



National  
Science  
Foundation



# 2018

## AGENCY FINANCIAL REPORT

About the Cover:

The AFR cover is a portion of the mural at NSF's headquarters that provides a visual history of scientific discovery and innovation and depicts the Foundation's impact on the Nation. For more information about NSF's history wall artwork visit: <https://www.nsf.gov/about/history/history-wall.jsp>

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NSF 19-002  
11/15/2018

## 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 is the global leader in research and innovation.

—*from "Building the Future: Investing in Discovery and Innovation"*  
*NSF Strategic Plan for FY 2018-2022*



## About This Report

For fiscal year (FY) 2018, 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 Chief Financial Officers (CFO) Act, as amended by the Government Management Reform Act of 1994, the Federal Managers' Financial Integrity Act of 1982, 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.<sup>1</sup>

- 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 memorandum from the NSF Inspector General (IG) on the agency's FY 2019 management challenges, as well as management's report on the progress made on the management challenges identified by the IG for FY 2018.
- 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 2020 Budget Request to Congress* in February 2019.
- 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 2020 Budget Request to Congress* is published in February 2019.

For copies of these reports, please send a request to [accountability@nsf.gov](mailto:accountability@nsf.gov) or call (703) 292-8200. We welcome your suggestions on how we can make these reports more informative.

| NSF by the Numbers   |  |
|----------------------|--|
| <b>\$7.8 billion</b> | FY 2018 Appropriations (does not include mandatory accounts)   |
| <b>1,800</b>         | Colleges, universities, and other institutions receiving NSF funding in FY 2018  |
| <b>48,300</b>        | Proposals evaluated in FY 2018 through a competitive merit review process  |
| <b>11,700</b>        | Competitive awards funded in FY 2018   |
| <b>223,800</b>       | Proposal reviews conducted in FY 2018  |
| <b>386,000</b>       | Estimated number of people NSF supported directly in FY 2018 (researchers, postdoctoral fellows, trainees, teachers, and students) |
| <b>57,700</b>        | Students supported by NSF Graduate Research Fellowships since 1952   |

<sup>1</sup> <https://www.nsf.gov/about/performance/>

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# NATIONAL SCIENCE FOUNDATION

## FY 2018 Agency Financial Report

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## A MESSAGE FROM THE DIRECTOR



Photo: NSF/Stephen Voss

The National Science Foundation (NSF) is pleased to present its *Fiscal Year (FY) 2018 Agency Financial Report*. NSF is a U.S. federal agency with a global reputation for supporting groundbreaking research and education across the full range of science and engineering (S&E) disciplines. For over 68 years, NSF investments have enabled U.S. researchers to deepen our understanding of the universe, transform the way we live, open the world to new occupations and industries, and enrich our quality of life.

To define and position the U.S. at the leading edge of discovery, NSF is investing in 10 Big Ideas.<sup>1</sup> These bold, long-term research and enabling ideas focus on critical societal challenges and aim to catalyze breakthroughs from the S&E communities. They identify new frontiers of basic research such as the data revolution, quantum world, multi-messenger astronomy, and the human-technology interface. Foundational to achieving these goals are greater investments in S&E infrastructure and workforce, and the convergence of scientific disciplines to foster deep connections among scientific fields.

Cutting-edge science also requires that NSF strengthen its strategic collaborations with government, industry, academia, and international partners. In 2018, NSF and Boeing announced a partnership to accelerate training in critical skill areas and increase diversity in S&E fields. In May, NSF and the Air Force created a strategic research partnership to enhance national security. Our new international MULTIPLIER program deploys small teams of NSF experts to advance scientific frontiers by exploring strategic collaborations with global S&E researchers. In the important area of artificial intelligence (AI), NSF has an emerging collaboration with the Defense Advanced Research Projects Agency that also includes machine learning, and is supporting the Computing Community Consortium in the development of an interdisciplinary AI research and development roadmap anticipated in the spring of 2019. As co-chair of the National Science and Technology Council Select Committee on Artificial Intelligence, I work with my interagency colleagues on efforts to maintain the Nation's leadership in AI.

NSF supports discoveries across the broad spectrum of scientific disciplines. In 2018, an international research team, using data gathered by NSF's IceCube Neutrino Observatory at the South Pole, detected a high-energy neutrino, apparently from a cosmic source. The data, when combined with simultaneous observations of high-energy gamma rays by multiple observatories, and corroborated with archival IceCube neutrino data, point to an active galaxy called a blazar as the source. This remarkable result marks the discovery of the origin of high-energy cosmic rays, solving a century-old mystery. It is a discovery that, like the previous results with NSF's Laser Interferometer Gravitational-Wave Observatory, showcases the importance of multi-messenger astronomy. This past year, NSF supported a quantum research collaboration to create the first practical quantum computer capable of solving complex problems that today's best computers cannot solve. Other NSF-supported researchers study the behavior of Earth's atmosphere and the geo-space system, developing models to predict extreme events such as hurricanes, earthquakes, wildfires, and drought; still other researchers are collecting data on how people make decisions, and how community infrastructure systems respond during natural disasters. At the human-technology frontier, advances in the development of self-driving cars build on NSF research investments in precision sensors; computer vision, planning, and reasoning; real-time data analytics; and predictive modeling. As a major player in nanotechnology, NSF is helping to transform U.S. industry through advances in manufacturing, electronics, medical instrumentation, and materials science.

NSF catalyzes innovation that keeps the U.S. on the cutting edge of science and technology. It fosters this innovation through support of small businesses; promoting creative partnerships among academia, industry,

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<sup>1</sup> NSF's 10 Big Ideas: [https://www.nsf.gov/news/special\\_reports/big\\_ideas/](https://www.nsf.gov/news/special_reports/big_ideas/)

and national laboratories; broadening participation in the S&E enterprise by non-profit, non-academic organizations; and providing entrepreneurship training for academic scientists to accelerate commercialization of basic research. Moreover, NSF invests in world-class facilities and equipment – from telescopes and polar stations to ecological sites to cyberinfrastructure and supercomputers. At the end of September 2018, NSF announced its funding for the largest and most powerful supercomputer the agency has ever supported that will allow high performance computing access to thousands of researchers around the country, and accelerate the pace of scientific discoveries.

NSF investments support and develop S&E talent. In FY 2018, the agency directly supported approximately 386,000 researchers, graduate and undergraduate students, postdoctoral fellows, trainees, as well as K-12 teachers and students. Collectively, NSF-funded researchers have won 236 Nobel Prizes in physics, chemistry, physiology, medicine, and economics, including six Nobel laureates in 2018. In addition, among the 2018 MacArthur Fellows, seven were supported by NSF funding at some point in their careers, including the winner of NSF's 2018 Alan T. Waterman Award.

As societies around the world transition to more knowledge-based economies, our global standing increasingly relies on a skilled workforce. I am proud of the multiple opportunities NSF's education and training portfolio provides to enrich educational experiences for all students and to develop science, technology, engineering, and mathematics (STEM) talent needed for the 21<sup>st</sup> century. These opportunities challenge students to exceed expectations and help direct future career choices. NSF strives to ensure that students from all sectors of our society have access to exemplary learning experiences. NSF INCLUDES, one of our Big Ideas, is broadening participation in the STEM workforce. In 2018, NSF initiated the Hispanic-serving Institution program to increase retention and graduation rates. This initiative joins other capacity-building programs like the Tribal Colleges and Universities program, the Community College Innovation Challenge, and the Historically Black Colleges and Universities program.

With the publication of the FY 2018 Agency Financial Report, I am pleased to report that NSF received its 21<sup>st</sup> 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.

For more information on NSF's performance management process and the complete results of our FY 2018 annual goals under the Government Performance and Results (GPRA) Modernization Act of 2010, I invite you to read NSF's Annual Performance Report, which we will release with NSF's FY 2020 Budget Request to Congress. In keeping with government-wide requirements, NSF's GPRA data are subject to rigorous verification and validation by an independent, external management consultant, based on guidance from the U.S. Government Accountability Office.

In closing, I would like to highlight NSF's commitment to maintaining the highest standards of integrity. In 2018, NSF was at the forefront among federal agencies in taking a firm stance against all forms of harassment and sexual assault among its staff and anywhere NSF-funded S&E is conducted. NSF works to build and sustain public trust in our operational and fiduciary responsibilities by using forward-looking risk management practices and by maintaining effective internal controls that provide transparency and accountability. With the support of the American people, NSF-funded researchers will continue to transform the world with their ingenuity and creativity and provide new knowledge and innovations that will propel our economy, enhance our lives, and secure our Nation.

/s/

**France A. Córdova**

November 14, 2018



# 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...”<sup>1</sup> As the only federal agency that invests in fundamental, basic research and education across the full spectrum of science, technology, engineering, and mathematics (STEM) disciplines, this mission continues to guide the agency today.

Throughout the past 68 years, NSF has supported the basic research that sets the stage for transformative breakthroughs. NSF-funded discoveries have been instrumental in developing new ways of thinking about scientific, economic, and sociotechnical challenges facing the Nation and the world. These discoveries have led to the first detection of gravitational waves, the early web browsers, advanced wireless communications, magnetic resonance imaging technology, Global Positioning Systems, improvements in laser microsurgery, and more.

To advance NSF’s mission and keep the Nation at the forefront of research, technology, and innovation, NSF developed a bold research agenda called the “10 Big Ideas for Future Investment.”<sup>2</sup> Six of these are Big Research Ideas, which define cutting-edge research goals uniquely suited to NSF’s capabilities. The other four Big Ideas implement new processes to catalyze advances in research by embracing new practitioners and new approaches.

In fiscal year (FY) 2018, NSF-funded researchers combined mathematical modeling and high-performance computers to look for ways to address the complexity of cancer; NSF-funded engineers conducted research to improve people’s lives with smart transportation, resilient infrastructure, and advanced manufacturing; and still other NSF-funded researchers improved cryptography, cybersecurity, new materials, and advanced analytics for massive datasets that support national defense. In FY 2018, NSF joined with other federal agencies and international partners in support of an international brain initiative. The agency has long supported research in cognitive science and neuroscience achieved by cross-disciplinary teams across the U.S., often in close cooperation with international partners. NSF-funded research helps save lives and preserve property through better prediction and understanding of earthquakes, hurricanes, tsunamis, drought, wildfires, and solar storms. NSF-

#### Mystery Solved: Where high-energy cosmic neutrinos begin

An international team of researchers recently discovered the first evidence of one source of high-energy cosmic neutrinos. They initially used data gathered from NSF’s IceCube Neutrino Observatory in Antarctica. Detectors, buried deep in the ice, captured the signature blue light, that results when neutrinos, particles smaller than an atom, interact with ice molecules. The detection initiated a global alert to a network of ground- and spaced-based telescopes. The team traced the neutrino source to a blazar, a giant galaxy with a massive black hole at its core and twin jets of elementary particles and light that shoot out from the core. The discoveries open a new chapter in exploring properties of the universe previously unknown.



The world’s largest neutrino detector, NSF’s IceCube Neutrino Observatory, detected a high-energy subatomic particle or neutrino passing through the Earth. *Credit: NSF IceCube Neutrino Observatory*

<sup>1</sup> National Science Foundation Act of 1950 (P.L. 81–507)

<sup>2</sup> NSF’s 10 Big Ideas: [https://www.nsf.gov/news/special\\_reports/big\\_ideas](https://www.nsf.gov/news/special_reports/big_ideas)

supported nano-oriented centers and networks across the country have led to discoveries of the fundamental mechanisms driving activity at extremely tiny dimensions. Nanotechnology research leads to advances in drug development, protective gear for soldiers and first responders, computing and communications, imaging, antibiotic resistance and wearable technologies. NSF's investments to nurture Artificial Intelligence (AI) over the past several decades have laid the foundation upon which today's breakthroughs are being built. AI is transforming every segment of American industry, from making agriculture more precise and efficient to giving us new medical diagnostics that save lives.

**NSF-funded research, supercomputer working to develop next generation batteries**

Large-scale structures such as smart grids and wind turbines require next generation batteries with greater energy capacity than the lithium ion batteries found in today's smaller consumer electronics. One possible solution is lithium-metal batteries, which can store large amounts of energy at a low cost. These batteries have one key flaw, however: they are susceptible to dendritic growth, wherein lithium atoms clump together in the battery over its life cycle, leading to overheating, short-circuiting and even fire.

NSF-funded researchers are working to better understand how dendrites form and how new materials can prevent dendrite formation. Using powerful supercomputers, including the NSF-funded Stampede supercomputer operated by the Texas Advanced Computing Center, the researchers were able to model at the atomic level how a graphene oxide nanosheet sprayed onto a glass fiber separator inserted into a lithium-metal battery helped control the flow of ions and slow the build-up of lithium atoms in a battery, thus mitigating dendrite growth. Understanding how different coatings impact ion transfer could help researchers develop new materials to enhance lithium-metal batteries.



The Stampede supercomputer has already enabled research teams to predict where and when earthquakes may strike, how much sea levels could rise and how fast brain tumors grow. *Credit: University of Texas at Austin's Texas Advanced Computing Center*

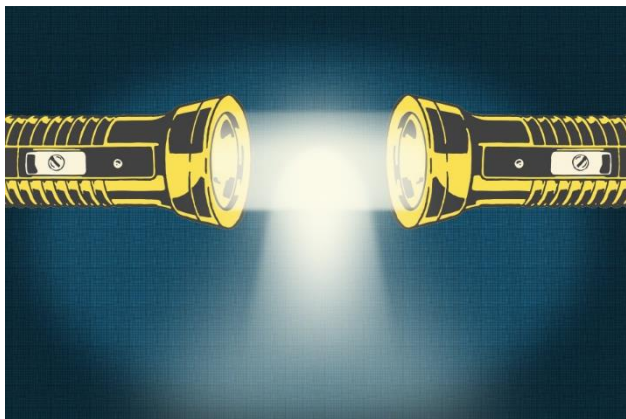
In FY 2018, NSF continued investments in research facilities and centers that foster collaboration and provide sophisticated platforms for conducting cutting-edge research. It also supports a world-class research infrastructure that includes ships, planes and autonomous research platforms, astronomical observatories, particle accelerators, seismic observatories, U.S. research stations in Antarctica, advanced cyberinfrastructure, sustained large-scale surveys, and more. In July 2018, an international research team, using data gathered by NSF's IceCube Neutrino Observatory in Antarctica, announced the discovery of one source of cosmic neutrinos. These kinds of breakthroughs are possible because of the agency's long-term commitment to basic research and the steady advancements and upgrades to facilities like the IceCube Neutrino Observatory.

NSF helps researchers and small businesses translate scientific innovations and knowledge into commercial products and services through programs like the Small Business Innovation Research program and NSF Innovation Corps. The Foundation also supports programs to spur academia-industry partnerships to create enabling technologies that meet national needs, such as managing the electrical power system and improving manufacturing.

NSF's sustained investment in basic research results in a steady stream of new ideas and techniques that, together with a well-educated STEM workforce, fosters a world-class research enterprise. Today, NSF funds STEM education research and the professional development of teachers and mentors to prepare and inspire a culturally diverse and globally competitive workforce of scientists, engineers, and STEM-literate

#### **New form of light could enable quantum computing**

Extremely fast quantum computers will require the controlled interaction of light particles called photons. But photons don't naturally interact with each other. For years, physicists tested ways to encourage photon mingling. The efforts paid off in 2013 when NSF-funded researchers observed pairs of photons interacting and binding together. Now in 2018, the same scientists reported witnessing groups of three photons melding together. The behavior occurred during an experiment in which a very weak laser beam shone through a dense cloud of ultracold rubidium atoms. Rather than exiting the cloud singly, the photons left in pairs or triplets. The next step is to see if photons can interact in other ways. If successful, they may be harnessed to perform extremely fast, highly complex quantum computations.



NSF-funded scientists have coaxed photons to interact, paving the way for their use in quantum computing. *Credit: Christine Daniloff/MIT*

citizens. NSF's Advanced Technological Education program focuses on the education of technicians for the high-technology fields that drive our Nation's economy. The Foundation also supports a strong STEM workforce through the Graduate Research Fellowship Program; funding nearly 58,000 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 236 people who have gone on to win the Nobel Prize.

Public investment in high-risk, foundational research is key to staying on the cutting edge of science and technology. NSF supports 25 percent of all federally-sponsored basic scientific research conducted by America's colleges and universities; this share

increases to 59 percent when medical research supported by the National Institutes of Health is excluded.<sup>3</sup> 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. NSF's investment in 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. Convergence is the integration of scientific disciplines to foster the robust collaborations needed to address complex problems.

NSF's vision is to ensure that the U.S. remains the global leader in research and innovation. NSF's core values of excellence, public service, learning, inclusion, collaboration, integrity, and transparency articulate the essential qualities that staff are encouraged to embody in support of the agency's mission and vision. These core values guide staff in making decisions, setting priorities, addressing challenges, managing tradeoffs, recruiting and developing personnel, and working together with awardees. NSF's strategic plan

<sup>3</sup> National Center for Science and Engineering Statistics Survey of Federal Funds for Research and Development Fiscal Years 2016–2017. <https://ncesdata.nsf.gov/fedfunds/2016/>.

for FYs 2018 – 2022, *Building the Future: Investing in Discovery and Innovation*<sup>4</sup> identifies three interrelated goals for achieving the agency's mission: (1) expand knowledge in science, engineering, and learning; (2) advance the capability of the Nation to meet current and future challenges; and (3) enhance NSF's performance of its mission.

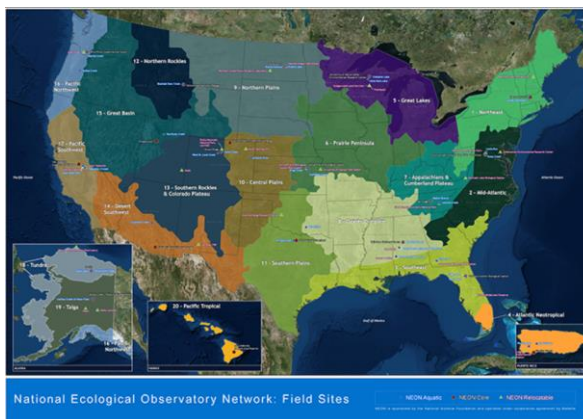
Today, the economy is stronger, and our knowledge is greater because of NSF-funded basic research. NSF investment in research that enables discovery represents the fulfillment of the Foundation's mission and its commitment to advancing the frontiers of science and engineering. This commitment ensures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

### 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 2018 totaled \$7,784 million,<sup>5</sup> an increase of 4 percent over the FY 2017 appropriations level of \$7,472 million. R&RA, EHR, and MREFC appropriations fund the agency's programmatic activities and accounted for over 95 percent of NSF's total appropriations in FY 2018. Figure 1.1 provides details on NSF's FY 2018 appropriations.

