

FY 2020 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.⁶ This section is a republication of NSF's progress report in that document. It highlights the significant actions taken as of mid-FY 2020 on the management challenges identified by NSF's Inspector General at the beginning of that fiscal year. The FY 2021 Progress Update will be published in fall of 2021.

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 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 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 Antarctic Infrastructure Modernization for Science (AIMS) Project
- Encouraging the responsible and ethical conduct of research
- Mitigating threats posed by foreign government talent recruitment programs

FY 2021 Management Challenges

- Providing Oversight of Major Multi-User Research Facilities
- Providing Oversight of Grants During a Pandemic
- Managing the Intergovernmental Personnel Act Program
- Providing Oversight of the Antarctic Infrastructure Modernization for Science (AIMS) Project
- Increasing Diversity in Science & Engineering Education and Employment
- Mitigating Threats Posed by Foreign Government Talent Recruitment Programs

⁶ www.nsf.gov/about/performance

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 OIG concerns, including the need for strengthened controls to ensure major facilities clearly identify subrecipients, complete subrecipient risk assessments, and properly charge project expenditures to construction or operations.
- b) Ensure that NSF and recipients constructing and operating major facilities maintain project management expertise.

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 facilities. 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 greatly strengthened its oversight policies and procedures. This includes an annual Major Facilities Portfolio Risk Assessment to determine the necessary reviews and audits to be conducted by the Large Facilities Office (LFO) and Cooperative Support Branch (CSB) within the Office of Budget, Finance and Award Management (BFA). 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 continues to show its commitment to major facilities oversight through the active engagement of the Chief Officer for Research Facilities (CORF) and leadership's periodic review of the Office of the Director's Watch List. The governance structure currently in place, which includes the Accountable Directorate Representatives, Facilities Governance Board, Facilities Readiness Panel, and the Director's Review Board, continues to help ensure consistent implementation of NSF's expanded controls for major facilities oversight. Furthermore, NSF is ensuring adequate human capacity through implementation of the Program Management Improvement Accountability Act (PMIAA) on the major facility/acquisition portfolio for NSF staff overseeing major facility awards, and by establishing guidance on the necessary core competencies for recipient staff managing major facilities.

Since 2017, NSF has been through three Government Accountability Office (GAO) reviews related to its oversight of projects funded from the Major Research Equipment and Facilities Construction (MREFC) account. 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 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. The April 2020 report entitled National Science Foundation: Cost and Schedule Performance of Major Facilities Construction Projects and Progress on Prior GAO Recommendations had no new recommendations. NSF has Corrective Action Plans (CAPs) in place as described below.

The COVID-19 pandemic presents unique challenges for major facilities, including protecting the safety of personnel and property, construction delays, and unanticipated additional costs given that it is considered an "unforeseen event." The greatest risk is the inadvertent misuse of funds when re-budgeting (Operations Stage awards) and the proper use of budget contingency funds (Construction Stage awards). Following the flexibilities granted through OMB guidance under the pandemic, NSF is taking action to address these risks by developing internal and external guidance for major facility programs and recipients. These efforts have

included the following: (1) developing and updating a set of frequently asked questions (FAQs) specific to major facility recipients as a complement to NSF's implementation of Office of Management and Budget (OMB) Guidance; (2) issuing guidance jointly from the Office of the Director (OD) and the Large Facilities Office (LFO) to NSF Program Offices in response to the COVID-19 pandemic to ensure recipients segregate and track related cost increases; and (3) providing guidance for addressing re-baselining of construction projects and the application of management reserve for this unforeseen event. NSF will be following its current policies and controls with only minor clarifications. No additional controls are deemed necessary.

Based on NSF's evaluation of this Management Challenge under Enterprise Risk Management (ERM), coupled with activities already completed and those planned for FY 2020, NSF has determined that the residual risk impact for fraud, waste and abuse (Risk 1) is "low" and the likelihood is "very low" and that the residual risk impact for scientific performance (Risk 2) is "moderate" and the likelihood is "very low." Risk 2 impact and likelihood assume sufficient additional funding is made available. NSF is confident that its current and planned controls related to major facility oversight adequately consider and balance risk, resources, benefit to the science community, and stewardship of federal funds.

The planned corrective actions, demonstrated progress, and monitoring activities are described below.

NSF's Corrective Measures to Address the Challenge

Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years

Since 2015, NSF has implemented enhanced controls and strengthened agency governance to fully address the recommendations of the 2015 National Academy of Public Administration report; the requirements of the American Innovation and Competitiveness Act of 2017 (AICA); the FY 2018 and FY 2019 GAO Review Reports; and numerous OIG report recommendations. Examples of recent (FY 2019) agency actions include the following:

- Addition of the Chief Officer for Research Facilities (CORF) in the Office of the Director and Accountable Directorate Representatives; formation of the Major Facilities Working Group, Facilities Readiness Panel, and Facilities Governance Board; and implementation of Integrated Project Teams.
- Revised the *Major Facilities Guide* (MFG; NSF 19-68, September 2019) to include:
 - Created new Section 4.3 - *Schedule Development, Estimating, and Analysis*.
 - Requirement for Segregation of Funding Plan (as part of the Project Execution Plan) which requires recipients to describe how they allocate expenses between Construction and Operation Stage awards, particularly when awards overlap in duration.
 - Language describing the intent of the final Construction Stage review in determining whether the required project scope to meet science requirements was delivered in accordance with the Project Execution Plan and the impact on operations for any deferred work packages.
- Initiated major facilities portfolio workforce gap analysis as part of PMIAA implementation and the CAP for GAO-19-227.
- Revised 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.
- Drafted the new *Major Facilities Oversight Reviews* Standard Operating Guidance (SOG) to utilize external review panels more fully in addressing elements of cost and schedule and to evaluate the competencies of Recipient Key Personnel (GAO-18-370 and GAO-19-227).
- Drafted new MFG Section on *Key Personnel* as part of CAP for GAO-19-227.

