UNITED STATES
NATIONAL
SCIENCE
FOUNDATION

# FY 2017 AGENCY FINANCIAL REPORT

**About the Cover:**
This cover shows two of the winning images from The Vizzies Visualization Challenge. The images are (top): a photograph of microscopic crystals found in a sea urchin's tooth, and (bottom) an image showing the connectivity of a cognitive computer based on the macaque brain.

Image credits: Pupa U. P. A. Gilbert and Christopher E. Killian, University of Wisconsin, Madison (top); Emmett McQuinn, Theodore M. Wong, Pallab Datta, Myron D. Flickner, Raghavendra Singh, Steven K. Esser, Rathinakumar Appuswamy, William P. Risk, and Dharmendra S. Modha (bottom)

For more information see: www.nsf.gov/news/special_reports/scivis/

# THE NSF STATUTORY MISSION

To promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense; and for other purposes.

*—From The National Science Foundation Act of 1950 (P.L. 81-507)*


# THE NSF VISION

A Nation that creates and exploits new concepts in science and engineering and provides global leadership in research and education.

*—From "Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018"*

# About This Report

For fiscal year (FY) 2017, the National Science Foundation (NSF) is producing three reports to provide financial management and program performance information to demonstrate accountability to our stakeholders and the American public. These reports are produced in accordance with the Office of Management and Budget (OMB) Circular A-136, *Financial Reporting Requirements*, and meet the requirements of the CFO Act, as amended by the Government Management Reform Act of 1994 (GMRA), the Federal Managers' Financial Integrity Act of 1982 (FMFIA), the Reports Consolidation Act of 2000, and the Government Performance and Results Modernization Act of 2010. All three reports are available on NSF's website as they are completed.[1]

- This report, the ***Agency Financial Report*** (AFR), focuses on financial management and accountability. It includes the results of NSF's annual financial statement audit, management's assurance statement, the NSF Inspector General's (IG) memorandum on the agency's FY 2018 management challenges, as well as management's report on the progress made on the management challenges identified by the IG for FY 2017.
- The ***Annual Performance Report*** (APR) provides information on the progress NSF has made toward achieving its goals and objectives as described in the agency's strategic plan and Annual Performance Plan, including the strategic objectives, performance goals, and Agency Priority Goals. The ***APR*** will be included in NSF's *FY 2019 Budget Request to Congress* in February 2018.
- NSF's ***Performance and Financial Highlights*** report summarizes key financial and performance information from the ***AFR*** and ***APR.*** This will be available on NSF's website when the *FY 2019 Budget Request to Congress* is published in February 2018.

For copies of these reports, please send a request to accountability@nsf.gov. We welcome your suggestions on how we can make these reports more informative.

| NSF by the Numbers | |
|---|---|
| **$7.5 billion** | FY 2017 Appropriations (does not include mandatory accounts) |
| **1,800** | Colleges, universities, and other institutions receiving NSF funding in FY 2017 |
| **49,400** | Proposals evaluated in FY 2017 through a competitive merit review process |
| **11,500** | Competitive awards funded in FY 2017 |
| **203,400** | Proposal reviews conducted in FY 2017 |
| **353,000** | Estimated number of people NSF supported directly in FY 2017 (researchers, postdoctoral fellows, trainees, teachers, and students) |
| **55,700** | Students supported by NSF Graduate Research Fellowships since 1952 |

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

# NATIONAL SCIENCE FOUNDATION

## FY 2017 Agency Financial Report

# A MESSAGE FROM THE DIRECTOR

The National Science Foundation (NSF) is pleased to present its *Agency Financial Report* for Fiscal Year (FY) 2017. The past year has been exciting at NSF, a time during which we have watched our investments produce remarkable results. Notably, the NSF-supported Laser Interferometer Gravitational-Wave Observatory (LIGO), in coordination with its European Virgo partners and some 70 ground- and space-based telescopes, made the first direct detection of gravitational waves from the collision of two neutron stars. Researchers are only beginning to understand the scope of this discovery's implications.

LIGO offers the possibility of many more groundbreaking discoveries to come, and its NSF-supported leaders have already received one of the highest plaudits in science: the Nobel Prize in Physics. These laureates understand the importance of large-scale, collaborative research, noting to the Nobel Committee that LIGO was a group effort – thousands of researchers analyzed the data that made its findings possible. Bold and visionary from its inception, LIGO is a stunning example of how vital NSF investments are toward the advancement of progress in science and engineering.

The Nobel Committee also, for the first time since 2003, recognized NSF-supported researchers in all four science-related categories – Physics, Chemistry, Physiology or Medicine, and Economics. In total, the Nobel Committee has named more than 230 NSF-supported researchers as laureates since 1951, including eight in 2017. Like the Nobel Prize-winning LIGO researchers, NSF provided these laureates with support long before their work carried the promise of guaranteed rewards; NSF gave them opportunities and resources to perform research that was later recognized as revolutionary. In FY 2017, NSF directly supported about 353,000 researchers, graduate and undergraduate students, postdoctoral fellows, trainees, and K-12 teachers and students. The potential for those NSF-backed researchers to produce work that will transform industries, enhance entire fields of research, and receive recognition including the Nobel Prize is impossible to overstate.

NSF's mission is to promote the progress of science; to advance the national health, prosperity and welfare; and to secure the national defense. For nearly seven decades, NSF has invested in scientific and engineering research and education that drives the nation's economy, strengthens national security, enhances the well-being of millions of Americans, and positions the nation as a global leader in discovery and innovation.

As the only agency with a research portfolio that spans the full spectrum of science and engineering disciplines, NSF helps cultivate the U.S. role as a worldwide leader in the scientific enterprise. To this end, NSF continues to pursue a set of Big Ideas – bold, long-term research agendas that represent new frontiers for guiding the agency's investments. The Big Ideas provide innovative approaches for solving today's major research challenges, including innovating at the human-technology frontier; harnessing large data sets; and developing new quantum-inspired technologies for sensing, computing, modeling, and communicating. Underlying these ideas is convergence, the blending of scientific disciplines, necessary to foster deep connections among scientific fields and innovative partnerships across industry, academia, and government.

Today, outcomes from basic research across multiple scientific disciplines are transforming entire industries, from transportation and computing to manufacturing and agriculture. In January 2017, I presented the keynote address at the Washington Auto Show. The exciting future of self-driving cars has benefitted from NSF-funded research in areas such as sensing, real-time data analytics, computer vision, and system verification technologies. NSF investments enable researchers across various disciplines to investigate methods for ensuring sustainable supplies of food, energy and water, and identifying novel ways to protect the ecosystems that are essential for humankind. NSF serves as a major player in the rapidly growing field of nanotechnology, helping transform U.S. industry through advances in manufacturing, electronics, medical instrumentation, and materials science. NSF investments in some of the world's most powerful and sophisticated telescopes allow scientists to peer into space to detect gravitational waves, survey distant galaxies, detect cosmic particles, and monitor the sun's magnetic field and solar flares.

This past year, researchers supported by NSF continued a long history of working to understand, prepare for, and respond to extreme events such as tornados, floods, earthquakes, and landslides. In the wake of the 2017 hurricane season, NSF called for proposals related to rapid-response research on natural disasters. NSF research has led to the deployment of underwater rescue robots for safeguarding emergency workers, the development of real-time flood-potential models, and the investigation of long-term psychological impacts resulting from natural disasters. In addition, NSF-supported researchers are working to address another major challenge facing modern society: the need for computing and communication systems that can resist cyberattacks and other vulnerabilities while preserving privacy and trust. Over the years, NSF has funded cutting-edge social and technical research in cybersecurity, such as research that strengthens cryptography, limits vulnerabilities in software, builds tools to help individuals and business work safely online, and helps educate and train a cybersecurity workforce.

People are the backbone of the nation's science and engineering enterprise, and NSF is a leader in the preparation of the future science, technology, engineering, and mathematics (STEM) workforce. Researchers and educators in STEM disciplines, along with a well-informed public, are key to that future. To sustain U.S. STEM leadership and excellence and to meet the high-technology workforce needs of today and tomorrow, NSF invests in the development of STEM talent. NSF INCLUDES, one of our Big Ideas, is part of an integrated, national initiative to develop STEM talent from all sectors and groups in society by increasing STEM participation of underrepresented groups in K-12, undergraduate, and graduate students.

In FY 2017, NSF funded fundamental research and education across all fields of science and engineering, reaching all 50 states, the District of Columbia and three U.S. territories through grants to 1,800 colleges, universities and other institutions. NSF evaluated 49,400 proposals requesting funding through our highly-acclaimed merit review process, and while thousands more were fundable, the Foundation made about 11,500 new awards.

If you would like more information on NSF's performance management process and the complete results of our FY 2017 annual goals under the Government Performance and Results (GPRA) Modernization Act of 2010, I invite you to read NSF's *Annual Performance Report*, which will be released with NSF's *FY 2019 Budget Request to Congress*. In keeping with government-wide requirements, NSF's GPRA data are subject to a rigorous verification and validation review by an independent, external management consultant, based on guidance from the U.S. Government Accountability Office.

With the publication of the FY 2017 Agency Financial Report, I am pleased to report that NSF received its 20th consecutive unmodified opinion from an independent audit of its financial statements. The Independent Auditors' Report identified no material weaknesses or significant deficiencies. In addition, NSF provides reasonable assurance that the agency is in compliance with the Federal Managers' Financial Integrity Act, and that internal control over financial reporting is operating effectively to produce reliable financial reporting.

As stewards of American taxpayer dollars, our goal is to build and sustain public trust through transparency and accountability. We remain committed to ensuring NSF funds are used effectively so we may continue as a champion of U.S. basic research and spark the creativity of the men and women performing research. Their curiosity, inventiveness, and bold ideas will shape the future.

Thank you for your interest in the National Science Foundation, where discoveries and discoverers begin.

/s/
**France A. Córdova**

November 14, 2017

Chapter 1

# MANAGEMENT'S DISCUSSION AND ANALYSIS

# Agency Overview

## Mission and Vision

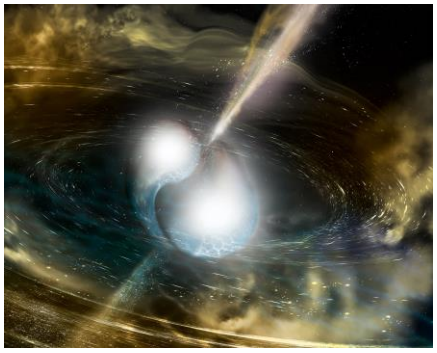
The National Science Foundation (NSF) was established in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…"[1] As the only federal agency responsible for the support of research and education across the full spectrum of science, technology, engineering, and mathematics (STEM) disciplines, this mission continues to guide the agency today. NSF's programs and initiatives play an important role in establishing U.S. leadership in science and engineering fields, foster innovations that drive the economy, strengthen national security, and enhance the well-being of millions of Americans; thereby shaping the nation as a world leader in science and technology.

For over 67 years, NSF has funded discoveries that have been critical to developing new ways of thinking about scientific, economic, and sociotechnical challenges facing the nation and the world. These discoveries have led to innovations such as the Internet, bar codes found on nearly all products, smartphones, magnetic resonance imaging technology, Global Positioning Systems, and improvements in laser microsurgery, such as LASIK eye surgery. NSF supports the basic research that sets the stage for transformative breakthroughs. NSF participation in the multi-agency Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative supports scientists as they investigate new tools that further our understanding of the brain's structure, activity, and function that lay the groundwork for advancing treatments for nervous system disorders or traumatic brain injury. With NSF funding, researchers have developed a bionic eye that allows patients to perceive light, navigate surroundings, and sense movement; their discoveries have led to semiautonomous cars through advances in sensing, real-time data analytics, computer vision, controllers and actuators, and system verification technologies; and at NSF's National Radio Astronomy Observatory, astronomers measured the magnetic field of a galaxy nearly 5 billion light-years away to better understand the formation of galaxies. Other NSF-funded researchers have helped develop more profitable agricultural practices and technologies that have led to higher yield, drought-resistant, and disease-resistant crops that need less water and fertilizer.

**LIGO has done it again!** For a fourth time, the NSF Laser Interferometer Gravitational-Wave Observatory (LIGO) in Livingston, Louisiana, and Hanford, Washington, has detected gravitational waves—ripples in space-time—from the collision of two neutron stars. The most recent detection, by both LIGO and Virgo (the European detector near Pisa, Italy), was the first observation of gravitational waves by three different detectors and marks a new era of greater insights and improved localization of cosmic events now available through globally networked gravitational-wave observatories.

The three scientists who were seminal in the development of LIGO won the 2017 Nobel Prize in Physics for their work detecting gravitational waves—ripples in space-time created by the motion of massive objects in the universe.

NSF initiated funding for what eventually became the LIGO project 40 years ago; and its continued commitment to LIGO's high-risk, high-reward research has launched a new field of gravitational astronomy that is transforming our understanding of the universe.



Artist's illustration of two merging neutron stars. The narrow beams represent the gamma-ray burst while the rippling space-time grid indicates the isotropic gravitational waves that characterize the merger. Swirling clouds of material ejected from the merging stars are a possible source of the light that was seen at lower energies. *Credit: NSF/LIGO/Sonoma State University/A. Simonnet*.

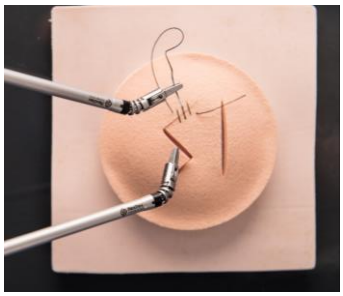
[1] National Science Foundation Act of 1950 (Public Law [P.L.] 81–507).

In fiscal year (FY) 2017, NSF continued investments in research facilities and centers that foster collaboration and provide sophisticated platforms for conducting cutting-edge research. This past year marked the 60-year anniversary of the establishment of NSF's Amundsen-Scott South Pole Station. Among the research projects done at this unique setting, scientists search for clues as to how the universe formed and observe space weather events, which can damage electrical grids, disrupt radio signals, and affect the electronic devices we depend on in our daily lives. Scientists at the NSF-funded Engineering Research Center for Innovative and Strategic Transformation of Alkane Resources (CISTAR) are developing technologies for responsible conversion of light hydrocarbons from shale gas into fuels and chemicals using a network of portable, modular processing plants. Not all investments in scientific endeavors lead to an immediate, clear outcome; but, as we have seen recently, long-term commitment to basic research can lead to remarkable discoveries. During 2017, the Laser Interferometer Gravitational-Wave Observatory (LIGO) continued to detect ripples in space-time, or gravitational waves. LIGO was possible only with decades of NSF support that strategically committed to a high-risk, potentially transformational project. The discovery is opening up new ways to observe and understand our universe. The 2017 Nobel Prize in Physics was awarded to the three scientists who were the architects and leaders of LIGO.

**Low-cost mechanical device for minimally invasive surgery.** Thanks to researchers and small business entrepreneurs funded by NSF, surgeons can now use a new type of mechanical instrument to perform complex, minimally invasive procedures, also known as laparoscopic surgery.

This handheld instrument provides the same sorts of benefits as robot-assisted surgery, such as greater precision and functionality, but at a lower cost compared to existing robotic surgical systems. The technology even offers a higher degree of dexterity and intuitive control than traditional laparoscopic instruments, which require significant training and can be difficult and tiresome to use—leading to longer surgeries and higher costs.

This innovation could result in less trauma and shorter recovery times after surgery. The simplicity and affordability of this device has great potential in underfunded medical centers in the U.S. and around the world.



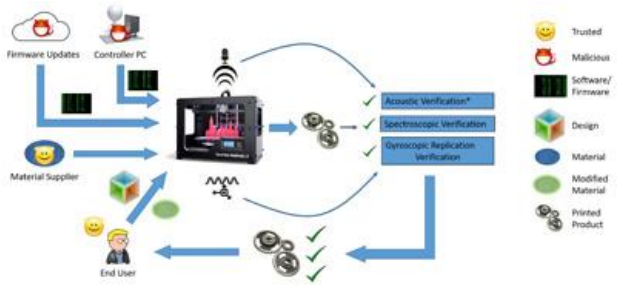
This innovation could provide surgeons with access to a robot-like laparoscopic instrument resulting in less painful recovery. *Credit: FlexDex Surgical*.

NSF's sustained investment in basic research results in a steady pipeline of new ideas and techniques that, together with a highly trained STEM workforce, fosters a world-class research enterprise. For nearly seven decades, NSF has funded the development of STEM talent—from pre-kindergarten through postdoctoral study—preparing and inspiring a culturally diverse and globally competitive workforce of scientists, engineers, and other citizens. Another aspect of this is support for graduate fellowships. For example, NSF has funded over 55,700 Graduate Research Fellows since 1952. Over the years, NSF fellows have made groundbreaking and important discoveries in science and engineering research. Many of them have become leaders in their chosen careers—over 450 have become members of the National Academies of Sciences or Engineering, and 39 fellows have been honored as Nobel laureates. Additionally, NSF has funded the research of 231 people who have gone on to win the Nobel Prize. These investments are an important means by which NSF identifies, nurtures, and invests in scientific potential.

NSF's vision is of a nation that creates and exploits new concepts in science and engineering and provides global leadership in advancing research and education. NSF's core values articulate the essential qualities that staff are encouraged to embody in support of the agency's mission. Among these core values are a dedication to scientific excellence, organizational excellence, learning, inclusiveness, and accountability. NSF strives to excel as a federal agency by investing in priorities that address important national challenges

while promoting economic growth, innovation, and new scientific advancements. NSF's Strategic Plan for 2014–2018, *Investing in Science, Engineering, and Education for the Nation's Future*,[2] identifies three interrelated strategic goals to achieving the agency's mission: (1) transform the frontiers of science and engineering, (2) stimulate innovation and address societal needs through research and education, and (3) excel as a federal science agency. These strategic goals are a roadmap for NSF's success.

Public investment in high-risk, foundational research is key to staying on the cutting-edge of science and technology. Government plays a key role in providing sustained, long-term investments that private industry alone is unable to sustain. NSF supports 27 percent of all federally sponsored basic scientific research conducted by America's colleges and universities; this share increases to 60 percent when medical research supported by the National Institutes of Health is excluded.[3] NSF support of interdisciplinary, high-risk, and potentially transformative research promotes scientific progress and advances scientific frontiers. NSF awards reflect national priorities, keep U.S. researchers and research institutions at the forefront of innovation, and distinguish the United States as a leader in the rapidly changing global landscape of scientific research and discovery. Its research pushes the boundaries of innovation and productivity, sometimes leading to new fields of scientific inquiry and new theoretical paradigms. Increasingly, NSF awards are made where scientific disciplines converge, which reflects the blending of scientific disciplines and engagement of creative partnerships to address complex problems.




Rutgers University-New Brunswick and Georgia Tech engineers have devised three ways to combat cyberattacks on 3-D printers: monitoring printer motion and sounds and using tiny gold nanoparticles. *Credit: Christian Bayens, Georgia Institute of Technology*.

**Defeating cyberattacks on 3-D printers.** The innovative use of 3-D printers to manufacture objects and parts is increasing in critical fields such as health care, robotics, transportation, aviation, and space. But there is growing concern that cyberattacks on 3-D printers may threaten our health and safety. Instead of spending up to $100,000 or more to buy a 3-D printer, many companies and organizations send software-designed products to outside facilities for printing, where it is possible to hack into a computer's firmware and print defective objects. While the defects are undetectable on the outside, the objects may have holes or fractures inside them.

NSF-funded researchers are developing novel methods to combat future cybersecurity threats to this exciting new technology, staying a step ahead of abuse and sabotage before it can occur.

Today, the economy is stronger, and our knowledge is greater because of NSF-funded basic research. NSF investment in research that enables discovery represents the fulfillment of the Foundation's mission and its commitment to advance the frontiers of science and engineering. This commitment ensures sustained vigor of fundamental research and leverages the nation's innovation ecosystem to maintain global leadership in the 21st century.

[2] NSF's 2014–2018 Strategic Plan: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf14043.
[3] National Center for Science and Engineering Statistics Survey of Federal Funds for Research and Development Fiscal Years 2015–2017. https://ncsesdata.nsf.gov/fedfunds/2015/.

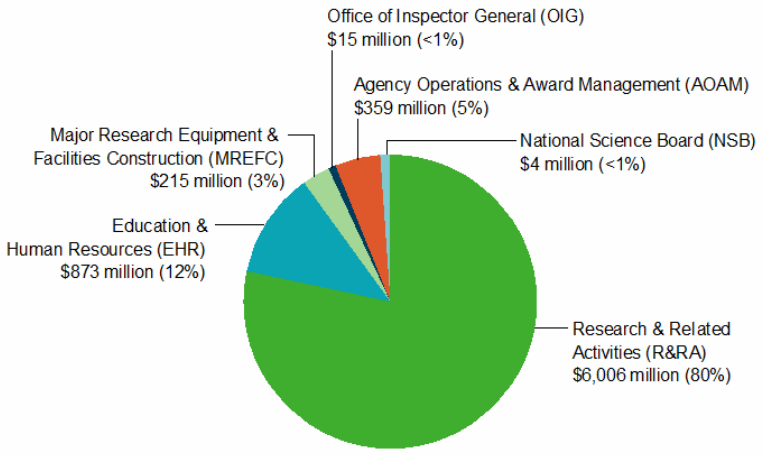
## NSF by the Numbers

NSF is funded primarily through congressional appropriations to six accounts: Research and Related Activities (R&RA), Education and Human Resources (EHR), Major Research Equipment and Facilities Construction (MREFC), Agency Operations and Award Management (AOAM), National Science Board (NSB), and Office of Inspector General (OIG). Appropriations in these six accounts in FY 2017 totaled $7,472 million,[4] an increase of $9 million over the FY 2016 appropriations level of $7,463 million. R&RA, EHR, and MREFC appropriations fund the agency's programmatic activities and accounted for 95 percent of NSF's total appropriations in FY 2017. Figure 1.1 provides details on NSF's FY 2017 appropriations.

Figure 1.1

**NSF Budget Structure**

FY 2017 Appropriations by Account—$7,472 million




Note: MREFC includes $6 million transferred from R&RA to fund NEON construction. AOAM includes $29 million in transfers for NSF headquarters relocation expenses. Transfers to AOAM: $22 million from R&RA, and $7 million from EHR. These transfers were authorized by P.L. 115-31, Consolidated Appropriations Act, 2017.
Totals may not add due to rounding.

- R&RA, which supports basic research and education activities in science and engineering, including high-risk and transformative research, accounted for 80 percent of FY 2017 funding. The FY 2017 R&RA funding level of $6,006 million was $16 million higher than the FY 2016 appropriation of $5,990 million.
- EHR, which supports activities that ensure a diverse, competitive, and globally engaged U.S. STEM workforce and a scientifically literate citizenry is NSF's second largest appropriation, accounting for about 12 percent of the agency's budget. EHR's FY 2017 funding level of $873 million was $6 million, or less than 1 percent, below the FY 2016 EHR appropriation of $879 million.
- The MREFC appropriation supports the construction of unique national research platforms and major research equipment that enable cutting-edge research. This account was 3 percent of the agency's total appropriations in FY 2017. The FY 2017 MREFC funding level of $215 million decreased $3 million, or 1 percent, from the prior-year appropriation of $218 million. The MREFC funding level reflects the transfer of $6 million in R&RA funds to provide additional support for the National Ecological Observatory Network (NEON) construction project.

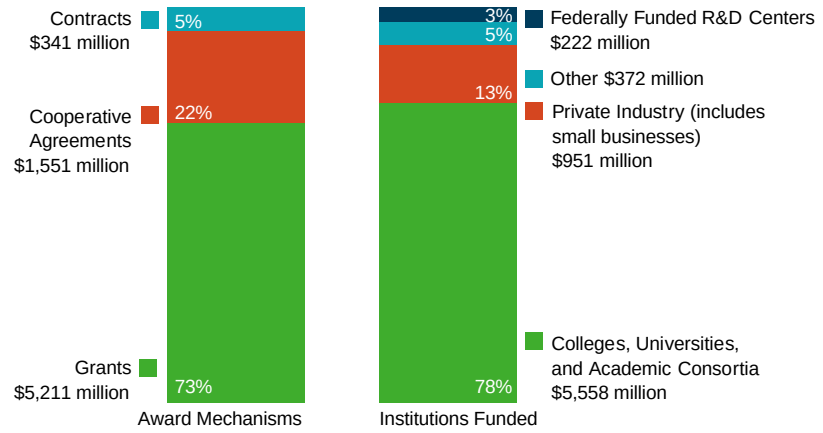
[4] Amount shown is NSF's FY 2017 discretionary appropriations. This amount does not include Donations and H-1B Nonimmigrant Petitioner Receipts. These amounts are included in NSF's appropriations shown in the Statement of Budgetary Resources (SBR). The SBR is on page Financials-17 of this AFR.