#### The impact of one forest

Every elementary school student learns about the food web's interconnectedness. Now, scientists are discovering similar kinds of links with vegetation. A recent NSF-funded study of U.S. forests shows that the loss of trees in specific regions can influence plant growth in other parts of the country. Of all the regions studied, the Pacific Southwest, which covers most of California, had the smallest total area of tree cover. However, when the trees in this area were removed in computer models, vegetation in the Eastern U.S. was reduced. This deletion also produced the biggest impact on growing conditions nationally. The Pacific Southwest is currently experiencing dramatic tree die-off. By learning how the effects of forest loss can ricochet across regions, researchers can improve models of the impacts of environmental change.



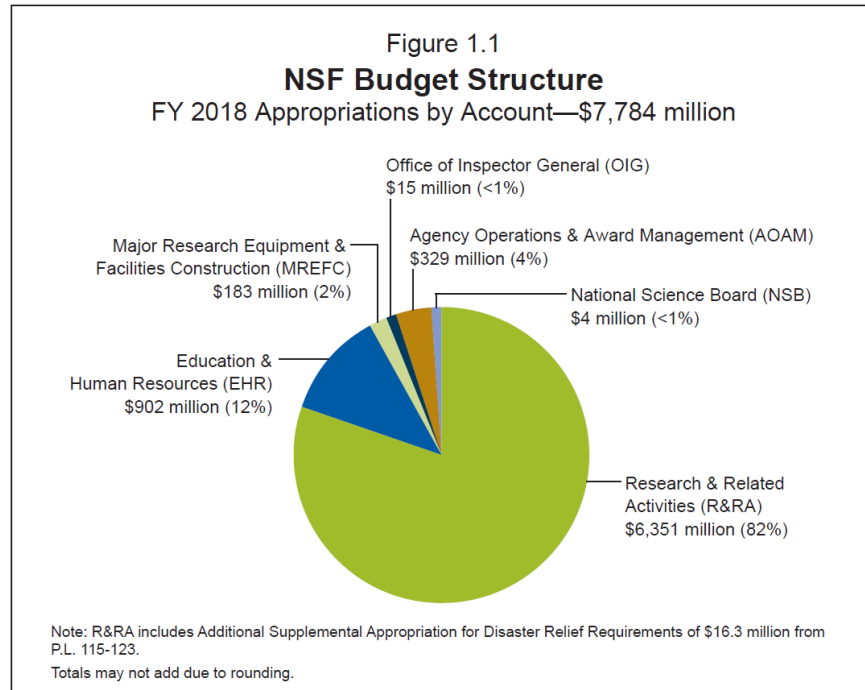
An NSF-funded study examined the impact of forest removal on growing conditions across the continental U.S. using the 18 ecological regions shown in this map. Credit: National Ecological Observatory Network (NEON)

- R&RA, which supports basic research and education activities in science and engineering, including high-risk and transformative research, accounted for 82 percent of FY 2018 funding. The FY 2018 R&RA funding level of \$6,351 million was \$345 million higher than the FY 2017 appropriation of \$6,006 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 2018 funding level of \$902 million was \$29 million, or approximately 3 percent, above the FY 2017 EHR appropriation of \$873 million.

<sup>4</sup> NSF Strategic Plan FY 2018 – 2022: <https://www.nsf.gov/pubs/2018/nsf18045/nsf18045.pdf>

<sup>5</sup> Amount shown is NSF's FY 2018 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 Agency Financial Report.

- The MREFC appropriation supports the construction of unique national research platforms and major research equipment that enable cutting-edge research. This account was about 2 percent of the agency's total appropriations in FY 2018. The FY 2018 MREFC funding level of \$183 million was \$32 million, or 15 percent, below the prior-year appropriation of \$215 million.

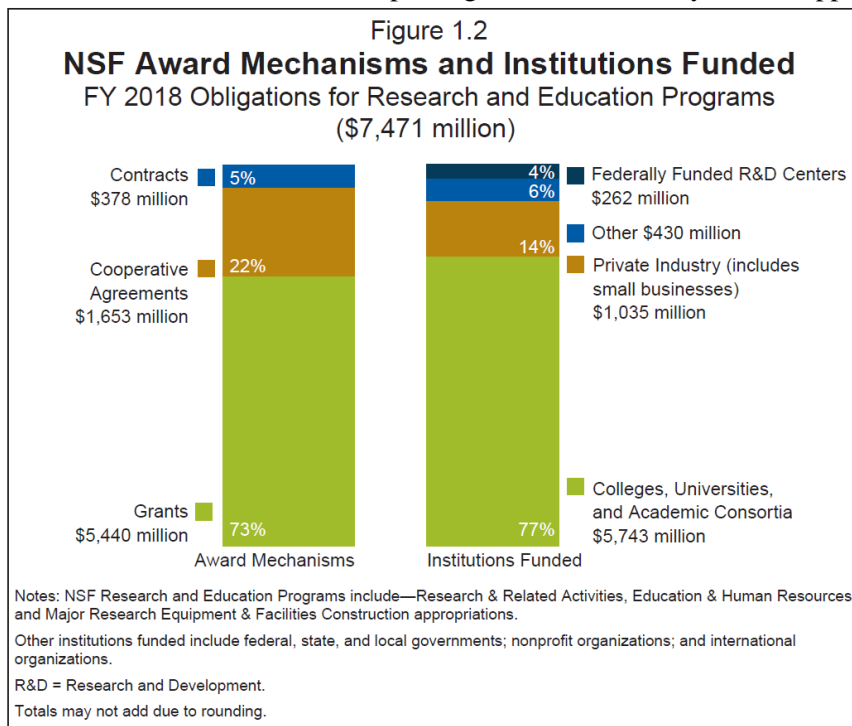


- FY 2018 AOAM funding of \$329 million supported NSF's administrative and management activities. AOAM was 4 percent of NSF's total FY 2018 appropriations. AOAM had almost a \$31 million, or 9 percent, decrease from the FY 2017 level of \$359 million.
- Separate appropriations support the activities of the OIG and the NSB; each accounted for less than 1 percent of NSF's total FY 2018 appropriations. The FY 2018 OIG appropriation of \$15 million was equal to the FY 2017 appropriation. Similarly, the NSB received an appropriation of \$4 million in FY 2018, the same as the previous year's funding level.

Over 32,000 members of the science and engineering community participated in the merit review process as panelists and proposal reviewers.<sup>6</sup> Awards were made to over 1,800 institutions in all 50 states, the District of Columbia, and 2 U.S. territories. These institutions employ many of America's leading scientists, engineers, and educators; and they train the leading innovators of tomorrow. In FY 2018, about 386,000 people were directly involved in NSF-funded programs and activities. 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.

<sup>6</sup> For more information about NSF's merit review process, see [https://www.nsf.gov/bfa/dias/policy/merit\\_review/](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>.

During FY 2018, NSF evaluated over 48,300 proposals through a competitive merit review process and made over 11,700 new competitive awards, mostly to academic institutions. In addition to these proposals, the Graduate Research Fellowship Pro-gram reviews nearly 11,500 applications for fellowships annually.



As shown in Figure 1.2, 77 percent of support for research and education pro-grams (\$5,743 million) was to colleges, universities, and academic consortia. Private industry, including small businesses, accounted for 14 percent (\$1,035 million), and support to Federally Funded Research and Development Centers accounted for 4 percent, or \$262 million. Other recipients (federal, state, and local governments; nonprofit organizations; and international organizations) received 6 percent (\$430 million). A small number of awards fund international science and engineering research, education, and

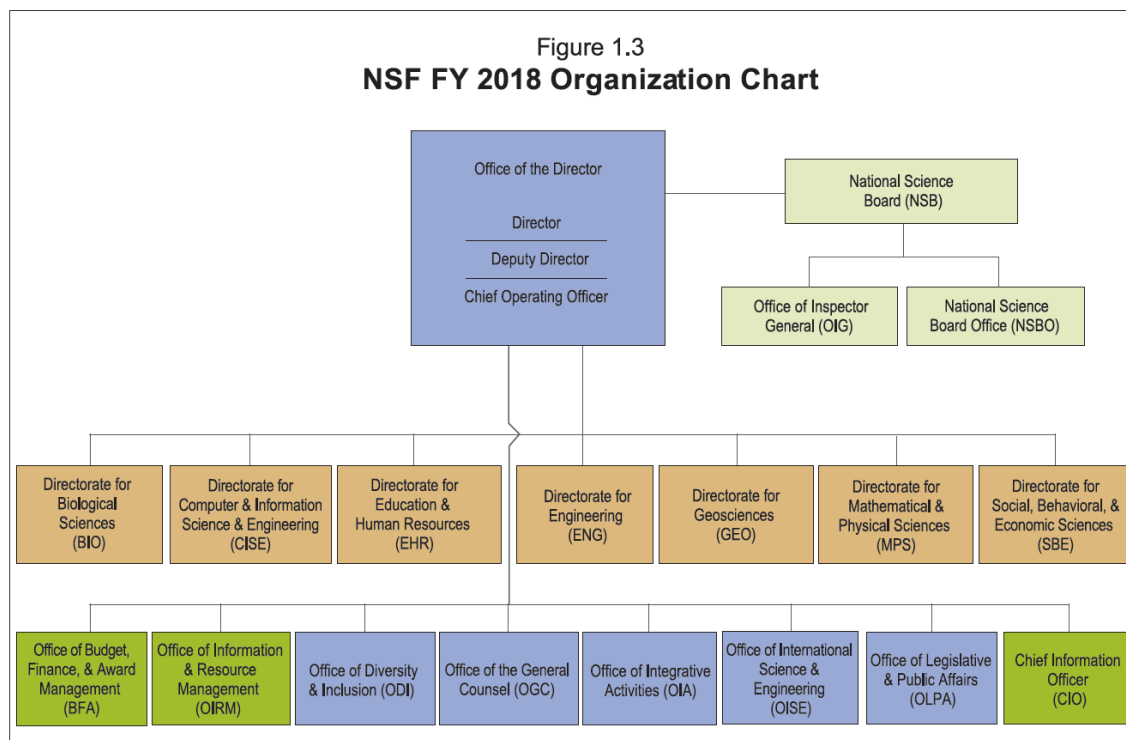
partnerships, which add value to the U.S. scientific enterprise and maintain U.S. leadership in the global scientific enterprise.

As shown in Figure 1.2, NSF's award funding is primarily for financial assistance to carry out a public purpose 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 presents the organization chart for NSF. As shown, NSF's organizational structure aligns with the major fields of science and engineering.<sup>7</sup> NSF is an independent federal agency headed by a Director who is appointed by the President and confirmed by the U.S. Senate.<sup>8</sup>



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.”<sup>9</sup> 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 education community.<sup>10</sup> 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 included 1,417 federal employees in FY 2018.<sup>11</sup> NSF also regularly recruits scientists, engineers, and educators through the Intergovernmental Personnel Act (IPA) who work at NSF for up to 4 years.<sup>12</sup> 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.

<sup>7</sup> NSF’s organization chart is available at: [https://www.nsf.gov/staff/organizational\\_chart.pdf](https://www.nsf.gov/staff/organizational_chart.pdf).

<sup>8</sup> The Director’s biography is available at [https://www.nsf.gov/news/speeches/cordova/cordova\\_bio.jsp](https://www.nsf.gov/news/speeches/cordova/cordova_bio.jsp).

<sup>9</sup> 42 U.S. Code 1862(d): <https://www.law.cornell.edu/uscode/text/42/1862>

<sup>10</sup> A list of NSB members is available at <https://www.nsf.gov/nsb/members>.

<sup>11</sup> Full-time equivalents include the federal employee workforce for NSF, NSB, OIG, and U.S. Arctic Research Commission.

<sup>12</sup> As of September 30, 2018, temporary appointments included 165 under the IPA Mobility Program.

The Foundation's headquarters are in Alexandria, Virginia. NSF maintains an office in Christchurch, New Zealand, to support the U.S. Antarctic Program (USAP); and the OIG has an office in Denver, Colorado. In FY 2018, NSF closed its offices in Brussels, Belgium; Tokyo, Japan; and Beijing, China.

## Management Challenges

In October 2017, the OIG identified six areas representing challenges for the agency for FY 2018: (1) major multi-user research facilities, (2) business operations management, (3) management of the IPA program, (4) management of USAP, (5) cybersecurity and information technology (IT) management, and (6) encouraging the ethical conduct of research.<sup>13</sup>

Management's report on the significant activities undertaken in FY 2018 to address the challenges is in *Appendix 2B: Management Challenges—NSF's Response* of this Agency Financial Report (AFR). The report also discusses activities planned for FY 2019 and beyond. Some of the agency's significant actions and planned next steps to address the challenges are highlighted below.

### Tapping citizens for water research

Across the country, NSF-funded citizen scientists and engineers are helping their local communities as they examine the quality of nearby bodies of water. With projects as varied as their geographical areas, the citizen groups are filling gaps where data currently does not exist. Among their activities: assessing pollutants such as titanium dioxide, developing new tools such as smartphone apps to test water quality, and developing new ways to recruit water quality participants. Their findings can inform future decision-making by providing critical data on topics such as drinking water, sewage treatment, agricultural pollution, green infrastructure, and crowdsourced recruitment. In addition, the programs are increasing scientific literacy and building capacity for sustainable water quality programs.



New York City residents take part in the Citizen's Water Quality Testing Program. Credit: New York City Water Trails Program, Citizen's Water Quality Testing Program

### Major Multi-User Research Facilities Management

Since June 2014, NSF has been continuously enhancing its pre-award and post-award oversight of major facilities in construction and operations. These enhancements are documented in the latest revision of the Large Facilities Manual (LFM)<sup>14</sup> and internal agency guidance. To date, the agency has taken action to close 63 of 65, or 97 percent, of the OIG's recommendations related to oversight of major facilities dating back to 2012. Building on prior years' improvements, in FY 2018, NSF implemented or improved existing accountabilities, which included: (1) appointing a new Chief Officer for Research Facilities in the Office of the Director to advise the NSF Director on all aspects of NSF major and mid-scale facilities throughout their life-cycle, and to collaborate with all NSF staff who are involved in oversight and assistance for the NSF research facilities portfolio; (2) appointing Accountable Directorate Representatives (ADRs) in the directorates with major facilities and forming the Major Facilities Working Group, comprised of the ADRs, to review and socialize policies and procedures across the agency; (3) forming a Facilities Governance Board to approve agencywide major facility oversight policies and procedures; and (4) revising the

<sup>13</sup> The Inspector General's memorandum on Management Challenges for NSF in FY 2018 is in NSF's *FY 2017 Agency Financial Report*, Appendix 4A, at: [https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf18020&org=NSF](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf18020&org=NSF).

<sup>14</sup> LFM: <https://www.nsf.gov/pubs/2017/nsf17066/nsf17066.pdf>

Integrated Project Team guidance to include facilities in the Operations Stage. In order to obtain an independent evaluation of the agency's current major facilities policies and procedures, the agency engaged a subcommittee of the Business Operations Advisory Committee (BOAC) to review NSF's strengthened oversight of major facility cost surveillance. The subcommittee completed its comprehensive review during FY 2018 and will report on its findings and recommendations during the first quarter of FY 2019.

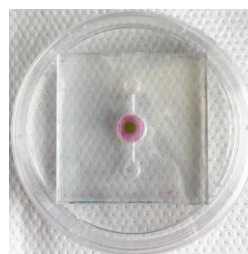
Going forward, NSF plans to continue strengthening its oversight by (1) addressing the findings and recommendations of the forthcoming report from the BOAC subcommittee, (2) finalizing the "Selection of Independent Cost Estimate Review" guidance, which has been implemented in practice, (3) completing updates to the LFM, which will include describing the purpose and customary methods for sensitivity analysis and application of the Government Accountability Office's (GAO's) 12 steps of a high-quality cost estimating process and creating a new section to address schedule development, estimating, and analysis, and (4) finalizing various agency guidance documents to specifically address American Innovation and Competitiveness Act (AICA) requirements and GAO good practice guides.

**Business Operations Management**

- *Improper payments*—NSF continues to effectively manage risk related to improper payments. An OIG inspection of FYs 2016 and 2017 risk reviews found that the agency was in compliance with improper payments reporting requirements. Actions taken in FY 2018 included conducting an improper payments risk assessment and collaborating with the OIG and program offices on risk reduction activities, including completion of an initial fraud risk assessment for grants under the Fraud Reduction and Data Analytics Act. In FY 2019 and beyond, NSF will continue working with the OIG on risk reduction activities while improving improper payments risk assessment and reporting compliance activities.

**Advancing new drug therapies with light**

A biosensor developed by NSF-funded researchers could help advance high-throughput testing for new drug evaluation. Made of a phosphorescent gel, the biosensor measures oxygen levels for organ-on-a-chip systems; these are small, biological structures that mimic a specific organ function. Monitoring oxygen levels is important because normal levels signal health and abnormal levels signal disease. Until the biosensor, researchers lacked tools to retrieve data from the chip systems in real time. Now, rather than destroying the tissue, researchers can flash infrared light at the biosensor. In response, the sensor emits its own infrared light, depending on the oxygen level. Lag times last just microseconds, but with them researchers can measure oxygen concentrations down to tenths of a percent.



This biosensor tracks oxygen levels using infrared light. Credit: Kristina Rivera, NCSU/UNC

- *Digital Accountability and Transparency Act of 2014 (DATA Act)<sup>15</sup> implementation*—In November

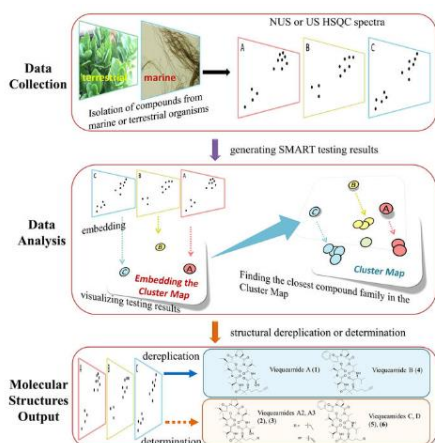
2017, the OIG issued a report required by the DATA Act with respect to the completeness, timeliness, quality, and accuracy of financial data submitted by the agency, as well as its use of consistent data standards. NSF developed corrective actions for all recommendations, which the OIG found sufficient to resolve and close the recommendations. NSF continues to collaborate governmentwide and with the OIG and audit community toward continued success in achieving the goals of the DATA Act. NSF is currently participating in a governmentwide effort to develop a DATA Act Playbook to support compliance and audit readiness while also developing an NSF DATA Act Data Quality Plan.