Demonstrated Progress through Agency Actions Taken in FY 2020

- Required recipients to develop Segregation of Funding Plans for the following NSF projects: Daniel K. Inouye Solar Telescope (DKIST), Vera C. Rubin Observatory (formerly Large Synoptic Survey Telescope, or LSST), Antarctic Infrastructure Modernization for Science (AIMS), Regional Class Research Vessel (RCRV), and Large Hadron Collider Hi-Luminosity Upgrade (HL-LHC) Program (the CMS and ATLAS projects).
- Converted Director's Watch List to Office of the Director's Watch List under cognizance of the Chief Officer for Research Facilities, formalizing the process of tracking open action items on a monthly to bi-monthly interval.
- Ensured that the AIMS project has Federal Acquisition Regulations (FAR)-compliant procedures in place, including requirements for expending funds for established purposes, tracking and billing of costs incurred, and record-keeping for audit comparable to Segregation of Funding Plans under cooperative agreements.
- Revised the *Business Systems Review (BSR) Guide* to better align with the Uniform Guidance and address implementation of Segregation of Funding Plans and the allocation of expenses during the Construction and Operations Stages (if identified as a risk).
- Implemented corrective actions in response to all OIG recommendations under OIG Report 18-2-005 *Audit of NSF's Oversight of Subrecipient Monitoring*, which included updating various NSF policies and procedures to: (1) align with the Uniform Guidance; (2) provide a specific mechanism to verify that Pass-through entities (PTEs) of large and complex awards complete subrecipient risk assessments; and (3) to require that PTEs clearly identify entities that will receive a subaward.

NSF's Anticipated Action Plan Milestones

NSF management developed the following anticipated milestones in consideration of NSF's strategic and operational objectives and the previous actions NSF has already taken as described above:

- Revise *Obligation and Allocation of Management Reserve* SOG (NSF-LFO-FY19-02-00) to clarify the relation to the NSB delegation order and eliminate the \$10 million applicability limit for use on construction projects impacted by the COVID-19 pandemic [FY 2020, Q3].
- Finalize the *BSR Guide* and post for public comment [FY 2020, Q4].
- Finalize the *Major Facilities Oversight Reviews* SOG and provide to the OIG for consideration in closing the resolved recommendation in OIG Report 19-2-006, *Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses* [FY 2020, Q4].
- Complete the major facilities portfolio workforce gap analysis as part of Program Management Improvement Accountability Act (PMIAA) implementation and the CAP for GAO-19-227 [FY 2020, Q4].
- Finalize and post interim update to the MFG for public comment [FY 2021, Q1], including:
 - Content in the new MFG Section 4.3, *Schedule Development, Estimating, and Analysis*.
 - More detailed guidance on Segregation of Funding Plans and provide to the OIG for consideration in closing resolved recommendations in OIG Report 19-2-006, *Audit of NSF's Controls to Prevent Misallocation of Major Facility Expenses*.
 - New section(s) on *Key Personnel* and *Recipient Core Competencies*.
- Monitor allocation of funds between awards as part of required cost incurred audits using Segregation of Funding Plans as reference [on-going].

Meeting DATA Act Reporting Requirements

Lead: Chief Financial Officer and Office Head, OIRM

Summary of OIG Identified Challenge

In OIG Fiscal Year (FY) 2019 performance audit of NSF's implementation of the Digital Accountability and Transparency Act (DATA Act), the audit report (OIG 20-2-003) noted that "[data reviewed] did not meet OMB quality requirements [and several] data elements were inaccurate, incomplete, or untimely". Most of these OIG-identified errors were related to specific award actions, notable award closeout transactions, and post-closeout upward and downward modifications, that are not captured in NSF's Awards System. The report also acknowledged that although NSF has improved its DATA Act reporting, "challenges remain in implementing a process to ensure all award actions are transparent to the public".

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge

NSF is confident in the quality of our quarterly and monthly data submissions. The data submitted includes the required linkages between the submission files, the differences are legitimate and documented, and NSF's internal controls support the reliability and validity of the agency account-level and award-level data. NSF does not agree with the OIG's finding that the NSF award and financial systems must reconcile exactly. The data that the OIG pulled and identified as errors are not designated as "errors" in the Department of Treasury's (Treasury) DATA Act Information Model Schema (DAIMS) technical requirements, but are actually broker "warnings", which are previously disclosed as explainable differences between File C and D2.

NSF stores the original award amount and the true award actions (amendments) for additional funding, no-cost extensions and other administrative amendments in its award management system (Awards). NSF maintains information regarding all financial award actions interfaced from Awards, outlays/expenditures, and accounting adjustments (resulting from award close and post-award close actions) in its financial management system (iTRAK). The policy of maintaining award close-out and post-award actions in iTRAK is in compliance with the Office of Management and Budget's (OMB) Uniform Grant Guidance (2 CFR 200). A unique Federal Award ID link exists between the two systems, providing full traceability for transactions that are interfaced from Awards to iTRAK, as required by the DATA Act guidance from OMB and Treasury (OMB M-15-12 and DAIMS specifications). The specific difference in interpretation between NSF and the OIG is whether the non-financial system should be used as an accounting ledger or sub-ledger.

NSF has communicated with OMB and Treasury requesting further guidance on this issue, and we have received several responses that support our position.

- On October 3, 2019, NSF received an email from Treasury that noted that DAIMS Policy and Procedures Guide does not provide detailed policy requirements for what should be in the award system and recommended agencies defer to FAR and 2 CFR 200 as well as OMB.
- On October 16, 2019, NSF received an email from OMB that confirmed our interpretation of 2 CFR 200, validating our approach of managing award activity between the award system and the financial management system.
- On October 24, 2019, NSF received an email from Treasury that validated NSF's opinion that the DAIMS Practices and Procedures contains no absolute requirement to have a one-to-one match between Files C and D2.
- On February 24, 2020, NSF provided OIG a walkthrough of various interactions with OMB and Treasury as well as additional clarifications on NSF data and its representation on USASpending.gov which also included a confirmation from Treasury that the "Obligation Amount" on USASpending.gov is pulled from File D2.

Since February, NSF has been in constant communication with OMB and Treasury through Leveraging Data As a Strategic Asset (LDASA) and Chief Financial Officers Council (CFOC) meetings on revising documentation to further address these explainable differences. Although we are working to resolve this issue before the next audit, Treasury has deferred documentation updates to future DAIMS releases. NSF is also currently undergoing a Government Accountability Office (GAO) audit in which we have explained the nature of the abovementioned recommendation and how it relates to our standard business processes. Since this regular business process comprises the majority of our submission warnings, we look forward to GAO's interpretation of the issue and related feedback at the conclusion of the audit.