- FY 2017 AOAM funding of $359 million supported NSF's administrative and management activities. AOAM was approximately 5 percent of NSF's total FY 2017 appropriations. AOAM increased $2 million, or less than 1 percent, from the FY 2016 level of $357 million. The FY 2017 funding includes $29 million transferred from the R&RA and EHR accounts to support the relocation of NSF's headquarters to Alexandria, Virginia.
- Separate appropriations support the activities of the OIG and the NSB; each accounted for less than 1 percent of NSF's total FY 2017 appropriations. The FY 2017 OIG appropriation of $15.20 million increased $40,000 over the prior-year appropriation of $15.16 million. The NSB received an appropriation of $4.37 million in FY 2017, equal to the previous year's funding level.
- Nearly 34,000 members of the science and engineering community participated in the merit review process as panelists and proposal reviewers.[5] Awards were made to 1,798 institutions in all 50 states, the District of Columbia, and 3 U.S. territories. These institutions employ America's leading scientists, engineers, and educators; and they train the leading innovators of tomorrow. In FY 2017, about 353,000 people were directly involved in NSF programs and activities, receiving salaries, stipends, participant support, and other types of direct involvement. Beyond these figures, NSF programs indirectly impact millions of people, reaching K-12 students and teachers, the general public, and researchers through activities including workshops; informal science activities such as museums, television, videos, and journals; outreach efforts; and dissemination of innovative instructional resources and teaching methods.

Figure 1.2

**NSF Award Mechanisms and Institutions Funded**

FY 2017 Obligations for Research and Education Programs ($7,103 million)




Notes: NSF Research and Education Programs include—Research & Related Activities, Education & Human Resources, and Major Research Equipment & Facilities Construction appropriations.

Other institutions funded include federal, state, and local governments; nonprofit organizations; and international organizations.

R&D = Research and Development.

Totals may not add due to rounding.

During FY 2017, NSF evaluated over 49,400 proposals through a competitive merit review process and made over 11,450 new competitive awards, mostly to academic institutions. In addition to these proposals, GRFP reviews approximately 12,500 applications for fellowships annually. As shown in Figure 1.2, 78 percent of support for research and education programs ($5,558 million) was to colleges, universities, and academic consortia. Private industry, including small businesses, accounted for 13 percent ($951 million), and support to Federally Funded Research and Development Centers accounted for 3 percent ($222 million). Other recipients ($372 million) included federal, state, and local governments; nonprofit organizations; and international organizations. A small number of awards fund international

[5] For more information about NSF's merit review process, see https://www.nsf.gov/bfa/dias/policy/merit_review/ and *Report to the National Science Board on the National Science Foundation's Merit Review Process, FY 2016* (NSB-2017-26) at https://www.nsf.gov/nsb/publications/2017/nsb201726.pdf.

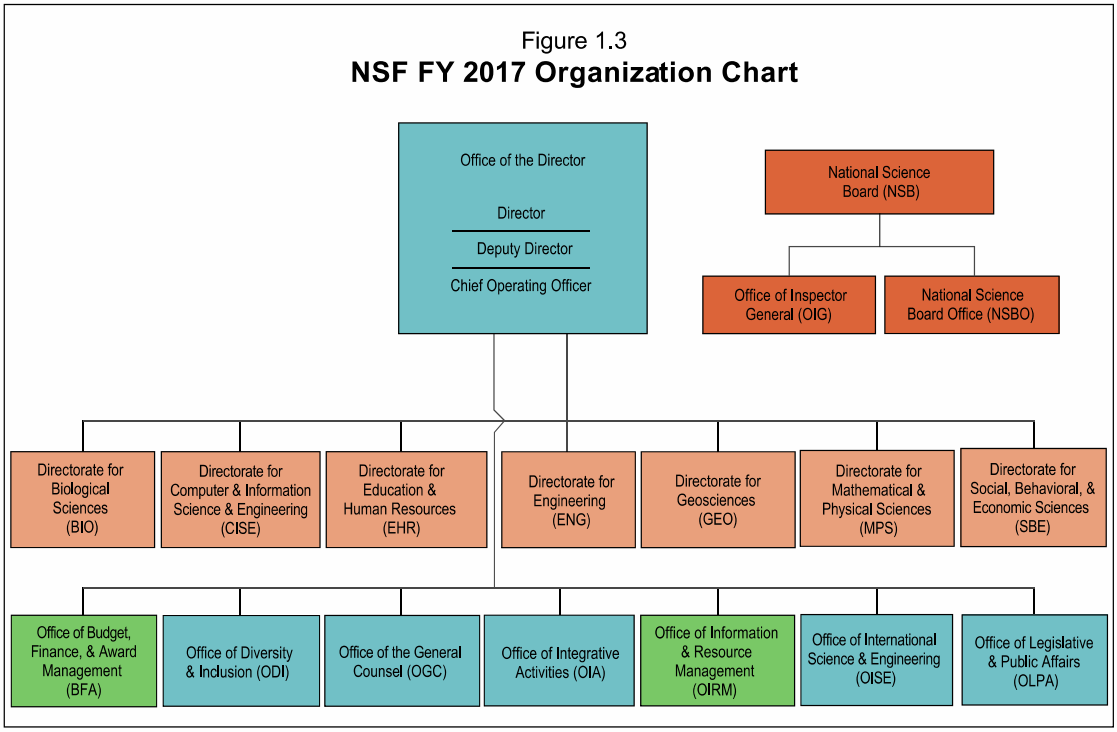
science and engineering research, education, and partnerships, which add value to the U.S. scientific enterprise and maintain U.S. leadership in the global scientific enterprise.

As shown in Figure 1.2, NSF's award funding was primarily for financial assistance through the use of grants and cooperative agreements. Grants can be funded either as standard awards, in which funding for the full duration of the project is provided in a single fiscal year, or as continuing awards, in which funding for a multiyear project is provided in increments. Cooperative agreements are used when the project requires substantial agency involvement during the project performance period (e.g., research centers, multi-use facilities). Contracts (procurement instruments) are used to acquire products, services, and studies (e.g., program evaluations) required for NSF or other government use.

## Organizational Structure

Figure 1.3 shows the organization chart for NSF. NSF is an independent federal agency headed by a Director who is appointed by the President and confirmed by the U.S. Senate.[6]

Figure 1.3
**NSF FY 2017 Organization Chart**




The NSF Director and the 24-member NSB jointly pursue the goals and function of NSF, including the duty to "recommend and encourage the pursuit of national policies for the promotion of research and education in science and engineering."[7] The NSB identifies issues critical to NSF's future and helps chart the strategic direction of NSF's budget and programs. The Board also serves as an independent body of advisors to both the President and the Congress on policy matters related to STEM research and education. NSB members are appointed by the President and are prominent contributors to the STEM research and

[6] The Director's biography is available at https://www.nsf.gov/news/speeches/cordova/cordova_bio.jsp/
[7] 42 U.S. Code 1862(d): https://www.law.cornell.edu/uscode/text/42/1862.

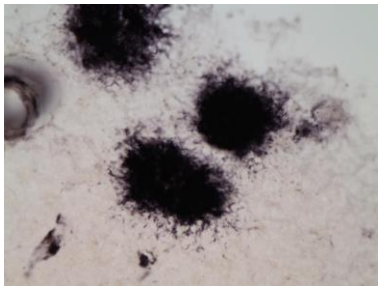
education community.[8] NSF's Director is a member *ex officio* of the Board. The Director and the other NSB members serve 6-year terms.

The NSF workforce includes 1,430 federal employees.[9] NSF also regularly recruits scientists, engineers, and educators through the Intergovernmental Personnel Act (IPA) who work at NSF for up to 4 years.[10] These "rotators" bring fresh perspectives from across the country and across all fields of science supported by the Foundation, helping explore new directions for research in science, engineering, and education, including emerging interdisciplinary fields. On returning to their home institutions and across academia, rotators bring knowledge of NSF programming and leading research from a national perspective. As shown in Figure 1.3, NSF's organizational structure aligns with the major fields of science and engineering.[11]

Near the end of FY 2017, the agency's headquarters relocated to Alexandria, Virginia. NSF maintains offices in Brussels, Belgium; Tokyo, Japan; and Beijing, China, to facilitate its international activities and an office in Christchurch, New Zealand, to support the U.S. Antarctic Program (USAP).

**New research detects Alzheimer's disease markers in nonhuman primates.** Proteins associated with Alzheimer's disease—believed to be unique to humans—have been discovered in a sample of brains of aged chimpanzees. It has been suggested that humans are uniquely susceptible to Alzheimer's, potentially because of genetic differences from other primates, changes to the human brain during evolution, and longer lifespans.

Understanding these differences can provide key insights into identifying the causes of Alzheimer's and working toward a cure. The identification in the aged chimpanzees of amyloid beta and tau lesions, hallmarks of Alzheimer's diagnosis, is a significant advance in understanding the brain and Alzheimer's.



Amyloid beta plaques in the brain of a 58-year-old female chimpanzee. *Credit: Mary Ann Raghanti, Kent State University*.

## Management Challenges

In October 2016, the OIG identified seven major management and performance challenges for the agency for FY 2017: (1) establishing accountability over large cooperative agreements, (2) management of NSF's business operations, (3) management of the IPA program, (4) moving NSF headquarters to a new building, (5) management of USAP, (6) improving grant administration, and (7) encouraging the ethical conduct of research.[12]

Management's report on the significant activities undertaken in FY 2017 to address the challenges is located in *Appendix 4B: Management Challenges —NSF's Response* of this AFR. The report also discusses activities planned for FY 2017 and beyond. Some of the agency's significant actions and planned next steps to address the challenges are highlighted below.

[8] A list of NSB members is available at https://www.nsf.gov/nsb/members/.
[9] Full-time equivalents (FTE) include the federal employee workforce for NSF, NSB, OIG, and U.S. Arctic Research Commission.
[10] As of September 30, 2017, temporary appointments included 174 under the IPA Mobility Program.
[11] NSF's organization chart is available at: https://www.nsf.gov/staff/organizational_chart.pdf.
[12] The Inspector General's memorandum on Management Challenges for NSF in FY 2017 is in NSF's *FY 2016 Agency Financial Report* Appendix 5A at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf17002.

### *Establishing Accountability over Large Cooperative Agreements*

NSF has been continuously enhancing its pre- and post-award oversight of major facilities in construction and operations since June 2014. These enhancements are documented in the latest revision of the Large Facilities Manual (LFM)[13] and internal agency guidance. Building on these improvements, NSF focused, in FY 2017, on implementation of the recommendations set forth in the December 2015 report by the National Academy of Public Administration (NAPA).[14] The NAPA report supported NSF's use of cooperative agreements, while also noting that NSF should "*apply equal emphasis to increased internal management of the business practices critical to the enhanced oversight and project success*" in order to bring them into balance with the science and technical aspects of oversight. Examples of actions taken by NSF in FY 2017 include revising the LFM (NSF 17-066) to align with the American Innovation and Competitiveness Act[15] requirements and other newly strengthened agency oversight requirements, naming the NSF Chief Operating Officer (COO) as the agency Senior Accountable Official for major facilities oversight, and implementing a process for conducting incurred cost audits and accounting system audits. To ensure that the agency has access to reliable Earned Value Management (EVM) data, NSF implemented formal procedures for EVM System (EVMS) verification, acceptance, and surveillance. NSF completed EVMS acceptance on the Daniel K. Inouye Solar Telescope and Large Synoptic Survey Telescope projects and completed verification review of the Regional Class Research Vessel project. Overall, NSF focused on ensuring that effective implementation of its new policies led to enhanced oversight of its major facilities while balancing administrative burden for NSF and its recipients. In FY 2017, NSF leveraged the expertise of its Advisory Committee on Business and Operations (BOAC) by (1) receiving and implementing a subcommittee's recommendations relating to the NAPA report, and (2) initiating a second subcommittee on cost surveillance to independently assess NSF's strengthened policies and procedures. To date, the agency has taken action to close nearly 62 of 65 (95 percent) of the OIG recommendations related to oversight of major facilities dating back to 2012.

Going forward, NSF plans to continue strengthening its oversight by (1) finalizing guidance around an annual major facilities portfolio risk assessment, (2) strengthening the role and composition of the MREFC Panel to include life-cycle oversight of facilities, (3) adopting and implementing new guidance in areas such as management reserve and Internal Management Plans, and (4) formalizing a lessons-learned program and NSF Communities of Practice.

### *Management of NSF's Business Operations*

- *Improper payments*—In May 2017, the NSF OIG issued a report on NSF's compliance with the improper payment requirements for FY 2016. The OIG concluded NSF complied with the requirements and had addressed all recommendations from the previous OIG report. This was the second consecutive report finding NSF in compliance with improper payment reporting requirements. The May 2017 OIG report had no recommendations and no resolution tracking requirements. The consecutive reports validate that NSF has taken the steps necessary to demonstrate compliance and effectiveness in the agency's implementation of improper payment requirements; thus NSF management does not consider improper payments to be a significant risk to NSF's mission, programs, or operations. NSF will conduct an improper payment risk assessment in FY 2018.
- *Information & IT resources*—NSF continued to operate a strong program employing effective tools and technology to continuously monitor its network availability and security posture, incorporating information gained and lessons learned from the agency's Federal Information Security Management

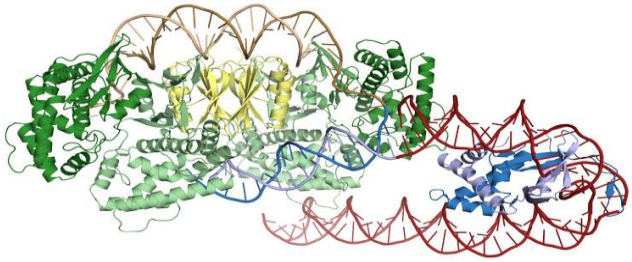
[13] Large Facilities Manual: https://www.nsf.gov/pubs/2017/nsf17066/nsf17066.pdf.
[14] *National Science Foundation: Use of Cooperative Agreements to Support Large Scale Investment in Research* https://www.napawash.org/academy-studies/search/eyJyZXN1bHRfcGFnZSI6ImFjYWRlbXktc3R1ZGllc1wvc2VhcmNoIiwieWVhciI6IjIwMTUifQ
[15] American Innovation and Competitiveness Act (P.L. 114–329): https://www.congress.gov/bill/114th-congress/senate-bill/3084/text.

Act of 2002 (FISMA) report. NSF ensured effective operations during the physical relocation of agency headquarters to a new building. The Foundation also completed a thorough review of USAP information technology (IT) security program controls, allocating appropriate resources to address FISMA findings.

- *DATA Act implementation*—NSF successfully certified and submitted the Digital Accountability and Transparency Act (DATA Act) files on April 28, 2017, and agency data were included in the U.S. Department of Treasury's May 2017 rollout of the beta version of USASpending.gov. NSF received the Secretary's Certificate of Appreciation from Treasury for outstanding commitment to collaboration. NSF will continue to collaborate agency-wide, government-wide, and with the OIG and audit community toward continued success in achieving the goals of the DATA Act.
- *Government records*—In November 2015, NSF submitted a corrective action plan to address a Government Accountability Office (GAO) report finding that agencies needed to take action to meet the requirements of the National Archives and Records Administration (NARA) directive related to reforming the policies and practices for the management of physical records and providing a framework for the management of electronic records. In FY 2017, NSF designed and executed a plan to manage its permanent records, including scanning over 7,000 permanent and temporary records to reduce the footprint of hardcopy files ahead of NSF's move to its new headquarters. Going forward, NSF will update its records management policy to comply with current NARA guidance and federal regulations while also preserving critical agency documentation for use by the Office of the General Counsel, OIG, and the scientific community.

### *Management of the IPA Program*

Through the IPA program, scientists, engineers, and educators rotate into the Foundation as temporary Program Directors, advisors, and leaders. They bring fresh perspectives that help explore new directions for research in science, engineering, and education, including emerging interdisciplinary fields. NSF's IPA Steering Committee was established in April 2016 to oversee the ongoing implementation of the program and champion the effective use of IPAs. In FY 2017, NSF took several actions to improve the effectiveness of the program, protect against conflict of interest, and reduce cost. For example, in March 2017, the agency issued a memorandum reminding IPAs and all staff of their ethical responsibilities. Also in FY 2017, NSF initiated a pilot requiring cost sharing by the IPA's home institution, published guidance limiting NSF payment of IPA independent research and development travel, and implemented a process for the NSF COO's review of IPA salary cases that exceed the Senior Executive Service cap. In June 2017, the NSF OIG issued an audit report concluding that NSF had "implemented internal controls to identify and mitigate IPA conflicts of interest." NSF will continue to strengthen the program through the implementation of additional controls and continued assessment of the pilot efforts.



A protein called IHF (blue) creates a sharp turn in the DNA (red helix) upstream of the CRISPR repeat (brown helix), allowing Cas1-Cas2 (green and yellow) to recognize and bind the insertion site. *Credit: Addison Wright image*.

**New technique enables safer gene-editing therapy using CRISPR.** NSF-funded researchers studying how a bacterium's immune system fights off viruses uncovered a powerful new gene-editing technique called CRISPR-Cas9. CRISPR-Cas9 acts like a pair of molecular-sized scissors that researchers can wield to snip a segment of DNA; for example, to edit a segment that codes for a particular trait in an organism.

Biomedical researchers are exploring CRISPR-Cas9's potential use for everything from treating genetic disorders and developing targeted cancer therapies to preventing vector-borne infectious diseases. The agricultural industry is also exploring whether CRISPR-Cas9 can help enhance crop production and livestock survival.

New findings were published on July 20, 2017, in *Science* that explain how proteins, responsible for the CRISPR immune system's ability to adapt to new viral infections, identify the site in the genome where they insert viral DNA so they can recognize it later and mount an attack.

### *Moving NSF Headquarters to a New Building*

NSF began occupying its new location in Alexandria, Virginia, in August 2017. In FY 2017, the relocation was routinely monitored by NSF leadership, and the NSF Relocation Office (NRO) led a multi-faceted outreach effort to prepare staff for the relocation. The move was successful—the construction and physical relocation were completed on time, and NSF procurements were under budget. By December 31, 2017, NSF will decommission its Arlington locations and will complete its relocation to Alexandria.

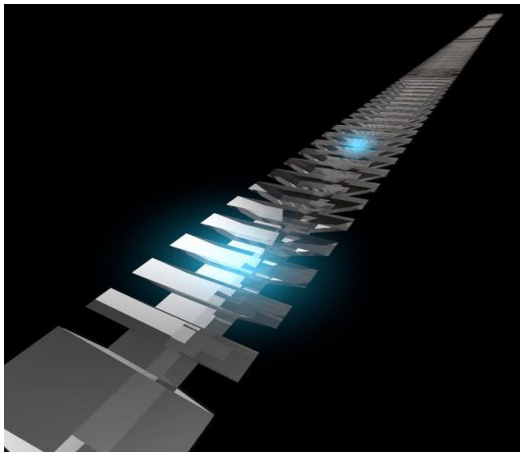
### *Management of the U.S. Antarctic Program*

NSF focused on ensuring a successful transition, from Lockheed Martin to Leidos as the Antarctic Support Contractor (ASC), by strengthening the agency's understanding of the strategic rationale for the transition and by monitoring Leidos' operations on legacy Lockheed Martin systems, including the Accounting System, Estimating System, Material Management and Accounting System, Purchasing System, and Property System. Also in FY 2017, NSF continued progress on implementing the 2012 Blue Ribbon Panel recommendations, including investing in lifecycle acquisitions and infrastructure upgrades for McMurdo Station through continued design efforts.[16] Other significant agency actions included (1) improving USAP participant guidance for Physical Qualification (PQ) exams, clarifying expectations relating to required tests and nonreimbursable costs; (2) continuing to apply invoice processing; and (3) requesting periodic, full listings of materials/items of less than $5,000 for review. NSF will continue to monitor the ongoing transfer of business systems from Lockheed Martin to Leidos, initiate and complete necessary solicitation efforts for individual Antarctic Infrastructure Modernization for Science (AIMS) project components, and continue to review and modify PQ requirements, including during the annual medical review panel meetings.

**First on-chip nanoscale optical quantum memory developed.** With NSF funding, researchers have built the first nanoscale optical quantum memory device that could one day be used to create more reliable and secure internet communications.

Quantum memory stores information in a similar fashion to the way traditional computer memory does, but on individual quantum particles—in this case, photons of light. This allows it to take advantage of the peculiar features of quantum mechanics to store data more efficiently and securely.

The use of individual photons to store and transmit data has long been a goal of engineers and physicists because of photons' potential to carry information reliably and securely. Because photons lack charge and mass, they can be transmitted across a fiber optic network with minimal interactions with other particles.



Artist's representation of Faraon's quantum memory device. *Credit: Ella Maru Studio.*

### *Improving Grant Administration*

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

[16] *U.S. Antarctic Program Blue Ribbon Panel Report*: https://www.nsf.gov/geo/plr/usap_special_review/usap_brp/rpt/index.jsp.

to strengthen grant administration through such efforts as initiating a fraud risk assessment within the grants program, refining its enterprise risk management (ERM) risk profile, continuing to implement legislative requirements under the DATA Act and the Grants Oversight and New Efficiency (GONE) Act, and working to strengthen prime awardees' compliance with the Office of Management and Budget (OMB) *Uniform Guidance* through enhanced implementation of internal controls over their subawardees.

### *Encouraging the Ethical Conduct of Research*

NSF recognizes that the responsible and ethical conduct of research is critical to ensure excellence, as well as public trust, in science and engineering. NSF requires each institution that submits a proposal to certify it has a plan to provide appropriate training and oversight in the ethical conduct of research to all undergraduates, graduate students, and postdoctoral researchers involved in NSF-supported research. In August 2017, NSF published Important Notice No. 140[17] to Presidents of Universities and Colleges and Heads of Other National Science Foundation Grantee Organizations addressing Training in Responsible Conduct of Research. Also in August 2017, the NSB discussed both the OIG report, "Review of Institutions' Implementation of NSF's Responsible Conduct of Research Requirements," and the National Academies of Sciences, Engineering, and Medicine (NASEM) report, "Fostering Integrity in Research." The OIG report made several important observations about the ethical conduct of research that NSF is incorporating into its approach. As in previous years, in FY 2017, NSF's Cultivating Cultures for Ethical STEM (CCE STEM) program invested in innovative approaches to foster ethical STEM research in all of the fields of science and engineering that NSF supports. Federal funding of research on the ethical conditions in the research environment was a key recommendation in the NASEM report. The Foundation also continued funding of the Online Ethics Center website and funded two key ethics workshops in March 2017: "Qualitative Research Ethics in the Big-Data Era" and "Positive Research Integrity." NSF will continue to fund CCE STEM research projects that use basic research to identify what nurtures, hinders, or challenges responsible or irresponsible conduct of science, how just or unjust scientific practices become embedded in sociotechnical systems, and how to best instill this knowledge in students. In addition, NSF continues interactions with the scientific community to monitor and adapt practice in this area, most recently by participating in review and discussion of the "Fostering Integrity in Research" report.

[17] Important Notice No. 140: Training in Responsible Conduct of Research: https://www.nsf.gov/pubs/issuances/in140.jsp.

## Proposal Workload and Management Trends

NSF continuously monitors key portfolio, proposal workload, and financial measures to understand short- and long-term trends and to help inform management decisions. For an analysis of the long-term trends in competitive proposals, awards, funding rate, and other portfolio metrics, see the *Report to the National Science Board on the National Science Foundation's Merit Review Process, Fiscal Year 2016.*[18]

Overall, the FY 2017 portfolio indicators of competitive proposals acted upon, new awards, and funding rates are relatively stable between FY 2016 and FY 2017, as shown in Figure 1.4.

Figure 1.4

**Number of NSF Competitive Proposals, New Awards, and Funding Rates**

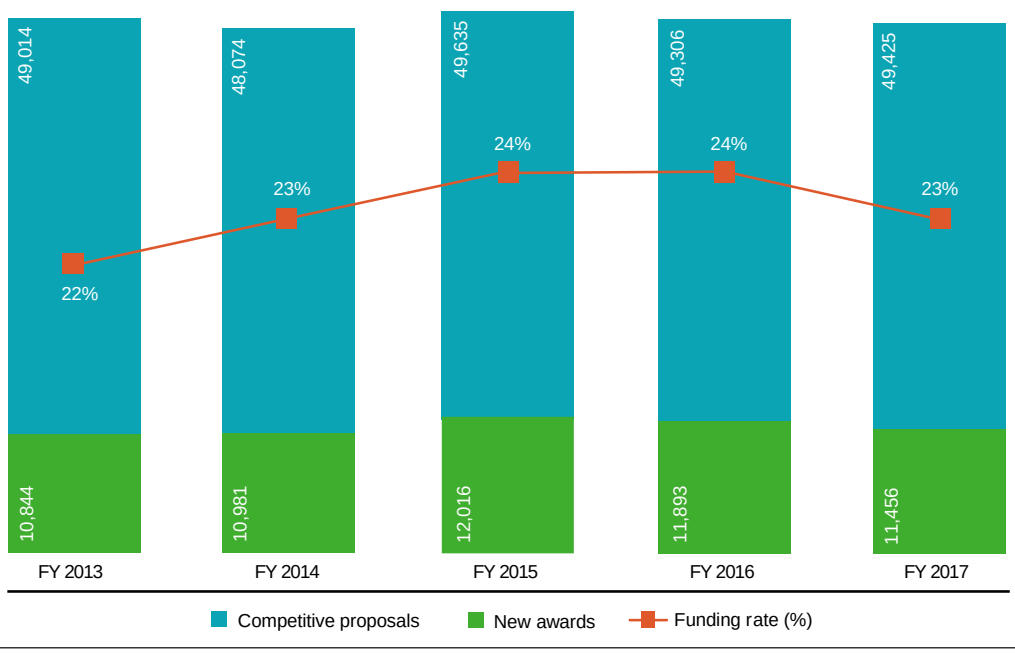



Table 1.1 provides 5 years of data on NSF's portfolio, proposal workload, and financial indicators. In summary:

- Between FY 2016 and FY 2017, the number of competitive proposal actions was stable and in excess of 49,000.
- The number of new awards in FY 2017 was close to 11,500, a small decrease from FY 2016, and almost exactly the average amount of new awards for the 5 years FY 2013–2017.
- The overall funding rate in FY 2017 was 23 percent, a decrease of 1 percentage point. Funding rates differ by directorate and are presented in the agency's annual budget request to Congress.
- The average annual award size of competitive awards was $174,533, slightly lower than in FY 2016. As shown in Table 1.1, award size varies by year. The FY 2017 average annual award size is higher than the 5-year average, $172,983.
- There was a 2-percent increase in the number of employees (full-time equivalents, or FTE) between FY 2016 and FY 2017, from 1,398 FTE to 1,430 FTE.