<sup>15</sup> DATA Act (P.L. 113-101): <https://www.gpo.gov/fdsys/pkg/PLAW-113publ101/pdf/PLAW-113publ101.pdf>

- *Government records*—In November 2015, NSF submitted a corrective action plan to address a 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 policies and practices for the management of physical records and providing a framework for the management of electronic records.

#### Artificial Intelligence research inspired by human visual learning accelerates drug discovery

NSF-funded researchers combined nuclear magnetic resonance spectroscopy with artificial intelligence (AI) to more quickly assess the uniqueness of natural compounds, from which new drugs are often derived. The researchers developed a deep learning system, called Small Molecule Accurate Recognition Technology (SMART), that could streamline by 10-fold the process of identifying the chemical structure of new compounds, leading to faster drug discovery. The tool embraces techniques developed from an NSF-funded researcher's work on face-recognition and visual expertise. It is an example of biologically-inspired machine learning derived from the models of human visual learning, being used to develop a system that will help natural product researchers analyze structures of new compounds.



Workflow for the Small Molecule Accurate Recognition Technology (SMART). Credit: Garrison W. Cottrell, University of California-San Diego

In FY 2018, NSF completed numerous efforts to further enhance the agency's management of physical and electronic records in accordance with NARA requirements, which included issuing staff bulletins with guidance on agency records and establishing records management training content and policy. Actions taken to date have significantly reduced the inherent risk, such as noncompliance and lost records, to a low level. In FY 2019, NSF's efforts in this area will include completing the NARA 2019 Annual Records Management Self-Assessment, the Annual Federal Email Management Report, and the Annual Senior Agency Official for Records Management Report.

- *Subrecipient monitoring*—NSF currently has a risk-based approach to overseeing its award recipients' subaward monitoring through baseline and advanced monitoring activities, including site visits, desk reviews, and Business Systems Reviews. NSF continued to enhance its efforts to ensure transparency and oversight of NSF funds that are passed through to subrecipients by ensuring that awardees sufficiently review cost information to determine that subrecipients' costs are allowable, fair, and reasonable. In FY 2018, NSF piloted a targeted review assessment methodology to assess prime awardees' oversight of subrecipients, continued to require prime awardees to take

corrective actions for findings related to subaward monitoring, and clarified agency documentation such as the NSF budget form, award notification language, and a subrecipient monitoring fact sheet. In FY 2019, NSF will revise agency policies and procedures to align with the *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance)* as it relates to the agency's responsibility to oversee its prime recipients' management of subawards.

### **Management of the IPA Program**

Through the IPA program, scientists, engineers, and educators rotate into the Foundation as temporary program directors, advisors, and leaders. NSF's IPA Steering Committee was established in April 2016 to oversee the ongoing implementation of the program and champion the effective use of IPA rotators. In FY 2018, NSF continued to improve the effectiveness of the program in preventing and addressing conflicts of interest. For example, NSF formulated a corrective action plan (CAP) in response to the OIG's recommendations to strengthen and add to existing controls cited in its June 2017 audit report, *NSF Controls to Mitigate IPA Conflicts of Interest*. The OIG subsequently closed three of its four recommendations in response to NSF's completion-to-date of actions outlined in the CAP. NSF continues to enforce its long-standing policy with respect to statutory and perceived conflicts of interest for staff and reviewers, which includes requiring ethics training for all individuals managing the merit review process. With respect to efforts to control costs under the program, NSF extended into FY 2018 the FY 2017 Cost-Share Pilot Program, which requires an IPA's home institution to provide 10 percent of the rotator's cost. Going forward, NSF will continue to strengthen the program through the implementation of additional controls and completion of an evaluation report for the IPA Steering Committee and the Office of the Director on the second year of the cost-share pilot program.

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

During FY 2018, NSF continued to focus on ensuring a successful management transition, from Lockheed Martin to Leidos as the Antarctic Support Contractor, by monitoring the transfer of business systems with a subsequent review and approval of the business systems by the NSF Contracting Officer. NSF also completed necessary initial solicitations for individual Antarctic Infrastructure Modernization for Science (AIMS) project components, and the Foundation continued to review and modify process and quality requirements. In FY 2019, NSF will complete additional solicitations for the AIMS project, conduct the AIMS Final Design Review, engage the scientific community in an effort to minimize the disruption that the AIMS planning and construction process might have on Antarctic science, and advance the long-range capital plan to include lifecycle and real property investments for all Antarctic locations.



Researchers drop a robotic float into the Southern Ocean.  
*Credit: Greta Shum, ClimateCentral*

#### **Robotic float tracks ocean data**

Southern Ocean data is critical to understanding how carbon dioxide interacts with the polar oceans. However, obtaining that data is challenging because the ocean is one of the world's most turbulent. To overcome this hurdle, NSF-funded researchers developed an array of robotic floats. Diving and drifting in the waters around Antarctica, the floats collect valuable details and beam their findings back to shore via satellite. A recent study using float data suggests that open water nearest the sea ice surrounding the southernmost continent releases significantly more carbon dioxide in winter than previously believed. By increasing the amount of data collected and its specificity, the floats are helping researchers refine carbon dioxide models and understand seasonal and multiyear trends.

### Cybersecurity and Information Technology Management

The availability of IT resources and the security of IT systems are vital to NSF's ability to carry out its mission. NSF continued its efforts in FY 2018 to protect information systems against unauthorized access and to decrease the risk of unauthorized transactions and modifications that would affect the integrity of

#### Tech industry joins with NSF to problem-solve data challenges

NSF joined with leading cloud providers Amazon Web Services (AWS), Google Cloud Platform (GCP) and Microsoft Azure to provide access to cloud computing services to researchers in data science and engineering. NSF provided nearly \$30 million through its Critical Techniques, Technologies and Methodologies for Advancing Foundations and Applications of Big Data Sciences and Engineering (BIGDATA) program, which funds novel research in computer science, statistics, computational science and mathematics to advance the frontiers of data science. AWS, GCP and Microsoft Azure each committed up to \$3 million in cloud computing resources for selected BIGDATA projects, beginning in FY 2017 and continuing for a 3-year period. IBM Cloud joined the collaboration in FY 2018, similarly committing \$3 million over 3 years. NSF's collaboration with the technology industry through BIGDATA will leverage cloud computing to drive creative and principled approaches to address data management, modeling and analysis of big data, and apply novel techniques to solve data-intensive domain science and engineering problems.



NSF's BIGDATA awards are paired with support from leading cloud computing providers.  
Credit: NSF

financial transactions. Additionally, the agency continued to develop effective measures to preserve social media messages and electronic records on NSF-owned mobile devices in order to ensure compliance with federal requirements. In FY 2019 and beyond, the agency will further strengthen the cybersecurity program and implement ways to detect potential unauthorized changes to NSF financial data or security safeguards, while also evaluating new capabilities to preserve and retain information from NSF mobile devices.

#### 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. As in previous years, in FY 2018, NSF's Cultivating Cultures for Ethical STEM (CCE STEM) program invested in innovative approaches to foster ethical STEM research in all 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 *Fostering Integrity in Research*, a 2017 National Academies of Sciences, Engineering, and Medicine report. 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, and how to best instill this knowledge in students. In FY 2019, NSF will continue to promote awardee awareness of the definition and consequences of research misconduct through updates to the *Proposal and Award Policies and Procedures Guide* including references to Chapters 9 ("Identifying and Promoting Best Practices for Integrity") and 10 ("Education for the Responsible Conduct of Research") of *Fostering Integrity in Research*. NSF's outreach to the scientific community on this critical issue will also be conducted through a "Promising Practices Summit," Responsible Conduct of Research training events, and continued funding of the Online Ethics Center and research on best practices.

## Performance

In FY 2018, NSF released its new Strategic Plan for FYs 2018-2022, *Building the Future: Investing in Discovery and Innovation*.<sup>16</sup> This plan lays out two strategic goals that embody the dual nature of NSF's mission to advance the progress of science while benefitting the Nation: *Expand knowledge in science, engineering, and learning* and *Advance the capability of the Nation to meet current and future challenges*. A third goal, *Enhance NSF's performance of its mission*, directs NSF to hold itself accountable for achieving excellence in carrying out its mission. As shown below, each goal has two strategic objectives which together encompass all areas of agency activity. This goal structure enables NSF to link its investments to longer-term outcomes.

| Strategic Goals   | Strategic Objectives   |
|---|--|
| Expand knowledge in science, engineering, and learning.                     | <i>1.1 Knowledge</i><br>Advance knowledge through investments in ideas, people, and infrastructure.  |
|   | <i>1.2 Practice</i><br>Advance the practice of research.   |
| Advance the capability of the Nation to meet current and future challenges. | <i>2.1 Societal Impacts</i><br>Support research and promote partnerships to accelerate innovation and to provide new capabilities to meet pressing societal needs. |
|   | <i>2.2 STEM Workforce</i><br>Foster the growth of a more capable and diverse research workforce and advance the scientific and innovation skills of the Nation.    |
| Enhance NSF's performance of its mission.                                   | <i>3.1 Human Capital</i><br>Attract, retain, and empower a talented and diverse workforce.   |
|   | <i>3.2 Processes and Operations</i><br>Continually improve agency operations.  |

In the Strategic Plan, NSF set an FY 2018 - 2019 Agency Priority Goal (APG) to *Expand public and private partnerships to enhance the impact of NSF's investments and contribute to American economic competitiveness and security*.<sup>17</sup> The APG states that by September 30, 2019, NSF's number of partnerships and/or award actions with other federal agencies, private industry, and foundations/philanthropies will grow by 5 percent, relative to the FY 2017 baseline, to make available infrastructure, expertise, and financial resources to the U.S. scientific and engineering research and education enterprise. In FY 2018, NSF continued its practice of having agency leaders conduct quarterly data-driven performance reviews, including reporting on the APG.

NSF participates actively in the President's Management Agenda,<sup>18</sup> most prominently in the implementation of Cross-Agency Priority (CAP) Goals relevant to its mission such as CAP Goal 8, *Results-Oriented Accountability for Grants*.<sup>19</sup>

<sup>16</sup> NSF Strategic Plan FY 2018 – 2022: <https://www.nsf.gov/pubs/2018/nsf18045/nsf18045.pdf>

<sup>17</sup> Agency Priority Goal – Expand Public and Private Partnerships: [https://www.performance.gov/NSF/APG\\_nsf\\_1.html](https://www.performance.gov/NSF/APG_nsf_1.html)

<sup>18</sup> President's Management Agenda: <https://www.whitehouse.gov/omb/management/pma>

<sup>19</sup> CAP Goal 8: [https://www.performance.gov/CAP/CAP\\_goal\\_8.html](https://www.performance.gov/CAP/CAP_goal_8.html)

## Progress Toward Achievement of Performance Goals

Each year, NSF produces an *Agency Financial Report*, *Annual Performance Report (APR)*, and *Performance and Financial Highlights* summary report. NSF's *FY 2018 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 2018 APR* will also 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 2018 APR* (included in the *FY 2020 Budget Request to Congress*) and *FY 2018 Performance and Financial Highlights* summary report will be posted on the NSF website concurrent with NSF's *FY 2020 Budget Request to Congress* in early February 2019.<sup>20</sup>

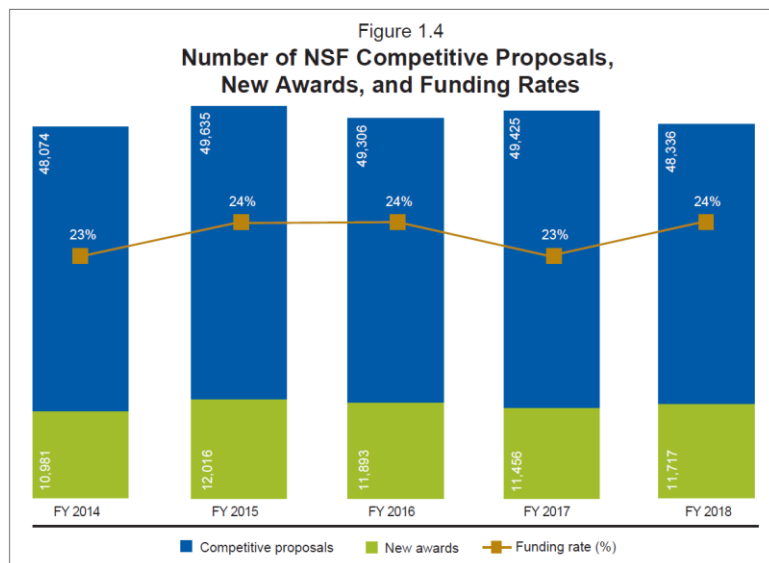
### 2026 Idea Machine helps set research agenda

Inspired by the momentum and impact of NSF's 10 Big Ideas, NSF began considering the kinds of initiatives that could be launched in the near future that would set the stage for breakthrough discoveries. With the 250<sup>th</sup> anniversary of our Nation's founding on the horizon, NSF created a unique way for the public to help set the U.S. agenda for fundamental research in science and engineering. The 2026 Idea Machine competition asked participants, those not employed by NSF, to suggest research questions that will need answers in the coming decade. Their entries are contributing to NSF's next set of Big Ideas for future investment. NSF plans to announce the winners in August 2019.



## 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*.<sup>21</sup>



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*.<sup>21</sup>

As shown in Figure 1.4, the FY 2018 portfolio indicators of competitively reviewed proposals (“competitive proposal actions”), new awards, and funding rates are relatively stable between FY 2017 and FY 2018.

<sup>20</sup> *FY 2018 Agency Performance Report* (included in the Performance chapter of the FY 2020 Budget Request to Congress) and *FY 2018 Performance and Financial Highlights*: <https://www.nsf.gov/about/performance/>.

<sup>21</sup> *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>.



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

- Between FY 2017 and FY 2018, the number of competitive proposal actions decreased by 2 percent; from 49,425 to 48,336.
- The number of new awards in FY 2018 was 11,717, a 2 percent increase over FY 2017, and close to the average number of new awards from FY 2014 to FY 2018.
- The overall funding rate in FY 2018 was 24 percent, an increase of 1 percent. 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 \$189,418, approximately \$15,000 higher than in FY 2017. As shown in Table 1.1, award size varies by year. The FY 2018 average annual award size is higher than the 5-year average of \$177,045.
- The number of employees (full-time equivalents, or FTE) decreased by 1 percent between FY 2017 and FY 2018 from 1,430 FTE to 1,417 FTE.
- The number of active awards decreased slightly (< 1%) in FY 2018, from 54,806 in FY 2017 to 54,386 in FY 2018. The 5-year average number of active awards is 54,229.

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

| Measure           |  | FY 2014   | FY 2015   | FY 2016   | FY 2017   | FY 2018   | Percent Change (FY 2018–FY 2017) | Average (FY 2014–FY 2018) |
|-------------------|--|-----------|-----------|-----------|-----------|-----------|----------------------------------|---------------------------|
| Portfolio         | Competitive proposal actions   | 48,074    | 49,635    | 49,306    | 49,425    | 48,336    | – 2.2%                           | 48,955                    |
|                   | Competitive award actions  | 10,981    | 12,016    | 11,893    | 11,456    | 11,717    | 2.3%                             | 11,613                    |
|                   | Average annual award size (competitive awards)                                 | \$180,507 | \$164,526 | \$176,243 | \$174,533 | \$189,418 | 8.5%                             | 177,045                   |
|                   | Funding rate   | 23%       | 24%       | 24%       | 23%       | 24%       | +1 percentage point              | 24%                       |
| Proposal Workload | Number of employee FTE, usage <sup>1</sup>                                     | 1,391     | 1,374     | 1,398     | 1,430     | 1,417     | – 0.9%                           | 1,402                     |
|                   | Number of active awards <sup>2</sup>   | 53,546    | 53,967    | 54,439    | 54,806    | 54,386    | – 0.8%                           | 54,229                    |
|                   | Proposal reviews conducted <sup>3</sup>  | 225,847   | 231,450   | 225,017   | 231,691   | 223,781   | – 3.4%                           | 227,557                   |
| Financial         | Number of grant payments   | 27,978    | 22,860    | 22,926    | 22,615    | 21,727    | – 3.9%                           | 23,621                    |
|                   | Award expenses incurred but not reported at 9/30 (\$ in millions) <sup>4</sup> | \$250     | \$369     | \$366     | \$397     | \$393     | – 1.0%                           | \$355                     |

<sup>1</sup> Full-time equivalents (FTE) shown include the federal employee workforce for NSF, NSB, OIG, and U.S. Arctic Research Commission.

<sup>2</sup> Active awards include all active awards regardless of whether funds were received during the fiscal year.

<sup>3</sup> Includes written reviews, panel summaries, and site visit reports. In FY 2017, system changes implemented additional categories of panelist roles. Beginning in FY 2018, reviews conducted by these roles are included in the review counts, and FY 2017 has been revised for historical consistency.

<sup>4</sup> FY 2018 number reflects an accrual, and all other years reflect actuals

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. Reliance on ACM\$ reduces the burden of manual invoicing and potential for errors or missed payments.

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 ACM\$ 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.

**Training students for the growing unmanned aircraft systems market**

Through the NSF-funded Geospatial Technician Education-Unmanned Aircraft Systems Faculty Institute, high school teachers and faculty members are learning how to plan and fly manual and autonomous unmanned aircraft system (UAS) missions. The week-long training enables the educators to establish coursework for Virginia's community colleges. Thus far, the project helped five colleges in the Virginia Community College System to offer UAS courses for credit, and three additional colleges to offer non-credit courses. NSF's Advanced Technological Education Program funds the UAS training activity, with the goal of promoting the education of technicians to meet STEM workforce demands through faculty professional development, curriculum development and precollege activities at 2-year colleges. More than 200 students completed courses at one school, Mountain Empire Community College. The project seeks to meet the emerging demand for trained UAS technicians. In 2013, the Association for Unmanned Vehicle Systems International released a report that projected more than 100,000 new jobs in UAS by 2025.



