RECR education.
• Published and communicated widely NSF's new harassment policy.

Demonstrated Progress through Agency Actions Taken in FY 2019

a) <u>Respond to broader definition of the Responsible Conduct of Research (RCR) which includes protecting the integrity of data; complying with relevant requirements; communicating openly with researchers, institutions, and funding agencies; mentoring; ensuring responsible authorship; managing conflicts of interests; and establishing research environments free of harassment.</u>

- Provided a comprehensive definition of RECR in the draft 2020 PAPPG: "The responsible and ethical conduct of research involves not only a responsibility to generate and disseminate knowledge with rigor and integrity, but also a responsibility to (a) conduct peer review with the highest ethical standards, (b) diligently protect proprietary information and intellectual property from inappropriate disclosure, and (c) treat students and colleagues fairly and with respect."
- Implemented NSF's harassment policy.
- Issued in draft 2020 PAPPG clarification of requirements for disclosure of institutional/professional appointments to achieve full transparency.
- Provided intramural and extramural guidance, resources, and consultation for the inclusion of ethics considerations in citizen science, collaborative/team science, and international science by NSF program officers overseeing the Ethics and Responsible Research Program.
- Issued Dear Colleague Letter encouraging researchers in computer and information science and engineering to include fairness, ethics, accountability, and transparency in their proposals.
- Provided Program Officer training on NSF harassment policy.

b) <u>Respond to encouragement to provide substantive guidance to the research community on mentoring and RCR training to accomplish the goals of the America COMPETES Act.</u>

- Provided guidance in the draft 2020 PAPPG on reference material to use in designing RECR training (NASEM Reports: Fostering Integrity in Research; Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine; and Reproducibility and Replicability in Science).
- Provided guidance and encouragement in draft 2020 PAPPG on training faculty in RECR.
- Presented guidance and NSF perspectives to university research integrity officers and other research administrators at a workshop on RECR tools and methods for university leaders.
- Funded Online Ethics Center workshop on training STEM faculty new to teaching ethics using a "train the trainer" approach for capacity building across diverse STEM communities.
- Revised the solicitation for the Ethical and Responsible Research Program to also address topics such as the ethics of behavior at scientific field stations and the ethics of scientific reproducibility, as well as to enhance visibility across STEM fields funded by NSF.

c) <u>Foster the implementation of effective RCR training – including its content and how it is delivered – for all researchers, especially new members of the research community.</u>

- Continued to encourage the training of faculty in RECR.
- Continued to encourage STEM faculty to incorporate RECR into their mentoring, teaching, and curriculum development.
- Funded the Online Ethics Center to hold a workshop on identifying promising practices and innovative programs in RECR education and practice.
- Issued Dear Colleague Letter welcoming proposals in Education and Human Resources (EHR) on equity, inclusion, and ethics in STEM.

NSF's Anticipated Action Plan Milestones

a) Respond to broader definition of the Responsible Conduct of Research (RCR) which includes protecting the integrity of data; complying with relevant requirements; communicating openly with researchers, institutions, and funding agencies; mentoring; ensuring responsible authorship; managing conflicts of interests; and establishing research environments free of harassment.
   - Publish the final 2020 PAPPG.
   - Develop further improvements for the 2021 PAPPG based on community feedback.
   - Highlight changes to RECR provisions on 2020 PAPPG web page.
   - Create RECR landing page that leads directly to NSF's encompassing RECR definition, policies, and programs.
   - Increase the incorporation of ethics considerations into NSF research opportunities.

b) Respond to encouragement to provide substantive guidance to the research community on mentoring and RCR training to accomplish the goals of the America COMPETES Act.
   - Continue to fund the Online Ethics Center and research on best practices.
   - Hold promising practices workshops (including the Online Ethics Center workshop funded in FY 2019) and incorporate findings into guidance and outreach.
   - Publish final 2020 PAPPG.
   - Continue outreach on 2020 PAPPG.

c) Foster the implementation of effective RCR training – including its content and how it is delivered – for all researchers, especially new members of the research community.
   - Continue to encourage and provide guidance for faculty to engage in RECR teaching and mentoring.
   - Continue to work with academic institutions on promising practices for educating researchers at all levels.
   - Fund projects in equity, inclusion, and ethics in STEM as a result of EHR Dear Colleague Letter.