[18] *Report to the National Science Board on the National Science Foundation's Merit Review Process, Fiscal Year 2016* (NSB-2016-41) at https://www.nsf.gov/publications/ods/results.jsp?TextQuery=nsb201726.

- The number of active awards increased slightly in FY 2017, from 54,439 in FY 2016 to 54,806 in FY 2017. The 5-year average of active awards is 54,460.

All NSF awardee institutions are required to submit payment requests at the award level to the NSF Award Cash Management Service (ACM$). Award expenses are posted to the NSF financial system at the time of the payment request. To further expand payment activity in ACM$, starting in January 2017, all postdoctoral research fellowship awardees began to utilize ACM$ for their monthly stipend payments. At year-end close, nearly 500 postdoctoral research fellows have accessed ACM$. Reliance on ACM$ reduces the burden of manual invoicing and potential for errors or missed payments.

**Table 1.1 – Proposal Workload and Management Trends**

| Measure | | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | Percent Change (FY 2017 FY 2016) | Average (FY 2013 FY 2017) |
|---|---|---|---|---|---|---|---|---|
| Portfolio | Competitive proposal actions | 49,014 | 48,074 | 49,635 | 49,306 | 49,425 | 0.2% | 49,091 |
| | Competitive award actions | 10,844 | 10,981 | 12,016 | 11,893 | 11,456 | – 3.7% | 11,438 |
| | Average annual award size (competitive awards) | $169,107 | $180,507 | $164,526 | $176,243 | $174,533 | – 1.0% | $172,983 |
| | Funding rate | 22% | 23% | 24% | 24% | 23% | – 1 percentage point | 23% |
| Proposal Workload | Number of employees FTE, usage[1] | 1,417 | 1,391 | 1,374 | 1,398 | 1,430 | 2.3% | 1,402 |
| | Number of active awards[2] | 55,542 | 53,546 | 53,967 | 54,439 | 54,806 | 0.7% | 54,460 |
| | Proposal reviews conducted[3] | 233,116 | 225,847 | 231,450 | 225,017 | 203,438 | – 9.6% | 223,774 |
| Financial | Number of grant payments | 27,649 | 27,978 | 22,860 | 22,926 | 22,615 | – 1.4% | 24,806 |
| | Award expenses incurred but not reported at 9/30 ($ in millions)[4] | $344 | $250 | $369 | $366 | $381 | 4.1% | $342 |

Notes:
[1] Full-time equivalents (FTE) include the federal employee workforce for NSF, NSB, OIG, and U.S. Arctic Research Commission.
[2] Active awards include all active awards regardless of whether funds were received during the fiscal year.
[3] Includes written reviews, panel summaries, and site visit reports.
[4] FY 2017 number reflects an accrual, and all other years reflect actuals.

Since its introduction in FY 2013, ACM$ has significantly improved the timeliness of grant financial data. In prior years, NSF awardee institutions using quarterly expense reporting processes had approximately $1.7 billion in award expenses that they had incurred but not-yet-reported to NSF on September 30. With the use of AMC$ and its expansion each year to include additional award groups, the amount of incurred but not-yet-reported award expenses has decreased to under $400 million for each of the last 5 years.

## Progress toward Achievement of Performance Goals

Each year, NSF produces an *Agency Financial Report* and an *Annual Performance Report (APR)*. NSF's *FY 2017 APR* will provide a complete discussion of the Foundation's performance measures, including descriptions of the metrics, methodologies, results, and trends, along with a list of relevant external reviews. The *FY 2017 APR* also will provide information about NSF's verification and validation review of performance data, as required by the Government Performance and Results Modernization Act of 2010. NSF's *FY 2017 APR* (included in the *FY 2019 Budget Request to Congress)* and *FY 2017 Performance and Financial Highlights* summary report will be posted on the NSF website on February 5, 2018.[19]

**Native students graduating with advanced science degrees.** Northwest Indian College in Washington State offers one of the few Bachelor of Science in Native environmental science programs in the world.

Supported by NSF's Tribal Colleges and Universities Program (TCUP), the first student enrolled in the program graduated in 2009. Since then, 51 students have graduated from the program, with 10 more on track to graduate in 2017 and another 81 currently enrolled.

Of the 2016 graduates, 6 are pursuing advanced degrees, and the first Ph.D. graduate will return to the college as a faculty member.

TCUP makes awards to Tribal, Alaska Native-, and Native Hawaiian-serving institutions. *Credit: Marco Hatch, Western Washington University.*

[19] *FY 2017 Agency Performance Report* (included in the Performance chapter of the FY 2019 Budget Request to Congress) and *FY 2017 Performance and Financial Highlights*: https://www.nsf.gov/about/performance/.

# Financial Discussion and Analysis

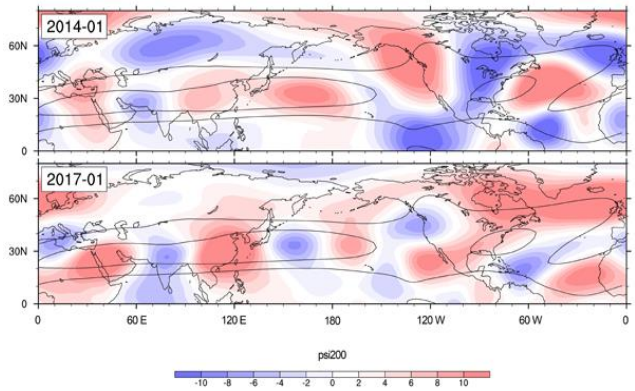
NSF's directorates and offices work together to uphold the agency's strong commitment to excellence in financial responsibilities, improved business processes, increased data transparency, responsible stewardship of federal funds, and accountability. In FY 2017, business operations highlights included:

- *Digital Accountability and Transparency Act of 2014 (DATA Act)*—NSF successfully implemented the requirements of the DATA Act, ushering in a new era of access to government-wide award and financial data. Staff expertly leveraged the capabilities of NSF's new financial system with the longstanding integration of its grant and financial systems to meet DATA Act requirements. Agency staff engaged in a 2-year coordinated collaboration and implementation effort, led by the U.S. Department of Treasury and OMB, that resulted in NSF receiving the only award given by the Secretary of the Treasury to a federal agency in recognition of this type of excellence.
- *Grants Oversight and New Efficiency (GONE) Act Reporting*—In FY 2017, NSF conducted a full analysis of expired awards meeting the reporting requirements of the Act and made significant progress in administratively closing awards and compiling data for the report. Having already financially closed these awards and repurposed the funds, none of these administrative closures carried financial balances. The results of NSF's review can be found in *Appendix 4, Grants Oversight and New Efficiency (GONE) Act Requirements*, of this AFR.
- *Enterprise Risk Management*—To better manage risks toward achieving strategic objectives, while leveraging NSF's existing resources and capabilities, the Foundation made significant progress in implementing its ERM framework. In FY 2017, NSF prepared an initial risk profile for the agency in accordance with Circular A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control*. NSF fully supports the concept that when risks are understood and managed properly, the agency operates more efficiently and effectively, is able to prioritize and allocate resources more strategically, and becomes more resilient and better able to manage change. Going forward, NSF will continue to expand its discussions about risk across the agency with the goal of fully integrating ERM into its strategic planning, budget formulation, performance assessment, and quality control improvements.
- *Targeted Review Assessment*—For over a decade, NSF's annual risk assessment has been used to identify awardees for advanced monitoring. In FY 2017, NSF leveraged that program by piloting a new tool, the TRA, intended to quickly assess grants management and compliance and to identify the awardee community's need for business assistance. The first TRA, focused on subrecipient oversight, found that the majority of sampled pass-through institutions had appropriate policies and procedures or needed only minor updates. Relatively few needed to develop internal controls for addressing closeout, subrecipient risk assessments, and/or the review of subrecipients' single audit reports. NSF shared results of its analysis with the NSF OIG that is auditing NSF's oversight of pass-through entities' subrecipient monitoring, pursuant to the *American Innovation and Competitiveness Act.*
- *Indirect Cost Rates*—In September 2017, GAO issued *National Science Foundation: Actions Needed to Improve Oversight of Indirect Costs for Research (GAO-17-721),* which is a review of the amount of NSF funding for indirect costs and NSF's negotiation of indirect cost rates (ICRs). Indirect costs afforded to research institutions represent a share of true costs attributable to the conduct of doing research. Between 2000 and 2016, indirect costs varied from 16 to 24 percent of total annual award amounts, based on types of activities supported and types of awardee organizations. GAO recommended that NSF improve its internal guidance for setting ICRs, including adding certain details and procedures. NSF is addressing GAO recommendations.
- *Invoice Processing Platform (IPP)*—NSF continued to demonstrate its focus on efficient financial operations that support the agency's mission by going live with the Department of Treasury's web-

based e-Invoicing system, or IPP, on July 31, 2017—a year ahead of OMB's deadline. IPP promotes NSF's digital documentation efforts, supports efficient invoice processing, and results in cost savings to NSF and the vendors by moving to a paperless invoicing and payment system. Approximately 485 NSF vendors (excludes grantees, IPAs, panelists, employees, or other federal entities) are registered to submit invoices electronically through IPP. NSF expects to receive approximately 3,500 electronic invoice submissions per year.

**Scientists link recent California droughts and floods to distinctive atmospheric waves.** California is one of the many places to have suffered from unforeseen weather emergencies in recent years—extreme drought in the 2013–2015 winter seasons and drenching storms causing floods and mudslides this past winter. Scientists at the National Center for Atmospheric Research (NCAR) have discovered a wave pattern, wavenumber-5, that emerges in the upper atmosphere and circles the globe. This pattern may sometimes make droughts or floods in local areas, such as California, more likely to occur.

Increasing our understanding of the wave pattern, its formation, seasonal nature, and strength holds the promise of better understanding and predicting weather patterns in California and around the world.




The black curves illustrate the jet streams that trap and focus wavenumber-5. The high- and low-pressure regions of wavenumber-5 set up in different locations during January 2014, when California was enduring a drought, and January 2017, when it was facing floods. The location of the high- and low-pressure regions (characterized by anticylonic vs. cyclonic upper-level air flow) can act to either suppress or enhance precipitation and storms. *Credit: Haiyan Teng and Grant Branstator, ©UCAR*

In accordance with the Chief Financial Officers Act of 1990 and the Government Management Reform Act of 1994, NSF prepares financial statements in conformity with U.S. generally accepted accounting principles for federal entities. The financial statements present NSF's detailed financial information relative to its mission and the stewardship of those resources entrusted to the agency. It also provides readers with an understanding of the resources that NSF has available, the cost of its programs, and the status of resources at the end of the fiscal year. NSF's financial statements have undergone an independent audit to ensure that they are free from material misstatement and can be used to assess NSF's financial status and related financial activity for the year ending September 30, 2017.

NSF received an unmodified audit opinion on its financial statements, and no material weaknesses or significant deficiencies were identified in the internal control program for financial reporting. The Independent Auditor's Report begins on page Financials-3. Management's response follows the audit report.

## Understanding the Financial Statements

The following discussion of NSF's financial condition and results of operations should be read together with the FY 2017 financial statements and accompanying notes, found in chapter 2, *Financials*, of this AFR.

NSF's FY 2017 financial statements and notes are presented in accordance with OMB Circular No. A-136, *Financial Reporting Requirements*. NSF's current year financial statements and notes are presented in a comparative format. The Stewardship Investment schedule presents information over the last 5 years. Table 1.2 summarizes the changes in NSF's financial position in FY 2017.

**Table 1.2 – Changes in NSF's Financial Position in FY 2017**
(Dollars in Thousands)

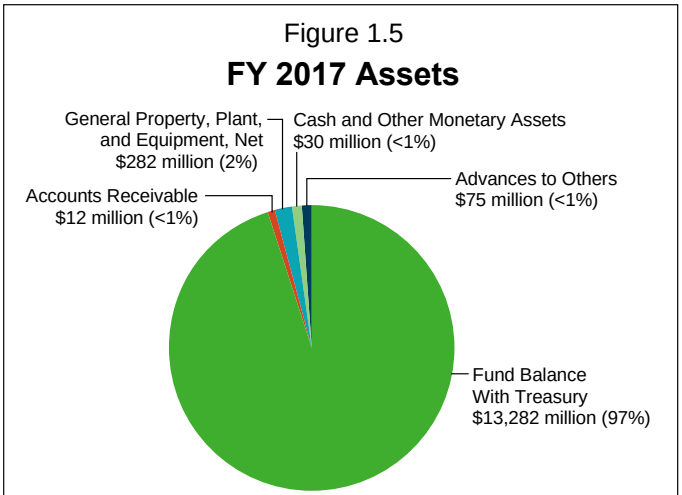
| Net Financial Condition | FY 2017 | FY 2016 | Increase/(Decrease) | % Change |
|---|---|---|---|---|
| Assets | $13,681,518 | $13,330,617 | $350,901 | 2.6% |
| Liabilities | $494,445 | $608,725 | – $114,280 | – 18.8% |
| Net Position | $13,187,073 | $12,721,892 | $465,181 | 3.7% |
| Net Cost | $7,116,204 | $7,046,347 | $69,857 | 1.0% |

### *Balance Sheet*

The Balance Sheet presents the total amounts available for use by NSF (assets) against the amounts owed (liabilities) and amounts that comprise the difference (net position). NSF's total assets are largely composed of *Fund Balance with Treasury*. A significant balance also exists in the *General Property, Plant, and Equipment, Net* account.

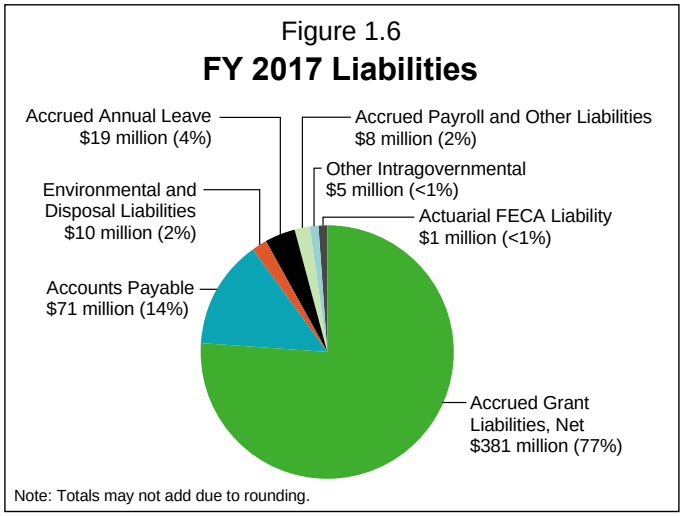
In FY 2017, Total Assets (Figure 1.5) increased 2.6 percent from FY 2016. Most of this change occurred in the *Fund Balance with Treasury* account, which increased by $310.6 million in FY 2017. NSF is authorized to use *Fund Balance with Treasury* to make expenditures and pay amounts due through the disbursement authority of the Department of Treasury. The *Fund Balance with Treasury* is increased through appropriations and collections and decreased by expenditures and rescissions.

Figure 1.5




In FY 2017, Total Liabilities (Figure 1.6) decreased 18.8 percent from FY 2016. This change was primarily related to a $74.7 million decrease in *Accounts Payable* in FY 2017. *Accounts Payable* is estimated annually by utilizing historical data based on the actual expenses incurred but not reported, as a percentage of current fiscal year expenses. The majority of the FY 2017 change was due to a change in the methodology used to estimate *Accounts Payable*, resulting in a lower *Accounts Payable* as compared to FY 2016.

### Statement of Net Cost




The Statement of Net Cost presents the annual cost of operating NSF programs. The net cost of operations of each NSF program equals the program's gross cost less any offsetting revenue. Intragovernmental earned revenues are recognized when related program or administrative expenses are incurred. Earned revenue is deducted from the full cost of the programs to arrive at the Net Cost of Operation.

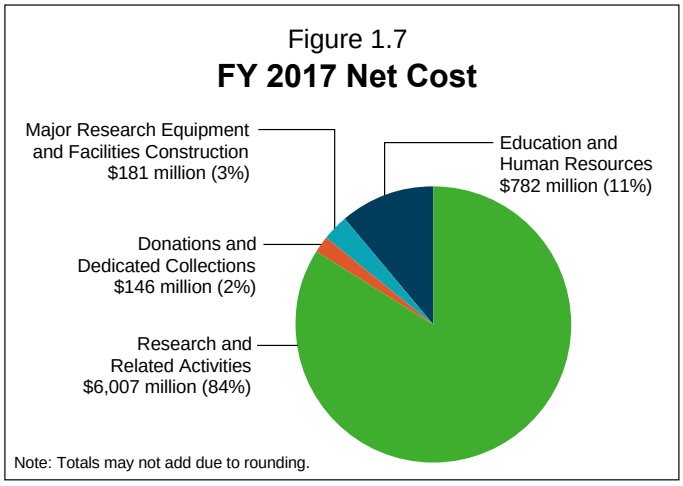
Approximately 95 percent of all current year NSF Net Costs of Operations incurred were directly related to the support of R&RA, EHR, MREFC, and Donations and Dedicated Collections. Additional costs were incurred for indirect general operation activities (e.g., salaries, training, and activities related to the advancement of NSF information systems technology) and activities of the NSB and the OIG. These costs were allocated to R&RA, EHR, MREFC, and Donations and Dedicated Collections and account for 5 percent of the total current year Net Cost of Operations (Figure 1.7). These administrative and management activities are focused on supporting the agency's program goals.

### Statement of Changes in Net Position

The Statement of Changes in Net Position presents the agency's cumulative net results of operation and unexpended appropriations for the fiscal year. NSF's Net Position increased by 3.7 percent, or $465.2 million, in FY 2017.

### Statement of Budgetary Resources

This statement provides information on how budgetary resources were made available to NSF for the year and the status of those budgetary resources at year end. For FY 2017, *Total Budgetary Resources* decreased $36.3 million from the FY 2016 level. *Budgetary Resources—Appropriations* for the R&RA, EHR, and MREFC accounts were $6,005.6 million, $873.1 million, and $214.9 million, respectively. The combined *Budgetary Resources—Appropriations* in FY 2017 for the NSB, OIG, and AOAM accounts totaled $378.7 million. NSF also received funding via warrant from the H-1B Nonimmigrant Petitioner Account (H-1B) in the amount of $138.1 million and via donations from foreign governments, private companies, academic institutions, nonprofit foundations, and individuals in the amount of $40.9 million. In FY 2017, the *Budgetary Resources—Appropriations* line was also affected by H-1B sequestration in the amount of $9.7 million.




### Stewardship Investments

NSF-funded investments yield long-term benefits to the general public. NSF investments in research and education produce quantifiable outputs, including the number of awards made and the number of researchers, students, and teachers supported or involved in the pursuit of science and engineering research

and education. NSF incurs stewardship costs as part of its longstanding commitment to invest in learning and discovery. In FYs 2017 and 2016, these costs amounted to $364.0 million and $371.2 million, respectively.

## Limitations of the Financial Statements

In accordance with the guidance provided in OMB Circular No. A-136, NSF discloses the following limitations of the agency's FY 2017 financial statements. The principal financial statements are prepared to report the financial position and results of operations of NSF, pursuant to the requirements of 31 U.S.C. 3515(b). The statements are prepared from the books and records of NSF in accordance with federal *Generally Accepted Accounting Principles (GAAP)* and the formats prescribed by OMB. Reports used to monitor and control budgetary resources are prepared from the same books and records. The financial statements should be read with the realization that they are for a component of the U.S. Government.

## Other Financial Reporting Information

### *Debt Collection Improvement Act of 1996*

Net Accounts Receivable totaled $12.1 million at September 30, 2017. Of that amount, $9.8 million was due from other federal agencies. The remaining $2.3 million was due from the public. NSF fully participates in the Department of the Treasury Cross-Servicing Program. In accordance with the Debt Collection Improvement Act, as amended by the DATA Act, this program allows NSF to refer debts that are delinquent more than 120 days to the Department of the Treasury for appropriate action to collect those accounts. In accordance with M-04-10, *Memorandum on Debt Collection Improvement Act Requirements*, NSF writes off delinquent debt more than 2 years old. Additionally, NSF seeks Department of Justice concurrence for action items over $100,000.

### *Cash Management Improvement Act of 1990*

In FY 2017, NSF had no awards covered under Cash Management Improvement Act Treasury-State Agreements. The timeliness of NSF's payments to grantees through its payment systems makes the timeliness of payment issue under the Act essentially not applicable to the agency. No interest payments were made in FY 2017.

### *Federal Civil Penalties Inflation Adjustment Act of 1990*

The Federal Civil Penalties Inflation Adjustment Act Improvements Act of 2015 (the 2015 Act; Sec. 701 of Public Law [P.L.] 114–74) further amended the Federal Civil Penalties Inflation Adjustment Act of 1990 (P.L. 104–410) to improve the effectiveness of civil monetary penalties and to maintain their deterrent effect. The 2015 Act requires

**By age 6, gender stereotypes can affect girls' choices.** Women account for more than half the U.S. population but only 30 percent of those employed as scientists and engineers in the country. Researchers are investigating several possible factors that contribute to this disparity—including the societal stereotype that associates intellectual talent more closely with men than women.

Stereotypes are powerful. They often influence the types of careers people see themselves in and ultimately choose. Previous research shows that society associates not only ability in math and science with men and boys but also the notion of being "brilliant"—of having raw brainpower. This research evaluated the beliefs of 5-, 6-, and 7-year-old boys and girls about gender and brilliance. Findings highlight the importance of reducing gender disparities by showing how we are influenced by society, especially when we are extremely young.

Stereotypes can influence educational and career paths. *Credit: ©Alesia.* Kan/Shutterstock.com.

agencies to (1) adjust the level of civil monetary penalties with an initial "catch-up" adjustment through an interim final rulemaking and (2) make subsequent annual adjustments for inflation. Inflation adjustments are to be based on the percent change in the Consumer Price Index for all Urban Consumers (CPI-U) for the month of October preceding the date of the adjustment, relative to the October CPI-U in the year of the previous adjustment.

The only civil monetary penalties within NSF's jurisdiction are those authorized by the Antarctic Conservation Act of 1978, 16 U.S.C. 2401, et seq., and the Program Fraud Civil Remedies Act of 1986, 31 U.S.C. 3801, et seq.

**Table 1.3 – FY 2017 Civil Monetary Penalty Adjustment for Inflation**

| Statutory Authority | Penalty (Name or Description) | Year Enacted | Latest Year of Adjustment (via Statute or Regulation) | Current Penalty Level ($ Amount or Range) | Location for Penalty Update Details |
|---|---|---|---|---|---|
| Antarctic Conservation Act of 1978, as amended | Knowing violations | 1978 | 2017 | $27,950 | 82 FR 3363-01<br><br>Wednesday, January 11, 2017 |
| Antarctic Conservation Act of 1978, as amended | Not knowing violations | 1978 | 2017 | $16,516 | 82 FR 3363-01<br><br>Wednesday, January 11, 2017 |
| Program Fraud Civil Remedies Act of 1986 | Violations | 1986 | 2017 | $10,957 | 82 FR 3363-01<br><br>Wednesday, January 11, 2017 |

# Systems, Controls, and Legal Compliance

## Management Assurances

The Federal Managers' Financial Integrity Act (FMFIA)[20] requires that agencies conduct evaluations of their systems of internal control and provide reasonable assurance annually to the President and the Congress on the adequacy of those systems. Internal control is an integral component of an organization's management that provides reasonable assurance of effective and efficient operations, reliable financial reporting, and compliance with laws and regulations.

The FMFIA assurance statement provides management's assessment of the efficacy of the organization's internal control to support effective and efficient programmatic operations, reliable financial reporting, and compliance with applicable laws and regulations (FMFIA§2) and of whether financial management systems conform to financial systems requirements (FMFIA§4).

The FY 2017 unmodified Statement of Assurance is the culmination of the efforts of NSF management's assessment of the design, implementation, and operating effectiveness of its system of internal control. For FY 2017, NSF's internal control assessment provides reasonable assurance that the objectives of the FMFIA and the Federal Financial Management Improvement Act of 1996 (FFMIA) were achieved and also concludes that the internal control processes over financial reporting are effective.