Instruction for faculty participants. Credit: Chris Carter, Virginia Space Grant Consortium

## Financial Discussion and Analysis

Throughout FY 2018, NSF upheld its commitment to excellence in financial management by continuing its focus on fiscal responsibility, improved business processes, increased data transparency, responsible stewardship of federal funds, and accountability. In FY 2018, financial highlights included:

- *Financial System (iTRAK)*— An independent auditor determined that the ‘cloud’ operations of NSF’s financial system, iTRAK, have well-designed and effective controls in place. This is an important milestone for affirming the financial reporting capabilities of iTRAK. Details about the review are on page MD&A-26, *Compliance with the Federal Financial Management Improvement Act of 1996 – OMB Circular A-123, Appendix D*.
- *Enterprise Risk Management (ERM)*—NSF completed its second year of implementing an ERM program that effectively identifies risks, assesses and evaluates those risks, and addresses and monitors the risks. In FY 2018, NSF expanded its risk reporting to include management challenges across the Foundation. The ERM team, based in the Office of Budget, Finance, and Award Management, also increased its outreach to NSF staff about the importance of ERM techniques and the involvement of stakeholders such as the OIG. As a result, an ERM community of practice has started to emerge within the agency. 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.
- *Subrecipient Monitoring*—Under the AICA, Congress directed the NSF OIG to audit NSF policies and procedures governing subrecipient monitoring by pass-through entities (PTEs). The OIG’s audit report recommendations centered on NSF efforts that ensure PTEs meet their responsibilities to monitor completion of subrecipient risk assessments and proper identification of subawards. The OIG also recommended NSF continue efforts to update policies and procedures to align with the *Uniform Guidance*. NSF agreed with OIG recommendations and is taking actions that are anticipated to further improve NSF oversight protocols. On August 20, 2018, the OIG notified NSF that its corrective action plan was responsive to all OIG concerns and officially resolved the audit report.
- *Fraud Risk Assessment for Grants*—In FY 2018, NSF conducted an analysis of fraud risks and schemes across the grant lifecycle. Key outcomes of the analysis included development of a fraud risk map for the grants process, identification of fraud schemes relative to the pre-award process, and generation of a list of proposed pre-award fraud indicator analytics that NSF can incorporate into its grants oversight activities. Details of the review may be found in *Appendix 4, Fraud Reduction Report*, of this AFR.
- *Centralized Receivables Service (CRS)* – NSF transferred the collection of all new non-federal debt to the Department of Treasury’s (Treasury) CRS program in the second quarter of FY 2018. Using an automated system, CRS manages all aspects of debt collection: from issuing the initial invoice to the payment or transfer of delinquent debts to the Treasury Cross-Servicing system. Participating in the CRS program has already reaped benefits for NSF. The agency has increased the amount of debt collected, while decreasing the average time to collect a debt, risk of noncompliance with regulations, risk of errors, and employee workload.
- *Digital Accountability and Transparency Act of 2014 (DATA Act)*—NSF completed a risk assessment as part of its efforts to address the DATA Act Management Challenge. The assessment showed that the agency has an effective mitigation plan in place for known risks. NSF used its mitigation actions in responding to the FY 2017 DATA Act Audit and to manage DATA Act risks.

Further details on NSF's DATA Act status may be found in *Appendix 2 B, Management Challenges—NSF Response*.

Since the passage of the Chief Financial Officers Act of 1990 (CFO Act), the financial management community has been determined to move from the “backroom to the boardroom.” Not only does the President's Management Agenda seek to modernize government for the 21<sup>st</sup> century, Treasury has provided a compelling vision for the future of federal financial management. This vision identifies a series of initiatives that form a foundation of critical building blocks for transforming federal financial management.

Consistent with this vision, NSF is exploring different ways to uphold its strong commitment to excellence in financial management. The agency started piloting the use of Robotic Process Automation (RPA) to enhance operational efficiency and productivity. RPA is a form of intelligent automation using tools that can be deployed and configured to execute

repetitive and time-consuming tasks across applications and systems. Treasury selected NSF to participate in the FY 2018 RPA pilot under its Financial Management Innovation Program. NSF's participation in this governmentwide pilot program will allow the agency to gain insights into the use of RPAs and to share experiences and lessons learned with other agencies. With the goal of streamlining financial operations while increasing the agency's focus on serving as efficient stewards of public funds, NSF will explore other foundational improvements such as blockchain and improved cybersecurity and data analytics.

In accordance with the CFO Act and the Government Management Reform Act of 1994, NSF prepares financial statements in conformity with Generally Accepted Accounting Principles (GAAP) 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. They also provide 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 activities for the year ending September 30, 2018.

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 the first page of Chapter 2, *Financials*. Management's response follows the audit report.

**NSF-funded researcher “transfers” a memory**

An NSF-funded researcher reported that his team transferred a memory from one animal to another via injections of ribonucleic acid, or RNA, extracted from the first animal's neurons. The results challenge the way scientists understand where and how the brain stores memories and hints at the potential for new RNA-based treatments to one day restore lost memories or treat post-traumatic stress disorder. The results also indicate that memory storage involves RNA-mediated epigenetic changes, or changes in the activity of genes, and not in the DNA sequences that make up those genes. The findings potentially upset the long-held idea in neuroscience that memories are stored in the brain's synapses, which convey electrical or chemical signals between nerve cells. Instead, the new research suggests that memories may in fact be stored in neurons' nuclei, a finding that has implications in both the basic sciences and the clinical realm.



“I think in the not-too-distant future, we could potentially use RNA to ameliorate the effects of Alzheimer's disease or post-traumatic stress disorder,” said UCLA professor David Glanzman, seen here holding a marine snail. *Credit: Christelle Snow, UCLA*

## Understanding the Financial Statements

The following discussion of NSF's financial condition and results of operations should be read together with the FY 2018 financial statements and accompanying notes, found in Chapter 2, *Financials*, of this AFR.

In accordance with guidance in OMB Circular No. A-136, *Financial Reporting Requirements*, NSF's FY 2018 financial statements and notes are presented in a comparative format to facilitate analysis of FYs 2018 and 2017. The Stewardship Investments schedule, also in the *Financials* chapter, presents research and human capital investments over the past 5 years. Table 1.2, below, summarizes the changes in NSF's financial position in FY 2018 relative to FY 2017.

**Table 1.2—Changes in NSF's Financial Position in FY 2018**

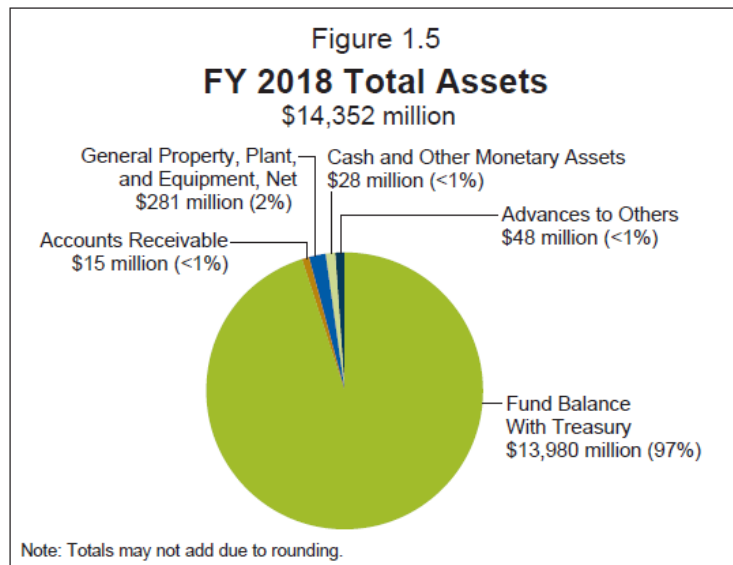
(Dollars in Millions)

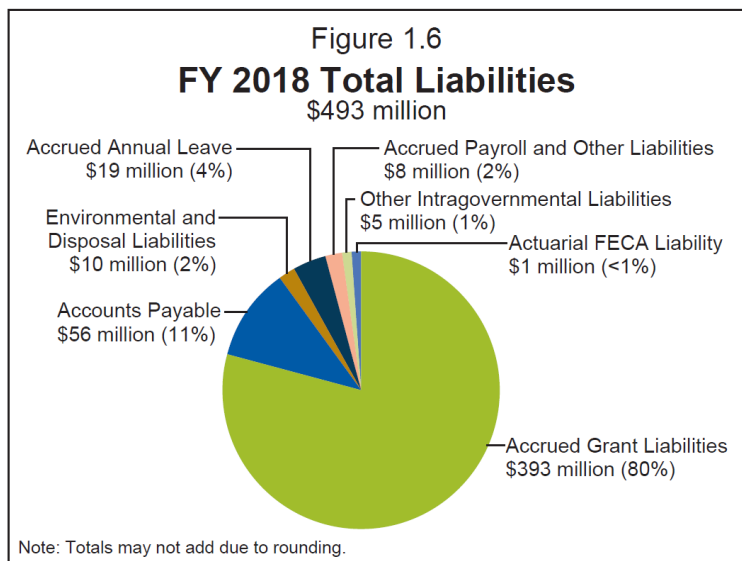
| Net Financial Condition | FY 2018  | FY 2017  | \$ Change | % Change |
|-------------------------|----------|----------|-----------|----------|
| Assets                  | \$14,352 | \$13,682 | \$670     | 5%       |
| Liabilities             | \$493    | \$494    | -\$1      | < -1%    |
| Net Position            | \$13,859 | \$13,187 | \$672     | 5%       |
| Net Cost                | \$7,232  | \$7,116  | \$116     | 2%       |

### 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*.

In FY 2018, Total Assets (Figure 1.5) increased 5 percent from FY 2017. Most of the change occurred in the *Fund Balance with Treasury* account, which increased by \$698 million in FY 2018. NSF is authorized to use *Fund Balance with Treasury* to make expenditures and pay amounts due through the disbursement authority of Treasury. The *Fund Balance with Treasury* is increased through appropriations and collections and decreased by expenditures and rescissions.





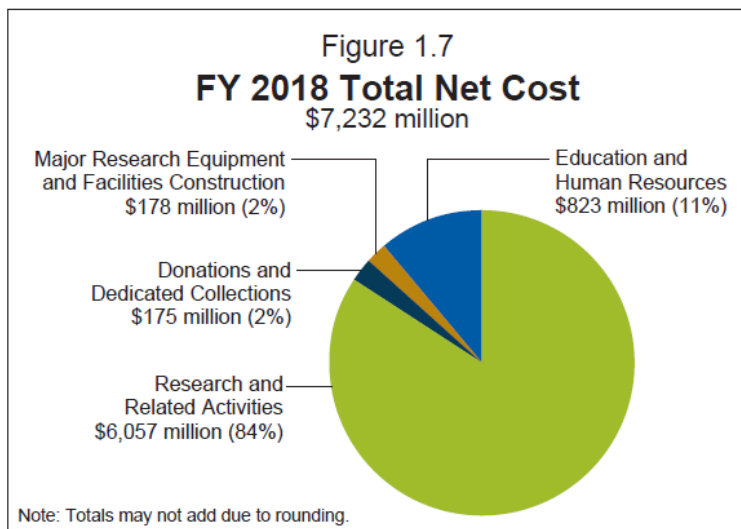
In FY 2018, Total Liabilities (Figure 1.6) decreased less than 1 percent from FY 2017. Underlying this small change was a \$15 million decrease in *Accounts Payable* that was partially offset by a \$12 million increase in *Accrued Grant Liabilities* in FY 2018. *Accounts Payable* is estimated annually 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 2018 change was due to the implementation of the Invoice Processing Platform in the fourth quarter of FY 2017. As a result, NSF became more efficient in paying its invoices,

resulting in a lower *Accounts Payable* balance as compared to FY 2017. *Accrued Grant Liabilities* is estimated annually by utilizing a linear regression model based on the statistical correlation of NSF grantees' historical unliquidated obligations and expenses incurred but not reported. In FY 2018, the unliquidated obligations balance for grantees increased, resulting in a higher *Accrued Grant Liabilities* as compared to FY 2017.

**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 Operations*.

Approximately 95 percent of FY 2018 *Net Cost of Operations* was 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 approximately 5 percent of FY 2018 *Net Cost of Operations* (Figure 1.7). These administrative and management activities support the agency's program goals.



### Statement of Changes in Net Position

The Statement of Changes in Net Position presents the agency's cumulative results of operations and unexpended appropriations for the fiscal year. NSF's *Total Budgetary Financing Sources*, as part of *Unexpended Appropriations*, increased by \$254 million; and *Total Financing Sources*, as part of *Cumulative Results of Operations*, increased by \$69 million in FY 2018 for a total increase of \$323 million. *Cumulative Results of Operations* increased by \$14 million.

#### Engineered sand zaps stormwater pollutants

Using a mineral-coated sand that reacts with and destroys organic pollutants, NSF-funded researchers have discovered that the engineered sand could help purify stormwater percolating into underground aquifers. The discovery may lead to a safe and local reservoir of drinking water for communities in need of clean water sources. As utilities in water-stressed regions consider how to direct urban stormwater back into the ground, water quality becomes a concern. The coated sand is an inexpensive option for removing many of the contaminants that pose risks to groundwater systems. Although the coating does not remove all pollutants, it can be used in conjunction with other water purification systems to remove most impurities.



Engineered sand destroys toxins such as endocrine-disrupting bisphenol A (BPA). Credit: Kara Manke

### 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 2018, *Total Budgetary Resources* increased \$339 million from the FY 2017 level. *Budgetary Resources—Appropriations* for the R&RA, EHR, and MREFC accounts were \$6,351 million, \$902 million, and \$183 million, respectively. The combined *Budgetary Resources—Appropriations* in FY 2018 for the NSB, OIG, and AOAM accounts totaled \$348 million. NSF also received funding via warrant from the H-1B Nonimmigrant Petitioner Account (H-1B) in the amount of \$155 million and via donations from foreign governments, private companies, academic institutions, nonprofit foundations, and individuals in the amount of \$28 million. In FY 2018, the *Budgetary Resources—Appropriations* line was also affected by H-1B sequestration in the amount of \$10 million.

### Stewardship Investments

NSF-funded investments yield long-term benefits to the 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 2018 and 2017, these costs amounted to \$395 million and \$364 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 2018 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 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 \$15 million at September 30, 2018. Of that amount, \$14 million was due from other federal agencies. The remaining \$1 million was due from the public. NSF fully participates in Treasury's 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 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 2018, 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 issue of timeliness of payment under the Act essentially not applicable to the agency. No interest payments were made in FY 2018.

### **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 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.

#### **A century of growth**

The Sahara Desert has expanded by about 10 percent since 1920, according to a study by NSF-funded scientists. The research is the first to assess changes over a century to the boundaries of the world's largest warm-weather desert. When the scientists looked at seasonal trends between 1920 and 2013, they found that the most notable expansion of the Sahara occurred during the summer, resulting in a nearly 16-percent increase in the desert's average area over the 93-year span covered in the study. Documenting the long-term trends in rainfall and temperature in the Sahara and understanding the factors driving those trends will help researchers predict future impacts for deserts across the globe.



Africa's Sahara Desert is encroaching on savanna ecosystems. Credit: Luca Galuzzi

Table 1.3 identifies NSF's FY 2018 inflation adjustments to civil monetary penalties.



**Table 1.3 – FY 2018 Civil Monetary Penalty Adjustment for Inflation**

| Statutory Authority   | Penalty (Name and 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, 16 U.S.C., 2401 <i>et seq.</i> , as amended | Antarctic Conservation Act, Knowing violations     | 1978         | 2018  | \$28,520                                   | 82 FR 60631<br><br>Thursday, December 21, 2017 |
| Antarctic Conservation Act of 1978, 16 U.S.C., 2401 <i>et seq.</i> , as amended | Antarctic Conservation Act, Not knowing violations | 1978         | 2018  | \$16,853                                   | 82 FR 60631<br><br>Thursday, December 21, 2017 |
| Program Fraud Civil Remedies Act of 1986, 31 U.S.C., 3801, <i>et seq.</i>       | Program Fraud violations                           | 1986         | 2018  | \$11,181                                   | 82 FR 60631<br><br>Thursday, December 21, 2017 |

**Multiplying resources, promoting collaboration**

From polar exploration to the recent LIGO discoveries, NSF has a rich history of fostering international research partnerships. Collaboration across disciplines and continents is a critical element needed to solve challenging science and engineering issues facing society. To continue its commitment to global engagement, NSF recently launched the Multiplying Impact Leveraging International Expertise in Research Missions (MULTIPLIER) program. In this new strategy, NSF deploys small teams of NSF staff to selected international sites that offer content-specific collaborations to advance scientific frontiers. The first MULTIPLIER trip focused on synthetic biology research in European laboratories. Synthetic biology is an emerging field centered on construction of new biological systems. The field has the potential to enhance healthcare, agriculture and biotechnology products. Findings from the first expedition may help guide future research funding solicitations.



Members of the NSF MULTIPLIER expedition with members of the German Research Foundation in Bonn, Germany. *Credit: NSF*

## Systems, Controls, and Legal Compliance

### Management Assurances

The Federal Managers' Financial Integrity Act of 1982 (FMFIA)<sup>22</sup> and the OMB Circular A-123, "Management's Responsibility for Enterprise Risk Management and Internal Control"<sup>23</sup> require NSF to evaluate its systems of internal control and provide reasonable assurance to the President and the Congress on the adequacy of those systems, annually. Sound internal control programs support efficient and effective operations; provide reliable, continuous feedback to management about operations; and comply with applicable laws and regulations.

NSF's Internal Control Quality Assurance Program is a management program supporting the Director's assurance statement. This program has evolved and matured over the past 10 years.

The FY 2018 unmodified Statement of Assurance, with no material weaknesses, is reasonable assurance to the overall adequacy and effectiveness of internal controls based upon information that the system of internal control is operating as intended.

NSF's internal control assessment provides reasonable assurance that the objectives of FMFIA and the Federal Financial Management Improvement Act of 1996 (FFMIA) were achieved and that the internal control process over financial reporting is effective.