The NSF business process that is used for recording and reporting these transactions to USASpending.gov is fully aligned with the DATA Act and applicable guidance (e.g., OMB M-17-04, and Treasury DAIMS technical guidance). Our monthly Financial Assistance Broker System (FABS) submission process ensures that reportable award actions from the Awards system are validated and reviewed by the stakeholders before publishing on USASpending.gov. NSF has also updated its Data Quality Plan (DQP) to note that the agency considers these adjustments as non-addressable, acceptable differences between Files C and D2. NSF accounts for these differences as part of its quantitative and qualitative materiality considerations, and monitors adjustments for significant increases to the risk of misstatement via its newly implemented Award Reconciliation Report. Further, NSF implemented a Quarterly Retrospective to review outstanding discrepancies and final dispositions of warnings, consider dollar materiality of issues, and document lessons learned for subsequent quarters. Through this process, NSF validates that all addressable warnings identified within monthly reporting cycles were addressed at the time of certification to provide full transparency to the public over its award actions.

NSF's Corrective Measures to Address the Challenge

Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years

- Actively participated in the Chief Financial Officer Council (CFOC) 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.
- Continued ongoing work, through the NSF Deputy Chief Financial Officer (DCFO) and staff, with the joint working group of the CFOC and the Council of the Inspectors General on Integrity and Efficiency (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 DCFO 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 data quality measures. The NSF DATA Act Working Group worked with appropriate stakeholders from the Internal Controls and Enterprise Risk Management groups in developing and executing a data quality plan that would define 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 System (FABS) Standard Operating Guidance, and NSF Acquisition Manual.
- Created a desk guide for the NSF Contracts Branch that includes step-by-step instructions intended to reduce recurring data errors.
- Implemented a SharePoint tool to assist in quarterly DATA Act submission processes by tracking Division Director assurances and the Senior Accountable Officer (SAO) certification.

Demonstrated Progress through Agency Actions Taken in FY 2020

- Corresponded with Treasury and OMB to get further clarity on the linkage requirements between Files C and D2 and to inform updates to Treasury DAIMS specifications that will provide more specific guidance on NSF's legitimate differences.
- Migrated reporting functionality from NSF's custom solution into iTRAK so that all reporting is now conducted directly out of NSF's financial system of record, with reconciliation reports also implemented into iTRAK directly.
- Implemented a SharePoint tool to assist in quarterly DATA Act submission process by tracking Division Director assurances and the SAO certification.
- Implemented an NSF Award Reconciliation Report to identify potential data issues across financial and award files and assign dollar impact and preliminary root causes to these issues to help report all addressable warnings.
- Incorporated lessons learned from feedback on data submissions to improve accuracy and efficiencies.
- Continued to work closely with OMB, Treasury, and intra-governmental groups to provide input into DATA Act technical guidance and policy
- Updated NSF's DQP for FY 2020 to provide an executive level summary of key and supplemental controls to ensure the completeness, accuracy, and timeliness of DATA Act submissions. This update includes new procedures developed and implemented to meet DAIMS 2.0 and OMB M-20-21 requirements.
- Updated DATA Act and FABS policies and procedures to reflect DAIMS 2.0 and OMB M-20-21 enhancements.
- Continued collaboration with NSF OIG and GAO to cooperate with and support their audit responsibilities as well as to resolve any recommendations through implementing a corrective action plan.

NSF's Anticipated Action Plan Milestones

NSF management developed the anticipated milestones below in consideration of NSF's strategic and operational objectives, the risks inherent to achieving these objectives, and the key actions NSF has already taken to address those risks.

- Incorporate recommendations from the GAO audit into NSF's reporting processes and controls.
- Continue to provide feedback to OMB and Treasury on recommended guidance changes that will help clarify the nature of NSF's legitimate differences, and reference to-be-published guidance in NSF policies and procedures.
- Continue to work with the OIG to achieve a common understanding and resolution of this issue.

Managing the IPA Program

Co-Leads: Assistant Director, BIO and Office Head, OIRM

Summary of OIG Identified Challenge

IPAs can have a heightened risk of conflicts of interest while working at NSF because most IPAs come from institutions receiving NSF grants. The IPA program remains an area with inherent risk that NSF must continue to monitor and mitigate, because:

- a) IPAs 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.

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge

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 overseen 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 the NSF Director and Chief Operating Officer (COO) 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, the Office of Management and Budget (OMB), and Congress, pursuant to the American Innovation and Competitiveness Act (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 engages in continuous improvement of its management of the IPA Program, 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. One example is NSF's work to resolve and close the recommendations from OIG report 17-2-008, *NSF Controls to Mitigate IPA Conflicts of Interest*. The last of the four recommendations from this report was closed by the OIG in October 2018. This result demonstrates that NSF has effectively minimized the inherent risk of IPA conflicts of interest while working at NSF (since most IPAs come from institutions receiving NSF grants). NSF is confident that these actions taken in response to prior OIG recommendations and ongoing monitoring and controls have mitigated the potential risks associated with managing IPAs' COIs.

NSF's Corrective Measures to Address the Challenge

Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years

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.*

- Ensured there is a “bench” of staff ready to fill developmental detail assignments to vacant executive positions who have been trained at 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 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 IPA 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.
- Produced IPA Program Annual Reports for the Director of NSF, beginning in 2018. 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 Corrective Action Plan (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).*

- 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 IR/D 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 combine other NSF official business and/or telework with these trips to more efficiently use 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.
- 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 checks 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.*

- NSF initiated a pilot requiring 10 percent 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. An assessment of the pilot indicated that the cost-share percentage increased from 7.2 percent in FY 2016 to 7.9 percent in FY 2017 to 9.2 percent in FY 2018 and to 10.4 percent in FY 2019. At the conclusion of FY 2019, NSF had realized significant cost avoidance with increased cost share dollars and participation rates each year.
- Engaged with the GAO on the salary reimbursements associated with IPAs. As noted in the GAO report, IPAs remain employees of their home institutions, with NSF reimbursing the institutions for most of their salaries and benefits. 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 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.

Demonstrated Progress through Agency Actions Taken in FY 2020

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.*

- Submitted the IPA Program Annual Report covering the prior fiscal year to the Director of NSF.
- Integrated activities associated with the CAP in response to GAO-18-533 into Renewing NSF goal 1 Adapting the Workforce to the Work.
- Engaged in IPA Program Enterprise Risk Management to clearly identify IPA Program objectives and associated risks as they pertain to the mission of NSF.
- Established implementation plan to Integrate Program level and Executive level IPAs into the USA Performance Management System in FY21.

b) *IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).*

- Continued the IR/D Program, which permits employees and individuals performing temporary service with NSF to maintain their involvement with their professional research and research-related activities. Prior to creating an IR/D plan, participants must receive approval from their

supervisor for the time and expense related to the submitted activities. Additionally, the plan needs to be approved by the Division Director and designated IR/D Expert from the organization. IR/D activities may not interfere with other assigned NSF duties and may be curtailed at management's or the participant's discretion.