**National Science Foundation**

**FY 2017 Statement of Assurance**

The National Science Foundation (NSF) management is responsible for managing risks and maintaining effective internal control to meet the objectives of Sections 2 and 4 of the Federal Managers' Financial Integrity Act (FMFIA). The NSF conducted its assessment of risk and internal control processes in accordance with OMB Circular No. A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control*. Based on the results of the assessment, NSF can provide reasonable assurance that internal control over operations, reporting, and compliance was operating effectively as of September 30, 2017.

/s/
**France A. Córdova**
Director

November 14, 2017

## Highlights from NSF's FY 2017 Internal Control Quality Assurance Program

The Internal Control Quality Assurance Program is responsible for the NSF internal control review process. The internal control review process supports NSF's strategic goal to *excel as a federal science agency*. Excelling as a federal science agency is essential to achieve and carry out NSF's mission and accomplish the other two strategic goals: (1) *transform the frontiers of science and engineering* and (2) s*timulate innovation and address societal needs through research and education*.

[20] FMFIA: https://obamawhitehouse.archives.gov/omb/financial_fmfia1982.

In FY 2017, NSF continued its efforts to enhance its internal control review program and further implement the guidance in OMB Circular A-123, *Management's Responsibility for Enterprise Risk Management and Internal Control*,[21] the GAO *Standards for Internal Control in the Federal Government* (known as the Green Book),[22] and the Committee of Sponsoring Organizations of the Treadway Commission (COSO) *Internal Control—Integrated Framework (2013)*.[23] To ensure compliance with the Green Book and the COSO framework, NSF performed an entity-level assessment comprised of interviews and data gathering through questionnaires administered to key members of NSF management. The assessment validated NSF's compliance with the Green Book and COSO frameworks.

NSF sought to gain efficiencies in testing processes by approaching the program as a value-added management function for the agency. For FY 2017 the business process review approach consisted of two general tracks: corrective actions and management assurance.

The corrective actions track focused on the remediation activities related to the significant deficiency and control deficiencies identified during the FY 2016 financial statement audit. NSF developed and validated corrective actions to address issues highlighted in the FY 2016 financial statement audit. This activity included:

- efforts to eliminate the IT significant deficiency (iTRAK, Awards, and WebTA);
- strengthening user controls over third party service providers;
- documenting and strengthening internal controls over undelivered orders; and
- process improvements to the grant accruals methodology, including adjustments in the use of historical data.

For the management assurance track, NSF focused on testing and evaluating its business processes. In conducting its assessment of internal control over agency operations, reporting, and compliance with applicable laws and regulations, NSF applied an agile and multi-year approach.

In addition to the existing internal control review process, FY 2017 activities were expanded into two new areas: (1) DATA Act compliance and (2) Fraud Reduction and Data Analytics Act of 2015 (FRDAA) requirements. NSF conducted an audit readiness assessment for the control design related to the DATA Act reporting implementation and for compliance with the DATA Act requirements. NSF evaluated whether the internal controls over spending data were properly designed, implemented, and operating effectively to manage and report financial and award data in accordance with the DATA Act. NSF used iterative reviews to determine if there were opportunities for improving the control environment to support the organization's implementation and compliance with the DATA Act. These observations addressed the design elements, which focused both on complying with DATA Act requirements and ensuring that NSF is continually improving its readiness for future audits from the agency's OIG. The assessment yielded opportunities in several areas including validating data, improving controls, and better documenting and communicating decisions and policy.

Implementation activities related to FRDAA are discussed in *Appendix 3: Fraud Reduction Report* of this AFR.

### *Internal Control over Financial Reporting—OMB Circular A-123, Appendix A*

NSF's FY 2017 review for Internal Control over Financial Reporting consisted of tests of operational effectiveness and tests of control design. NSF evaluated the key controls to ensure they were functioning properly to mitigate risks of material misstatements in the financial reports and to support NSF

[21] OMB Circular A-123: https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2016/m-16-17.pdf
[22] GAO *Standards for Internal Control in the Federal Government*: http://www.gao.gov/products/GAO-14-704G.
[23] COSO Internal Control Integrated Framework: https://www.coso.org/Pages/ic.aspx

management's financial reporting assertions. The process areas tested for operational effectiveness were Grants Management, Large Facilities Oversight, Travel Systems, Procure to Pay, and Financial Reporting alignment with DATA Act submission processes. As part of the test of design, NSF assessed whether key controls performed properly and whether the controls addressed the control object and business risk. The process areas tested for control design were undelivered orders, DATA Act implementation, and user controls over third party service providers.

Based on the results of the assessment, NSF provides reasonable assurance that its internal control over financial reporting is operating effectively and no material weaknesses were identified.

### *Improving the Management of Government Charge Card Programs—OMB Circular A-123, Appendix B*

In FY 2017, NSF conducted a fraud risk assessment of travel and purchase cards, developed a fraud risk profile and response plan, and created a proof-of-concept for developing a data analytics capability to better identify potential risk exposures in the travel and purchase card programs.

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

The fraud risk assessment reviewed purchase cards and identified a finding consistent with the repeat finding from the internal control reviews; specifically, a need for periodic reviews to determine whether each purchase cardholder has a need for the purchase card. The recommendation is to increase monitoring of the issuance of purchase cards to ensure that resources are allocated in the most efficient and effective manner.

In addition to conducting the fraud risk assessment and ensuring OMB Circular A-123, Appendix B compliance, NSF assessed the status of the corrective action plans from the FY 2016 review and completed an Appendix B crosswalk to ensure NSF has maintained the appropriate internal controls to reduce the risk of fraud, waste, and error within the charge card program. The review of the Appendix B crosswalk ensured that NSF is in compliance with the following sources:

- P.L. 112–194, Government Charge Card Abuse Prevention Act of 2012;
- OMB Memorandum *M-12-12, Promoting Efficient Spending to Support Agency Operations;* and
- OMB Circular A-123, *Appendix B, Improving the Management of Government Charge Card Programs.*

Based on the results of the assessment, NSF provides reasonable assurance that internal control processes related to the Government Charge Card Programs are operating effectively, and no material weaknesses were identified.

### *Requirements for Effective Estimation and Remediation of Improper Payments—OMB Circular A-123, Appendix C*

During early FY 2017, NSF completed a qualitative risk assessment of FY 2016 improper payments. The risk assessment determined NSF did not have significant risk of improper payments for grants, contracts, charge cards, and payroll payments. In May 2017, the NSF OIG issued a report on NSF's compliance with the improper payment requirements for FY 2016. The OIG concluded NSF complied with the requirements and had addressed all recommendations from the previous OIG report. This was the second consecutive

report finding NSF in compliance with improper payment reporting requirements. The May 2017 OIG report had no recommendations and no resolution tracking requirements. The two reports validate that NSF has taken the steps necessary to demonstrate compliance and effectiveness in the agency's implementation of improper payment requirements. NSF will conduct an improper payment risk assessment in FY 2018.

Based on the results of the OIG's assessment, and NSF management's efforts to eliminate improper payments, NSF provides reasonable assurance related to the OMB Circular A-123, Appendix C requirements.

### *Compliance with the Federal Financial Management Improvement Act of 1996—OMB Circular A-123, Appendix D*

NSF is required by Appendix D of OMB Circular A-123, *Compliance with the Federal Financial Management Improvement Act of 1996*, to implement and maintain financial management systems that substantially comply with Federal Financial Management System Requirements, federal accounting standards, and the U.S. Standard General Ledger (USSGL) at the transaction level.

NSF reviewed business processes and completed the FFMIA Compliance Determination Framework, to validate compliance with the following requirements, as outlined in Circular A-123, Appendix D:

- NSF developed and maintains financial management systems, in accordance with Circular A-130 and Circular A-123.
- NSF's financial management systems comply with the policies prescribed in Appendix D, as well as associated financial management system guidance.
- NSF established a remediation plan identifying resources, remedies, and target dates to bring NSF's financial management system into compliance.
- Report, if needed, compliance with the Federal Financial Management System Requirements, federal accounting standards, and USSGL at the transaction level through the reporting structure established by Section VI of Circular A-123.

NSF performed remediation efforts to resolve the financial statement audit IT significant deficiency related to the iTRAK, Awards and WebTA systems. NSF actively monitored and addressed the issues identified in the audit. In addition, NSF verified and validated corrective action plan efforts based on testing results. NSF also strengthened user controls over third party service providers. NSF regularly assesses the design and operating effectiveness of the service organization's internal controls, including IT general controls and all five GAO Green Book components of internal control. NSF management established user controls to monitor the process for effectiveness. In FY 2017, NSF performed remediation efforts to document procedures for ensuring the adequacy of controls over third party service providers.

NSF has established a comprehensive IT security program that is consistent with the Federal Information Security Modernization Act of 2014 and industry best practices. NSF's IT controls are effective in maintaining a secure IT environment and align with the National Institute of Standards and Technology Framework for Improving Critical Infrastructure. The agency's IT environment is supported by a suite of comprehensive policies and procedures that incorporate federal mandates and guidance. NSF has a strong Information Security Continuous Monitoring program that includes the Department of Homeland Security Continuous Diagnostic and Mitigation technologies. The OMB Cybersecurity Risk Management Assessment evaluated NSF's overall cybersecurity risk management and confirmed that NSF has effective IT security controls in place.

Based on the results of the assessment, NSF provides reasonable assurance that internal control processes related to FFMIA—OMB Circular A-123, Appendix D, are operating effectively, and no material weaknesses were identified.

### *Other Federal Reporting and Disclosures*

*Anti-Deficiency Act (ADA)*: NSF is not aware of any ADA violations that are required to be reported for the year ended September 30, 2017.

*Pay and Allowance System for Civilian Employees, provided primarily in Chapters 31–50 of Title 5, U.S.C.*: The Department of the Interior, Interior Business Center (IBC) Federal Personnel/Payroll System (FPPS) is a Shared Service Provider and performs many of NSF's payroll functions. IBC FPPS's internal control is annually reviewed by auditors under the Statement on Standards for Attestation Engagements (SSAE-18). IBC FPPS's controls are found to be suitably designed and operating effectively. This conclusion is based partly on transactional testing.

*Prompt Payment Act*: The Prompt Payment Act mandates interest penalties on payments over 30 days. Under OMB *Memorandum 17-27, Reducing Burden for Federal Agencies by Rescinding and Modifying OMB Memoranda*, NSF is encouraging accelerating payments to all contractors within 15 days of a proper invoice being received. This acceleration allows small business contractors to be paid as quickly as possible. NSF's Prompt Payment Rate was consistently above 95 percent during this fiscal year.

*Government Charge Card Abuse Prevention Act of 2012, P.L. 112–194:* The act requires that agencies ensure that appropriate policies and controls are in place or that corrective actions have been taken to mitigate the risk of fraud and inappropriate charge card practices. NSF provides reasonable assurance that internal controls related to the Government Charge Card Programs are operating effectively, and no material weaknesses were identified. Additional information is provided above in *Improving the Management of Government Charge Card Programs—OMB Circular A-123, Appendix B*, page MD&A-23.

*Provisions Governing Claims of the U.S. Government (31 U.S.C. 3711–3720E) (Including the Debt Collection Improvement Act of 1996)*: The Debt Collection Improvement Act is addressed on page MD&A-19

*Federal Information Security Modernization Act Management Act of 2014*: This topic is addressed in subsection *Compliance with the Federal Financial Management Improvement Act of 1996—OMB Circular A-123, Appendix D*, page MD&A-24.

*Single Audit Act of 1984, P.L. 98–502, and the Single Audit Act Amendments of 1996, P.L. 104–156. (A-136, section II.2.8)*: The Single Audit Act requires financial statement audits of non-federal entities receiving or administering grant awards with federal expenditures exceeding $750,000 during its fiscal year. Federal agency internal control standards determine whether award expenditures comply with laws and regulations. NSF, similar to other federal agencies, is required to review the findings and recommendations of audit reports for funding recipients to determine whether corrective actions (if required) are adequate and implemented. NSF utilizes guidance from the *OMB Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance)*[24] and *Audit Follow-up*[25] as a basis for its audit resolution and follow-up activities. During FY 2017, NSF resolved 192 single audit reports.

[24] Uniform Guidance (2 CFR 200): https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=fd67dcb2fb543c275053150a6352be38&mc=true&n=pt2.1.200&r=PART&ty=HTML
[25] Audit Follow-up (OMB Circular A-50): https://www.whitehouse.gov/omb/circulars_a050.

NSF continues to ensure that its policies and procedures fully align with federal requirements. The agency continually assesses the effects changes in policies and practices (e.g., increase in single-audit thresholds, risk management, streamlining of federal requirements, timeliness) may have on NSF's stewardship over its investments. NSF continues to strengthen audit resolution and other oversight functions by deepening subject matter expertise of its staff and the effective utilization of available resources. In addition, NSF maintains formal, ongoing dialogue with the OIG to address issues affecting audit resolution (e.g., new methodologies), as well as the interpretation and application of NSF policies and procedures.

## Financial System Strategy and Framework

### *Financial System Strategy*

The goals for NSF's 3-year-old core financial system align with NSF's strategic goal in that iTRAK's goals are to increase capabilities for more informed decision making to further science and innovation and to excel as a federal science agency by improving financial effectiveness and accountability for the public benefit. iTRAK ensures that transactions are posted in accordance with the USSGL at the transaction level; maintains accounting data to permit reporting in accordance with *GAAP* as prescribed by the Federal Accounting Standards Advisory Board; enforces strict funds control across the budgeting and spending functions to prevent ADA violations; and enables strong access control and definition of "responsibilities" to support segregation of duties control. iTRAK complies with OMB Memorandum M-10-26, *Immediate Review of Financial Systems IT Projects*; OMB Memorandum M-13-08, *Improving Financial Systems through Shared Services*; and OMB Circular A-123, Appendix D.

Also key to NSF's financial system strategy is leveraging iTRAK to support agency compliance with federal mandates. For example, NSF continues to evaluate, test, and plan for the implementation of the Oracle DATA Act patches so that the DATA Act required files can be created directly from iTRAK. Additionally, the new financial system enabled NSF to successfully implement Treasury's web-based e-Invoicing system, IPP, in compliance with OMB M-15-19, *Improving Government Efficiency and Saving Taxpayer Dollars through Electronic Invoicing*.

NSF continues to strengthen iTRAK with a focus on (1) maturing iTRAK system and business processes to improve operational efficiencies, (2) training users to improve skills in targeted functionalities, (3) providing financial data to the agency's data warehouse to enable users to combine financial and programmatic data for more informed decision making, and (4) strengthening controls over system processes including security controls.

As iTRAK matures, NSF will continue to expand its analytical capabilities toward a more performance-driven system to better support NSF's mission. Competing priorities coupled with limited resources continue to be key challenges facing the Foundation. Senior leadership will continue to work with internal and external stakeholders to agree on the order of priorities while managing risk.

### *Financial Management System Framework*

NSF's financial management system framework (Figure 1.8) focuses on the Foundation's financial management systems, standard business processes, data, and information architecture to ensure reliable, timely, and consistent financial information that enables effective management of NSF resources and delivery of mission critical products and services.

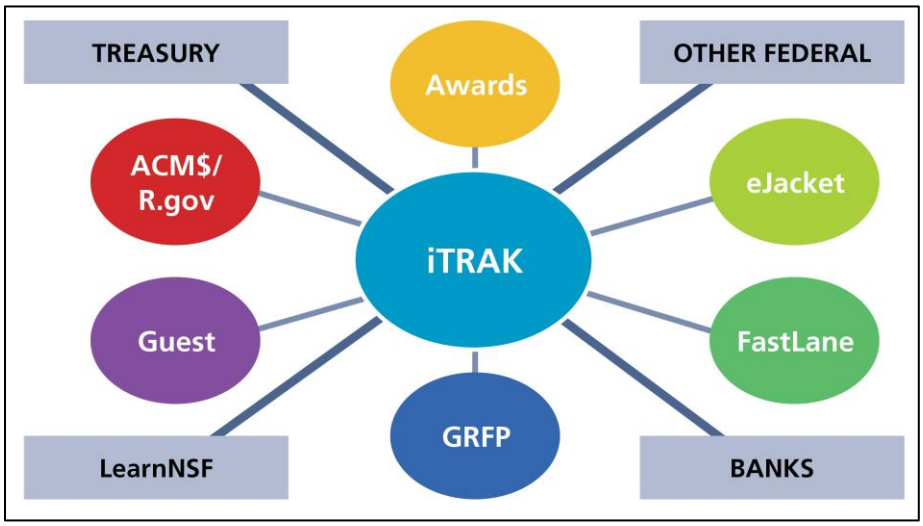
NSF's core financial system, iTRAK, interfaces with NSF's awards, grants management, and business process systems including:

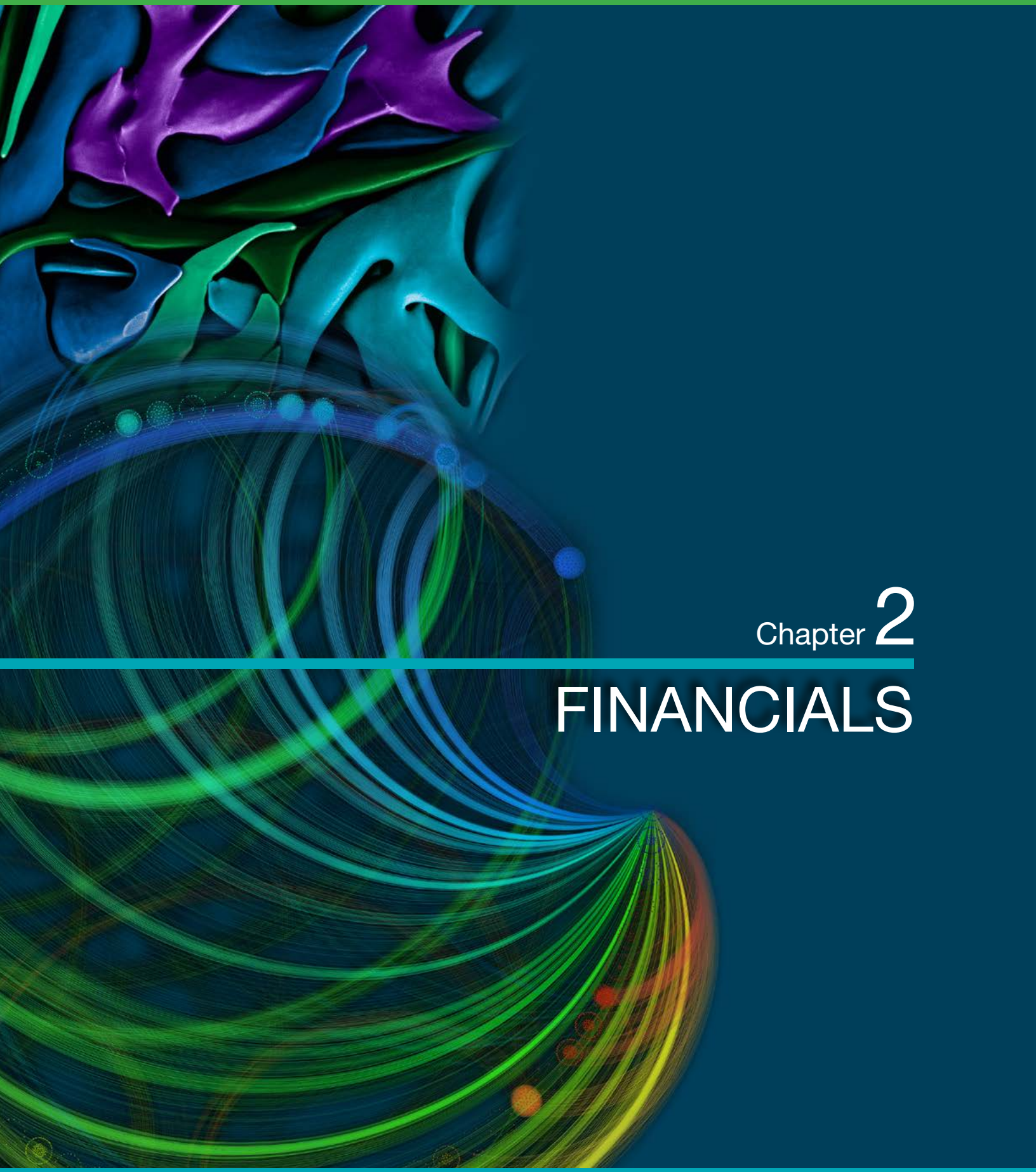
- Award Cash Management Service (ACM$).
- Award Management and Award Letter System ("Awards").

- eJacket, NSF's internal awards processing system.
- Research.gov and FastLane, NSF's websites through which researchers, research administrators and their organizations, and reviewers interact with NSF.
- Graduate Research Fellowship Program System (GRFP).
- Guest Travel and Reimbursement System.

iTRAK also interfaces with external systems operated by the U.S. Department of the Treasury; JPMorgan Chase Bank; and LearnNSF, the Foundation's training system, and with other federal systems such as the FPPS, eTravel/Concur, and GSA's System for Award Management.

**Figure 1.8—NSF Financial Management System Framework**





Chapter 2

# FINANCIALS

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

**MEMORANDUM**

**TO:** Dr. France A. Córdova
Director
National Science Foundation

Dr. Maria T. Zuber
Chair
National Science Board

**FROM:** Allison Lerner
Inspector General

**DATE:** November 14, 2017

**SUBJECT:** Audit of the National Science Foundation's
Fiscal Years 2017 and 2016 Financial Statements

This memorandum transmits Kearney & Company's reports on its financial statement audit of the National Science Foundation (NSF) for FY 2017, which includes FY 2016 comparative information.

**Audit Reports on Financial Statements; Internal Control over Financial Reporting; and Compliance with Laws, Regulations, Contracts, and Grant Agreements**

The *Chief Financial Officer's (CFO) Act of 1990* (P.L. 101-576), as amended, requires that NSF's Inspector General or an independent external auditor, as determined by the Inspector General, audit NSF's financial statements in accordance with *Government Auditing Standards* (GAS) issued by the Comptroller General of the United States. We contracted with the independent certified public accounting firm Kearney & Company (Kearney) to audit NSF's financial statements as of September 30, 2017, and for the fiscal year then ended. The contract requires that the audit be performed in accordance with GAS and the Office of Management and Budget (OMB) Bulletin 17-03, *Audit Requirements for Federal Financial Statements.*

For Fiscal Year 2017 Kearney provided: (1) its opinion on the financial statements, (2) a report on internal control over financial reporting, and (3) a report on compliance with laws, regulations, contracts, and grant agreements. In its audit of NSF, Kearney:

- Found that the financial statements present fairly, in all material respects, the financial position of NSF as of September 30, 2017 and 2016, as well as NSF's net cost of operations, changes in net position, and budgetary resources for the years then ended, in accordance accounting principles generally accepted in the United States of America.

- Did not identify any deficiencies in internal control that it considers to be material weaknesses.[1]
- Identified no instances of noncompliance or other matters that are required to be reported under GAS.
- Identified no instances in which NSF's financial management systems did not comply with the *Federal Financial Management Improvement Act of 1996* (FFMIA).

NSF's response to the draft reports, dated November 6, 2017, follows Kearney's reports.

**OIG Evaluation of Kearney's Audit Performance**

To fulfill our responsibilities under the *CFO Act of 1990*, as amended, and other related Federal financial management requirements, we reviewed Kearney's approach and planning of the audit; evaluated the qualifications and independence of Kearney and its staff; monitored the progress of the audit at key points; coordinated periodic meetings with NSF management to discuss audit progress, findings, and recommendations; reviewed Kearney's audit reports to ensure compliance with GAS and OMB Bulletin No. 17-03; and coordinated issuance of the audit reports.

Our review, as differentiated from an audit in accordance with GAS, was not intended to enable us to express, and we do not express, an opinion on NSF's financial statements; internal control; or compliance with laws, regulations, contracts, and grant agreements. Kearney is responsible for the attached auditor's reports, dated November 14, 2017, and the conclusions expressed therein.

Kearney's Independent Auditor's Report is meant only to be distributed and read as part of the Agency Financial Report (AFR). Also, Kearney's Independent Auditor's Report is not a stand-alone document because it refers to the AFR contents and should not be circulated to anyone other than those receiving this transmittal.

We appreciate the courtesies and cooperation NSF extended to Kearney and OIG staff during the audit. If you or your staff have any questions, please contact me or Mark Bell, Assistant Inspector General for Audits, at 703.292.7100.

Attachment

[1] A material weakness is significant deficiency, or combination of significant deficiencies, that results in more than a remote likelihood that a material misstatement of the financial statements will not be prevented or detected.

KEARNEY& COMPANY

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# INDEPENDENT AUDITOR'S REPORT

To the Director and Inspector General of the National Science Foundation

## Report on the Financial Statements

We have audited the accompanying financial statements of the National Science Foundation (NSF), which comprise the balance sheet as of September 30, 2017 and 2016, the related statements of net cost and changes in net position, and the combined statement of budgetary resources (hereinafter referred to as the "financial statements") for the years then ended, as well as the related notes to the financial statements.

## Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

## Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America; the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States; and Office of Management and Budget (OMB) Bulletin No. 17-03, *Audit Requirements for Federal Financial Statements*. Those standards and OMB Bulletin No. 17-03 require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

KEARNEY& COMPANY

## Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of NSF as of September 30, 2017 and 2016, as well as its net cost of operations, changes in net position, and budgetary resources for the years then ended, in accordance with accounting principles generally accepted in the United States of America.

## Other Matters

*Required Supplementary Information*

Accounting principles generally accepted in the United States of America require that the Management's Discussion and Analysis, Required Supplementary Stewardship Information, and Required Supplementary Information as named in the Agency Financial Report (hereinafter referred to as the "required supplementary information") be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by OMB and the Federal Accounting Standards Advisory Board (FASAB), who consider it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing it for consistency with management's responses to our inquiries, the financial statements, and other knowledge we obtained during our audits of the financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

*Other Information*

Our audits were conducted for the purpose of forming an opinion on the financial statements taken as a whole. The information in the NSF Mission and Vision Statement, About This Report, Message from the Director, Other Information, and the Appendices, as listed in the Table of Contents of NSF's Agency Financial Report, are presented for purposes of additional analysis and are not a required part of the financial statements. Such information has not been subjected to the auditing procedures applied in the audits of the financial statements; accordingly, we do not express an opinion or provide any assurance on the information.

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**Other Reporting Required by *Government Auditing Standards***

In accordance with *Government Auditing Standards* and OMB Bulletin No. 17-03, we have also issued reports, dated November 14, 2017, on our consideration of NSF's internal control over financial reporting and on our tests of NSF's compliance with provisions of applicable laws, regulations, contracts, and grant agreements, as well as other matters for the years ended September 30, 2017. The purpose of those reports is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on internal control over financial reporting or on compliance and other matters. Those reports are an integral part of an audit performed in accordance with *Government Auditing Standards* and OMB Bulletin No. 17-03 and should be considered in assessing the results of our audit.

Alexandria, Virginia
November 14, 2017

KEARNEY& COMPANY

1701 Duke Street, Suite 500, Alexandria, VA 22314
PH: 703.931.5600, FX: 703.931.3655, www.kearneyco.com

# INDEPENDENT AUDITOR'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

To the Director and Inspector General of the National Science Foundation

We have audited the financial statements of the National Science Foundation (NSF) as of and for the years ended September 30, 2017 and 2016, and we have issued our report thereon dated November 14, 2017. We conducted our audits in accordance with auditing standards generally accepted in the United States of America; the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States; and Office of Management and Budget (OMB) Bulletin No. 17-03, *Audit Requirements for Federal Financial Statements*.

## Internal Control over Financial Reporting

In planning and performing our audits of the financial statements, we considered NSF's internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinion on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of NSF's internal control. Accordingly, we do not express an opinion on the effectiveness of NSF's internal control. We limited our internal control testing to those controls necessary to achieve the objectives described in OMB Bulletin No. 17-03. We did not test all internal controls relevant to operating objectives as broadly defined by the Federal Managers' Financial Integrity Act of 1982 (FMFIA), such as those controls relevant to ensuring efficient operations.

A deficiency in internal control exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent or detect and correct misstatements on a timely basis. A material weakness is a deficiency, or combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented or detected and corrected on a timely basis. A significant deficiency is a deficiency, or combination of deficiencies, in internal control that is less severe than a material weakness yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies; therefore, material weaknesses or significant deficiencies may exist that were not identified. Given these limitations, during our audit, we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

We noted certain additional matters involving internal control over financial reporting that we will report to NSF's management in a separate letter.

KEARNEY& COMPANY

**Status of Prior Year Finding**

In the *Independent Auditor's Report on Internal Control over Financial Reporting* within the audit report on NSF's fiscal year (FY) 2016 financial statements, we noted one issue that was related to internal control over financial reporting. The status of the FY 2016 internal control finding is summarized in the table below.

**Status of Prior-Year Finding**

| Control Deficiency | FY 2016 Status | FY 2017 Status |
|---|---|---|
| Information Technology (IT) Control Environment | Significant Deficiency | No longer considered a significant deficiency. |

**Purpose of this Report**

The purpose of this report is solely to describe the scope of our testing of internal control and the results of that testing, and not to provide an opinion on the effectiveness of NSF's internal control. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* and OMB Bulletin No. 17-03 in considering the entity's internal control. Accordingly, this communication is not suitable for any other purpose.

Kearney & Company

Alexandria, Virginia
November 14, 2017

KEARNEY& COMPANY

# Attachment I – National Science Foundation's Management Response

KEARNEY& COMPANY

OFFICE OF BUDGET, FINANCE & AWARD MANAGEMENT

**MEMORANDUM**

**Date:** November 6, 2017

**To:** Allison Lerner, Inspector General

**From:** Teresa Grancorvitz, Acting Chief Financial Officer

**Subject:** Management's Response to Independent Auditor's Report for Fiscal Year (FY) 2017

I appreciate the opportunity to comment on the draft Independent Public Auditor's Report on the National Science Foundation's (NSF) FY 2017 financial statements. During FY 2017, we continued the outstanding collaboration that began last year under unusually challenging conditions. Although every year carries its own set of unique challenges, I believe the strong basis of cooperation that we established last year coupled with constructive audit input, facilitated NSF's progress in achieving excellent audit results. Therefore, it is with great pleasure that NSF receives its 20th consecutive unmodified audit opinion on its financial statements. This accomplishment includes the continuation of its record of no material weaknesses in internal control over financial reporting, and the resolution of the prior year significant deficiency on NSF's information technology control environment.

I commend NSF's staff for their continued commitment to the success of the audit, while accomplishing our operational objectives and making continuous improvements in our systems and business processes. We also welcome the proactive and professional approach that Kearney & Company and your staff followed during the course of the audit.

If you have any questions or require additional information, please contact Mike Wetklow, Deputy Chief Financial Officer and Division Director for Financial Management at mwetklow@nsf.gov.

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# INDEPENDENT AUDITOR'S REPORT ON COMPLIANCE WITH LAWS, REGULATIONS, CONTRACTS, AND GRANT AGREEMENTS

To the Director and Inspector General of the National Science Foundation

We have audited the financial statements of the National Science Foundation (NSF) as of and for the years ended September 30, 2017 and 2016, and we have issued our report thereon dated November 14, 2017. We conducted our audits in accordance with auditing standards generally accepted in the United States of America; the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States; and Office of Management and Budget (OMB) Bulletin No. 17-03, *Audit Requirements for Federal Financial Statements*.

## Compliance and Other Matters

As part of obtaining reasonable assurance about whether NSF's financial statements are free from material misstatement, we performed tests of its compliance with provisions of applicable laws, regulations, contracts, and grant agreements, noncompliance which could have a direct and material effect on the determination of financial statement amounts, as well as provisions referred to in Section 803(a) of the Federal Financial Management Improvement Act of 1996 (FFMIA).

We limited our tests of compliance to these provisions and did not test compliance with all laws, regulations, contracts, and grant agreements applicable to NSF. Providing an opinion on compliance with those provisions was not an objective of our audits; accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards* and OMB Bulletin No. 17-03.

The results of our tests of compliance with FFMIA disclosed no instances in which NSF's financial management systems did not comply substantially with the Federal financial management system's requirements, applicable Federal accounting standards, or application of the United States Standard General Ledger at the transaction level.

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**Purpose of this Report**

The purpose of this report is solely to describe the scope of our testing of compliance and the results of that testing and, therefore, does not express an opinion on the effectiveness of the entity's compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* and OMB Bulletin No. 17-03 in considering the entity's compliance. Accordingly, this communication is not suitable for any other purpose.

Alexandria, Virginia
November 14, 2017


# National Science Foundation

## Financial Statements

As of and for the Fiscal Years ended
September 30, 2017 and 2016

**National Science Foundation**
**Balance Sheet**
**As of September 30, 2017 and 2016**
**(Amounts in Thousands)**

| **Assets** | | **2017** | | **2016** |
|---|---|---|---|---|
| Intragovernmental Assets | | | | |
| Fund Balance With Treasury (Note 2) | $ | 13,282,046 | $ | 12,971,429 |
| Accounts Receivable | | 9,780 | | 4,316 |
| Advances to Others | | 75,169 | | 64,682 |
| Total Intragovernmental Assets | | 13,366,995 | | 13,040,427 |
| Cash and Other Monetary Assets (Note 2) | | 30,359 | | 21,951 |
| Accounts Receivable, Net | | 2,276 | | 1,513 |
| General Property, Plant and Equipment, Net (Note 3) | | 281,888 | | 266,726 |
| **Total Assets** | **$** | **13,681,518** | **$** | **13,330,617** |
| **Liabilities** | | | | |
| Intragovernmental Liabilities | | | | |
| Accounts Payable | $ | 10,458 | $ | 25,105 |
| Other Intragovernmental Liabilities | | 4,574 | | 5,777 |
| Total Intragovernmental Liabilities | | 15,032 | | 30,882 |
| Accounts Payable | | 60,340 | | 120,441 |
| Actuarial FECA Liability | | 1,249 | | 1,171 |
| Environmental and Disposal Liabilities (Note 6) | | 10,189 | | 18,247 |
| Accrued Grant Liabilities | | 381,073 | | 412,639 |
| Accrued Payroll and Other Liabilities | | 7,751 | | 7,333 |
| Accrued Annual Leave | | 18,811 | | 18,012 |
| **Total Liabilities** | **$** | **494,445** | **$** | **608,725** |
| **Net Position** | | | | |
| Unexpended Appropriations - Other Funds | $ | 12,328,610 | $ | 11,923,203 |
| Cumulative Results of Operations - Other Funds | | 325,069 | | 289,469 |
| Cumulative Results of Operations - Dedicated Collections (Note 7) | | 533,394 | | 509,220 |
| **Total Net Position** | | **13,187,073** | | **12,721,892** |
| **Total Liabilities and Net Position** | **$** | **13,681,518** | **$** | **13,330,617** |

*The accompanying notes are an integral part of these statements.*

**National Science Foundation**
**Statement of Net Cost**
**For the Years Ended September 30, 2017 and 2016**
**(Amounts in Thousands)**

| **Program Costs (Note 8)** | **2017** | **2016** |
|---|---|---|
| Research and Related Activities | | |
| Gross Costs | $ 6,106,485 | $ 5,979,543 |
| Less: Earned Revenue | (99,531) | (108,177) |
| **Net Research and Related Activities** | **6,006,954** | **5,871,366** |
| Education and Human Resources | | |
| Gross Costs | $ 785,978 | $ 861,295 |
| Less: Earned Revenue | (4,043) | (2,514) |
| **Net Education and Human Resources** | **781,935** | **858,781** |
| Major Research Equipment and Facilities Construction | | |
| Gross Costs | $ 181,093 | $ 182,474 |
| Less: Earned Revenue | - | - |
| **Net Major Research Equipment and Facilities Construction** | **181,093** | **182,474** |
| Donations and Dedicated Collections | | |
| Gross Costs | $ 146,222 | $ 133,726 |
| Less: Earned Revenue | - | - |
| **Net Donations and Dedicated Collections** | **146,222** | **133,726** |
| **Net Cost of Operations (Notes 8 and 14)** | **$ 7,116,204** | **$ 7,046,347** |

*The accompanying notes are an integral part of these statements.*

**National Science Foundation**
**Statement of Changes in Net Position**
**For the Year Ended September 30, 2017**
**(Amounts in Thousands)**

| | 2017 | | |
|---|---|---|---|
| | Funds From Dedicated Collections | All Other Funds | Total |
| **Cumulative Results of Operations** | | | |
| **Beginning Balances (Note 7)** | $ 509,220 | 289,469 | 798,689 |
| **Budgetary Financing Sources** | | | |
| Appropriations Used | - | 6,996,111 | 6,996,111 |
| Non-exchange Revenue | - | 23 | 23 |
| Donations | - | 40,838 | 40,838 |
| Funds from Dedicated Collections | | | |
| Transferred In / (Out) (Note 7) | 138,135 | - | 138,135 |
| **Other Financing Sources** | | | |
| Transfers In / (Out) Without Reimbursement | - | 107 | 107 |
| Imputed Financing From Costs Absorbed By Others | - | 7,385 | 7,385 |
| Other | - | (6,621) | (6,621) |
| **Total Financing Sources** | **138,135** | **7,037,843** | **7,175,978** |
| **Net Cost of Operations (Notes 7, 8, and 14)** | **(113,961)** | **(7,002,243)** | **(7,116,204)** |
| **Cumulative Results of Operations (Note 7)** | **$ 533,394** | **325,069** | **858,463** |
| **Unexpended Appropriations** | | | |
| **Beginning Balances** | $ - | **11,923,202** | **11,923,202** |
| **Budgetary Financing Sources** | | | |
| Appropriations Received | - | 7,472,215 | 7,472,215 |
| Cancelled Authority Adjustments | - | (70,696) | (70,696) |
| Appropriations Used | - | (6,996,111) | (6,996,111) |
| **Total Budgetary Financing Sources** | **-** | **405,408** | **405,408** |
| **Total Unexpended Appropriations** | **$ -** | **12,328,610** | **12,328,610** |
| **Net Position** | **$ 533,394** | **12,653,679** | **13,187,073** |

*The accompanying notes are an integral part of these statements.*

**National Science Foundation**
**Statement of Changes in Net Position**
**For the Year Ended September 30, 2016**
**(Amounts in Thousands)**

| | 2016 | | |
|---|---|---|---|
| | Funds From Dedicated Collections | All Other Funds | Total |
| **Cumulative Results of Operations** | | | |
| **Beginning Balances (Note 7)** | $ 469,922 | 308,703 | 778,625 |
| **Budgetary Financing Sources** | | | |
| Appropriations Used | - | 6,897,524 | 6,897,524 |
| Non-exchange Revenue | - | 26 | 26 |
| Donations | - | 24,416 | 24,416 |
| Funds from Dedicated Collections | | | |
| Transferred In / (Out) (Note 7) | 139,293 | - | 139,293 |
| **Other Financing Sources** | | | |
| Transfers In / (Out) Without Reimbursement | - | - | - |
| Imputed Financing From Costs Absorbed By Others | - | 9,020 | 9,020 |
| Other | - | (3,868) | (3,868) |
| **Total Financing Sources** | **139,293** | **6,927,118** | **7,066,411** |
| **Net Cost of Operations (Notes 7, 8, and 14)** | **(99,995)** | **(6,946,352)** | **(7,046,347)** |
| **Cumulative Results of Operations (Note 7)** | **$ 509,220** | **289,469** | **798,689** |
| **Unexpended Appropriations** | | | |
| **Beginning Balances** | **$ -** | **11,427,234** | **11,427,234** |
| **Budgetary Financing Sources** | | | |
| Appropriations Received | - | 7,463,485 | 7,463,485 |
| Cancelled Authority Adjustments | - | (69,992) | (69,992) |
| Appropriations Used | - | (6,897,524) | (6,897,524) |
| **Total Budgetary Financing Sources** | **-** | **495,969** | **495,969** |
| **Total Unexpended Appropriations** | **$ -** | **11,923,203** | **11,923,203** |
| **Net Position** | **$ 509,220** | **12,212,672** | **12,721,892** |

*The accompanying notes are an integral part of these statements.*

**National Science Foundation**
**Statement of Budgetary Resources**
**For the Years Ended September 30, 2017 and 2016**
**(Amounts in Thousands)**

| | 2017 | 2016 |
|---|---|---|
| **Budgetary Resources** | | |
| Unobligated Balance - Brought Forward, October 1 | $ 348,265 | $ 394,527 |
| Recoveries of Prior Year Unpaid Obligations | 123,260 | 105,748 |
| Other Changes in Unobligated Balance | (70,064) | (67,967) |
| Unobligated Balance from Prior Year Budget Authority, Net | 401,461 | 432,308 |
| Appropriations | 7,651,210 | 7,627,220 |
| Spending Authority from Offsetting Collections | 68,026 | 97,461 |
| **Total Budgetary Resources (Note 12)** | **$ 8,120,697** | **$ 8,156,989** |
| **Status of Budgetary Resources** | | |
| New Obligations and Upward Adjustments (Note 9 & 12) | $ 7,754,266 | $ 7,808,724 |
| Unobligated Balance, End of Year | | |
| Apportioned, Unexpired (Note 2) | 183,264 | 160,313 |
| Unapportioned, Unexpired (Note 2) | 24,102 | 28,162 |
| Unobligated Balance, Unexpired, End of Year | 207,366 | 188,475 |
| Unobligated Balance, Expired, End of Year (Note 2) | 159,065 | 159,790 |
| Total Unobligated Balance, End of Year | 366,431 | 348,265 |
| **Total Status of Budgetary Resources** | **$ 8,120,697** | **$ 8,156,989** |
| **Change in Obligated Balance** | | |
| Unpaid Obligations | | |
| Unpaid Obligations - Brought Forward, October 1 | $ 12,740,408 | $ 12,078,549 |
| New Obligations and Upward Adjustments (Note 9) | 7,754,266 | 7,808,724 |
| Gross Outlays | (7,351,520) | (7,041,117) |
| Recoveries of Prior Year Unpaid Obligations | (123,260) | (105,748) |
| Unpaid Obligations, End of Year | 13,019,894 | 12,740,408 |
| Uncollected Payments | | |
| Uncollected Payments from Federal Sources - Brought Forward, October 1 | $ (95,386) | $ (103,956) |
| Change in Uncollected Payments from Federal Sources | 21,425 | 8,570 |
| Uncollected Payments from Federal Sources, End of Year | (73,961) | (95,386) |
| Memorandum (non-add) Entries | | |
| Obligated Balance, Start of Year | $ 12,645,022 | $ 11,974,593 |
| Obligated Balance, End of Year (Note 2) | $ 12,945,933 | $ 12,645,022 |
| **Budget Authority and Outlays, Net** | | |
| Budget Authority, Gross | $ 7,719,236 | $ 7,724,681 |
| Actual Offsetting Collections | (90,082) | (108,056) |
| Change in Uncollected Payments from Federal Sources | 21,425 | 8,570 |
| Recoveries of Prior Year Paid Obligations | 631 | 2,025 |
| Budget Authority, Net | **$ 7,651,210** | **$ 7,627,220** |
| Gross Outlays | $ 7,351,520 | $ 7,041,117 |
| Actual Offsetting Collections | (90,082) | (108,056) |
| Net Outlays | **7,261,438** | **6,933,061** |
| Distributed Offsetting Receipts (Note 12) | (46,140) | (28,648) |
| Net Agency Outlays | **$ 7,215,298** | **$ 6,904,413** |

*The accompanying notes are an integral part of these statements.*

# Notes to the Principal Financial Statements

## Note 1. Summary of Significant Accounting Policies

### *A. Reporting Entity*

The National Science Foundation (NSF or "Foundation") is an independent federal agency created by the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-75). Its primary mission is to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense. NSF initiates and supports scientific research and research fundamental to the engineering process and programs to strengthen the Nation's science and engineering potential. NSF also supports critical education programs in science, technology, engineering, and mathematics (STEM) fields, which help prepare future generations of scientists and engineers. NSF funds research and education in science and engineering by awarding grants and contracts to educational and research institutions throughout the United States and its territories. NSF, by law, cannot operate research facilities except in the polar regions. NSF enters into relationships through awards to fund the research operations conducted by grantees. Information on NSF funding by institution can be found at https://dellweb.bfa.nsf.gov/AwdLst2/default.asp NSF is led by a presidentially-appointed, Senate confirmed, Director and the 24-member National Science Board (NSB). The NSB members represent a cross section of prominent leaders in science and engineering research and education, and are appointed by the President for 6-year terms. The NSF Director is an e*x officio* member of the Board.

NSF has a total workforce of about 2,100 at its Alexandria, VA, headquarters, including the staff of the NSB Office and the Office of the Inspector General. The NSF workforce includes approximately 1,400 career employees, 200 rotator scientists from research institutions in temporary positions, and 450 contract workers. NSF provides the opportunity for scientists, engineers, and educators to join the Foundation as temporary program directors and advisors. These "rotators" provide input during the merit review process of proposals; provide insight for new directions in the fields of science, engineering, and education; and support cutting-edge interdisciplinary research. Rotators can come to NSF under multiple mechanisms. The largest numbers come on Intergovernmental Personnel Act assignments, or IPAs, who remain employees of their home institutions. NSF facilitates IPA assignments through grants to their institution as a reimbursement in whole or in part for salary and benefits, and that reimbursement is then paid by the institution to their employee. All rotators are subject to criminal conflict of interest statutes as well as the Government-wide Standards of Ethical Conduct of Employees of the Executive Branch which prohibit them from participating in NSF proposals and awards affecting themselves and their home organizations.

### *B. Basis of Presentation*

These financial statements have been prepared to report the financial position and results of operations of NSF as required by the Chief Financial Officers Act of 1990, the Government Management Reform Act of 1994, the Reports Consolidation Act of 2000, and the Office of Management and Budget (OMB) Circular No. A-136, *Financial Reporting Requirements*. While the statements have been prepared from the books and records of NSF in accordance with United States Generally Accepted Accounting Principles (U.S. GAAP) for federal entities and the formats prescribed by OMB, the statements are in addition to the financial reports used to monitor and control budgetary resources, which are prepared from the same books and records.

### *C. Basis of Accounting*

The accompanying financial statements have been prepared in accordance with U.S. GAAP for federal entities using the accrual method of accounting. Under the accrual method, revenues are recognized when earned, and expenses are recognized when a liability is incurred, without regard to receipt or payment of

cash. The accompanying financial statements also include budgetary accounting transactions that ensure compliance with legal constraints and controls over the use of federal funds.

### *D. Revenues and Other Financing Sources*

NSF receives the majority of its funding through appropriations contained in the Commerce, Justice, Science, and Related Agencies Appropriations Act. NSF receives annual, multi-year, and no-year appropriations that may be expended within statutory limits. NSF also receives funding via warrant from a receipt account for dedicated collections that is reported as H-1B Nonimmigrant Petitioner Account (H-1B) funds. Additional amounts are obtained from reimbursements for services provided to other federal agencies as well as from receipts to the NSF Donations Account. Also, NSF receives interest earned on overdue receivables and excess cash advances to grantees. The interest earned on overdue receivables and excess cash advances to grantees is returned to Treasury at the end of each fiscal year.

In FY 2017, the Science Appropriations Act, 2017 under Public Law 115-31, provided funding for each of NSF's appropriations. In addition, the Act provided an administrative provision allowing NSF to transfer up to 5 percent of current year funding between appropriations. Appropriations are recognized as a financing source at the time the related "funded" program or administrative expenditures are incurred. Appropriations are also recognized when used to purchase Property, Plant and Equipment (PP&E). "Unfunded" liabilities result from liabilities not covered by budgetary resources and will be paid when future appropriations are made available for these purposes. Donations are recognized as revenues when funds are received. Revenues from reimbursable agreements are recognized when the services are provided and the related expenditures are incurred. Reimbursable agreements are mainly for grant administrative services provided by NSF on behalf of other federal agencies.

Under the general authority of the Foundation, NSF is authorized to accept and use both U.S. and foreign funds in the NSF Donations Account. In accordance with 42 U.S.C. 1862 Section 3 (a)(3), NSF has authority "to foster the interchange of scientific and engineering information among scientists and engineers in the United States and foreign countries" and in 42 U.S.C. 1870 Section 11 (f), NSF is authorized to receive and use funds donated by others. Donations may be received from foreign governments, private companies, academic institutions, non-profit foundations, and individuals. These funds must be donated without restriction other than that they be used in furtherance of one or more of the general purposes of the Foundation. Funds are made available for obligations as necessary to support NSF programs.

### *E. Fund Balance with Treasury and Cash and Other Monetary Assets*

*Fund Balance with Treasury* is composed of appropriated funds that are available to pay current liabilities and finance authorized purchase commitments. *Cash and Other Monetary Assets* include non-appropriated funding sources from donations and undeposited collections. Cash receipts and disbursements are processed by Treasury.

### *F. Accounts Receivable*

*Accounts Receivable* consist of amounts due from governmental agencies, private organizations, and individuals. Additionally, NSF has the right to conduct audits on awardees to verify billed amounts. These audits may result in monies owed back to NSF. Upon resolution of the amount owed by the awardee to NSF, a receivable is recorded.

NSF establishes an allowance for loss on accounts receivable from non-federal sources that are deemed uncollectible but regards amounts due from other federal agencies as fully collectible. NSF analyzes each account independently to assess collectability and the need for an offsetting allowance or write-off. NSF writes off delinquent debt from non-federal sources that is more than 2 years old.

### *G. Advances to Others*

*Advances to Others* consist of advances to federal agencies which are issued when agencies are operating under working capital funds or are unable to incur costs on a reimbursable basis. Advances are reduced when documentation supporting expenditures is received and recorded. Additionally, some NSF grantees receive advanced funds prior to incurring expenses. Payments are only made within the amount of the recorded grant obligation and are intended to cover immediate cash needs.

### *H. General Property, Plant and Equipment, Net*

NSF capitalizes PP&E with costs exceeding $25.0 thousand and useful lives of 2 or more years; items not meeting these criteria are recorded as operating expenses. NSF currently reports capitalized PP&E at original acquisition cost; assets acquired from the General Services Administration (GSA) excess property schedules are recorded at the value assigned by the donating agency; and assets transferred in from other agencies are valued at the cost recorded by the transferring entity for the asset net of accumulated depreciation or amortization.