### Highlights from NSF's FY 2018 Internal Control Quality Assurance Program

In FY 2018, NSF continued to apply an innovative enterprise-wide approach for its internal control reviews while complying with the guidance in OMB Circular A-123 and the GAO *Standards for Internal Control in the Federal Government* (known as the Green Book).<sup>24</sup> NSF also focused on an integrated approach for



#### National Science Foundation

#### FY 2018 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, 2018.

/s/  
**France A. Córdova**  
 Director

November 14, 2018

<sup>22</sup> FMFIA: [https://obamawhitehouse.archives.gov/omb/financial\\_fmfia1982](https://obamawhitehouse.archives.gov/omb/financial_fmfia1982).

<sup>23</sup> OMB Circular A-123: <https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2016/m-16-17.pdf>

<sup>24</sup> GAO *Standards for Internal Control in the Federal Government*: <http://www.gao.gov/products/GAO-14-704G>.

ERM to include strategic risks, operational risks, and the internal control system. This integrated approach enabled NSF to conduct an enterprise-wide review while reducing duplication of effort and streamlining the use of resources. Supporting the integrated approach included, but was not limited to, identifying, evaluating, and performing testing on cross-cutting controls. Reviewing cross-cutting controls supported enterprise-wide discussions and integrated controls beyond a single business process and across the agency.

**Management of Reporting and Data Integrity Risk—OMB Circular A-123, Appendix A**

In accordance with the updated Appendix A, NSF applied a practical and effective approach in determining which control activities to document, assess, and report for internal control over reporting. NSF evaluated key controls as they related to the financial statements, identified and evaluated cross-cutting controls at the entity level, and performed transactional testing. Testing covered the operational effectiveness and design. Tests of operational effectiveness were performed on the following areas:

- Grants Management
- Accounting Operations, General Ledger Analysis, and Financial Reporting
- Charge Cards
- Internal Property, Plant, and Equipment
- External Property, Plant, and Equipment
- Procure to Pay
- Pay and Benefits

Tests of design were performed on the following areas:

- User Controls over Third Party Service Providers
- Insider Threat Program

No significant deficiencies or material weaknesses in internal control over reporting were identified.

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

In 2018, NSF conducted a charge card review that included purchase card and travel card transactions. The review was conducted to determine whether the purchases/charges were in compliance with laws, regulations, and NSF policies and procedures. Various types of data analytics were performed to examine purchase and travel card data. A crosswalk was completed to ensure NSF maintains the appropriate internal controls to reduce risk of fraud, waste, and error within charge card spending. No significant deficiencies or material weaknesses in internal control over government charge cards were identified.

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

*Assessment of FY 2017 Improper Payments:* During early FY 2018, NSF completed a qualitative risk review of FY 2017 improper payments. The risk review determined NSF did not have significant risk of improper payments for grants, contracts, charge cards, and payments to employees. In May 2018, the NSF OIG issued a report on NSF's compliance with the Improper Payment Elimination and Recovery Act (IPERA) requirements for FY 2017. The OIG concluded NSF complied with the requirements of IPERA. This was the third consecutive report finding NSF in compliance with IPERA reporting requirements.

*Assessment of FY 2018 Improper Payments:* During the third and fourth quarters of FY 2018, NSF completed a qualitative risk assessment of FY 2018 improper payments through June 30, 2018. The risk assessment was completed as the final step of an overall 3-year risk assessment cycle comprised of risk reviews in 2016 and 2017 and culminated with the results of those 2 years rolled forward and combined with the 2018 risk assessment activities. The FY 2018 risk assessment determined that NSF did not have a

significant risk of improper payments for grants, contracts, charge cards, and payments to employees. No significant deficiencies or material weaknesses in internal control over improper payments were identified.

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

OMB Circular A-123, Appendix D provides guidance in determining compliance with FFMIA for agencies subject to the CFO Act. NSF leveraged work from Appendix A and focused efforts on implementing the Statement of Standards for Attestation Engagements (SSAE) 18 process to demonstrate that both the iTRAK service provider and NSF have the appropriate controls designed and in place, including the Complementary User Entity Controls. NSF's service provider received a clean opinion on the service auditor type 2 System and Organization Controls Report, which is relevant to internal control over financial reporting. The auditors' opinion addressed the accuracy and completeness of the design of controls and service. NSF developed goals and compliance indicators and established compliance with Appendix D requirements. No significant deficiencies or material weaknesses in internal control over FFMIA compliance were identified.

*Federal Information Security Modernization Act (FISMA) of 2014:* NSF has established a comprehensive IT Security and Privacy Program that is consistent with FISMA 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. NSF includes cybersecurity as part of its ERM program. The OMB Cybersecurity Risk Management Assessment evaluated NSF as overall managing cybersecurity risk and confirmed that NSF has implemented appropriate security protections. Improved technologies and continuous monitoring enhance and verify an effective IT Security and Privacy Program.

**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, 2018.

*Digital Accountability and Transparency Act of 2014 (DATA Act):* The DATA Act is a governmentwide initiative led by OMB and Treasury to standardize and publish the federal government's wide variety of reports and data compilations related to spending. NSF successfully met the DATA Act's requirement for federal agencies to begin submitting data to Treasury by May 2017 and implemented corrective actions sufficient to close all recommendations of a November 2017 OIG review, as required by the DATA Act. NSF, subsequently, conducted a root cause analysis of its challenges related to the DATA Act. The agency continues to provide leadership and engagement in governmentwide DATA Act work, which includes developing a data quality plan in accordance with OMB-issued guidance in June 2018. Based on NSF's risk-based evaluation and analysis of causes and actions taken, NSF believes that its risk of reporting inaccurate, incomplete, or untimely data has been significantly reduced.

*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), is a Shared Service Provider and its Federal Personnel/Payroll System (FPPS) performs many of NSF's payroll functions. IBC FPPS's internal control is reviewed annually by auditors under 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 encourages 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.

*Government Charge Card Abuse Prevention Act of 2012, Pub. 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 in *Improving the Management of Government Charge Card Programs—OMB Circular A-123, Appendix B*, page MD&A-25.

*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-22.

*Federal Information Security Modernization Act of 2014*: This topic is addressed in the subsection *Compliance with the Federal Financial Management Improvement Act of 1996—OMB Circular A-123, Appendix D*, page MD&A-26.

*Single Audit Act of 1984, Pub L. No. 98-502, and the Single Audit Act Amendments of 1996, P.L. 104-156. (A-136, section II.2.8)*: In accordance with § 2 CFR 200.501, Subpart F, Audit Requirements, non-federal entities that expend \$750,000 or more during the previous fiscal year in federal awards must have a single or program-specific audit conducted by an independent auditor for that year. Federal agency internal control standards determine whether award expenditures comply with laws and regulations. NSF, like 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 Guidance* and OMB Circular A-50, Audit Follow-up, as a basis for its audit resolution and follow-up activities. During FY 2018, NSF resolved 152 single audit reports.

NSF continues to ensure that its policies and procedures fully align with federal requirements. The agency continually assesses the effects that 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**

iTRAK is NSF's Oracle-based commercial-off-the-shelf financial system hosted in the 'cloud' by a commercial hosting provider. iTRAK provides automated business processes and improved funds management and reporting capabilities for NSF's external and internal customers, including grantees, financial and administrative staff, and program managers. iTRAK also performs system edit checks and provides audit trails for financial transactions, thereby strengthening internal controls. iTRAK aligns with NSF's strategic objective to continually improve agency operations by enabling efficient, effective execution of financial activities and business operations; and it supports the agency in its stewardship role by providing managers and staff with financial data and reports, so they may make informed decisions about the programs they manage and support. For example, an iTRAK Open Obligations Reporting Tool was developed to assist NSF staff with prioritizing the review of open obligations and understanding the related funding impacts. The reporting tool supports NSF's efforts to continuously employ sound financial management and stewardship funding practices to fully utilize resources.

iTRAK complies with federal mandates and regulations by ensuring that transactions are posted in accordance with the United States Standard General Ledger (USSGL) at the transaction level; maintaining accounting data to permit reporting in accordance with GAAP as prescribed by the Federal Accounting Standards Advisory Board. iTRAK also 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*; OMB Circular A-130, *Management of Federal Information Resources*, and OMB Circular A-123, Appendix D, *Compliance with the Federal Financial Management Improvement Act of 1996* and with other federal regulations and guidance such as the CFO Act, FISMA, and the Rehabilitation Act, Section 508.

In FY 2018, an independent accounting firm examined iTRAK's IT controls. The assessment was favorable with no significant findings. Details about the review are on page MD&A-26, *Compliance with the Federal Financial Management Improvement Act of 1996 – OMB Circular A-123, Appendix D*.

As iTRAK continues to mature, NSF will continue to expand its analytical capabilities toward a more performance-driven system through reporting and data analytics tools and dashboards to better support NSF's mission. In keeping with this objective, NSF will continue to explore opportunities for iTRAK reporting and integration enhancements. Future initiatives on the horizon are summarized below with anticipated implementation dates:

#### *Integration Initiatives*

- GSA SmartPay 3 (FY 2019) – NSF will integrate with Citibank for recording NSF's purchase and travel card transactions.
- G-invoicing (FY 2021) – NSF will integrate with Treasury's new G-invoicing system which will serve as the front-end application for users to originate and manage interagency agreements.
- NSF Business Applications (NBAs) Account Code Structure (ACS) – NSF will modernize its NBAs' ACS to align with iTRAK's current structure, thereby streamlining data and reporting standards across the foundation.

#### *Reporting Initiatives*

- Financial Management Indicators (FMI) Dashboard (FY 2019) – As a next generation offering, a FMI Dashboard will be developed to provide more real-time, dashboard, and drill down reporting of open obligations.

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 prioritize requirements while managing risk.

**Financial Management System Framework**

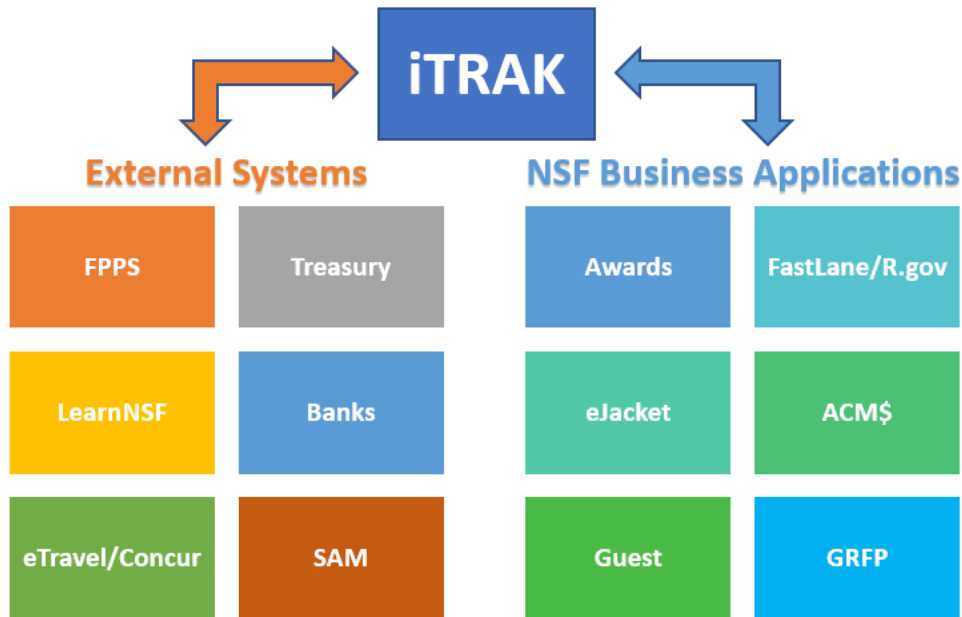
NSF's financial management system framework (Figure 1.8) focuses on the Foundation's financial management systems, standard business processes, data, and information architecture to ensure reliable, timely, and consistent financial information that enables effective management of NSF resources and delivery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

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

- 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 (GRFP) system; and
- Guest Travel and Reimbursement System.

iTRAK also interfaces with external systems operated by Treasury; Citibank and LearnNSF, the Foundation's training system; and with other federal systems such as FPPS, eTravel/Concur, and GSA's System for Award Management, or SAM.

**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. Diane Souvaine  
Chair  
National Science Board

**FROM:** Allison C. Lerner *Allison C. Lerner*  
Inspector General

**DATE:** November 14, 2018

**SUBJECT:** Audit of the National Science Foundation's  
Fiscal Years 2018 and 2017 Financial Statements

This memorandum transmits Kearney & Company's reports on its financial statement audit of the National Science Foundation (NSF) for FY 2018, which includes FY 2017 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*,<sup>1</sup> 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, 2018, and for the fiscal year then ended. The contract requires that the audit be performed in accordance with GAS, the Office of Management and Budget Bulletin 19-01, *Audit Requirements for Federal Financial Statements*, and the GAO/CIGIE *Financial Audit Manual*.

For Fiscal Year 2018 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, 2018 and 2017, as well as NSF's net cost of operations, changes in

<sup>1</sup> Pub.L. No. 101-576



## NATIONAL SCIENCE FOUNDATION OFFICE OF INSPECTOR GENERAL

net position, and budgetary resources for the years then ended, in accordance with accounting principles generally accepted in the United States of America.

- Identified no material weaknesses in internal control over financial reporting.<sup>2</sup>
- Identified no instances in which NSF's financial management systems did not substantially comply with the *Federal Financial Management Improvement Act of 1996* (FFMIA).<sup>3</sup>
- Identified no reportable instances of noncompliance with provisions of laws tested or other matters.

NSF's response to the draft reports, dated November 9, 2018, follows Kearney's reports.

Kearney is responsible for the attached auditor's reports dated November 14, 2018, and the conclusions expressed therein. We do not express opinions on NSF's financial statements or internal control over financial reporting, or on whether NSF's financial management systems substantially complied with the three requirements of FFMIA, or conclusions on compliance and other matters.

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.

### Attachments

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<sup>2</sup> 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.

<sup>3</sup> Pub. L. No. 104-208

## **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, 2018 and 2017, 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, and 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 19-01, *Audit Requirements for Federal Financial Statements*. Those standards and OMB Bulletin 19-01 require that we plan and perform the audit 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.

**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, 2018 and 2017, and 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 and, accordingly, we do not express an opinion or provide any assurance on the information.

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

In accordance with *Government Auditing Standards* and OMB Bulletin 19-01, we have also issued reports, dated November 14, 2018, 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, and other matters for the year ended September 30, 2018. 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 19-01 and should be considered in assessing the results of our audit.



Alexandria, Virginia  
November 14, 2018



## 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 year ended September 30, 2018, and we have issued our report thereon dated November 14, 2018. We conducted our audit 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 19-01, *Audit Requirements for Federal Financial Statements*.

### Internal Control over Financial Reporting

In planning and performing our audit 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 19-01. 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 of this section 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.





### **Status of Prior Year Findings**

In the *Independent Auditor's Report on Internal Control over Financial Reporting* within the audit report on NSF's fiscal year (FY) 2017 financial statements, we did not identify any issues related to internal control over financial reporting.

### **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 19-01 in considering the entity's internal control. Accordingly, this communication is not suitable for any other purpose.

A handwritten signature in blue ink that reads "Kearney &amp; Company". The signature is written in a cursive, flowing style.

Alexandria, Virginia  
November 14, 2018

# **Attachment I – National Science Foundation’s Management Response**



National Science Foundation  
Office of Budget, Finance and Award Management

**MEMORANDUM**

**Date:** November 9, 2018  
**To:** Allison Lerner, Inspector General  
**From:** *Teresa Grancorvitz*  
Teresa Grancorvitz, Chief Financial Officer  
**Subject:** Management's Response to Independent Auditor's Report for  
Fiscal Year (FY) 2018

I am pleased to respond to the Independent Public Auditor's Report on the National Science Foundation's (NSF) FY 2018 financial statements. For the 21<sup>st</sup> consecutive year NSF has achieved an unmodified audit opinion on its financial statements. This accomplishment includes the continuation of no material weaknesses or significant deficiencies in internal control over financial reporting.

I am proud of the financial stewardship that we have demonstrated over NSF's resources to the taxpayer. I also appreciate the continued commitment of your staff and Kearney & Company to collaborate with NSF in achieving outstanding audit results.

We look forward to working with the Office of Inspector General and Kearney & Company to make continuous improvements in our systems and business processes, while advancing the agency's mission. 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](mailto:mwetklow@nsf.gov).



## 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 year ended September 30, 2018, and have issued our report thereon dated November 14, 2018. We conducted our audit 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 19-01, *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 financial statements, 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 audit; 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 19-01.

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.



### **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 19-01 in considering the entity's compliance. Accordingly, this communication is not suitable for any other purpose.

A handwritten signature in blue ink that reads "Kearney &amp; Company". The signature is written in a cursive, flowing style.