- NSF continued to maintain robust oversight, training, and internal controls to monitor use of the IR/D program as demonstrated by these actions taken in FY 2020.
- Submitted the IR/D Annual Report to the DADs, covering program participation statistics, average days and dollars requested and used and status of IR/D training and outreach.
- Provided annual training for IR/D experts, including updates to the IR/D Guide and the online electronic IR/D plan.
- Provided quarterly data to NSF senior managers to ensure appropriate oversight of IR/D time and travel by both permanent and rotating staff.
- Continued 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.

- Submitted the FY 2019 IPA Program Annual Report to OD, which demonstrated that the 10 percent cost-share pilot has reduced/eliminated the gap between IPA reimbursements and Fed salaries, and thus this is not a major risk to the agency.
- Effective January 16, 2020, informed by the data in the IPA Program Annual Report, NSF implemented the 10 percent Cost Share Policy for Personnel on Intergovernmental Personnel Act (IPA) Assignment to NSF. Submitted to Congress the FY2019 annual response to the AICA on the Justifications for Rotator Pay Exceeding the SES Pay Max.
- NSF is preparing a brief report to GAO that will highlight the efforts of the agency surrounding the IPA Cost Share Policy and address concerns surrounding IPA costs at the Foundation.

NSF's Anticipated Action Plan Milestones

NSF management developed the anticipated milestones and responses to the findings in the OIG Management Challenge FY 2020 Report below in consideration of NSF's strategic and operational objectives, the risks inherent to achieving these objectives, and the key actions NSF has already taken in response to those risks.

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.

- NSF conducted an 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.⁷
- Thus, the turnover risk for IPAs is not any greater than for other employees. NSF will continue to use the robust onboarding, training, knowledge transfer, and performance management systems that are in place, to ensure that turnover of all employees and IPAs have minimal impact on operations.
- Migrate Program Director and Executive IPAs to the USA Performance system for managing performance plans.

⁷ www.opm.gov/policy-data-oversight/senior-executive-service/facts-figures/#url=Demographics

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b) *IPAs can spend up to 50 days each year on Independent Research/Development (IR/D).*

- Continue to submit the IR/D Annual Report to the DADs, covering program participation statistics, average days and dollars requested and used and status of IR/D training and outreach.
- Continue to provide annual training for IR/D experts, including updates to the IR/D Guide and the online electronic IR/D plan.
- Continue to 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 checks 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.*

- As of FY 2020, the gap in pay between IPAs and Federal employees has been reduced/eliminated by implementing the required 10 percent cost-share as policy. Thus, this does not constitute a significant risk to the agency. NSF will continue to monitor costs of the program, and provide annual reports to the Director, COO and NSF senior management.

Managing the Antarctic Infrastructure Modernization for Science (AIMS) Project

Co-Leads: Assistant Director, GEO, and Office Director, Polar Programs

Summary of OIG Identified Challenge

- a) The Antarctic Infrastructure Modernization for Science (AIMS) Project will stretch Agency resources and may present additional challenges for NSF to overcome.
- b) In addition, OPP is also managing construction of the Information Technology & Communications (IT&C) primary facility – a key precursor to the success of AIMS.

NSF Management’s Overview of the Challenge and Action Plan to Address and Monitor the Challenge

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. USAP has two major construction projects ongoing at McMurdo Station – the IT&C Primary Addition, which entails building onto an existing facility for the consolidation of IT&C functions, and the AIMS Project, for which 6 new facilities are being built to replace multiple outdated structures and consolidate key functions for more streamlined and efficient operations. Both projects are being implemented through NSF’s Antarctic Support Contractor (ASC) under a FAR-based contract with NSF. Antarctica’s remote location, extreme environment, and the short period of time during which the continent is accessible present challenges above and beyond those typically encountered for domestic construction projects.

The ASC (Leidos, Inc.) has a well-developed risk identification and mitigation process overseen by NSF as captured in the Project Execution Plan. The initial risk register for AIMS contained 120 entries to develop the project’s budget contingency – key among them were delays in long-lead procurement items, inadequate quantities of fill material on-site, and work stoppages due to weather. Leidos mitigates the likelihood and impacts of these key risks through extensive pre-authorization planning and coordination to identify the key long-lead material and equipment purchases to support delivery dates meeting the logistics supply chain requirements. These procurements are captured and tracked in the project integrated master schedule and reviewed regularly by project and program leadership.

A significant challenge that remains is the risk of increased costs due to unpredictable and fluctuating market conditions. To minimize the impact of these uncertainties, each major construction package is awarded only after designs are complete, subcontractor bids are received, and costs are understood. This risk of rising costs has materialized in the first few construction packages, and mitigation steps have included evaluation of design-to-cost measures and seeking revised bids. Another significant challenge remaining is the need to align logistics chain/cargo capacities with the planned pace of construction. To mitigate this risk, NSF and Leidos held a series of workshops to clearly define execution and oversight processes for each step in the logistics pathway.

The global pandemic associated with COVID-19, which is considered an unforeseen event not addressed by budget contingency for AIMS construction, has had impacts on the entirety of USAP operations. As a result of the significant health risk to the deployed population as well as global travel restrictions, it was necessary to make significant changes to program and construction project plans. The global pandemic resulted in “excusable delays” for the contractor as well as additional government-directed delays in performance of work under the AIMS project. This included placing the construction sites in a safe and stable configuration in March 2020 and bringing home deployed construction crews earlier than anticipated. In accordance with NSF policy, the magnitude of these impacts will require re-baselining of the AIMS project and OPP is actively engaged with Leidos, BFA, and the Office of the Director for that purpose.

NSF's Corrective Measures to Address the Challenge

Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years

- Completed design and began construction on the IT&C Primary Addition Project. As of March 2020, the facility construction was 74 percent complete and is poised to be continued as conditions warrant. Significant delays to schedule due to the COVID-19 pandemic will now require a re-baselining effort.
- AIMS received authorization for the total project cost and duration from the National Science Board in February 2019 following extensive internal reviews and Independent Cost Estimate (ICE), with the first two construction packages awarded for the Vehicle Equipment and Operations Center and the Lodging Building exterior in April 2019.
- OPP augmented internal staffing for program/project management and oversight by assigning the management of capital projects to a dedicated staff resource.
- Shortly following AIMS authorization, weekly meetings of the core Integrated Project Team – including OPP, DACS, and LFO – were initiated.