The PP&E balance consists of Equipment, Aircraft and Satellites, Buildings and Structures, Leasehold Improvements, Construction in Progress, Internal Use Software, and Software in Development. These balances are comprised of PP&E maintained "in-house" by NSF to support operations and PP&E under the U.S. Antarctic Program (USAP). The majority of USAP property is under the custodial responsibility of the NSF prime contractor for the program.

Depreciation expense is calculated using the straight-line half-year convention. The economic useful life classifications for capitalized assets are as follows:

**Equipment**

| | |
|---|---|
| 5 years | Computers and peripheral equipment, fuel storage tanks, laboratory equipment, and vehicles |
| 7 years | Communications equipment, office furniture and equipment, pumps and compressors |
| 10 or 15 years | Generators, Department of Defense equipment |
| 20 years | Movable buildings (e.g., trailers) |

**Aircraft and Satellites**

| | |
|---|---|
| 7 years | Aircraft, aircraft conversions, and satellites |

**Buildings and Structures**

| | |
|---|---|
| 31.5 years | Buildings and structures placed in service prior to 1994 |
| 39 years | Buildings and structures placed in service after 1993 |

**Leasehold Improvements**

NSF's headquarters are leased through GSA under an occupancy agreement. The cancellation clause within the agreement allows NSF to terminate use with a 120-day notice. NSF is billed by GSA for the leased space as rent based upon estimated lease payments made by GSA plus an administrative fee. Therefore, the cost of headquarters is not capitalized by NSF. All NSF leases are cancellable and/or in effect for a period of no more than 1 year. Leasehold improvements performed by GSA are financed with NSF appropriated funds. Amortization is calculated using the straight-line half-year convention upon transfer from construction in progress.

**Construction in Progress**

Costs incurred for construction projects are accumulated and tracked as construction in progress until the asset is placed in service. At 75 percent completion of real property construction, an on-site

Conditional Occupancy inspection is performed to evaluate for compliance with the approved plans, design, specifications, and changes. Items that pertain to the safety and health of any future occupants of the facility must be corrected before a Conditional Occupancy is granted and the facility occupied. When Conditional Occupancy is granted, the completed project is transferred from construction in progress to real property and depreciated over the respective useful life of the asset.

**Internal Use Software and Software in Development**

NSF controls, values, and reports purchased or developed software as tangible property assets, in accordance with the Statement of Federal Financial Accounting Standards (SFFAS) No. 10, *Accounting for Internal Use Software*. NSF identifies software investments as capital property for items that, in the aggregate, cost $500.0 thousand or more to purchase, develop, enhance, or modify a new or existing NSF system, or configure a government-wide system for NSF needs. Software projects that are not completed at year end and are expected to exceed the capitalization threshold are recorded as software in development. All internal use software meeting the capitalization threshold is amortized over a 5-year period using the straight-line half-year convention.

*Assets Owned by NSF in the Custody of Other Entities*: NSF awards grants, cooperative agreements, and contracts to various organizations, including colleges and universities, non-profit organizations, state and local governments, Federally Funded Research and Development Centers (FFRDCs), and private entities. The funds provided may be used in certain cases to purchase or construct PP&E to be used for operations or research on projects or programs sponsored by NSF. In these instances, NSF funds the acquisition of property, but transfers control of the assets to these entities. NSF's authorizing legislation specifically prohibits the Foundation from operating such property directly.

In practice, NSF's ownership interest in such PP&E is similar to a reversionary interest. To address the accounting and reporting of these assets, specific guidance was sought by NSF and provided by the Federal Accounting Standards Advisory Board (FASAB). This guidance stipulates that NSF should: (i) disclose the value of such PP&E held by others in its financial statements based on information contained in the audited financial statements of these entities (if available); and (ii) report information on costs incurred to acquire the research facilities, equipment, and platforms in the Research and Human Capital Activity costs as required by SFFAS No. 8, *Supplementary Stewardship Reporting*. Very few entities disclose information on NSF-owned property in their audited financial statements. Therefore, NSF has elected to disclose only the number of entities in possession of NSF-owned property. Entities that separately present the book value of NSF-owned property in their audited financial statements and FFRDCs, if applicable, are listed in Note 4, *General Property, Plant and Equipment in the Custody of Other Entities*, along with the book value of the property held.

### *I. Other Intragovernmental Liabilities*

*Other Intragovernmental Liabilities* consist of advances from others, federal payroll payable, and liabilities for non-entity assets. *Advances From Others* consist of amounts obligated and advanced by other federal entities to NSF for grant administration and other services to be furnished under reimbursable agreements. Liabilities for federal payroll payable consist of the federal portion of payroll benefits, taxes, and unfunded Federal Employees' Compensation Act (FECA) liabilities. Liabilities for non-entity assets are recorded to offset accounts receivable balances associated with cancelled appropriations.

### *J. Accounts Payable*

*Accounts Payable* consist of liabilities to commercial vendors, contractors, federal agencies, and disbursements in transit. *Accounts Payable* to federal agencies, commercial vendors, and contractors are expenses for goods and services received but not yet paid for by NSF at the end of the fiscal year. At year end, NSF accrues for the amount of estimated unpaid expenses to vendors for which invoices have not been

received, but goods and services have been delivered and rendered. *Accounts Payable* also consist of disbursements in transit recorded by NSF but not paid by Treasury.

### *K. Accrued Grant Liabilities*

*Accrued Grant Liabilities* consist of estimated liabilities to grantees for expenses incurred but not reported (IBNR) by September 30. NSF's grant accrual methodology utilizes a linear regression model based on the statistical correlation between prior year unliquidated obligations and prior year expenses IBNR. NSF utilizes the Award Cash Management Service (ACM$), a grantee cash request and expenditure reporting system. ACM$ enables all grantee institutions to request funds at the award level to support project needs.

### *L. Accrued Payroll and Other Liabilities*

*Accrued Payroll and Other Liabilities* consist of accrued payroll and undeposited collections. NSF's payroll services are provided by the Department of the Interior's Interior Business Center. *Accrued Payroll* relates to services rendered by NSF employees, for which they have not yet been paid. At year end, NSF accrues the amount of salaries and benefits earned, but not yet paid. Undeposited collections are funds received by NSF, but not remitted to Treasury prior to September 30.

### *M. Employee Benefits*

A liability is recorded for actual and estimated future payments to be made for workers' compensation pursuant to the FECA. The estimated actuarial FECA liability consists of the net present value of estimated future payments calculated by the U.S. Department of Labor (DOL) and the actual unreimbursed cost paid by DOL for compensation paid to recipients under FECA. The actual costs incurred are reflected as a liability because NSF will reimburse DOL 2 years after the actual payment of expenses. Future NSF Agency Operations and Award Management (AOAM) appropriations are used for DOL's estimated reimbursement.

Annual leave is accrued as it is earned, and the accrual is reduced as leave is taken. Each year, the balance in the accrued annual leave account is adjusted to reflect changes. To the extent current and prior-year appropriations are not available to fund annual leave earned but not taken, funding will be obtained from future AOAM appropriations. Sick leave and other types of non-vested leave are expensed as taken.

### *N. Net Position*

Net Position is the residual difference between assets and liabilities and is composed of unexpended appropriations and cumulative results of operations. *Unexpended Appropriations* represent the amount of undelivered orders and unobligated balances of budget authority. Unobligated balances are the amount of appropriations or other authority remaining after deducting the cumulative obligations from the amount available for obligation. The *Cumulative Results of Operations* represent the net results of NSF's operations since the Foundation's inception.

### *O. Retirement Plan*

In FY 2017, approximately 6 percent of NSF employees participated in the Civil Service Retirement System (CSRS), to which NSF matches contributions equal to 7 percent of pay. The majority of NSF employees are covered by the Federal Employees Retirement System (FERS) and Social Security. A primary feature of FERS is the thrift savings plan to which NSF automatically contributes 1 percent of pay. The maximum NSF matching contribution is 5 percent of employee pay, of which 3 percent is fully matched, and 2 percent is matched at 50 percent. NSF also contributes the employer's matching share for Social Security for FERS participants.

Although NSF funds a portion of the benefits under FERS and CSRS relating to its employees and withholds the necessary payroll deductions, the Foundation has no liability for future payments to employees under these plans, nor does NSF report CSRS, FERS, Social Security assets, or accumulated

plan benefits on its financial statements. Reporting such amounts is the responsibility of the Office of Personnel Management (OPM) and the Federal Retirement Thrift Investment Board.

SFFAS No. 5, *Accounting for Liabilities of the Federal Government*, requires employing agencies to recognize the cost of pensions and other retirement benefits during their employees' active years of service. OPM actuaries determine pension cost factors by calculating the value of pension benefits expected to be paid in the future, and provide these factors to the agency for current period expense reporting. Information is also provided by OPM regarding the full cost of health and life insurance benefits on the OPM Benefit Administration website.[1]

### *P. Contingencies and Possible Future Costs*

*Contingencies - Claims and Lawsuits*: NSF is a party to various legal actions and claims brought against it. In the opinion of NSF management and legal counsel, the ultimate resolution of the actions and claims will not materially affect the financial position or operations of the Foundation. NSF recognizes the contingency in the financial statements when claims are expected to result in a material loss (and the payment amounts can be reasonably estimated), whether from NSF's appropriations or the Judgment Fund, administered by the Department of Justice under Section 1304 of Title 31 of the United States Code.

Claims and lawsuits can also be made and filed against awardees of the Foundation by third parties. NSF is not a party to these actions and NSF believes there is no possibility that NSF will be legally required to satisfy such claims. Judgments or settlements of the claims against awardees that impose financial obligation on them may be claimed as costs under the applicable contract, grant, or cooperative agreement and thus may affect the allocation of program funds in future fiscal years. In the event that the claim becomes probable and amounts can be reasonably estimated, the claim will be recognized.

*Contingencies – Unasserted Claims*: For claims and lawsuits that have not been made and filed against the Foundation, NSF management and legal counsel determine, in their opinion, whether resolution of the actions and claims they are aware of will materially affect the Foundation's financial position or operations. NSF recognizes a contingency in the financial statements when unasserted claims are probable of assertion, and if asserted, would be probable of an unfavorable outcome and expected to result in a measurable loss, whether from NSF's appropriations or the Judgment Fund. NSF discloses unasserted claims if the loss is more likely than not to occur, but the materiality of a potential loss cannot be determined.

*Termination Claims*: NSF engages organizations, including FFRDCs, in cooperative agreements and contracts to manage, operate, and maintain research facilities for the benefit of the scientific community. As part of these agreements and contracts, NSF funds on a pay-as-you-go basis certain employee benefit costs (accrued vacation and other employee related liabilities, severance pay and medical insurance), long term leases, and vessel usage and drilling. In some instances, an award decision is made to continue operation of a facility with a different entity performing operation and management duties. In such an occurrence, NSF does not classify the facility as terminated. Claims submitted by the previous managing entity for expenditures not covered by the indirect cost rate included in the initial award are subject to audit and typically paid with existing program funds.

Agreements with FFRDCs include a clause that commits NSF to seek appropriations for termination expenses, if necessary, in the event a facility is terminated. NSF considers termination of these facilities only remotely possible. Should a facility be terminated, NSF is obligated to seek termination expenses for FFRDCs in excess of the limitation of funds set forth in the agreements, including any Post-Retirement Benefit liabilities, from Congress. Nothing in these agreements can be construed as implying that Congress will appropriate funds to meet the terms of any claims. Termination costs that may be payable to an FFRDC

[1] OPM Benefit Administration website:
https://www.opm.gov/retirement-services/publications-forms/benefits-administration-letters/2017/17-102.pdf

operator cannot be estimated until such time as the facility is terminated. In September 2017, a hurricane struck the United States territory of Puerto Rico where NSF provides funding for a facility, Arecibo Observatory, which was damaged by the hurricane. It is uncertain at this time if the hurricane damage sustained by the Arecibo Observatory in Puerto Rico will result in a financial impact to the facility and NSF. Due to the high degree of uncertainty and the evolving situation, the timeline for assessing these costs is uncertain.

*Environmental and Disposal Liabilities*: NSF manages USAP. The Antarctic Conservation Act and its implementing regulations identify the requirements for environmental clean-up in Antarctica. NSF continually monitors USAP in regards to environmental issues. NSF establishes its environmental liability estimates in accordance with the requirements of the SFFAS No. 5, *Accounting for Liabilities of the Federal Government*, and as amended by SFFAS No. 12, *Recognition of Contingent Liabilities Arising from Litigation*, and the Federal Financial Accounting and Auditing Technical Release No. 2, *Determining Probable and Reasonably Estimable for Environmental Liabilities in the Federal Government*.

While NSF is not legally liable for environmental clean-up costs in the Antarctic, there are occasions when the NSF Division of Polar Programs chooses to accept responsibility and commit funds toward clean-up efforts of various sites as resources permit. Decisions to commit funds are in no way driven by concerns of probable legal liability for failure to engage in such efforts, but rather a commitment to environmental stewardship of Antarctic natural resources. Environmental clean-up projects started and completed during the year are reflected in NSF's financial statements as expenses for the current fiscal year. An estimated cost would be accrued for approved projects that are anticipated to be performed after the fiscal year end or will take more than one fiscal year to complete.

Separate from environmental clean-up costs related to the Antarctic Conservation Act, NSF discloses NSF-owned buildings in the Antarctic that have been identified as having, or expected to have, friable and non-friable asbestos containing material. NSF's estimated cost for asbestos related clean-up is shown on the Balance Sheet as a liability. Additional detail on the estimate methodology is included in Note 6, *Environmental and Disposal Liability*.

### *Q. Use of Estimates*

Management has made certain estimates and assumptions when reporting assets, liabilities, revenues, and expenses, and also in the note disclosures. Estimates underlying the accompanying financial statements include accounting for grant liabilities, accounts payable, environmental liabilities, payroll, and PP&E. Actual results may differ from these estimates, and the difference will be adjusted for and included in the financial statements of the following fiscal year.

### *R. Reclassifications*

In FY 2017, certain FY 2016 balances related to advances from others and accounts payable with federal agencies were reclassified to conform to FY 2017 presentation on the Balance Sheet. These reclassifications have no effect on previously reported total assets, liabilities, or net position.

## Note 2. Fund Balance With Treasury

*Fund Balance with Treasury* (FBWT) consisted of the following components as of September 30, 2017 and 2016:

| (Amounts in Thousands) | 2017 | | | |
|---|---|---|---|---|
| | Appropriated Funds | Donated Funds | Funds from Dedicated Collections | Total |
| Obligated | $ 12,453,155 | $ 42,255 | $ 450,523 | $ 12,945,933 |
| Unobligated Available, Unexpired | 67,090 | 30,872 | 85,302 | 183,264 |
| Unobligated Unavailable, Unexpired | 10,795 | 1,750 | 11,557 | 24,102 |
| Unobligated Unavailable, Expired | 159,065 | - | - | 159,065 |
| Less: Cash and Other Monetary Assets | (41) | (30,318) | - | (30,359) |
| Add: Undeposited Collections | 41 | - | - | 41 |
| Total FBWT | $ 12,690,105 | $ 44,559 | $ 547,382 | $ 13,282,046 |

| (Amounts in Thousands) | 2016 | | | |
|---|---|---|---|---|
| | Appropriated Funds | Donated Funds | Funds from Dedicated Collections | Total |
| Obligated | $ 12,155,149 | $ 36,858 | $ 453,015 | $ 12,645,022 |
| Unobligated Available, Unexpired | 75,882 | 22,268 | 62,163 | 160,313 |
| Unobligated Unavailable, Unexpired | 14,031 | 1,666 | 12,465 | 28,162 |
| Unobligated Unavailable, Expired | 159,790 | - | - | 159,790 |
| Less: Cash and Other Monetary Assets | (93) | (21,858) | - | (21,951) |
| Add: Undeposited Collections | 93 | - | - | 93 |
| Total FBWT | $ 12,404,852 | $ 38,934 | $ 527,643 | $ 12,971,429 |

The NSF Donations Account includes amounts donated to NSF from all sources. Funds in the NSF Donations Account may be used to further one or more of the general purposes of the Foundation. The donated funds are reported as FBWT or as *Cash and Other Monetary Assets*. Donations reported as *Cash and Other Monetary Assets* represent cash held outside of Treasury at commercial banks in interest bearing accounts. These funds are collateralized up to $26.4 million by the bank, through the Federal Reserve Bank of St. Louis, in accordance with Treasury Financial Manual Volume 1, Chapter 6-9000. *Undeposited Collections* are funds received by NSF, but not remitted to Treasury prior to September 30. *Unobligated Available* balances include current-period amounts available for obligation or commitment. *Unobligated Unavailable* balances include recoveries of prior year obligations and other unobligated expired funds that are unavailable for new obligations.

In FY 1999, in accordance with P.L. 105-277, a special fund, H-1B account, was established in the general fund of the U.S. Treasury. These funds are considered Funds from Dedicated Collections and are not included in Appropriated Funds. The funds represent fees collected for each petition for nonimmigrant status. Under the law, NSF was prescribed a percentage of these fees for specific programs.

## Note 3. General Property, Plant and Equipment, Net

The components of *General Property, Plant and Equipment, Net* as of September 30, 2017 and 2016 are shown below. As of September 30, 2017, NSF had not identified any asset impairments.

| (Amounts in Thousands) | 2017 | | |
|---|---|---|---|
| | Acquisition Cost | Accumulated Depreciation | Net Book Value |
| Equipment | $ 164,796 | $ (148,675) | $ 16,121 |
| Aircraft and Satellites | 115,806 | (115,806) | - |
| Buildings and Structures | 314,961 | (146,138) | 168,823 |
| Leasehold Improvements | 39,906 | (12,600) | 27,306 |
| Construction in Progress | 841 | - | 841 |
| Internal Use Software | 88,294 | (62,307) | 25,987 |
| Software in Development | 42,810 | - | 42,810 |
| Total PP&E | $ 767,414 | $ (485,526) | $ 281,888 |

| (Amounts in Thousands) | 2016 | | |
|---|---|---|---|
| | Acquisition Cost | Accumulated Depreciation | Net Book Value |
| Equipment | $ 154,365 | $ (137,650) | $ 16,715 |
| Aircraft and Satellites | 115,806 | (115,806) | - |
| Buildings and Structures | 319,125 | (141,477) | 177,648 |
| Leasehold Improvements | 11,705 | (11,524) | 181 |
| Construction in Progress | 2,710 | - | 2,710 |
| Internal Use Software | 87,189 | (46,313) | 40,876 |
| Software in Development | 28,596 | - | 28,596 |
| Total PP&E | $ 719,496 | $ (452,770) | $ 266,726 |

## Note 4. General Property, Plant, and Equipment in the Custody of Other Entities

NSF received a ruling from FASAB on accounting for PP&E owned by NSF but in the custody of and used by others (see Note 1H. *General Property, Plant, and Equipment, Net*). The FASAB guidance requires PP&E in the custody of others be excluded from NSF PP&E as defined in the SFFAS No. 6, *Accounting for Property, Plant and Equipment*. NSF is required to disclose the dollar amount of NSF PP&E held by others in the footnotes based on information contained in the most recently issued audited financial statements of the organization holding the assets.

As of September 30, 2017, there were 26 colleges or universities and 22 commercial entities that were given award funds for property. With the exception of the entities listed below, none of the colleges, universities or commercial entities reported NSF-owned property separately.

The amount of PP&E owned by NSF but in the custody of an NSF awardee is identified in the table below. In some cases entities operate on a fiscal year end basis other than September 30.

(Amounts in Thousands)

| *Entities with Reported NSF Government Owned Equipment* | Amount | Fiscal Year Ending |
|---|---|---|
| Association of Universities for Research in Astronomy, Inc. - AURA | $750,783 | 9/30/16 |
| Consortium for Ocean Leadership - COL | $166,076 | 9/30/16 |
| Incorporated Research Institutions for Seismology - IRIS | $2,649 | 6/30/16 |
| National Radio Astronomy Observatory - AUI | $452,519 | 9/30/16 |
| University Corporation for Atmospheric Research - UCAR | $211,016 | 9/30/16 |

## Note 5. Leases

In addition to its headquarters, NSF occupies common spaces with other federal agencies overseas through the Department of State's (State) International Cooperative Administrative Support Services (ICASS) system. NSF uses ICASS in Brussels and Tokyo for residential and non-residential space. Previously, NSF used ICASS in Beijing, but that lease expired in FY 2017. In FY 2016, the NSF Europe Regional Office relocated from Paris, France to Brussels, Belgium, resulting in the termination of the Paris lease. ICASS is a voluntary cost distribution system and the agreement to receive ICASS services is through an annual Memorandum of Understanding (MOU) between NSF and State. Additionally, NSF leases residential space in Tokyo. As with all NSF leases, this lease is cancellable and/or for a period not more than a year. NSF leases its headquarters under an operating lease with GSA. The cancellation clause within the agreement allows NSF to terminate use with a 120-day notice. In August 2017, NSF relocated to a new headquarters in Alexandria, VA. The following is a schedule of future minimum lease payments for the current and future headquarters, warehouses, and office space in Denver, Colorado. The current leases are active through FY 2032.

(Amounts in Thousands)

| Fiscal Year | | Building Operating Lease Amount |
|---|---|---|
| 2018 | | 29,821 |
| 2019 | | 24,831 |
| 2020 | | 24,815 |
| 2021 | | 24,866 |
| 2022 | | 24,902 |
| 2023 and After | | 251,537 |
| Total Minimum Lease Payments | $ | 380,772 |

## Note 6. Environmental and Disposal Liability

Pursuant to FASAB Technical Bulletin 2006-1, *Recognition and Measurement of Asbestos-Related Cleanup Costs*, federal entities are required to recognize a liability for federal property asbestos cleanup costs. Some NSF owned buildings and structures used to support the USAP have been identified as having, or expected to have, friable and non-friable asbestos containing material.

As required by SFFAS No. 6, *Accounting for Property, Plant and Equipment*, NSF works with the current USAP contractor through the Antarctic Support Contract (ASC) to determine the need for asbestos liability adjustments based on actual asbestos costs incurred on an annual basis. Actual asbestos remediation costs are submitted quarterly by the ASC and the asbestos liability is reduced by the reported amount. No asbestos remediation costs were incurred as of September 30, 2017. During FY 2017, changes to NSF's estimated asbestos liability consisted of cost re-estimates, resulting in a decrease from $18.2 million in FY 2016 to $10.2 million in FY 2017.

## Note 7. Funds from Dedicated Collections

In FY 1999, Title IV of the American Competitiveness and Workforce Improvement Act of 1998 (P.L. 105-277) established the H-1B Nonimmigrant Petitioner Account in the General Fund of the U.S. Treasury. Funding is established from fees collected for alien, nonimmigrant status petitions. This law requires that a prescribed percentage of the funds in the account be made available to NSF for the following activities:

- Computer Science, Engineering, and Mathematics Scholarship (CSEMS)
- Grants for Mathematics, Engineering, or Science Enrichment Courses
- Systemic Reform Activities

The H-1B Nonimmigrant Petitioner fees are available to the Director of NSF until expended. The funds may be used for scholarships to low income students, or to carry out a direct or matching grant program to support private and/or public partnerships in K-12 education. The H-1B fund is set up as a permanent indefinite appropriation by NSF. These funds are described in the Budget of the United States Government (President's Budget). *Funds from Dedicated Collections* are accounted for in a separate Treasury Account Symbol (TAS), and the budgetary resources are recorded as *Funds from Dedicated Collections Transferred In / (Out).* *Funds from Dedicated Collections* are reported in accordance with SFFAS No. 43, *Funds from Dedicated Collections: Amending Statement of Federal Financial Accounting Standards 27, Identifying and Reporting Earmarked Funds.* For the years ended September 30, 2017 and September 30, 2016, NSF was subject to H-1B sequestrations in the amount of $9.7 million and $6.8 million, respectively.

| (Amounts in Thousands) | 2017 | 2016 |
|---|---|---|
| **Balance Sheet as of September 30, 2017 and 2016** | | |
| Fund Balance With Treasury | $ 547,382 | $ 527,643 |
| Intragovernmental Advances to Others | - | 313 |
| Accounts Receivable, Net | 51 | - |
| Total Assets | 547,433 | 527,956 |
| Accounts Payable | 94 | 3,289 |
| Accrued Grant Liabilities | 13,945 | 15,447 |
| Total Liabilities | 14,039 | 18,736 |
| Cumulative Results of Operations | 533,394 | 509,220 |
| Total Liabilities and Net Position | $ 547,433 | $ 527,956 |
| **Statement of Net Cost for the Years Ended September 30, 2017 and 2016** | | |
| Program Costs | $ 113,961 | $ 99,995 |
| Net Cost of Operations | $ 113,961 | $ 99,995 |
| **Statement of Changes in Net Position for the Years Ended September 30, 2017 and 2016** | | |
| Net Position Beginning of Period | $ 509,220 | $ 469,922 |
| Funds from Dedicated Collections Transferred In / (Out) | 138,135 | 139,293 |
| Net Cost of Operation | (113,961) | (99,995) |
| Change in Net Position | 24,174 | 39,298 |
| Net Position End of Period | $ 533,394 | $ 509,220 |

## Note 8. Statement of Net Cost

The Statement of Net Cost presents NSF's support for research and education awards as a single program with three primary appropriations: Research and Related Activities (R&RA), Education and Human Resources (EHR), and Major Research Equipment and Facilities Construction (MREFC). Donations and Dedicated Collections are also presented in the Statement of Net Cost and in the tables below.