Alexandria, Virginia  
November 14, 2018



# National Science Foundation

## **Financial Statements**

As of and for the Fiscal Years ended  
September 30, 2018 and 2017

**National Science Foundation**  
**Balance Sheet**  
**As of September 30, 2018 and 2017**  
**(Amounts in Thousands)**

| <b>Assets</b>   | <b><u>2018</u></b>          | <b><u>2017</u></b>          |
|---|-----------------------------|-----------------------------|
| Intragovernmental Assets  |                             |                             |
| Fund Balance With Treasury (Note 2)                               | \$ 13,979,579               | \$ 13,282,046               |
| Accounts Receivable   | 14,195                      | 9,780                       |
| Advances to Others  | 47,674                      | 75,169                      |
| <b>Total Intragovernmental Assets</b>                             | <b><u>14,041,448</u></b>    | <b><u>13,366,995</u></b>    |
| Cash and Other Monetary Assets (Note 2)                           | 28,385                      | 30,359                      |
| Accounts Receivable, Net  | 945                         | 2,276                       |
| General Property, Plant and Equipment, Net (Note 3)               | 281,211                     | 281,888                     |
| <b>Total Assets</b>   | <b><u>\$ 14,351,989</u></b> | <b><u>\$ 13,681,518</u></b> |
| <b>Liabilities</b>  |                             |                             |
| Intragovernmental Liabilities                                     |                             |                             |
| Accounts Payable  | \$ 7,794                    | \$ 10,458                   |
| Other Intragovernmental Liabilities                               | 5,010                       | 4,574                       |
| <b>Total Intragovernmental Liabilities</b>                        | <b><u>12,804</u></b>        | <b><u>15,032</u></b>        |
| Accounts Payable  | 47,799                      | 60,340                      |
| Actuarial FECA Liability  | 1,265                       | 1,249                       |
| Environmental and Disposal Liabilities (Note 6)                   | 10,268                      | 10,189                      |
| Accrued Grant Liabilities   | 393,365                     | 381,073                     |
| Accrued Payroll and Other Liabilities                             | 7,834                       | 7,751                       |
| Accrued Annual Leave  | 19,235                      | 18,811                      |
| <b>Total Liabilities</b>  | <b><u>\$ 492,570</u></b>    | <b><u>\$ 494,445</u></b>    |
| <b>Net Position</b>   |                             |                             |
| Unexpended Appropriations - Other Funds                           | \$ 12,987,425               | \$ 12,328,610               |
| Cumulative Results of Operations - Other Funds                    | 308,487                     | 325,069                     |
| Cumulative Results of Operations - Dedicated Collections (Note 7) | 563,507                     | 533,394                     |
| <b>Total Net Position</b>   | <b><u>13,859,419</u></b>    | <b><u>13,187,073</u></b>    |
| <b>Total Liabilities and Net Position</b>                         | <b><u>\$ 14,351,989</u></b> | <b><u>\$ 13,681,518</u></b> |

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

**National Science Foundation**  
**Statement of Net Cost**  
**For the Years Ended September 30, 2018 and 2017**  
**(Amounts in Thousands)**

| <b>Program Costs (Note 8)</b>                                   | <b><u>2018</u></b>         | <b><u>2017</u></b>         |
|---|----------------------------|----------------------------|
| Research and Related Activities                                 |                            |                            |
| Gross Costs   | \$ 6,137,371               | \$ 6,106,485               |
| Less: Earned Revenue  | (80,482)                   | (99,531)                   |
| <b>Net Research and Related Activities</b>                      | <b><u>6,056,889</u></b>    | <b><u>6,006,954</u></b>    |
| <br>Education and Human Resources                               |                            |                            |
| Gross Costs   | \$ 827,570                 | \$ 785,978                 |
| Less: Earned Revenue  | (4,925)                    | (4,043)                    |
| <b>Net Education and Human Resources</b>                        | <b><u>822,645</u></b>      | <b><u>781,935</u></b>      |
| <br>Major Research Equipment and Facilities Construction        |                            |                            |
| Gross Costs   | \$ 177,708                 | \$ 181,093                 |
| Less: Earned Revenue  | -                          | -                          |
| <b>Net Major Research Equipment and Facilities Construction</b> | <b><u>177,708</u></b>      | <b><u>181,093</u></b>      |
| <br>Donations and Dedicated Collections                         |                            |                            |
| Gross Costs   | \$ 174,564                 | \$ 146,222                 |
| Less: Earned Revenue  | -                          | -                          |
| <b>Net Donations and Dedicated Collections</b>                  | <b><u>174,564</u></b>      | <b><u>146,222</u></b>      |
| <br><b>Net Cost of Operations (Notes 8 and 14)</b>              | <b><u>\$ 7,231,806</u></b> | <b><u>\$ 7,116,204</u></b> |

*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, 2018**  
**(Amounts in Thousands)**

|   | <u>2018</u>                  |                       |                       |
|---|------------------------------|-----------------------|-----------------------|
|   | <u>Funds From</u>            | <u>All Other</u>      | <u>Total</u>          |
|   | <u>Dedicated Collections</u> | <u>Funds</u>          |                       |
|   | <u>(Note 7)</u>              |                       |                       |
| <b>Unexpended Appropriations</b>                |                              |                       |                       |
| <b>Beginning Balances</b>                       | \$ -                         | 12,328,610            | 12,328,610            |
| <b>Budgetary Financing Sources</b>              |                              |                       |                       |
| Appropriations Received                         | -                            | 7,783,656             | 7,783,656             |
| Cancelled Authority Adjustments                 | -                            | (74,039)              | (74,039)              |
| Appropriations Used                             | -                            | (7,050,802)           | (7,050,802)           |
| <b>Total Budgetary Financing Sources</b>        | <b>-</b>                     | <b>658,815</b>        | <b>658,815</b>        |
| <b>Total Unexpended Appropriations</b>          | <b>\$ -</b>                  | <b>12,987,425</b>     | <b>12,987,425</b>     |
| <br><b>Cumulative Results of Operations</b>     |                              |                       |                       |
| <b>Beginning Balances</b>                       | \$ 533,394                   | 325,069               | 858,463               |
| <b>Budgetary Financing Sources</b>              |                              |                       |                       |
| Appropriations Used                             | -                            | 7,050,802             | 7,050,802             |
| Non-exchange Revenue                            | -                            | 55                    | 55                    |
| Donations                                       | -                            | 28,223                | 28,223                |
| Funds from Dedicated Collections                |                              |                       |                       |
| Transferred In / (Out)                          | 155,429                      | -                     | 155,429               |
| <b>Other Financing Sources</b>                  |                              |                       |                       |
| Transfers In / (Out) Without Reimbursement      | -                            | -                     | -                     |
| Imputed Financing From Costs Absorbed By Others | -                            | 13,799                | 13,799                |
| Other   | -                            | (2,971)               | (2,971)               |
| <b>Total Financing Sources</b>                  | <b>155,429</b>               | <b>7,089,908</b>      | <b>7,245,337</b>      |
| <b>Net Cost of Operations (Note 8 and 14)</b>   | <b>(125,316)</b>             | <b>(7,106,490)</b>    | <b>(7,231,806)</b>    |
| <b>Cumulative Results of Operations</b>         | <b>\$ 563,507</b>            | <b>308,487</b>        | <b>871,994</b>        |
| <br><b>Net Position</b>                         | <br><b>\$ 563,507</b>        | <br><b>13,295,912</b> | <br><b>13,859,419</b> |

*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)**

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

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

**National Science Foundation**  
**Statement of Budgetary Resources**  
**For the Years Ended September 30, 2018 and 2017**  
**(Amounts in Thousands)**

|  | <u>2018</u>                | <u>2017</u>                |
|--|----------------------------|----------------------------|
| <b>Budgetary Resources</b>                                   |                            |                            |
| Unobligated Balance from Prior Year Budget Authority, Net    | \$ 402,816                 | \$ 401,461                 |
| Appropriations   | 7,967,360                  | 7,651,210                  |
| Spending Authority from Offsetting Collections               | 89,692                     | 68,026                     |
| <b>Total Budgetary Resources (Note 12)</b>                   | <b>\$ <u>8,459,868</u></b> | <b>\$ <u>8,120,697</u></b> |
| <br><b>Status of Budgetary Resources</b>                     |                            |                            |
| New Obligations and Upward Adjustments (Notes 9, 12, and 14) | \$ 8,132,724               | \$ 7,754,266               |
| Unobligated Balance, End of Year                             |                            |                            |
| Apportioned, Unexpired (Note 2)                              | 142,749                    | 183,264                    |
| Unapportioned, Unexpired (Note 2)                            | <u>31,610</u>              | <u>24,102</u>              |
| Unobligated Balance, Unexpired, End of Year                  | 174,359                    | 207,366                    |
| Unobligated Balance, Expired, End of Year (Note 2)           | <u>152,785</u>             | <u>159,065</u>             |
| Total Unobligated Balance, End of Year                       | 327,144                    | 366,431                    |
| <b>Total Status of Budgetary Resources</b>                   | <b>\$ <u>8,459,868</u></b> | <b>\$ <u>8,120,697</u></b> |
| <br><b>Net Outlays</b>                                       |                            |                            |
| Net Outlays  | \$ 7,197,800               | \$ 7,261,438               |
| Distributed Offsetting Receipts (Note 12)                    | <u>(31,459)</u>            | <u>(46,140)</u>            |
| <b>Net Agency Outlays</b>                                    | <b>\$ <u>7,166,341</u></b> | <b>\$ <u>7,215,298</u></b> |

*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>. In FY 2018, NSF implemented Statement of Federal Financial Accounting Standards (SFFAS) No. 47, *Reporting Entity*. In compliance with the standard, the United States Arctic Research Commission, an independent federal agency whose budget requests and appropriations are through NSF, continues to have its activities included in NSF’s financial statements for FY 2018 and FY 2017.

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 *ex 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*, revised July 30, 2018. For FY 2018, OMB Circular No. A-136 prescribed a new presentation for the Statement of Changes in Net Position (SCNP) and Statement of Budgetary Resources (SBR). The format of both current and prior year SCNP and SBR were updated in accordance with the new 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. NSF also 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 2018, the Science Appropriations Act, 2018 under Public Law 115-141, and the Bipartisan Budget Act of 2018, under Public Law 115-123, provided funding for NSF's appropriations. In addition, the Science Appropriations Act provided an administrative provision allowing NSF to transfer up to 5 percent of current year funding between appropriations, but no such appropriation shall be increased by more than 10 percent by any such transfers. 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* (FBWT) 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. *Undeposited Collections* are funds received by NSF, but not remitted to Treasury prior to September 30. 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. 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 that is non-cancelable. 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. Beneficial Occupancy is the point in time when the facility is ready for safe occupancy and use by NSF. Items that pertain to the safety and health of any future occupants of the facility must be corrected before a Beneficial Occupancy is granted and the facility occupied. All construction efforts at the construction site may not be completed (e.g., punch list items or other minor construction activities may still be required for construction to be considered complete), but the facility space can be used for its intended purpose. When Beneficial Occupancy is granted, the 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 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 the number of entities given award funds that allow for the purchase of 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 federal payroll payables, unfunded employment related liabilities, advances from others, and liabilities for non-entity assets. Liabilities for federal payroll payables consist of the federal portion of payroll benefits, taxes, and unfunded Federal Employees' Compensation Act (FECA) liabilities. *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 non-entity assets are recorded to offset accounts receivable balances associated with canceled appropriations.

### **J. Accounts Payable**

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

### **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 actual costs incurred are reflected as a liability because NSF will reimburse DOL 2 years after the actual payment of expenses. 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 is recorded as an unfunded liability. Future NSF Agency Operations and Award Management (AOAM) appropriations will be 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 2018, approximately 5 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.<sup>1</sup>

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<sup>1</sup> OPM Benefit Administration website:

<https://www.opm.gov/retirement-services/publications-forms/benefits-administration-letters?url=2018>

## **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 operator cannot be estimated until such time as the facility is terminated.

*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 Office 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 expecting 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 Liabilities*.

### **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.

### **Note 2. Fund Balance with Treasury**

*Fund Balance with Treasury* (FBWT) consisted of the following components as of September 30, 2018 and 2017:

| (Amounts in Thousands)                                   | 2018                 |
|--|----------------------|
|  | Total                |
| Obligated  | \$ 13,680,740        |
| Unobligated Available, Unexpired                         | 142,749              |
| Unobligated Unavailable, Unexpired                       | 31,610               |
| Unobligated Unavailable, Expired                         | 152,785              |
| Less: Cash and Other Monetary Assets                     | (28,385)             |
| Add: Undeposited Collections and Donations Sequestration | 80                   |
| <b>Total FBWT</b>  | <b>\$ 13,979,579</b> |

| (Amounts in Thousands)               | 2017                 |
|--------------------------------------|----------------------|
|                                      | Total                |
| Obligated                            | \$ 12,945,933        |
| Unobligated Available, Unexpired     | 183,264              |
| Unobligated Unavailable, Unexpired   | 24,102               |
| Unobligated Unavailable, Expired     | 159,065              |
| Less: Cash and Other Monetary Assets | (30,359)             |
| Add: Undeposited Collections         | 41                   |
| <b>Total FBWT</b>                    | <b>\$ 13,282,046</b> |

*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. Donations are reported as *Cash and Other Monetary Assets* and represent cash held outside of Treasury at a commercial bank in interest bearing accounts and may be subject to sequestration. *Undeposited Collections* are funds received by NSF, but not remitted to Treasury prior to September 30.

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

The components of *General Property, Plant and Equipment, Net* as of September 30, 2018 and 2017 are shown below. As of September 30, 2018, NSF had not identified any asset impairments.

| (Amounts in Thousands)   | 2018              |                     |                   |
|--------------------------|-------------------|---------------------|-------------------|
|                          | Acquisition       | Accumulated         | Net Book Value    |
|                          | Cost              | Depreciation        |                   |
| Equipment                | \$ 163,691        | \$ (149,343)        | \$ 14,348         |
| Aircraft and Satellites  | 115,806           | (115,806)           | -                 |
| Buildings and Structures | 315,005           | (155,154)           | 159,851           |
| Leasehold Improvements   | 29,389            | (2,869)             | 26,520            |
| Construction in Progress | 6,439             | -                   | 6,439             |
| Internal Use Software    | 88,294            | (74,394)            | 13,900            |
| Software in Development  | 60,153            | -                   | 60,153            |
| <b>Total PP&amp;E</b>    | <b>\$ 778,777</b> | <b>\$ (497,566)</b> | <b>\$ 281,211</b> |

| (Amounts in Thousands)   | 2017              |                     |                   |
|--------------------------|-------------------|---------------------|-------------------|
|                          | Acquisition       | Accumulated         | Net Book Value    |
|                          | Cost              | Depreciation        |                   |
| 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            |
| <b>Total PP&amp;E</b>    | <b>\$ 767,414</b> | <b>\$ (485,526)</b> | <b>\$ 281,888</b> |

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#### 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, 2018, there were 17 colleges or universities and 9 commercial entities given award funds that allow for the purchase of 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)

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| <u>Entities with Reported NSF Government Owned Equipment</u>       | <u>Amount</u> |
|--|---------------|
| Association of Universities for Research in Astronomy, Inc. - AURA | \$838,041     |
| Incorporated Research Institutions for Seismology - IRIS           | \$1,615       |
| National Radio Astronomy Observatory - AUI                         | \$407,990     |
| University Corporation for Atmospheric Research - UCAR             | \$244,689     |

#### Note 5. Leases

NSF occupies common spaces with other federal agencies overseas through the Department of State's (State) International Cooperative Administrative Support Services (ICASS) system. 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. NSF used ICASS in Brussels and Tokyo for residential and non-residential space. As of September 30, 2018, NSF no longer occupies space in Tokyo or Brussels, and has no obligation to pay rent. Previously, NSF used ICASS in Beijing, but that lease expired in FY 2017.

NSF currently has federal leases with the General Services Administration (GSA) for office space in Denver, Colorado and warehouse space in Springfield, Virginia. These leases are cancelable and expire at various dates through 2028. The cancellation clauses within the agreements allow NSF to terminate use with 120-day notice. As of September 30, 2018, NSF canceled one of their Denver, Colorado leases for office space.

Previously, NSF had its headquarters in Arlington, VA, but those leases expired as of December 31, 2017. NSF leases its current headquarters in Alexandria, VA under a federal operating lease with GSA. This lease is non-cancelable and active through 2032. The following is a schedule of future minimum lease payments for the NSF headquarters, warehouse space in Springfield, Virginia, and office space in Denver, Colorado:

(Amounts in Thousands)

| Fiscal Year                  | Building Operating<br>Lease Amount |
|------------------------------|------------------------------------|
| 2019                         | \$ 24,814                          |
| 2020                         | 24,821                             |
| 2021                         | 24,946                             |
| 2022                         | 25,076                             |
| 2023                         | 25,199                             |
| 2024 through 2032            | 229,173                            |
| Total Minimum Lease Payments | \$ 354,029                         |

### **Note 6. Environmental and Disposal Liabilities**

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 USAP have been identified as having, or expecting 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, 2018. During FY 2018, changes to NSF's estimated asbestos liability consisted of cost re-estimates, resulting in an increase from \$10.2 million in FY 2017 to \$10.3 million in FY 2018.

## 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, 2018 and 2017, NSF was subject to H-1B sequestrations in the amount of \$10.3 million and \$9.7 million, respectively.

| (Amounts in Thousands)  | 2018              | 2017              |
|---|-------------------|-------------------|
| <b>Balance Sheet as of September 30, 2018 and 2017</b>                                      |                   |                   |
| Fund Balance With Treasury  | \$ 579,176        | \$ 547,382        |
| Accounts Receivable   | -                 | 51                |
| Total Assets  | <u>579,176</u>    | <u>547,433</u>    |
| Accounts Payable  | 48                | 94                |
| Accrued Grant Liabilities   | 15,621            | 13,945            |
| Total Liabilities   | <u>15,669</u>     | <u>14,039</u>     |
| Cumulative Results of Operations  | 563,507           | 533,394           |
| Total Liabilities and Net Position  | <u>\$ 579,176</u> | <u>\$ 547,433</u> |
| <b>Statement of Net Cost for the Years Ended September 30, 2018 and 2017</b>                |                   |                   |
| Program Costs   | \$ 125,316        | \$ 113,961        |
| Net Cost of Operations  | <u>\$ 125,316</u> | <u>\$ 113,961</u> |
| <b>Statement of Changes in Net Position for the Years Ended September 30, 2018 and 2017</b> |                   |                   |
| Net Position Beginning of Period  | \$ 533,394        | \$ 509,220        |
| Funds from Dedicated Collections Transferred In / (Out)                                     | 155,429           | 138,135           |
| Net Cost of Operation   | <u>(125,316)</u>  | <u>(113,961)</u>  |
| Change in Net Position  | 30,113            | 24,174            |
| Net Position End of Period  | <u>\$ 563,507</u> | <u>\$ 533,394</u> |

## 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 2018-2022: *Building the Future: Investing in Discovery and Innovation*. The Plan lays out three strategic goals. The first, "Expand knowledge in science, engineering, and learning," is aligned with the first part of NSF's mission, "to promote the progress of science." It aims to advance knowledge through investments in ideas, people, and infrastructure, and to advance the practice of research. The second strategic goal, "Advance the capability of the Nation to meet current and future challenges," flows from the latter part of the NSF mission statement—"to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." It focuses on societal impacts and the STEM workforce. The third goal, "Enhance NSF's performance of its mission," includes strategies to attract, retain, and empower a talented and diverse workforce, and to continually improve agency operations.

Stewardship costs directly reflect the third strategic goal, "Enhance NSF's performance of its mission", 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, 2018 and 2017, approximately 95 percent of NSF's expenses totaling to \$6.9 billion for both FYs 2018 and 2017 were directly related to the "Expand Knowledge in science, engineering, and learning" and "Advance the capability of the Nation to meet current and future challenges" strategic outcome goals. As of September 30, 2018 and 2017, costs related to the stewardship activities totaled \$395.0 million and \$364.0 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." Earned revenues from other federal entities are offsetting collections provided through reimbursable agreements 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.