Demonstrated Progress through Agency Actions Taken in FY 2020

- On-site work began on AIMS with aggregate production, and demolition of facilities in the footprint of VEOC and Lodging. As of March 2020, the project was approximately 16.5 percent complete. Significant delays to schedule due to the COVID-19 pandemic will now require a re-baselining effort.
- Continued to engage the research community to ensure they remained aware of potential disruptions that construction might have on Antarctic science.
- Partnered with BFA/DACS and LFO to identify areas the contractor needed to strengthen, which resulted in the contractor hiring additional staff, restructuring the office supporting the contract, and obtaining interagency support for cost analysis from the U.S. Army Corps of Engineers (USACE).
- Augmented the AIMS Integrated Project Team by adding a Project Controls Lead, providing support to the Program Officer.
- Restructured USACE support being provided to the AIMS project by moving from cost reasonableness reviews to full independent cost estimates for proposal packages.
- Completed verification and acceptance of the AIMS Earned Value Management System (EVMS) in accordance with NSF policy.
- Enlisted formal Value Engineering sessions with NSF participation.
- Increased financial oversight of Construction in Progress reporting and construction invoicing by requiring Program Officer review of every invoice, and augmenting the accounting support to OPP.

NSF's Anticipated Action Plan Milestones

- Continue monitoring and oversight of the AIMS and IT&C Primary Addition Projects in accordance with established Internal Management and Project Execution Plans including external panel reviews and EVMS surveillance reviews for AIMS. Significant delays to schedule due to the COVID-19 pandemic will now require a re-baselining effort for both projects.
- Assess COVID-19 impacts and evaluate options for minimizing negative impacts to AIMS cost and schedule.
- Working closely with BFA, re-baseline AIMS, subject the revised cost, scope and schedule to external panel review, Facilities Readiness Panel Review, Director's Review Board Review and NSB re-authorization of the Total Project Cost.

Encouraging the Responsible and Ethical Conduct of Research

Lead: Chief Operating Officer

Summary of OIG Identified Challenge

- a) Develop written guidelines or templates for universities to follow so that NSF can ensure the training is of sufficient quality and complies with Responsible Conduct of Research (RCR) training requirements. Strengthen the impact of RCR training by working with the National Institutes of Health to harmonize RCR expectations as much as possible.
- b) Ensure that reports of sexual and other forms of harassment made pursuant to NSF's award term and condition are properly made to the NSF Office of Diversity and Inclusion and that NSF has enough staff and resources to respond to this new body of work.

NSF Management's Overview of the Challenge and Action Plan to Address and Monitor the Challenge

Research supported by NSF must be conducted responsibly and ethically to ensure that it is credible to the science and engineering community, trusted by the public, and maximizes the Nation's return on investment. NSF views the Responsible and Ethical Conduct of Research (RECR) holistically—not only as a responsibility to generate and disseminate knowledge with rigor and integrity, but also as a responsibility to conduct peer review with the highest ethical standards; diligently protect proprietary information and intellectual property from inappropriate disclosure; and treat students and colleagues fairly and with respect. This expectation is fully articulated in the June 202 update to the Proposal and Awards Policies and Procedures Guide (PAPPG)⁸ and on NSF's updated RECR web page⁹.

NSF does not tolerate research misconduct (falsification, fabrication, and plagiarism) 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 research misconduct (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 promptly takes appropriate action against individuals or organizations.

NSF is working to understand and reduce the occurrence of irresponsible and unethical research conduct through three sets of actions: 1) characterizing the problem and identifying priorities through stakeholder engagement, complemented by data collection and analysis; 2) funding basic research into the underlying causes and potential solutions, including the effectiveness of different approaches to improve RECR; and 3) implementing change through policy and public engagement. As reported by the OIG in its Fall 2019 Semiannual Report, the number of RM referrals to NSF from FY 2010 to FY 2019 has remained relatively low and has not trended upward. For example, from FY 2016 to FY 2019 NSF reviewed over 187,000 proposals, resulting in approximately 46,000 awards; *during that same four-year period, the OIG issued nearly four dozen referrals to NSF for RM (excluding other types of investigative referrals). Nearly half were allegations of research misconduct in proposals that NSF had not funded. Note that the referrals of potential RM account for just 0.02 percent of the proposals received.*

NSF is supporting research into the underlying causes, effective training practices, and how to best disseminate knowledge and best practice through community-led approaches. This approach will enhance understanding of the scope, causes, and best mitigation strategies to reduce detrimental conduct. NSF welcomes any further insight from the OIG into the scope and nature of RECR problems (including RM) brought to their attention. NSF is also involved in efforts to harmonize RECR expectations with other agencies, including the National Institutes of Health (NIH), being led by the Office of Science and Technology Policy (OSTP) through the National Science and Technology Council (NSTC) Joint Committee on Research Environment (JCORE). JCORE is co-chaired by the NSF Director, and NSF staff

⁸ www.nsf.gov/pubs/policydocs/pappg20_1/pappg_9.jsp

⁹ <https://nsf.gov/od/recr.jsp>

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co-chair all four of the subcommittees: Coordinating Administrative Requirements for Research; Rigor and Integrity in Research; Research Security; and Safe and Inclusive Research Environments. Furthermore, NSF leadership has committed to ensuring that the award term and condition (T&C) associated with sexual and other forms of harassment reporting is managed effectively, dedicating professional staff and senior executives in the Office of the Director to respond to and assess the reporting processes and outcomes.

NSF's Corrective Measures to Address the Challenge

NSF has consistently addressed RECR by working to characterize the problem and identify priority actions; funding basic research into the underlying causes and potential solutions; and implementing change through policy and public engagement.

Demonstrated Progress Through Agency Action Taken in Prior Fiscal Years

Characterizing the problem and identifying priority actions:

- Funded the Online Ethics Center to hold a national workshop on identifying promising practices and innovative programs in RECR education and practice.
- Issued a Dear Colleague Letter welcoming proposals in Education and Human Resources (EHR) on equity, inclusion, and ethics in Science, Technology, Engineering and Mathematics (STEM).
- Issued a Dear Colleague Letter encouraging researchers in computer and information science and engineering to include fairness, ethics, accountability, and transparency in their proposals.
- Renewed and refreshed the mission of the Online Ethics Center to develop communities of practices in RECR education (continuing into FY 2020).