In pursuit of its mission, NSF incurs costs in line with the Foundation's strategic plan for 2014-2018: *Investing in Science, Engineering, and Education for the Nation's Future*. The strategic goals outlined in this plan are: "Transform the Frontiers of Science and Engineering", "Stimulate Innovation and Address Societal Needs through Research and Education", and "Excel as a Federal Science Agency". "Transform the Frontiers of Science and Engineering" emphasizes the seamless integration of research and education as well as the close coupling of research infrastructure and discovery. "Stimulate Innovation and Address Societal Needs through Research and Education" points to the tight linkage between NSF programs and societal needs, and highlights the role that new knowledge and creativity play in economic prosperity and society's general welfare. "Excel as a Federal Science Agency" emphasizes the importance to NSF of attaining excellence and inclusion in all operational aspects. Stewardship costs directly reflect the third strategic goal, "Excel as a Federal Science Agency", and are prorated among the Net Cost programs. Stewardship costs include expenditures incurred from the AOAM, NSB, and Office of Inspector General (OIG) appropriations. These appropriations support salaries and benefits of persons employed at NSF; general operating expenses, including support of NSF's information systems technology; staff training, audit and OIG activities; and OPM and DOL benefits costs paid on behalf of NSF.

As of September 30, 2017 and 2016, approximately 95 percent of NSF's expenses amounting to $6.9 billion and $6.8 billion, respectively, were directly related to the "Transform the Frontiers of Science and Engineering" and "Stimulate Innovation and Address Social Needs through Research and Education" strategic outcome goals. As of September 30, 2017 and 2016, costs related to the stewardship activities totaled $364.0 million and $371.2 million, respectively.

In accordance with OMB Circular No. A-136, costs incurred for services provided by other federal entities are reported in the full costs of NSF programs and are separately identified in this note as "Federal." Costs incurred with non-federal entities are identified in this note as "Public." All earned revenues are offsetting collections provided through reimbursable agreements with other federal entities and are retained by NSF. Earned revenues are recognized when the related program or administrative expenses are incurred and are deducted from the full cost of the programs to arrive at the net cost of operating NSF's programs. NSF applies a cost recovery fee on other federal entities consistent with applicable legislation and U.S. Government Accountability Office decisions. NSF recovers the costs incurred in the management, administration, and oversight of activities authorized and/or funded by interagency agreements where NSF is the performing agency.

## *Intragovernmental and Public Costs and Earned Revenue by Program*

| (Amounts in Thousands) | 2017 | | |
|---|---|---|---|
| | Federal | Public | Total |
| Research and Related Activities | | | |
| Gross Costs | $ 272,117 | $ 5,834,368 | $ 6,106,485 |
| Less: Earned Revenue | (93,251) | (6,280) | (99,531) |
| Net Research and Related Activities | 178,866 | 5,828,088 | 6,006,954 |
| Education and Human Resources | | | |
| Gross Costs | $ 9,808 | $ 776,170 | $ 785,978 |
| Less: Earned Revenue | (3,788) | (255) | (4,043) |
| Net Education and Human Resources | 6,020 | 775,915 | 781,935 |
| Major Research Equipment and Facilities Construction | | | |
| Gross Costs | $ - | $ 181,093 | $ 181,093 |
| Less: Earned Revenue | - | - | - |
| Net Major Research Equipment and Facilities Construction | - | 181,093 | 181,093 |
| Donations and Dedicated Collections | | | |
| Gross Costs | $ 631 | $ 145,591 | $ 146,222 |
| Less: Earned Revenue | - | - | - |
| Net Donations and Dedicated Collections | 631 | 145,591 | 146,222 |
| Net Cost of Operations | $ 185,517 | $ 6,930,687 | $ 7,116,204 |

| (Amounts in Thousands) | 2016 | | |
|---|---|---|---|
| | Federal | Public | Total |
| Research and Related Activities | | | |
| Gross Costs | $ 221,997 | $ 5,757,546 | $ 5,979,543 |
| Less: Earned Revenue | (104,648) | (3,529) | (108,177) |
| Net Research and Related Activities | 117,349 | 5,754,017 | 5,871,366 |
| Education and Human Resources | | | |
| Gross Costs | $ 8,587 | $ 852,708 | $ 861,295 |
| Less: Earned Revenue | (2,432) | (82) | (2,514) |
| Net Education and Human Resources | 6,155 | 852,626 | 858,781 |
| Major Research Equipment and Facilities Construction | | | |
| Gross Costs | $ - | $ 182,474 | $ 182,474 |
| Less: Earned Revenue | - | - | - |
| Net Major Research Equipment and Facilities Construction | - | 182,474 | 182,474 |
| Donations and Dedicated Collections | | | |
| Gross Costs | $ 171 | $ 133,555 | $ 133,726 |
| Less: Earned Revenue | - | - | - |
| Net Donations and Dedicated Collections | 171 | 133,555 | 133,726 |
| Net Cost of Operations | $ 123,675 | $ 6,922,672 | $ 7,046,347 |

## Note 9. Apportionment Categories of Obligations Incurred: Direct vs. Reimbursable Obligations

OMB Circular No. A-11, *Preparation, Submission, and Execution of the Budget*, requires direct and reimbursable obligations be reported as Category A, Category B, or Exempt from Apportionment. In FYs 2017 and 2016, NSF's SF-133, *Report on Budget Execution and Budgetary Resources*, reported all new obligations and upward adjustments under Category B which is by activity, project, or object.

As of September 30, 2017 and 2016, direct and reimbursable obligations were:

| (Amounts in Thousands) | 2017 | 2016 |
|---|---|---|
| Apportionment Category B | | |
| Direct | $ 7,679,769 | $ 7,714,090 |
| Reimbursable | 74,497 | 94,634 |
| New Obligations and Upward Adjustments | $ 7,754,266 | $ 7,808,724 |

## Note 10. Undelivered Orders at the End of the Period

In accordance with SFFAS No. 7, *Accounting for Revenue and Other Financing Sources*, the amount of budgetary resources obligated for undelivered orders for the years ended September 30, 2017 and 2016 amounted to $12.6 billion and $12.2 billion, respectively.

## Note 11. Permanent Indefinite Appropriations

NSF maintains permanent indefinite appropriations for R&RA, AOAM and MREFC. The R&RA appropriation is used for polar research and operations support, and for reimbursement to other federal agencies for operational and science support, and logistical and other related activities for USAP. In FYs 2017 and 2016 the permanent indefinite appropriations for R&RA were $467.1 million and $442.8 million, respectively, and are reported as transfers from the current year R&RA appropriation.

The AOAM appropriation is used to fund the multi-year effort associated with NSF's headquarters relocation. In FYs 2017 and 2016, the permanent indefinite appropriations for AOAM were $21.2 million and $30.8 million, respectively. The FY 2017 permanent indefinite appropriation is comprised of current year transfers from the following appropriations: $2.0 million from AOAM, $12.2 million from R&RA, and $7.0 million from EHR. The FY 2016 permanent indefinite appropriation was comprised of current year transfers of $3.8 million from AOAM and a $27.0 million transfer from the R&RA, EHR, and MREFC appropriations. The latter transfer was the result of exercising the Administrative Provision described in Note 1D, *Revenue and Other Financing Sources.*

The MREFC appropriation supports the procurement and construction of unique national research platforms and major research equipment. In FY 2017, the permanent indefinite appropriation for MREFC was $209.0 million. In FY 2016, the permanent indefinite appropriation for MREFC was $198.3 million, which was reported net of transfers out as a result of the Administrative Provision.

## Note 12. Explanation of Differences between the Statement of Budgetary Resources and the Budget of the United States Government

SFFAS No. 7, Accounting for Revenue and Other Financing Sources and Concepts for Reconciling Budgetary and Financial Accounting, requires explanations of material differences between amounts reported in the Statement of Budgetary Resources (SBR) and the actual balances published in the President's Budget. The FY 2019 President's Budget will include FY 2017 budget execution information and is scheduled for publication in February 2018.[2]

Balances reported in the FY 2016 SBR and the related President's Budget are shown in a table below for *Budgetary Resources, Obligations Incurred, Unobligated Balance - Unavailable, Distributed Offsetting Receipts*, and any related differences. The differences reported are due to differing reporting requirements for expired and unexpired appropriations between the Treasury guidance used to prepare the SBR and the OMB guidance used to prepare the President's Budget. The SBR includes both unexpired and expired appropriations, while the President's Budget presents only unexpired budgetary resources that are available for new obligations. Additionally, the *Distributed Offsetting Receipts* amount on the SBR includes donations, while the President's Budget does not.

(Amounts in Thousands)

| | Budgetary Resources | Obligations Incurred | Unobligated Balance - Unavailable | Distributed Offsetting Receipts |
|---|---|---|---|---|
| Combined Statement of Budgetary Resources | $ 8,156,989 | $ 7,808,724 | $ 187,952 | $ 28,648 |
| Budget of the U.S. Government | $ 7,991,548 | $ 7,803,073 | $ 28,162 | $ 3,000 |
| Difference | $ 165,441 | $ 5,651 | $ 159,790 | $ 25,648 |

## Note 13. Awards to Affiliated Institutions

NSB members may be affiliated with institutions that are eligible to receive grants and awards from NSF. NSF made awards totaling $1.1 billion to Board member affiliated institutions in FY 2017. The Board does not review all NSF award actions; however the following require NSB approval for the NSF Director to take action under delegated authority:

- Proposed awards that meet or exceed a threshold where the average annual award amount is the greater of one percent or more of the awarding Directorate's or Office's prior year plan or 0.1 percent or more of the prior year total NSF budget (enacted level); and
- Major Research Equipment and Facilities Construction (MREFC) awards.

The NSB passed a resolution on February 22, 2017 making one substantive change to its existing authority. The NSB will consult with the Director on programs which represent a significant, long-term investment, particularly those which will be funded as an ongoing NSF-wide activity or which involve substantive policy, interagency, or international issues, rather than take formal action to approve them.

The Director's Review Board (DRB) reviews proposed actions for evaluation adequacy and documentation, and compliance with Foundation policies, procedures and strategies. Items requiring DRB action include large awards and RFPs that meet or exceed a threshold of 2.5 percent of the prior year Division or

[2] OMB Website: http://www.whitehouse.gov/omb

Subactivity Plan. In addition, the DRB reviews all items requiring NSB action as well as NSB information items prior to submission.

NSF may fund awards meeting the above requirements to institutions affiliated with Board members. Federal conflict-of-interest rules prohibit NSB members from participating in matters where they have a conflict of interest or there is an impartiality concern without prior authorization from the Designated Agency Ethics Official (DAEO). Prior to Board meetings, all NSB action items are screened for conflict-of-interest/impartiality concerns by the Office of the General Counsel. Members who have conflicts are either recused from the matter or receive a waiver from the DAEO to participate. In FY 2017, NSB did not approve any awards to Board member affiliated institutions.

## Note 14. Reconciliation of Net Cost of Operations to Budget

| (Amounts in Thousands) | 2017 | 2016 |
|---|---|---|
| Resources Used To Finance Activities | | |
| Budgetary Resources Obligated | | |
| New Obligations and Upward Adjustments | $ 7,754,266 | $ 7,808,724 |
| Less: Spending Authority from Offsetting Collections and Recoveries | (191,917) | (205,234) |
| Obligations Net of Offsetting Collections and Recoveries | 7,562,349 | 7,603,490 |
| Less: Distributed Offsetting Receipts | (46,140) | (28,648) |
| Net Obligations | 7,516,209 | 7,574,842 |
| Other Resources | | |
| Transfers In / (Out) Without Reimbursement | 107 | - |
| Imputed Financing | 7,385 | 9,020 |
| Other Resources | (6,621) | (3,868) |
| Net Other Resources Used to Finance Activities | 871 | 5,152 |
| Total Resources Used to Finance Activities | **7,517,080** | **7,579,994** |
| Resources Used to Finance Items Not Part of the Net Cost of Operations | | |
| Change in Budgetary Resources Obligated for Goods, Services and Benefits Ordered but Not Yet Provided | (425,424) | (577,426) |
| Resources that Fund Expenses Recognized in Prior Periods | (7,466) | 352 |
| Budgetary Offsetting Collections and Receipts that Do Not Affect Net Cost of Operations | 46,140 | 28,648 |
| Resources that Finance the Acquisition of Assets | (47,626) | (17,088) |
| Total Resources Used to Finance Items Not Part of the Net Cost of Operations | **(434,376)** | **(565,514)** |
| Total Resources Used to Finance Net Cost of Operations | **7,082,704** | **7,014,480** |
| Components of the Net Cost of Operations that will not Require or Generate Resources in the Current Period | | |
| Components Requiring or Generating Resources in Future Periods | | |
| Other | 120 | 649 |
| Total Components of Net Cost of Operations that will Require or Generate Resources in Future Periods | 120 | 649 |
| Components Not Requiring or Generating Resources | | |
| Depreciation and Amortization | 32,348 | 31,754 |
| Other | 1,032 | (536) |
| Total Components of Net Cost of Operations that will not Require or Generate Resources | 33,380 | 31,218 |
| Total Components of Net Cost of Operations that Will Not Require or Generate Resources in the Current Period | **33,500** | **31,867** |
| Net Cost of Operations | $ **7,116,204** | $ **7,046,347** |

# Required Supplementary Stewardship Information

## Stewardship Investments

For the Fiscal Years ended September 30, 2017 and 2016

**Stewardship Investments**
**Research and Human Capital**
**(Dollar Amounts in Thousands)**

**Research and Human Capital Activities**

| | 2017 | 2016 | 2015 | 2014 | 2013 |
|---|---|---|---|---|---|
| Basic Research | $ 5,213,706 | $ 5,216,976 | $ 5,202,144 | $ 5,383,795 | $ 5,446,790 |
| Applied Research | 820,635 | 793,519 | 782,986 | 726,087 | 588,261 |
| Education and Training | 821,413 | 775,326 | 801,678 | 941,330 | 861,871 |
| Non-Investing Activities | 364,024 | 371,217 | 329,685 | 309,837 | 327,357 |
| **Total Research & Human Capital Activities** | $ 7,219,778 | $ 7,157,038 | $ 7,116,493 | $ 7,361,049 | $ 7,224,279 |

**Inputs, Outputs and/or Outcomes**

**Research and Human Capital Activities**

| | | | | | |
|---|---|---|---|---|---|
| Investments In: | | | | | |
| Universities | $ 5,260,018 | $ 5,289,267 | $ 5,201,477 | $ 5,407,717 | $ 5,025,068 |
| Industry | 169,101 | 300,279 | 365,221 | 286,916 | 337,818 |
| Federal Agencies | 229,668 | 178,845 | 167,018 | 252,596 | 208,806 |
| Small Business | 292,997 | 240,759 | 225,958 | 224,931 | 249,443 |
| Federally Funded R&D Centers | 247,549 | 231,977 | 231,813 | 234,515 | 280,032 |
| Non-Profit Organizations | 529,241 | 446,750 | 451,232 | 529,482 | 605,059 |
| Other | 491,204 | 469,161 | 473,774 | 424,892 | 518,053 |
| | $ 7,219,778 | $ 7,157,038 | $ 7,116,493 | $ 7,361,049 | $ 7,224,279 |
| Support To: | | | | | |
| Scientists | $ 585,172 | $ 595,743 | $ 584,865 | $ 550,800 | $ 539,713 |
| Postdoctoral Programs | 200,840 | 195,874 | 203,128 | 190,188 | 190,564 |
| Graduate Students | 628,367 | 625,059 | 629,922 | 586,443 | 568,548 |
| | $ 1,414,379 | $ 1,416,676 | $ 1,417,915 | $ 1,327,431 | $ 1,298,825 |
| **Outputs & Outcomes (Rounded):** | | | | | |
| Number of: | | | | | |
| Award Actions | 20,000 | 21,000 | 21,000 | 20,000 | 20,000 |
| Senior Researchers | 42,000 | 44,000 | 42,000 | 41,000 | 44,000 |
| Other Professionals | 14,000 | 14,000 | 14,000 | 17,000 | 14,000 |
| Postdoctoral Associates | 6,000 | 6,000 | 6,000 | 6,000 | 6,000 |
| Graduate Students | 41,000 | 41,000 | 42,000 | 40,000 | 42,000 |
| Undergraduate Students | 38,000 | 38,000 | 36,000 | 34,000 | 29,000 |
| K-12 Students | 172,000 | 170,000 | 172,000 | 130,000 | 124,000 |
| K-12 Teachers | 40,000 | 44,000 | 41,000 | 40,000 | 40,000 |

NSF's mission is to support basic scientific research and research fundamental to the engineering process as well as education programs in STEM fields. NSF's Stewardship Investments fall principally into the categories of Research and Human Capital. For expenses incurred under the Research category, the majority of NSF funding is devoted to basic research, with a relatively small share going to applied research. This funding supports both the conduct of research and the necessary supporting infrastructure, including state-of-the-art instrumentation, equipment, computing resources, aircraft, and multi-user facilities such as digital libraries, observatories, and research vessels. Basic research, applied research, and education and training expenses are determined by prorating the program costs of NSF's R&RA, EHR, and MREFC appropriations, donations, and funds from dedicated collections reported on the Statement of Net Cost. The proration uses the basic research, applied research, and education and training percentages of total estimated research and development obligations reported in the FY 2018 Budget Request to Congress. The actual numbers are not available until later in the following fiscal year. Non-Investing activities reflect stewardship costs incurred from the AOAM, NSB and OIG appropriations.

The data provided for scientists, postdoctoral associates, and graduate students are obtained from NSF's award budget information as recorded at the time the award is made. The number of award actions are actual values from NSF's Enterprise Information System (EIS). The remaining outputs and outcomes are estimates provided annually by the NSF Directorates. These estimates are reported in the annual NSF Budget Request to Congress.

NSF's Human Capital investments focus principally on education and training, toward a goal of creating a diverse, internationally competitive, and globally engaged workforce of scientists, engineers and well-prepared citizens. NSF supports activities to improve formal and informal science, mathematics, engineering and technology education at all levels, as well as public science literacy projects that engage people of all ages in life-long learning. The number of K-12 students involved in NSF activities is based on a robust data collection and analysis process. The reported number of K-12 students and teachers in FY 2017 excludes data from the EPSCoR[1] programs' investments in the jurisdictions of Alabama, Arkansas, Iowa, Kansas, Montana, and Puerto Rico. Reporting from these jurisdictions is expected to be final by December 2017 and will be reflected in the FY 2019 Budget Request to Congress.

[1] Established Program to Stimulate Competitive Research (EPSCoR)

# Required Supplementary Information

## Deferred Maintenance and Repairs

For the Fiscal Years ended September 30, 2017 and 2016

## Deferred Maintenance and Repairs

NSF performs condition assessment surveys in accordance with SFFAS No. 42 for capitalized general PP&E, including fully depreciated general, and non-capital accountable personal property to determine if any maintenance and repairs are needed to keep an asset in an acceptable condition or restore an asset to a specific level of performance. NSF considers deferred maintenance and repairs to be any maintenance and repairs that are not performed on schedule, unless it is determined from the condition of the asset that scheduled maintenance does not have to be performed. Deferred maintenance and repairs also include any other type of maintenance or repair that, if not performed, would render the PP&E non-operational. Circumstances such as non-availability of parts or funding are considered reasons for deferring maintenance and repairs.

NSF considered whether any scheduled maintenance or repair necessary to keep fixed assets of the agency in an acceptable condition was deferred at years ended September 30, 2017 and 2016. Assets deemed to be in excellent, good, or fair condition are considered to be in acceptable condition. Assets in poor condition are in unacceptable condition and the deferred maintenance and repairs required to get them to an acceptable condition are reported. NSF determines the condition of an asset in accordance with standards comparable to those used in the private industry. Due to the environment and remote location of Antarctica, all deferred maintenance and repairs on assets in poor condition are considered critical in order to maintain operational status.

In accordance with SFFAS No. 42, NSF discloses the beginning and ending balances for the year ending September 30, 2017. At September 30, 2017 NSF determined that scheduled maintenance or repairs on one item of Antarctic capital equipment in poor condition was not completed and was deferred or delayed for a future period. The dollar amount of deferred maintenance for this item was $2.1 thousand. The item is heavy, mobile equipment and is considered critical to NSF operations.

At September 30, 2016, NSF determined that scheduled maintenance or repairs on one item of Antarctic capital equipment in poor condition was not completed and was deferred or delayed for a future period. The dollar amount of deferred maintenance for this item was $0.6 thousand. The item is heavy, mobile equipment and is considered critical to NSF operations.

# Required Supplementary Information

## Combining Statement of Budgetary Resources by Major Budget Accounts

In the following tables, NSF budgetary information for the fiscal years ended September 30, 2017 and 2016, as presented in the Statement of Budgetary Resources, is disaggregated for each of NSF's major budget accounts.

**The Science Appropriations Act, 2017**

**2017**
**(Amounts in Thousands)**

| | Research and Related Activities | Education and Human Resources | Major Research Equipment | OIG, AOAM, and NSB | Special and Donated | Total |
|---|---|---|---|---|---|---|
| **Budgetary Resources** | | | | | | |
| Unobligated Balance - Brought Forward, October 1 | $ 143,541 | 37,837 | 37,212 | 31,113 | 98,562 | $ 348,265 |
| Recoveries of Prior Year Unpaid Obligations | 83,234 | 19,057 | 2,069 | 5,907 | 12,993 | 123,260 |
| Other Changes in Unobligated Balance | (51,605) | (15,562) | - | (2,902) | 5 | (70,064) |
| Unobligated Balance from Prior Year Budget Authority, Net | 175,170 | 41,332 | 39,281 | 34,118 | 111,560 | 401,461 |
| Appropriations | 6,005,645 | 873,050 | 214,860 | 378,660 | 178,995 | 7,651,210 |
| Spending Authority from Offsetting Collections | 59,407 | 4,332 | - | 4,287 | - | 68,026 |
| **Total Budgetary Resources** | **$ 6,240,222** | **918,714** | **254,141** | **417,065** | **290,555** | **$ 8,120,697** |
| **Status of Budgetary Resources** | | | | | | |
| New Obligations and Upward Adjustments | $ 6,085,237 | 878,360 | 222,780 | 406,815 | 161,074 | $ 7,754,266 |
| Unobligated Balance, End of Year | | | | | | |
| Apportioned, Unexpired | 31,950 | 4,507 | 29,292 | 1,341 | 116,174 | 183,264 |
| Unapportioned, Unexpired | 4,790 | 3,936 | 2,069 | - | 13,307 | 24,102 |
| Unobligated Balance, Unexpired, End of Year | 36,740 | 8,443 | 31,361 | 1,341 | 129,481 | 207,366 |
| Unobligated Balance, Expired, End of Year | 118,245 | 31,911 | - | 8,909 | - | 159,065 |
| Total Unobligated Balance, End of Year | 154,985 | 40,354 | 31,361 | 10,250 | 129,481 | 366,431 |
| **Total Status of Budgetary Resources** | **$ 6,240,222** | **918,714** | **254,141** | **417,065** | **290,555** | **$ 8,120,697** |
| **Change in Obligated Balance** | | | | | | |
| Unpaid Obligations | | | | | | |
| Unpaid Obligations - Brought Forward, October 1, Gross | $ 10,100,815 | 1,787,878 | 240,296 | 121,546 | 489,873 | $ 12,740,408 |
| New Obligations and Upward Adjustments | 6,085,237 | 878,360 | 222,780 | 406,815 | 161,074 | 7,754,266 |
| Gross Outlays | (5,867,789) | (758,365) | (174,034) | (406,156) | (145,176) | (7,351,520) |
| Recoveries of Prior Year Unpaid Obligations | (83,234) | (19,057) | (2,069) | (5,907) | (12,993) | (123,260) |
| Unpaid Obligations - End of Year, Gross | 10,235,029 | 1,888,816 | 286,973 | 116,298 | 492,778 | 13,019,894 |
| Uncollected Payments | | | | | | |
| Uncollected Payments from Federal Sources - Brought Forward, October 1 | $ (87,745) | (7,214) | - | (427) | - | $ (95,386) |
| Change in Uncollected Payments from Federal Sources | 24,901 | (3,319) | - | (157) | - | 21,425 |
| Uncollected Payments from Federal Sources, End of Year | (62,844) | (10,533) | - | (584) | - | (73,961) |
| Memorandum (non-add) Entries | | | | | | |
| Obligated Balance - Start of Year | $ 10,013,070 | 1,780,664 | 240,296 | 121,119 | 489,873 | $ 12,645,022 |
| Obligated Balance - End of Year | $ 10,172,185 | 1,878,283 | 286,973 | 115,714 | 492,778 | $ 12,945,933 |
| **Budget Authority and Outlays, Net** | | | | | | |
| Budget Authority, Gross | $ 6,065,052 | 877,382 | 214,860 | 382,947 | 178,995 | $ 7,719,236 |
| Actual Offsetting Collections | (84,784) | (1,014) | - | (4,279) | (5) | (90,082) |
| Change in Uncollected Customer Payments from Federal Sources | 24,901 | (3,319) | - | (157) | - | 21,425 |
| Recoveries of Prior Year Paid Obligations | 476 | 1 | - | 149 | 5 | 631 |
| Budget Authority, Net | **$ 6,005,645** | **873,050** | **214,860** | **378,660** | **178,995** | **$ 7,651,210** |
| Gross Outlays | $ 5,867,789 | 758,365 | 174,034 | 406,156 | 145,176 | $ 7,351,520 |
| Actual Offsetting Collections | (84,784) | (1,014) | - | (4,279) | (5) | (90,082) |
| Net Outlays | **5,783,005** | **757,351** | **174,034** | **401,877** | **145,171** | **7,261,438** |
| Distributed Offsetting Receipts | - | - | - | - | (46,140) | (46,140) |
| Net Agency Outlays | **$ 5,783,005** | **757,351** | **174,034** | **401,877** | **99,031** | **$ 215,298** |