*Notes to the Financial Statements*  
*September 30, 2018 and 2017*

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

| (Amounts in Thousands)                                   | 2018              |                     |                     |
|--|-------------------|---------------------|---------------------|
|  | Federal           | Public              | Total               |
| Research and Related Activities                          |                   |                     |                     |
| Gross Costs  | \$ 219,903        | \$ 5,917,468        | \$ 6,137,371        |
| Less: Earned Revenue                                     | (78,476)          | (2,006)             | (80,482)            |
| Net Research and Related Activities                      | <u>141,427</u>    | <u>5,915,462</u>    | <u>6,056,889</u>    |
| Education and Human Resources                            |                   |                     |                     |
| Gross Costs  | \$ 13,311         | \$ 814,259          | \$ 827,570          |
| Less: Earned Revenue                                     | (4,802)           | (123)               | (4,925)             |
| Net Education and Human Resources                        | <u>8,509</u>      | <u>814,136</u>      | <u>822,645</u>      |
| Major Research Equipment and Facilities Construction     |                   |                     |                     |
| Gross Costs  | \$ 128            | \$ 177,580          | \$ 177,708          |
| Less: Earned Revenue                                     | -                 | -                   | -                   |
| Net Major Research Equipment and Facilities Construction | <u>128</u>        | <u>177,580</u>      | <u>177,708</u>      |
| Donations and Dedicated Collections                      |                   |                     |                     |
| Gross Costs  | \$ 219            | \$ 174,345          | \$ 174,564          |
| Less: Earned Revenue                                     | -                 | -                   | -                   |
| Net Donations and Dedicated Collections                  | <u>219</u>        | <u>174,345</u>      | <u>174,564</u>      |
| Net Cost of Operations                                   | <u>\$ 150,283</u> | <u>\$ 7,081,523</u> | <u>\$ 7,231,806</u> |

| (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                      | <u>178,866</u>    | <u>5,828,088</u>    | <u>6,006,954</u>    |
| 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                        | <u>6,020</u>      | <u>775,915</u>      | <u>781,935</u>      |
| Major Research Equipment and Facilities Construction     |                   |                     |                     |
| Gross Costs  | \$ -              | \$ 181,093          | \$ 181,093          |
| Less: Earned Revenue                                     | -                 | -                   | -                   |
| Net Major Research Equipment and Facilities Construction | <u>-</u>          | <u>181,093</u>      | <u>181,093</u>      |
| Donations and Dedicated Collections                      |                   |                     |                     |
| Gross Costs  | \$ 631            | \$ 145,591          | \$ 146,222          |
| Less: Earned Revenue                                     | -                 | -                   | -                   |
| Net Donations and Dedicated Collections                  | <u>631</u>        | <u>145,591</u>      | <u>146,222</u>      |
| Net Cost of Operations                                   | <u>\$ 185,517</u> | <u>\$ 6,930,687</u> | <u>\$ 7,116,204</u> |

## 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 2018 and 2017, 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, 2018 and 2017, direct and reimbursable obligations were:

| (Amounts in Thousands)                 | 2018         | 2017         |
|--|--------------|--------------|
| Apportionment Category B               |              |              |
| Direct                                 | \$ 8,044,998 | \$ 7,679,769 |
| Reimbursable                           | 87,726       | 74,497       |
| New Obligations and Upward Adjustments | \$ 8,132,724 | \$ 7,754,266 |

## 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, 2018 and 2017 amounted to \$13.4 billion and \$12.6 billion, respectively.

| (Amounts in Thousands)                                      | 2018          | 2017          |
|---|---------------|---------------|
| <b>Undelivered Orders as of September 30, 2018 and 2017</b> |               |               |
| Undelivered Orders, Unpaid - Non-Federal                    | \$ 13,161,220 | \$ 12,455,560 |
| Undelivered Orders, Paid - Federal                          | 47,752        | 75,396        |
| Undelivered Orders, Unpaid - Federal                        | 145,379       | 103,009       |
| Total Undelivered Orders - Federal                          | 193,131       | 178,405       |
| Total Undelivered Orders                                    | \$ 13,354,351 | \$ 12,633,965 |

## 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 2018 and 2017, the permanent indefinite appropriations for R&RA were \$494.6 million and \$467.1 million, respectively, and are reported as transfers from the current year R&RA appropriation. In FY 2018, NSF received a \$16.3 million permanent indefinite appropriation for disaster and emergency funding to repair and rehabilitate the Arecibo Observatory in Puerto Rico and the Very Long Baseline Array in St. Croix damaged by Hurricane Maria in FY 2017.

The AOAM appropriation was used to fund the multi-year effort associated with NSF's headquarter relocation to Alexandria, VA in FY 2017. In FY 2018, there was no permanent indefinite appropriation for AOAM; however, in FY 2017, the permanent indefinite appropriation for AOAM was \$21.2 million which consisted of the following transfers: \$2.0 million from AOAM, \$12.2 million from R&RA, and \$7.0 million from EHR.

The MREFC appropriation supports the procurement and construction of unique national research platforms and major research equipment. In FYs 2018 and 2017, the permanent indefinite appropriations for MREFC were \$182.8 million and \$209.0 million, respectively.

**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 SBR and the actual balances published in the President’s Budget. The FY 2020 President’s Budget will include FY 2018 budget execution information and is scheduled for publication in the spring of 2019 and can be found upon publication on the OMB website.<sup>2</sup>

Balances reported in the FY 2017 SBR and the related President’s Budget are shown in a table below for *Budgetary Resources, New Obligations and Upward Adjustments, Distributed Offsetting Receipts*, and *Net Outlays*, 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 | New Obligations and Upward Adjustments | Distributed Offsetting Receipts | Net Outlays  |
|---|---------------------|--|---------------------------------|--------------|
| Combined Statement of Budgetary Resources | \$ 8,120,697        | \$ 7,754,266                           | \$ 46,140                       | \$ 7,261,438 |
| Expired Accounts                          | \$ (173,814)        | \$ (14,749)                            | \$ -                            | \$ -         |
| Other                                     | \$ -                | \$ -                                   | \$ (41,140)                     | \$ -         |
| Budget of the U.S. Government             | \$ 7,946,883        | \$ 7,739,517                           | \$ 5,000                        | \$ 7,261,438 |

<sup>2</sup> OMB Website: <http://www.whitehouse.gov/omb>

### **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 \$797.7 million to Board member affiliated institutions in FY 2018. 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 where the average annual award amount is the greater of one percent of the prior year current plan of the awarding directorate/office, or 0.1 percent of the prior year enacted NSF budget level;
- Major Research Equipment and Facilities Construction (MREFC) awards;
- Amendments to awards and procurement actions specifying a dollar amount in the Board resolution, if the amended award exceeds the lesser of \$10.0 million dollars or 20 percent of the amount specified in the Board resolution; and
- In the case of procurements when no amount was specified in the Board resolution, if the amended amount exceeds the lesser of \$10.0 million dollars or 20 percent of the contract ceiling award amount.

The NSB will consult with the Director on new programs where the total annualized awards exceed three percent of the prior year current plan, involve sensitive political or policy issues, or will be funded as an ongoing NSF-wide activity.

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 Requests for Proposal that meet or exceed a threshold of 2.5 percent of the prior year Division or 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. Following NSF and NSB conflict of interest procedures, in FY 2018, the NSB voted to authorize the Director to make one award to a Board member affiliated institution.

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

| (Amounts in Thousands)  | 2018                       | 2017                       |
|---|----------------------------|----------------------------|
| <b>Resources Used To Finance Activities</b>                                       |                            |                            |
| Budgetary Resources Obligated   |                            |                            |
| New Obligations and Upward Adjustments  | \$ 8,132,724               | \$ 7,754,266               |
| Less: Spending Authority from Offsetting Collections and Recoveries               | <u>(200,116)</u>           | <u>(191,917)</u>           |
| Obligations Net of Offsetting Collections and Recoveries                          | 7,932,608                  | 7,562,349                  |
| Less: Distributed Offsetting Receipts   | <u>(31,459)</u>            | <u>(46,140)</u>            |
| Net Obligations   | 7,901,149                  | 7,516,209                  |
| Other Resources   |                            |                            |
| Transfers In / (Out) Without Reimbursement  | -                          | 107                        |
| Imputed Financing   | 13,799                     | 7,385                      |
| Other Resources   | <u>(2,971)</u>             | <u>(6,621)</u>             |
| Net Other Resources Used to Finance Activities                                    | 10,828                     | 871                        |
| <b>Total Resources Used to Finance Activities</b>                                 | <b>7,911,977</b>           | <b>7,517,080</b>           |
| <b>Resources Used to Finance Items Not Part of the Net Cost of Operations</b>     |                            |                            |
| Change in Budgetary Resources Obligated for Goods, Services and                   |                            |                            |
| Benefits Ordered but Not Yet Provided   | (714,317)                  | (425,424)                  |
| Resources that Fund Expenses Recognized in Prior Periods                          | 163                        | (7,466)                    |
| Budgetary Offsetting Collections and Receipts that Do Not Affect                  |                            |                            |
| Net Cost of Operations  | 31,459                     | 46,140                     |
| Resources that Finance the Acquisition of Assets                                  | <u>(28,571)</u>            | <u>(47,626)</u>            |
| <b>Total Resources Used to Finance Items Not Part of the</b>                      |                            |                            |
| <b>Net Cost of Operations</b>   | <b><u>(711,266)</u></b>    | <b><u>(434,376)</u></b>    |
| <b>Total Resources Used to Finance Net Cost of Operations</b>                     | <b>7,200,711</b>           | <b>7,082,704</b>           |
| <b>Components of the Net Cost of Operations that will not Require or Generate</b> |                            |                            |
| <b>Resources in the Current Period</b>  |                            |                            |
| Components Requiring or Generating Resources in Future Periods                    |                            |                            |
| Other   | <u>1,959</u>               | <u>120</u>                 |
| <b>Total Components of Net Cost of Operations that will Require</b>               |                            |                            |
| <b>or Generate Resources in Future Periods</b>                                    | <b>1,959</b>               | <b>120</b>                 |
| Components Not Requiring or Generating Resources                                  |                            |                            |
| Depreciation and Amortization   | 28,241                     | 32,348                     |
| Other   | <u>895</u>                 | <u>1,032</u>               |
| <b>Total Components of Net Cost of Operations that will not</b>                   |                            |                            |
| <b>Require or Generate Resources</b>  | <b>29,136</b>              | <b>33,380</b>              |
| <b>Total Components of Net Cost of Operations that Will Not</b>                   |                            |                            |
| <b>Require or Generate Resources in the Current Period</b>                        | <b><u>31,095</u></b>       | <b><u>33,500</u></b>       |
| <b>Net Cost of Operations</b>   | <b><u>\$ 7,231,806</u></b> | <b><u>\$ 7,116,204</u></b> |

# **Required Supplementary Stewardship Information**

## **Stewardship Investments**

For the Fiscal Years ended September 30, 2018 and 2017

Required Supplementary Stewardship Information  
September 30, 2018 and 2017

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

**Research and Human Capital Activities**

|  | <u>2018</u>         | <u>2017</u>         | <u>2016</u>         | <u>2015</u>         | <u>2014</u>         |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|
| Basic Research                                       | \$ 5,247,173        | \$ 5,213,706        | \$ 5,216,976        | \$ 5,202,144        | \$ 5,383,795        |
| Applied Research                                     | 862,049             | 820,635             | 793,519             | 782,986             | 726,087             |
| Education and Training                               | 813,076             | 821,413             | 775,326             | 801,678             | 941,330             |
| Non-Investing Activities                             | 394,915             | 364,024             | 371,217             | 329,685             | 309,837             |
| <b>Total Research &amp; Human Capital Activities</b> | <b>\$ 7,317,213</b> | <b>\$ 7,219,778</b> | <b>\$ 7,157,038</b> | <b>\$ 7,116,493</b> | <b>\$ 7,361,049</b> |

**Inputs, Outputs and/or Outcomes**

**Research and Human Capital Activities**

Investments In:

|                              |                     |                     |                     |                     |                     |
|------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Universities                 | \$ 5,290,399        | \$ 5,260,018        | \$ 5,289,267        | \$ 5,201,477        | \$ 5,407,717        |
| Industry                     | 272,626             | 169,101             | 300,279             | 365,221             | 286,916             |
| Federal Agencies             | 174,974             | 229,668             | 178,845             | 167,018             | 252,596             |
| Small Business               | 286,220             | 292,997             | 240,759             | 225,958             | 224,931             |
| Federally Funded R&D Centers | 293,884             | 247,549             | 231,977             | 231,813             | 234,515             |
| Non-Profit Organizations     | 494,364             | 529,241             | 446,750             | 451,232             | 529,482             |
| Other                        | 504,746             | 491,204             | 469,161             | 473,774             | 424,892             |
|                              | <u>\$ 7,317,213</u> | <u>\$ 7,219,778</u> | <u>\$ 7,157,038</u> | <u>\$ 7,116,493</u> | <u>\$ 7,361,049</u> |

Support To:

|                       |                     |                     |                     |                     |                     |
|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Scientists            | \$ 623,889          | \$ 585,172          | \$ 595,743          | \$ 584,865          | \$ 550,800          |
| Postdoctoral Programs | 208,136             | 200,840             | 195,874             | 203,128             | 190,188             |
| Graduate Students     | 649,550             | 628,367             | 625,059             | 629,922             | 586,443             |
|                       | <u>\$ 1,481,575</u> | <u>\$ 1,414,379</u> | <u>\$ 1,416,676</u> | <u>\$ 1,417,915</u> | <u>\$ 1,327,431</u> |

**Outputs & Outcomes (Rounded):**

Number of:

|                         |         |         |         |         |         |
|-------------------------|---------|---------|---------|---------|---------|
| Award Actions           | 20,000  | 20,000  | 21,000  | 21,000  | 20,000  |
| Senior Researchers      | 44,000  | 42,000  | 44,000  | 42,000  | 41,000  |
| Other Professionals     | 14,000  | 14,000  | 14,000  | 14,000  | 17,000  |
| Postdoctoral Associates | 6,000   | 6,000   | 6,000   | 6,000   | 6,000   |
| Graduate Students       | 42,000  | 41,000  | 41,000  | 42,000  | 40,000  |
| Undergraduate Students  | 38,000  | 38,000  | 38,000  | 36,000  | 34,000  |
| K-12 Students           | 200,000 | 172,000 | 170,000 | 172,000 | 130,000 |
| K-12 Teachers           | 42,000  | 40,000  | 44,000  | 41,000  | 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 2019 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.



# **Required Supplementary Information**

## **Deferred Maintenance and Repairs**

For the Fiscal Years ended September 30, 2018 and 2017

## Deferred Maintenance and Repairs

NSF performs condition assessment surveys in accordance with SFFAS No. 42, *Deferred Maintenance and Repairs*, 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 fiscal years ended September 30, 2018 and 2017. Assets deemed to be in excellent, good, or fair condition are considered to be in acceptable condition. Assets in poor or very 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 or very 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 fiscal year ending September 30, 2018. At September 30, 2018, NSF determined that there was no scheduled maintenance or repairs on Antarctic capital equipment and noncapital accountable personal property in poor or very poor condition that was not completed and was deferred or delayed for a future period.

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 was heavy, mobile equipment and was 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, 2018 and 2017, as presented in the Statement of Budgetary Resources, is disaggregated for each of NSF's major budget accounts.

The Science Appropriations Act and Bipartisan Budget Act, 2018

2018

(Amounts in Thousands)

|   | <u>Research and<br/>Related<br/>Activities</u> | <u>Education and<br/>Human<br/>Resources</u> | <u>Major<br/>Research<br/>Equipment</u> | <u>OIG, AOAM,<br/>and NSB</u> | <u>Special and<br/>Donated</u> | <u>Total</u>     |
|---|--|--|---|-------------------------------|--------------------------------|------------------|
| <b>Budgetary Resources</b>                                |  |  |   |                               |                                |                  |
| Unobligated Balance from Prior Year Budget Authority, Net | \$ 174,361                                     | 51,536                                       | 31,928                                  | 10,780                        | 134,211                        | 402,816          |
| Appropriations  | 6,350,776                                      | 902,000                                      | 182,800                                 | 348,080                       | 183,704                        | 7,967,360        |
| Spending Authority from Offsetting Collections            | 79,313   | 4,552  | -                                       | 5,827                         | -                              | 89,692           |
| <b>Total Budgetary Resources</b>                          | <b>\$ 6,604,450</b>                            | <b>958,088</b>                               | <b>214,728</b>                          | <b>364,687</b>                | <b>317,915</b>                 | <b>8,459,868</b> |
| <b>Status of Budgetary Resources</b>                      |  |  |   |                               |                                |                  |
| New Obligations and Upward Adjustments                    | \$ 6,461,184                                   | 909,038                                      | 186,298                                 | 354,730                       | 221,474                        | 8,132,724        |
| Unobligated Balance, End of Year:                         |  |  |   |                               |                                |                  |
| Apportioned, Unexpired                                    | 28,015   | 6,877  | 27,863                                  | 1,004                         | 78,990                         | 142,749          |
| Unapportioned, Unexpired                                  | 5,348  | 8,181  | 567                                     | 63                            | 17,451                         | 31,610           |
| Unobligated Balance, Unexpired, End of Year               | 33,363   | 15,058                                       | 28,430                                  | 1,067                         | 96,441                         | 174,359          |
| Unobligated Balance, Expired, End of Year                 | 109,903  | 33,992                                       | -                                       | 8,890                         | -                              | 152,785          |
| Total Unobligated Balance, End of Year                    | 143,266  | 49,050                                       | 28,430                                  | 9,957                         | 96,441                         | 327,144          |
| <b>Total Status of Budgetary Resources</b>                | <b>\$ 6,604,450</b>                            | <b>958,088</b>                               | <b>214,728</b>                          | <b>364,687</b>                | <b>317,915</b>                 | <b>8,459,868</b> |
| <b>Net Outlays</b>  |  |  |   |                               |                                |                  |
| Net Outlays   | \$ 5,691,371                                   | 783,915                                      | 170,321                                 | 385,900                       | 166,293                        | 7,197,800        |
| Distributed Offsetting Receipts                           | -  | -  | -                                       | -                             | (31,459)                       | (31,459)         |
| <b>Net Agency Outlays</b>                                 | <b>\$ 5,691,371</b>                            | <b>783,915</b>                               | <b>170,321</b>                          | <b>385,900</b>                | <b>134,834</b>                 | <b>7,166,341</b> |