Implementing change through policy and public engagement:

- 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 (continuing into FY 2020).
- Conducted outreach to the Principal Investigator and awardee community on promising practices in RECR training; continued to encourage STEM faculty to incorporate RECR into their mentoring, teaching, and curriculum development (continuing into FY 2020).
- 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.
- Expanded efforts to create a harassment-free environment internally at NSF, including requiring mandatory training in harassment prevention for all personnel, which includes Federal employees; Intergovernmental Personnel Act (IPA) assignees; Visiting Scientists, Engineers and Educators; in-house fellows; experts; and others who regularly conduct business at NSF. (See Staff Memorandum OD 19-09, Required Harassment Prevention Training.
- Clarified the PAPPG requirements for anti-harassment mitigation in conference/workshop proposals.
- Funded an 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 (continuing into FY 2020).
- Published, communicated, and implemented NSF’s new harassment policy.
- Added staff in the Office of Diversity and Inclusion to manage the harassment T&C process.
- Added additional questions and answers to further explain the new harassment policy in the updated T&C FAQs.
- Drafted language on the applicability of the new T&C for awards made directly to individuals (vs. institutions); e.g., for NSF Postdoctoral Fellowships.

Demonstrated Progress through Agency Actions Taken in FY 2020

Characterizing the problem and identifying priority actions

- Collected stakeholder input through regular participation in the annual meetings of the Association for Practical and Professional Ethics.
- The Social, Behavioral & Economic Sciences (SBE) Directorate asked leading members from the Association for Practical and Professional Ethics to join SBE's Professional Societies Advisory Board and SBE's Committee of Visitors to provide direct stakeholder input into the Ethical and Responsible Research Program.
- OD and SBE staff members regularly discussed policy and best practices with colleagues in the HHS Office of Research Integrity.

Funding basic research into the underlying causes and potential solutions

- Repositioned the former Cultivating Cultures for Ethical STEM program to SBE's Office for Multidisciplinary Activities and renamed to Ethical and Responsible Research to fund research projects that identify factors that are effective in the formation of ethical STEM researchers and approaches to developing those factors in all STEM fields that NSF supports. Increased the budget of this program from \$3.55 million to \$5.55 million.
- Renewed and refreshed the mission of the Online Ethics Center to develop communities of practices in RECR education.

Implementing change through policy and public engagement:

- 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.
- Conducted outreach to the principal investigator and awardee community on promising practices in RECR training; continued to encourage STEM faculty to incorporate RECR into their mentoring, teaching, and curriculum development.
- Funded an 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.
- Provided a comprehensive definition of RECR in the 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."
- Published revisions to the PAPPG to point to promising practices in RECR training, including the encouragement of faculty training and reference material to use in designing RECR training (National Academy of Sciences, Engineering, and Medicine (NAEM) 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).
- Issued in the 2020 PAPPG clarification of requirements for disclosure of institutional/professional appointments to achieve full transparency.
- Created a "Speak Up" campaign to raise awareness of materials and resources available for personnel to address discrimination, bullying, harassment, stress and anxiety, physical safety, and violence in the workplace.
- ODI, in collaboration with OIA's evaluation and assessment team, developed a phased evaluation plan for the new T&C on reporting incidents of harassment, with the first stage starting in FY 2021.

NSF's Anticipated Action Plan Milestones

As NSF continues to characterize the problem and identify priority actions, fund basic research, and implement change through policy and public engagement, specific actions are planned for the coming year.

Strengthen the understanding and effectiveness of RECR training and community guidance through coordination with Federal agencies and the ethics community:

- Leverage NSF's leadership role as co-chair of the JCORE Safe and Inclusive Research Environment subcommittee and the JCORE Rigor and Integrity in Research subcommittee to promote the coordination and development of RECR among Federal agencies, including with NIH.
- Fund through the Ethical and Responsible Research program a prospective workshop that will curate relevant ethics and educational resources for NSF's RECR training requirements.
- Update NSF's RECR page periodically to ensure the newest resources and current information are available; build a more user-friendly portal for the new web site (see <https://beta.nsf.gov/>) that makes it easier to find available resources and makes NSF's commitment to RECR more prominent.

Assess and strengthen through action and policy efforts to reduce sexual and other forms of harassment:

- Implement Recommendation 15 from the GAO report, *Sexual Harassment in STEM Research*, that the "Director of NSF should establish goals and an overall plan to assess all of the agency's sexual harassment prevention efforts for their university grantees, including methods to regularly monitor and evaluate its sexual harassment prevention policies and communications mechanisms."
- Collaborate with other Federal agencies to address harassment in a coordinated manner through active participation in the JCORE Safe and Inclusive Research Environment subcommittee and its ad hoc working groups.

Mitigating Threats Posed by Foreign Government Talent Recruitment Programs

NSF lead: Chief of Research Security Strategy and Policy

Summary of OIG Identified Challenge

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. These programs may require members to provide proprietary or export-controlled information and create conflicts of interests. Failure to disclose membership in such programs can have criminal or civil ramifications.

NSF should continue to assess and refine its controls in this area and should work to ensure that it has sufficient staff and resources to respond to this challenge.

NSF Management’s Overview of the Challenge and Action Plan to Address and Monitor the Challenge

The National Science Foundation seeks to maintain a vibrant science and engineering community for the benefit of the Nation. Participation in this community relies on individuals to uphold core principles and values such as openness, transparency, collaboration, and integrity. However, open scientific exchange and research face a challenge from some foreign governments through the use of talent recruitment programs. Some of these programs deliberately disregard these core principles and incentivize participants to acquire U.S. funded scientific research. These programs target scientists, engineers, and educators of all nationalities working or educated in the United States.

Over the past two years, NSF has taken steps to mitigate threats posed by foreign government talent recruitment programs. To ensure that NSF has sufficient staff and resources to continue to respond to this challenge, NSF created and filled the position of Chief of Research Security Strategy and Policy in March 2020 and is developing a new team to support the Chief. In addition, NSF coordinated with other agencies via the Joint Committee on the Research Environment (JCORE), an activity launched by the White House Office of Science and Technology Policy (OSTP) under the National Science and Technology Council in mid-2019.