**The Science Appropriations Act, 2016**
**2016**
**(Amounts in Thousands)**

| | Research and Related Activities | Education and Human Resources | Major Research Equipment | OIG, AOAM, and NSB | Special and Donated | Total |
|---|---|---|---|---|---|---|
| **Budgetary Resources** | | | | | | |
| Unobligated Balance - Brought Forward, October 1 | $ 130,595 | 36,992 | 58,058 | 23,745 | 145,137 | $ 394,527 |
| Recoveries of Prior Year Unpaid Obligations | 70,230 | 22,004 | 2,343 | 6,581 | 4,590 | 105,748 |
| Other Changes in Unobligated Balance | (50,217) | (14,567) | - | (3,271) | 88 | (67,967) |
| Unobligated Balance from Prior Year Budget Authority, Net | 150,608 | 44,429 | 60,401 | 27,055 | 149,815 | 432,308 |
| Appropriations | 5,989,675 | 878,970 | 218,310 | 376,530 | 163,735 | 7,627,220 |
| Spending Authority from Offsetting Collections | 87,580 | 4,395 | - | 5,486 | - | 97,461 |
| **Total Budgetary Resources** | **$ 6,227,863** | **927,794** | **278,711** | **409,071** | **313,550** | **$ 8,156,989** |
| **Status of Budgetary Resources** | | | | | | |
| New Obligations and Upward Adjustments | $ 6,084,322 | 889,957 | 241,499 | 377,958 | 214,988 | $ 7,808,724 |
| Unobligated Balance, End of Year | | | | | | |
| Apportioned, Unexpired | 17,311 | 5,394 | 28,538 | 24,639 | 84,431 | 160,313 |
| Unapportioned, Unexpired | 3,219 | 2,023 | 8,674 | 115 | 14,131 | 28,162 |
| Unobligated Balance, Unexpired, End of Year | 20,530 | 7,417 | 37,212 | 24,754 | 98,562 | 188,475 |
| Unobligated Balance, Expired, End of Year | 123,011 | 30,420 | - | 6,359 | - | 159,790 |
| Total Unobligated Balance, End of Year | 143,541 | 37,837 | 37,212 | 31,113 | 98,562 | 348,265 |
| **Total Status of Budgetary Resources** | **$ 6,227,863** | **927,794** | **278,711** | **409,071** | **313,550** | **$ 8,156,989** |
| **Change in Obligated Balance** | | | | | | |
| Unpaid Obligations | | | | | | |
| Unpaid Obligations - Brought Forward, October 1, Gross | $ 9,671,789 | 1,736,551 | 174,408 | 92,422 | 403,379 | $ 12,078,549 |
| New Obligations and Upward Adjustments | 6,084,322 | 889,957 | 241,499 | 377,958 | 214,988 | 7,808,724 |
| Gross Outlays | (5,585,066) | (816,626) | (173,268) | (342,253) | (123,904) | (7,041,117) |
| Recoveries of Prior Year Unpaid Obligations | (70,230) | (22,004) | (2,343) | (6,581) | (4,590) | (105,748) |
| Unpaid Obligations - End of Year, Gross | 10,100,815 | 1,787,878 | 240,296 | 121,546 | 489,873 | 12,740,408 |
| Uncollected Payments | | | | | | |
| Uncollected Payments from Federal Sources - Brought Forward, October 1 | $ (97,894) | (5,191) | - | (871) | - | $ (103,956) |
| Change in Uncollected Payments from Federal Sources | 10,149 | (2,023) | - | 444 | - | 8,570 |
| Uncollected Payments from Federal Sources, End of Year | (87,745) | (7,214) | - | (427) | - | (95,386) |
| Memorandum (non-add) Entries | | | | | | |
| Obligated Balance - Start of Year | $ 9,573,895 | 1,731,360 | 174,408 | 91,551 | 403,379 | $ 11,974,593 |
| Obligated Balance - End of Year | $ 10,013,070 | 1,780,664 | 240,296 | 121,119 | 489,873 | $ 12,645,022 |
| **Budget Authority and Outlays, Net** | | | | | | |
| Budget Authority, Gross | $ 6,077,255 | 883,365 | 218,310 | 382,016 | 163,735 | $ 7,724,681 |
| Actual Offsetting Collections | (98,572) | (2,924) | - | (6,472) | (88) | (108,056) |
| Change in Uncollected Customer Payments from Federal Sources | 10,149 | (2,023) | - | 444 | - | 8,570 |
| Recoveries of Prior Year Paid Obligations | 843 | 552 | - | 542 | 88 | 2,025 |
| Budget Authority, Net | **$ 5,989,675** | **878,970** | **218,310** | **376,530** | **163,735** | **$ 7,627,220** |
| Gross Outlays | $ 5,585,066 | 816,626 | 173,268 | 342,253 | 123,904 | $ 7,041,117 |
| Actual Offsetting Collections | (98,572) | (2,924) | - | (6,472) | (88) | (108,056) |
| Net Outlays | **5,486,494** | **813,702** | **173,268** | **335,781** | **123,816** | **6,933,061** |
| Distributed Offsetting Receipts | - | - | - | - | (28,648) | (28,648) |
| Net Agency Outlays | **$ 5,486,494** | **813,702** | **173,268** | **335,781** | **95,168** | **$ 904,413** |

# Other Information

## GONE Act Requirements

## Undisbursed Balances in Expired Grant Accounts

# Grants Oversight & New Efficiency (GONE) Act Requirements

The GONE Act was enacted in 2016 (P. L. 114-117) with the goal of closing out expired financial assistance awards. OMB's *Circular A-136, Financial Reporting Requirements*, requires GONE Act reporting on awards and balances for which closeout has not yet occurred but for which the period of performance has elapsed by more than two years. Table 2.1, below, identifies the total number of NSF financial assistance awards, including grant, cooperative agreement, and fellowship awards that expired on or before September 30, 2015 but have not been closed out. Undisbursed balance information is provided also.

**Table 2.1 – Age and Balances for Expired Awards not Closed**

(Dollars in millions)

| CATEGORY | 2 3 Years | >3 5 years | >5 years |
|---|---|---|---|
| Number of Grants/ Cooperative Agreements With Zero Dollar Balances | 133 | 275 | 75 |
| Number of Grants/ Cooperative Agreements With Undisbursed Balances | 0 | 0 | 0 |
| Total Amount of Undisbursed Balances | $0 | $0 | $0 |

Information shown above is as of 10/26/2017.

All the expired awards in Table 2.1 are financially closed (i.e., there are no undisbursed balances), but remain open for administrative reasons. (In this context, the term "expired" means the period of performance has ended.) The majority of these awards are open because the awardee has not yet provided the required project reports. Federal requirements incorporated into NSF policy require that a financial assistance award cannot be completely closed until all of the required project reports have been submitted, approved or reviewed, and posted.

NSF actively pursues closing all expired awards and cooperative agreements in a timely manner. In order to facilitate closeouts, expired awards missing project reports are designated by a special award status code for monitoring purposes. In terms of award report requirements, NSF has implemented several system-driven and enforced business rules including sending out due and overdue notices to the awardees.

In addition, NSF has identified challenges in related areas that have led to delays in the complete closeout of awards. These include system issues, which NSF is developing plans to address. Further, NSF will explore other options for ensuring that required project reports are submitted so that the awards, while financially closed, may be completely closed in a timely manner.

# Undisbursed Balances in Expired Grant Accounts

In FY 2017, NSF funded research and education in science and engineering through grants and cooperative agreements to 1,798 colleges, universities, and other institutions. NSF grants are funded in one of two ways: 1) the grant may be funded fully at the time of award, called a standard grant, or 2) the grant may be funded incrementally (one year at a time), called a continuing grant. In both cases, all costs on the grant must be incurred by the grantee during the term of the grant period. At NSF, grantees typically have 120 days after the grant expires to complete final drawdowns and expenditures.

The information provided here pertains to the agency's two grant making appropriation accounts: Research and Related Activities (R&RA) and Education and Human Resources (EHR). The data reported are based on the following definitions:

- An **expired grant** is a grant award that has reached the grant end date and is eligible for closeout. For NSF, this means grants with an expired period of performance.
- **Undisbursed balances** on expired grants are amounts that remain available for expenditure on an expired grant award before it is closed out.

Once a grant has expired, NSF takes actions to close out the grant both administratively and financially. The financial closeout action takes place 120 days after the award expiration date when the undisbursed balances are de-obligated from the award. Administrative closeout is initiated after financial closeout is completed.

The methodology used to develop undisbursed balances on expired grant awards is consistent with the U.S. Government Accountability Office (GAO) conclusions documented in their April 2012 report, GAO-12-360, *Grants Management: Action Needed to Improve the Timeliness of Grant Closeouts by Federal Agencies*, along with discussion and clarifying information from GAO. The data reported here reflects the amount of undisbursed balances in grant accounts that have reached their end date and are eligible for closeout.

1. **In the preceding three fiscal years, provide the total number of expired grant accounts with undisbursed balances (on the first day for each fiscal year) for the department, agency, or instrumentality and the total amount that has not been obligated to specific grant or project remaining in the accounts.**

   The number of expired grants with undisbursed balances for the preceding three fiscal years is provided in Table 2.2. The numbers and balances reflect a point in time before expired awards are closed out during normal processes described above. For FY 2017, there were 4,982 expired grants with undisbursed balances of $95,235,628.

**Table 2.2 – Status of Undisbursed Balances in Expired Grants**

| | FY 2017 (as of 9/30/17) | FY 2016 (as of 9/30/16) | FY 2015 (as of 9/30/15) |
|---|---|---|---|
| Number of expired grants | 4,982 | 5,132 | 4,406 |
| Undisbursed balances prior to closeout | $95,235,628 | $113,215,313 | $72,275,377 |

**2. Details on future action the department, agency, or instrumentality will take to resolve undisbursed balances in expired grant accounts.**

NSF continually monitors its grant awards throughout their lifecycle following a comprehensive post-award monitoring process. NSF grants are closed based on their period of performance end date. 120 days after the grant period has expired, all unliquidated (or undisbursed) award balances are de-obligated. Having small undisbursed balances at the end of the grant period is a routine occurrence, as not all grantees fully spend all of the funds obligated in the course of their research.

**3. The method that the department, agency or instrumentality uses to track undisbursed balances in expired grant accounts.**

NSF completes financial closeout of expired grant awards on a daily basis using a set of automated and manual activities. Eligibility for closeout for all NSF awards begins 120 days after the award expiration date. The NSF closeout process automatically de-obligates any unliquidated (unspent) award balance, produces an award closeout transaction to flag the award as financially closed, and sends the financial closeout date to NSF's award management system. This initiates final administrative closeout procedures in the award management system.

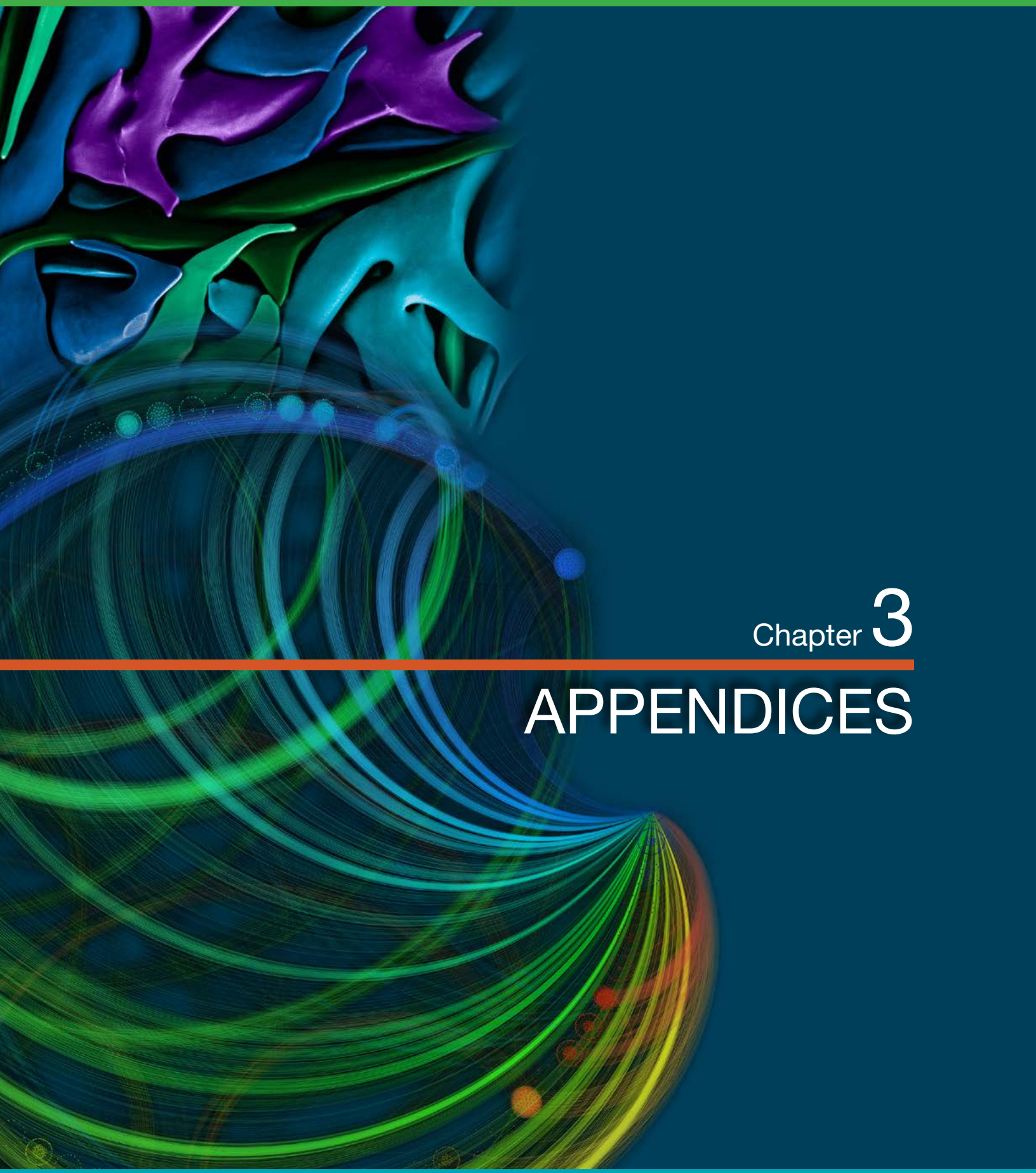
The expected award closeout date is made available to awardees and staff through the Award Cash Management Service (ACM$). ACM$ requires the submission of award level payment amounts and expenditures each time funds are requested by awardees and allows NSF to complete post-award monitoring at the individual award level throughout the lifecycle of the award.

**4. Process for identification of undisbursed balances in expired grant accounts that may be returned to the Treasury of the United States.**

When a grant is closed out, the unliquidated (or undisbursed) balances are de-obligated. The de-obligated grant balances are treated one of three ways:

- If the source appropriation is still active, the balances are recovered by NSF and remain available for valid new obligations until the source appropriation's expiration date.
- If the source appropriation has expired but funds have not yet been canceled, the grant balances are recovered by NSF and remain available for upward adjustments on other existing obligations within the source appropriation.
- If the source appropriation has been canceled, the grant balances are returned to the Treasury.

Prior to September 30, 2017, all undisbursed grant balances in canceling appropriations were de-obligated. These grant balances will be returned to Treasury.



Chapter 3

# APPENDICES

# Summary of FY 2017 Financial Statement Audit and Management Assurances

### Table 3.1 – Summary of Financial Statement Audit

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

### Table 3.2 – Summary of Management Assurances

| Effectiveness of Internal Control over Financial Reporting (FMFIA § 2) | | | | | |
|---|---|---|---|---|---|
| Statement of Assurance | *Unmodified* | | | | |
| | Beginning Balance | New | Resolved | Consolidated | Ending Balance |
| *Total Material Weaknesses* | *0* | - | - | - | *0* |

| Effectiveness of Internal Control over Operations (FMFIA § 2) | | | | | |
|---|---|---|---|---|---|
| Statement of Assurance | *Unmodified* | | | | |
| | Beginning Balance | New | Resolved | Consolidated | Ending Balance |
| *Total Material Weaknesses* | *0* | - | - | - | *0* |

| Conformance with Financial Management System Requirements (FMFIA § 4) | | | | | |
|---|---|---|---|---|---|
| Statement of Assurance | *Systems conform to financial management system requirements* | | | | |
| | Beginning Balance | New | Resolved | Consolidated | Ending Balance |
| *Total Non-Conformances* | *0* | - | - | - | *0* |

| Compliance with Section 803(a) of the Federal Financial Management Improvement Act (FFMIA) | | |
|---|---|---|
| | Agency | Auditor |
| 1. System Requirements | *No lack of compliance noted* | |
| 2. Accounting Standards | *No lack of compliance noted* | |
| 3. U.S. Standard General Ledger at Transaction level | *No lack of compliance noted* | |

# National Science Foundation
# FY 2017 Payment Integrity Reporting

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

## I. Payment Reporting

Not applicable.

## II. Recapture of Improper Payments Reporting

### *a. Payment Recapture Audits Narrative*

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

### *b. Programs Excluded from the Payment Recapture Audit Program*

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

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

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

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

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

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

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

***c. Payment Recapture Audit Reporting***

NSF did not conduct payment recapture audits during FY 2017.

***d. Overpayments Recaptured Outside of Payment Recapture Audits***

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

**Table 3.3 – Improper Payment Recaptures without Audit Programs**

(Dollars in Millions)

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

***e. How Overpayments Recaptured through Payment Recapture Audits Were Used***

Not Applicable.

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

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

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

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

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

(Dollars in Millions)

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

## IV. Barriers

Not applicable.

## V. Accountability

Not applicable.

## VI. Agency Information Systems and Other Infrastructure

Not applicable.

## VII. Sampling and Estimation

Not applicable.

# Fraud Reduction Report

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

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

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

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

# Management Challenges for the National Science Foundation in Fiscal Year 2018


October 12, 2017

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

# AT A GLANCE

## Management Challenges for the National Science Foundation in Fiscal Year 2018

October 12, 2017

## WHY WE DID THIS REPORT

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

## WHAT WE FOUND

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

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

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

## AGENCY RESPONSE TO *MANAGEMENT CHALLENGES FOR 2017*

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

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

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

**MEMORANDUM**

**DATE:** October 12, 2017

**TO:** Dr. Maria Zuber
Chair
National Science Board

Dr. France Córdova
Director
National Science Foundation

**FROM:** Allison C. Lerner
Inspector General
National Science Foundation

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

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

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

Attachment

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

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# ABBREVIATIONS

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

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL

## Introduction

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

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

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

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

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

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

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

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

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

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

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

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

## Major Multi-User Research Facilities Management

**Overview**

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

**Challenges for NSF**

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

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

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

**OIG Assessment of NSF Progress**

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

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

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

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

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

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

## Business Operations Management

**Overview**

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

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

**Challenges for NSF**

*Finding and Eliminating Improper Payments*

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

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

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

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

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

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

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

*Promoting Accountability and Transparency*

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

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

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

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

*Monitoring of Subrecipients*

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

*Managing the Government's Records*

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

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

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

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

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

**OIG Assessment of NSF Progress**

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

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

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

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

## Management of the Intergovernmental Personnel Act Program

**Overview**

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

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

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

**Challenges for NSF**

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

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

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

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

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

**OIG Assessment of NSF Progress**

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

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

## Management of the United States Antarctic Program

**Overview**

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

**Challenges for NSF**

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

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

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

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

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

**OIG Assessment of NSF Progress**

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

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

## Cybersecurity and Information Technology Management

**Overview**

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

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

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

**Challenges for NSF**

*Protecting Agency Information and IT Resources*

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

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

*Managing Records and Applications on Mobile Devices*

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

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

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

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

**OIG Assessment of NSF Progress**

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

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

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

## Encouraging the Ethical Conduct of Research

**Overview**

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

**Challenge for NSF**

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

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

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

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

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

**OIG Assessment of NSF Progress**

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

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

**NATIONAL SCIENCE FOUNDATION**
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

OFFICE OF THE
DIRECTOR

MEMORANDUM

DATE: October 20, 2017

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

FROM: Dr. France Córdova
Director, National Science Foundation

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

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

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

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

Enclosure

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

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

## CHALLENGE: Establishing Accountability over Large Cooperative Agreements

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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| *complete. Efforts may be assisted by using information security continuous monitoring (ISCM) strategies.*<br>*ii) Allocate appropriate resources to correct IT weaknesses related to the U.S. Antarctic Program (USAP) and ensure the systems and information are adequately protected.* | U.S. Antarctic Program (USAP)<br>• The Office of Polar Programs (OPP):<br>  ○ Completed a thorough review of USAP IT security program controls to ensure compliance with federal guidance and risk management and adequacy of risk management plans.<br>  ○ Allocated appropriate resources to the USAP IT security program to address information security findings identified in the annual FISMA review.<br>  ○ Documented redundancy capabilities to IG auditors to demonstrate resiliency of the USAP network and re-evaluate a longstanding finding to close the original issue.<br>  ○ Initiated a disaster recovery plan to document actions in the event of a contingency. OPP is also planning to complete a business impact analysis to validate their approach to service recovery. |
| | **NSF's Anticipated Milestones**<br>• Continue to monitor the availability, responsiveness, and security of agency IT resources during and after the move to the new headquarters, utilizing information security continuous monitoring (ISCM) strategies in support of these activities.<br>• Continue to address identified IT security weaknesses through USAP program funding. |

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

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

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

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

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

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

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

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

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

## CHALLENGE: Management of NSF's Business Operations Government Records

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

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

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

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

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

## CHALLENGE: Management of the IPA Program

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

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

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

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

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

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

## CHALLENGE: Moving NSF Headquarters to a New Building

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

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

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

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

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

**NSF's Significant Milestones in FY 2017**

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

**NSF's Anticipated Milestones**

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

## CHALLENGE: Management of the U.S. Antarctic Program

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

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

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| *a. Ensure a successful transition from Lockheed Martin to Leidos as the Antarctic Support Contractor (ASC) together with their respective subcontractors by having strong cost controls to protect the government against unwarranted increases in ASC costs during a period of reorganization and mergers.* | **NSF's Significant Milestones in FY 2017**<br>• Held routine executive meetings with Lockheed Martin leadership to understand the strategic rationale for the transition to Leidos and the impact to the Antarctic Support Contract (ASC).<br>• Started implementing the Novation Agreement processed by the Defense Contract Management Agency (DCMA) as the cognizant Federal Agency, which concluded that restructuring was in the best interest of the government.<br>• 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.<br>• The successful transition from Lockheed Martin to Leidos through a Reverse Morris Trust has resulted in decreased costs for ASC. |
| | **NSF's Anticipated Milestones**<br>• Continue to monitor the ongoing transfer of business systems from Lockheed Martin to Leidos, which is expected to be complete by January 1, 2018. Subsequently, the Leidos DCMA Divisional Administrative Contracting Officer will review and approve Leidos business systems.<br>• Continue to monitor invoices, Annual Program Plans, business system reviews (accounting, estimating, purchasing systems), indirect rates and financial reporting for the USAP contractor to ensure strong cost controls continue with the new entity. |
| *b. Ensure modernization of McMurdo Station and upgrades to Palmer Station as they proceed to construction projects, capitalizing on lessons learned from NSF's large facility work as appropriate.* | **NSF's Significant Milestones in FY 2017**<br>• Continued progress on the 2012 Blue Ribbon Panel (BRP) recommendations, including investment in lifecycle acquisitions and infrastructure upgrades.<br>• Addressed major infrastructure upgrades recommended by the BRP report for McMurdo Station through the following design efforts:<br>  ○ Completed designs for the Antarctic Infrastructure Modernization for Science (AIMS) project, including Core Facility and Utilities packages, and presented the designs to the MREFC Preliminary Design Review (PDR) Panel.<br>  ○ Completed designs of the Vehicle Equipment/Operations Center using NSF Research and Related Activities Funding. |

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

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

## CHALLENGE: Improving Grant Administration

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

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

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

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

**NSF's Significant Milestones in FY 2017**

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

**NSF's Anticipated Milestones**

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

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

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

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

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

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

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

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

# Reduce the Footprint

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

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

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

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

**Table 3.5 – Reduce the Footprint Policy Baseline Comparison**

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

# Awards to Affiliated Institutions

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

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

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

# Patents and Inventions Resulting From NSF Support

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

# Acronyms

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