Under the leadership of OSTP and through the JCORE subcommittee on research security which NSF co-chairs, U.S. science funding agencies are 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 JCORE subcommittee on coordinating administrative requirements for research across the science funding agencies, including those associated with research security. We work closely with other U.S. government science agencies to share policies and practices, and regularly engage with the academic research community to educate them about the risks, hear their concerns about this emerging challenge, and clarify our positions, policies, and procedures. With an increased awareness of the risk, the U.S. research community now is better positioned to understand, evaluate, and do their part to address it.

NSF’s Corrective Measures to Address the Challenge

In July 2019, NSF released a Dear Colleague Letter (DCL) on Research Protection to the research community from former Director Córdova. The DCL alerted the community to existing and emerging risks to the global research ecosystem, inspired conversations about balancing science and security, and warned of the risks of participation in foreign government talent recruitment programs. Further, it described NSF’s commitment to vigilantly addressing emerging risks to the Nation’s science and engineering enterprise, including concrete steps the agency is taking. To amplify the message from Director Córdova, NSF conducted outreach to multiple research community groups and sought best practices from the JASON

advisory group, the National Science Board, and NSF Advisory Committees.

At the same time, NSF issued a policy prohibiting NSF personnel and rotators such as Intergovernmental Personnel Act personnel (IPAs) detailed to NSF from participating in foreign government talent recruitment programs. This policy helps prevent inappropriate foreign influence on NSF personnel. This change built on earlier steps to protect NSF's policies, programs, and priorities, including the merit review process. For example, in 2018, NSF issued a requirement that all staff employed by NSF or detailed to NSF must be U.S. citizens or have applied for U.S. citizenship. In addition, earlier in 2019, NSF 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.

NSF's actions were taken in coordination with other U.S. agencies that fund basic research, including through the White House National Science and Technology Committee's JCORE subcommittees on research security and coordinating administrative requirements for research.

Demonstrated Progress Through Agency Actions Taken in FY 2020

- **Improved transparency / clarification for disclosure:** In January 2020, following a public comment process that began in May 2019, NSF issued clarifications to its proposal preparation requirements specified in the PAPPG to ensure senior personnel on proposals provide information on all sources of current and pending research support, foreign and domestic. NSF has also clarified its biographical sketch preparation requirements to ensure that any titled position is identified whether or not remuneration is received. Effective June 1, 2020, all senior personnel identified on an NSF proposal are required to comply with these requirements.
- **Standardized format and streamlined processes for disclosure:** As part of its revision to the PAPPG¹⁰, NSF announced that use of an NSF-approved format will be required to be used by senior personnel in preparation of both the biographical sketch and current and pending support sections of the proposal. To streamline the process, NSF worked with the National Institutes of Health (NIH) to use SciEncv: Science Experts Network Curriculum Vitae¹¹ as an NSF-approved format for both sections of the proposal. The formats were released in April 2020, and the community will be required to use an NSF-approved format to prepare these sections of any proposal submitted or due on or after October 5, 2020.
- **Issuance of a new award term and condition regarding previously undisclosed information:** NSF's longstanding policy is that senior personnel must disclose, in any submitted proposal, all current and pending support. In July 2020, NSF released a revised set of general terms and conditions that incorporated a new term that addresses the process and content requirements to be used if an organization discovers that a Principal Investigator or co-Principal Investigator on an active NSF award failed to disclose current support or in-kind contribution information as part of the proposal submission process. This new term and condition is effective for all new awards and funding amendments on existing awards effective October 5, 2020.
- **Term and condition for foreign collaboration considerations in major facilities:** In July 2020, NSF finalized a revised term and condition on foreign collaboration considerations for major facilities. The new term and condition is effective October 5, 2020, for new awards and funding amendments on existing awards. As of October 5, 2020, awards that contain the revised term and condition must provide NSF with advance notification of potential collaboration with non-U.S. organizations or governments

¹⁰ www.nsf.gov/pubs/policydocs/pappg20_1/index.jsp

¹¹ www.ncbi.nlm.nih.gov/sciencv/

in connection with its NSF-funded award and must await guidance from NSF prior to negotiating terms of any potential agreement.

- **Training for NSF staff:** In March 2020, NSF released mandatory training for all NSF personnel on science and security. It includes modules on risks from foreign governments, NSF's policies on disclosure, and NSF's policies on staff participation in foreign government talent recruitment programs.
- **Independent report on research security:** In December 2019, NSF accepted the final commissioned report from the independent JASON advisory group¹² assessing risks to fundamental research. The study included recommendations for NSF and grantee institutions to maintain balance between openness and security of science. In March 2020, NSF published its response,¹³ agreeing with the report's recommendations and noting where the agency has already taken action or plans to do so. More details on NSF's actions are included elsewhere in this document, and briefly, they can be summarized in relation to the nine JASON recommendations:
 1. **Scope of disclosure:** NSF clarified its disclosure requirements in the revision to the PAPPG. NSF's new internal training reinforces these requirements. (see above)
 2. **Failures to disclose:** NSF developed a new term and condition for previously undisclosed information. (see above)
 3. **Responsibilities of all stakeholders and harmonization:**
 - NSF has conducted significant outreach with other federal agencies, Congress, the research community, and the OIG (as detailed in subsequent sections).
 - NSF has been in discussions with the NIH to examine the existing content disclosure requirements for both the biographical sketch and current and pending support by both agencies. The goal of this exercise is to harmonize, to the extent possible, the requirements imposed by both agencies.
 - Through JCORE, NSF has worked to harmonize definitions of terms such as conflicts of commitment.
 4. **Tools to evaluate risk:** Through JCORE, the U.S. government collected best practices in risk assessment and mitigation from the research community, from other agencies, and from the intelligence community. Internally, NSF has used an Enterprise Risk Management framework to identify and mitigate risks.
 5. **Expand ethics training:** NSF has reviewed its internal training modules to adapt them for potential external use.
 6. **Reaffirm the principles of NSDD-189:** NSF continues to support openness and transparency in fundamental research. In 2018, in its Statement on Security and Science (NSB-2018-42), the National Science Board "strongly reaffirm(ed) the principle behind President Reagan's National Security Decision Directive 189 (NSDD-189)."
 7. **Communicate the problem and the importance of foreign researchers and collaborations:** NSF agreed with the JASON Advisory Group on the need for an evidence-based description of the scale and scope of the problems, though as many potential conflicts are not disclosed, understanding the full scale and scope is a great challenge. NSF has and will continue to communicate to other government agencies that international collaboration and participation are essential to our continued scientific advancement.
 8. **Engage with foreign researchers in the United States:** NSF has engaged with the full community of researchers, both foreign and domestic, in the United States (see "Engagement with the Research Community" below).

¹² www.nsf.gov/news/special_reports/jasonsecurity/JSR-19-2IFundamentalResearchSecurity_12062019FINAL.pdf

¹³ https://nsf.gov/news/special_reports/jasonsecurity/NSF_response_JASON.pdf

- 9. Plan for maintaining competitiveness for top talent globally:** NSF's specialized focus on STEM education, with a more than \$900 million budget, has programs that concentrate on maintaining the excellence of the U.S. STEM educational system.
- **Leadership in the U.S. government:** As co-chair of the JCORE subcommittee on research protection, NSF coordinated policy, practices, and guidance on science and security with the White House, other science agencies, and the intelligence and law enforcement communities. JCORE developed education and outreach materials – including a slide deck released in June 2020 called *Enhancing the Security and Integrity of America's Research Enterprise* – that highlight examples of risks to research and outline actions the Federal government is taking to protect America's research enterprise.
 - **Engagement with Congress:** In November 2019, the Head of NSF's Office of International Science and Engineering, testified before the Permanent Subcommittee on Investigations of the Senate Committee on Homeland Security and Governmental Affairs. The briefing focused on NSF's efforts to implement all reasonable and necessary steps to ensure the integrity of federally-funded research and protect against threats from foreign government talent recruitment programs. In March 2020, a similar briefing was provided to the House Committee on Science, Space, and Technology.
 - **Engagement with the research community:** To increase awareness of the risks and compliance with NSF's policies and procedures, NSF met with or presented to the research community, including to the National Science Board, Association of American Universities, Association of Public and Land-grant Universities, American Association of the Advancement of Science Board of Directors, Council on Government Relations, NSF Advisory Committees, American Physics Society, International Union of Pure and Applied Physics, American Society for Engineering Education, Federal Demonstration Partnership, and National Academies of Science, Engineering, and Medicine's Committee on Science, Engineering, Medicine, and Public Policy. NSF's outreach included an articulation of the clarified requirements for both the biographical sketch and current and pending support sections of the proposal. This outreach helped NSF to develop, issue, and update a set of Frequently Asked Questions to help ensure a consistent understanding on NSF expectations.
 - **Engagement with the Office of Inspector General:** In 2020, NSF worked collaboratively with the OIG, where appropriate, to address threats posed by foreign government talent recruitment programs. In 2020, consistent with our OIG Cooperation Directive, NSF continued to support the OIG's investigations, including those involving allegations related to foreign talent programs. Our support includes taking appropriate actions such as suspending or terminating awards, based on OIG recommendations arising from, for example, investigations for failures to disclose foreign talent program affiliations.
 - **Risk-benefit assessments:** Consistent with OSTP's guidance to utilize a risk-based approach to balance the need to foster an open and internationally collaborative environment while mitigating threats to the integrity of that enterprise, NSF worked with experts in Enterprise Risk Management to conduct risk assessments and analyses to guide decision-making. This includes assessing and refining NSF's controls to mitigate threats posed by foreign government talent recruitment programs. NSF also developed and implemented a formal process to assess requests for collaborative agreements with foreign entities that may involve items of value provided to or from NSF-funded major research facilities.
 - **Creation of the position of Chief of Research Security Strategy and Policy:** In March 2020, NSF created and filled the position of Chief of Research Security Strategy and Policy (CRSSP) and established a Research Security Strategy and Policy Group. The CRSSP is the NSF focal point for providing science and security strategy and policy recommendations to NSF leadership and for ensuring that NSF has the information that it needs to act vigilantly to address existing and emerging risks to the Nation's science and engineering enterprise posed by foreign government talent recruitment programs.

NSF's Anticipated Action Plan Milestones

NSF management developed the anticipated milestones below in consideration of NSF's strategic and operational objectives, the risks inherent to achieving these objectives, and the key actions NSF has already taken in response to those risks.

- Continue to serve as co-chair of the JCORE subcommittees on research security and reducing administrative workload and work closely with the White House, other federal science funding agencies, and intelligence and law enforcement communities to share information, promote outreach, coordinate policy and practices, and develop guidance for federal departments and agencies, as well as for universities and other research institutions.
- Facilitate NSF's access to classified information and ability to engage in classified discussions with other U.S. government agencies more easily, including through the addition of a Sensitive Compartmented Information Facility (SCIF) in NSF's headquarters.
- Evaluate recommendations and consider implementing additional policy steps or outreach related to research security at both the agency level and the JCORE level. Additional activities could include, but are not limited to:
 1. **Scope of disclosure:** Require the use of an NSF-approved format for biographical sketches and current and pending support in proposals submitted or due on or after October 5, 2020.
 2. **Failures to disclose:** Continue to coordinate with the NSF OIG and take the appropriate action needed to address violations.
 3. **Responsibilities of all stakeholders and harmonization:** Harmonize requirements and systems with other U.S. science funding agencies, when practical; co-chair the JCORE subcommittee on coordinating administrative requirements for research.
 4. **Tools to evaluate risk:** Continue to use the Enterprise Risk Management framework to describe science and security risks and implement risk mitigation strategies; initiate the development of risk assessment tools; and carry out regular risk assessments regarding the impacts of NSF's response to the threats posed by foreign government talent recruitment programs. Develop an approach to promulgate best practices in the research community.
 5. **Expand ethics training:** Prepare and distribute communication and briefing material for the external scientific research community on science and security and research integrity.
 6. **Reaffirm the principles of NSDD-189:** Work with other U.S. government agencies to further reaffirm the National Policy on the Transfer of Scientific, Technical and Engineering Information (aka NSDD-189) and maintain the distinction between research that should continue to be made open to the scientific community and research that should be protected due to security concerns.
 7. **Communicate the problem and the importance of foreign researchers and collaborations:** Support efforts of JCORE, the intelligence community, and/or law enforcement to understand the scale and scope of the risk of inappropriate foreign influence on the U.S. science and engineering research ecosystem, recognizing that this is a great challenge.
 8. **Engage with foreign researchers in the United States:** Further engage with the full community of researchers, both foreign and domestic.
 9. **Plan for maintaining competitiveness for top talent globally:** Continue to support programs that will increase the pool of top science and engineering talent available in the United States.