The Science Appropriations Act, 2017

2017

(Amounts in Thousands)

|  | <u>Research and<br/>Related<br/>Activities</u> | <u>Education and<br/>Human<br/>Resources</u> | <u>Major<br/>Research<br/>Equipment</u> | <u>OIG, AOAM,<br/>and NSB</u> | <u>Special and<br/>Donated</u> | <u>Total</u>     |
|--|--|--|---|-------------------------------|--------------------------------|------------------|
| <b>Budgetary Resources</b>   |  |  |   |                               |                                |                  |
| Unobligated Balance from Prior Year Budget Authority, Net Appropriations | \$ 175,170                                     | 41,332                                       | 39,281                                  | 34,118                        | 111,560                        | 401,461          |
| Spending Authority from Offsetting Collections                           | 6,005,645                                      | 873,050                                      | 214,860                                 | 378,660                       | 178,995                        | 7,651,210        |
| <b>Total Budgetary Resources</b>   | <b>\$ 6,240,222</b>                            | <b>918,714</b>                               | <b>254,141</b>                          | <b>417,065</b>                | <b>290,555</b>                 | <b>8,120,697</b> |
| <b>Status of Budgetary Resources</b>                                     |  |  |   |                               |                                |                  |
| 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          |
| <b>Total Status of Budgetary Resources</b>                               | <b>\$ 6,240,222</b>                            | <b>918,714</b>                               | <b>254,141</b>                          | <b>417,065</b>                | <b>290,555</b>                 | <b>8,120,697</b> |
| <b>Net Outlays</b>   |  |  |   |                               |                                |                  |
| Net Outlays  | \$ 5,783,005                                   | 757,351                                      | 174,034                                 | 401,877                       | 145,171                        | 7,261,438        |
| Distributed Offsetting Receipts  | -  | -  | -                                       | -                             | (46,140)                       | (46,140)         |
| <b>Net Agency Outlays</b>  | <b>\$ 5,783,005</b>                            | <b>757,351</b>                               | <b>174,034</b>                          | <b>401,877</b>                | <b>99,031</b>                  | <b>7,215,298</b> |



# CHAPTER 3

# APPENDICES (OTHER INFORMATION)







## Summary of FY 2018 Financial Statement Audit and Management Assurances

**Table 3.1 – Summary of Financial Statement Audit**

| Audit Summary                    |                   |     |          |              |                |
|----------------------------------|-------------------|-----|----------|--------------|----------------|
| Audit Opinion                    | <i>Unmodified</i> |     |          |              |                |
| Restatement                      | <i>No</i>         |     |          |              |                |
| Material Weakness                | Beginning Balance | New | Resolved | Consolidated | Ending Balance |
| <i>Total Material Weaknesses</i> | <i>0</i>          | -   | -        | -            | <i>0</i>       |

**Table 3.2 – Summary of Management Assurances**

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

# Management Challenges for the National Science Foundation in Fiscal Year 2019

NATIONAL SCIENCE FOUNDATION  
OFFICE OF INSPECTOR GENERAL

October 12, 2018



## AT A GLANCE

### Management Challenges for the National Science Foundation in Fiscal Year 2019

October 12, 2018

#### WHY WE DID THIS REPORT

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

#### WHAT WE FOUND

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 distribute scarce research funds properly. This year we are introducing a new design for the Management Challenges report, in which we clearly lay out each challenge, actions taken by the agency, and work left to do.

Based on NSF's significant progress, we have removed two challenge areas identified in our FY 2018 Management Challenges report: Managing the Government's Records and Cybersecurity and Information Technology Management. This year, we have identified six areas representing challenges NSF must continue to address to better accomplish its mission:

- Managing Major Multi-User Research Facilities
- Meeting *Digital Accountability and Transparency Act of 2014* (DATA Act) Reporting Requirements
- Eliminating Improper Payments
- Managing the *Intergovernmental Personnel Act* Program
- Managing the U.S. Antarctic Program
- Encouraging the Ethical Conduct of Research

We are encouraged by NSF's progress in its efforts to address critical management and performance challenges. Effective responses to these challenges will continue to 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 FY 2018

Following the issuance of this report, NSF will include its Management Challenges Progress Report and its response to *Management Challenges for the National Science Foundation in FY 2018* as part of its Agency Financial Report.

**FOR FURTHER INFORMATION, CONTACT US AT 703.292.7100 OR [OIG@NSF.GOV](mailto:OIG@NSF.GOV).**



National Science Foundation • Office of Inspector General  
2415 Eisenhower Avenue, Alexandria, Virginia 22314

**MEMORANDUM**

**DATE:** October 12, 2018

**TO:** Dr. Diane Souvaine  
Chair  
National Science Board

Dr. France Córdova  
Director  
National Science Foundation

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

**SUBJECT:** Management Challenges for the National Science Foundation in Fiscal Year 2019

Attached for your information is our report, *Management Challenges for the National Science Foundation in Fiscal Year 2019*. The *Reports Consolidation Act of 2000* (Public Law 106-531) requires us to annually update our assessment of NSF's "... most serious management and performance challenges facing the agency ... and the agency's progress in addressing those challenges." 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

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## Introduction

The *Reports Consolidation Act of 2000*<sup>1</sup> requires us to annually update our assessment of NSF's "... most serious management and performance challenges facing the agency ... and the agency's progress in addressing those challenges." 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 distribute scarce research funds properly.

This year we are introducing a new design for the Management Challenges report, in which we clearly lay out each challenge, actions taken by the agency, and work left to do. We hope that this new format will help our readers more quickly grasp the challenges facing the Foundation and provide a better picture of its efforts to address them.

### Significant Progress in Addressing FY 2018 Challenges

This year we have removed two challenge areas identified in our FY 2018 Management Challenges report: Managing the Government's Records and Cybersecurity and Information Technology Management.

NSF has taken significant action to mitigate challenges faced in managing the Government's records. For example, NSF:

- revised records management training to cover all elements required by the U.S. National Archives and Records Administration;
- issued NSF Bulletin 18-05, *Records Management Program*, and NSF Bulletin 18-04, *Managing Records in Electronic Messages*, to identify staff responsibilities at all levels of the agency;
- updated NSF Bulletin 18-07, *Mobile Communications Devices*, to include guidance related to electronic records on NSF-issued smartphones; and
- added instructions to the agency's standard operating procedures for social media on how to capture and retain records in social media posts on NSF accounts.

These actions, along with other agency activities, have enhanced NSF's confidence that its official records are retained and protected. Additionally, according to NSF, it is on track to comply with a 2012 U.S. National Archives and Records Administration and Office of Management and Budget directive requiring agencies to manage all permanent electronic Federal records in an electronic format to the fullest extent possible by December 31, 2019.<sup>2</sup> The agency must remain vigilant in its management of records to comply with the directive.

NSF has also made significant progress in the area of Cybersecurity and Information Technology Management. Although cybersecurity will always remain an area with inherent risk, NSF's actions have addressed some of the highest risk areas. For example, NSF:

<sup>1</sup> Pub. L. No. 106-531

<sup>2</sup> *Managing Government Records Directive*, Memorandum M-12-18, August 24, 2012

## Introduction

- established technical controls to monitor the NSF network for unauthorized access to reduce the risk of unauthorized transactions, changes to data, audit logs and configurations;
- conducted configuration scans and regular reviews of audit logs and reported results to management; and
- proactively assessed the security state of systems through NSF's IT security continuous monitoring program.

Additionally, the agency successfully mitigated all prior year *Federal Information Security Modernization Act of 2014*<sup>3</sup> (FISMA) findings. Based on this progress, we have removed the challenge from this year's list; however, by its nature, the cybersecurity area presents a myriad of potential and unknown risk that can never be fully anticipated and will, therefore, continue to test NSF's ability to respond and mitigate threats. In light of the ever-evolving nature of cybersecurity risks, it is quite possible that over time this area might once again prove to be a management challenge to the agency.

### Challenges for FY 2019

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 (GAO) and NSF's various advisory committees, contractors, and staff. We identify management challenges as those that meet at least one of the following criteria:

- The issue involves an operation that is critical to an NSF core mission.<sup>4</sup>
- There is a risk of fraud, waste, or abuse of NSF or other Government assets.
- The issue involves strategic alliances with other agencies, the Office of Management and Budget, the Administration, Congress, or the public.
- The issue is related to key initiatives of the President.
- The issue involves a legal or regulatory requirement not being met.

The following list represents six areas of the most critical management and performance challenges for the Foundation:

- Managing Major Multi-User Research Facilities
- Meeting *Digital Accountability and Transparency Act of 2014* (DATA Act) Reporting Requirements
- Eliminating Improper Payments
- Managing the *Intergovernmental Personnel Act* (IPA) Program
- Managing the U.S. Antarctic Program
- Encouraging the Ethical Conduct of Research

We have also identified an emerging challenge area of Responding to the National Security Threat of Foreign Talent Plans. Recent Congressional hearings have focused on the theft of U.S. federally funded research and development by foreign states that use "Talent Plans" to benefit the foreign state's economic development,

<sup>3</sup> Pub. L. No. 113-283

<sup>4</sup> The *National Science Foundation Act of 1950* (Pub. L. No. 81-507) sets forth the mission: "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes."

## Introduction

industry, and national security by obtaining information and technology from abroad. Such Talent Plans have the potential to exploit the openness of American universities and research enterprises and present a significant threat to the integrity of U.S. research initiatives. We have just begun investigating this challenge area and have not yet fully determined the risk to NSF.

We begin this year's list with challenges faced in managing major multi-user research facilities — an inherently risky portfolio due to the complex nature of these facilities, the associated high construction and operating costs, and the need to emphasize both sound business practices and innovative science in the awarding of cooperative agreements for such facilities. Additionally, as facilities age and reach their end of life cycle, NSF must be prepared for divestment of these facilities. NSF has improved its oversight over its major facilities over the past few years, and we are encouraged by NSF's action in implementing new controls in this area.

We continue to list the United States Antarctic Program (USAP) as a challenge. According to NSF, the transition of the Antarctic Support Contract responsibilities to Leidos has occurred without disruptions in operations or unwarranted increases in cost, and management controls and operating procedures for monitoring invoice processing and systems performance are in place. However, USAP is in the planning stage of a highly complex and risky program, the Antarctic Infrastructure Modernization for Science (AIMS) Project — a \$355 million endeavor that will stretch agency resources and present additional challenges for NSF to overcome.

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 and Small Business Technology Transfer programs, which provide equity-free funding and entrepreneur support at the earliest stages of research.

We are encouraged by NSF's progress in its efforts to address critical management and performance challenges. Effective responses to these challenges will continue to 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.



**CHALLENGE 1****Managing Major Multi-User Research Facilities****Why is this a serious management challenge?**

This challenge involves an operation that is critical to an NSF core mission. In addition, there is a risk of fraud, waste, or abuse of Government assets.

As part of its mission, NSF funds the construction, management, and operation of major multi-user research facilities (major facility), which are state-of-the-art infrastructure for research and education and include telescopes, ships, distributed networks, and observatories. NSF's major facility portfolio is inherently risky due to the complex nature of these facilities and the associated high construction and operating costs. In FY 2017, NSF spent \$222 million constructing major facilities and \$984 million operating them.

Our past reports highlighted concerns with oversight including unsupported proposal budgets, limited controls over management fees and contingency funds, and the absence of certified or validated earned value management systems. Recent audits identified additional oversight concerns, including the need for strengthened controls to ensure major facilities clearly identify subrecipients, complete subrecipient risk assessments, and properly charge project expenditures to construction or operations. Further, a June 2018 U.S. Government Accountability Office (GAO) audit found five of seven major facilities funded under NSF's no cost overrun policy experienced costs or schedule increases since starting construction.

Over the past few years, NSF has worked diligently to address our recommendations. NSF has strengthened controls over its major facility portfolio and continues to complete additional steps to strengthen its oversight.

**Completed Actions**

- ☑ Revised Large Facilities Manual to codify *American Innovation and Competitiveness Act* (AICA) and other strengthened requirements.
- ☑ Named Chief Officer for Research Facilities for life cycle oversight for major facilities.
- ☑ Formed Major Facilities Working Group and Facilities Governance Board to improve oversight.
- ☑ Implemented Earned Value Management System Verification, Acceptance, and Surveillance Procedures.
- ☑ Developed and implemented procedures for holding and allocating contingency funds.
- ☑ Closed 90 percent of our recommendations related to major facilities dating back to 2012.

**Ongoing Actions**

- Develop and implement new policies and procedures related to management reserve, monitoring subrecipients, and proper allocation of funding to construction and operations awards.
- Develop and implement new guidance to more fully use external review panels in addressing cost and schedule.
- Revise and implement internal policies and procedures related to NSF cost analysis and independent cost estimate reviews based on AICA requirements and GAO guidance.
- Ensure oversight of full life cycle of facilities from design to divestment.
- Continue oversight of eight major facilities in construction or receiving upgrades.

**Looking Ahead**

As of October 2018, we are completing an audit of NSF's controls to ensure major facilities properly charge expenditures to construction or operations awards. We also plan to conduct an audit to determine if NSF has a process in place for divestment of major facilities, and we are monitoring the establishment of the National Center for Optical Infrared Astronomy.

**CHALLENGE 2****Meeting DATA Act Reporting Requirements****Why is this a serious management challenge?**

This challenge involves strategic alliances with other agencies, the Office of Management and Budget, the Administration, Congress, or the public.

The *Digital Accountability and Transparency Act of 2014*<sup>5</sup> (DATA Act) requires Federal agencies to report quarterly spending data to the public through USASpending.gov, beginning with FY 2017 second quarter data. Federal agencies must report information in accordance with Government-wide financial data standards developed and issued by the Office of Management and Budget (OMB) and the Department of the Treasury.

In April 2017, NSF successfully met the DATA Act's requirement for Federal agencies to begin submitting data to Treasury. However, our November 2017 audit of NSF's FY 2017 second quarter spending data, conducted under a contract with Kearney & Company, found that the data did not meet the OMB quality requirements. Several data elements were inaccurate, incomplete, or untimely. Some of the errors were due to NSF's reporting, while others were due to Government-wide reporting issues. As a result of our audit, NSF staff conducted a root cause analysis of its challenges, noting that many of the OIG-identified errors were Government-wide in nature and beyond NSF's control, which we also recognized in our audit report.

We resolved all recommendations from our report and are encouraged by NSF's actions to improve its DATA Act reporting.

<sup>5</sup> Pub. L. No. 113-101

**Completed Actions**

- ☑ Developed and implemented corrective actions to address the audit report recommendations.
- ☑ Conducted a root cause analysis of data reporting errors.
- ☑ Submitted corrections for any data errors identified in the audit.
- ☑ Reviewed submission process with the internal controls team and identified opportunities for improvement.
- ☑ Worked closely with the DATA Act Audit Collaboration Working Group and CIGIE to improve DATA Act implementation.

**Ongoing Actions**

- Participate in Government-wide working groups to develop a DATA Act Playbook to support Federal agencies' compliance and audit readiness.
- Develop an NSF DATA Act data quality plan that considers incremental risks to data quality in Federal spending data and identifies controls to manage such risks.
- Monitor changes to NSF systems to determine impact on DATA Act reporting.

**Looking Ahead**

An independent public accountant, under contract with us, will issue an audit report in November 2019 on the quality of NSF's FY 2019 first quarter spending data reported to USASpending.gov.

**CHALLENGE 3****Eliminating Improper Payments****Why is this a serious management challenge?**

There is a risk of fraud, waste, or abuse of NSF or other Government assets. In addition, this challenge involves an operation that is related to key initiatives of the President.

The President's Management Agenda has a priority goal of Getting Payments Right to reduce the amount of cash lost through incorrect payments. The *Improper Payments Elimination and Recovery Act of 2010*<sup>6</sup> (IPERA) requires agencies to periodically review and identify programs and activities that may be susceptible to significant improper payments. OMB implementing guidance requires Federal agencies to institute a systematic method of reviewing all programs and activities and identify programs susceptible to significant improper payments. OMB requires agencies to assess risk against nine factors that are likely to contribute to improper payments. NSF identified one program — Grants and Cooperative Agreements — and three activities — Contracts, Payment to Employees (including salaries), and Charge Cards — for which a risk assessment needed to be conducted.

Our last review of NSF's risk assessment for FY 2015 determined that NSF complied with IPERA but that its risk assessment process needed significant improvements to ensure that the agency thoroughly assesses and documents its risk of improper payments. We identified limitations in NSF's analysis of six of the nine risk factors. NSF submitted a corrective action plan, and we resolved all recommendations related to the FY 2015 audit. Our FY 2019 audit will determine if the new risk assessment is sufficient to close the recommendations.

We also determined that NSF met the IPERA Agency Financial Report requirement for FY 2016 and FY 2017. Because NSF's FY 2015 IPERA risk assessments found the agency was not susceptible to significant improper payments, NSF was not required to perform a risk assessment until FY 2018. We are encouraged by NSF's steps to eliminate improper payments; however, this area will remain a challenge until our next audit of improper payments is completed in FY 2019.

<sup>6</sup> Pub. L. No. 111-204

**Completed Actions**

- ☑ Developed and published guidance for improper payment risk reviews, incorporating recommendations from the audit of the FY 2015 risk assessment.
- ☑ Completed an improper payments risk assessment for FY 2018 that built on the improper payments risk reviews completed during FYs 2016 and 2017.
- ☑ Conducted advanced and baseline grant monitoring activities, including grant payment testing.

**Ongoing Actions**

- Continue advanced and baseline grant monitoring activities, including grant payment testing.
- Continue internal controls program activities to provide assurance that NSF controls for its payment processes are operating effectively.
- Continue to improve improper payments risk assessment and reporting compliance activities.

**Looking Ahead**

An independent public accountant, under contract with us, will begin an audit in FY 2019, and issue its report in May 2019, on NSF's compliance with IPERA, including its review of the quality of NSF's FY 2018 risk assessment to identify improper payments.

**CHALLENGE 4****Managing the Intergovernmental Personnel Act Program****Why is this a serious management challenge?**

This challenge involves an operation that is critical to an NSF core mission.

NSF gives scientists, engineers, and educators the opportunity to temporarily serve as NSF program directors, advisors, and senior leaders. Most of these non-permanent appointments are individuals hired under the *Intergovernmental Personnel Act*<sup>7</sup> (IPA), who are not Federal employees but are paid through grants and remain employees of their home institutions. Individuals hired under the IPA — hereafter referred to as IPAs — bring in fresh perspectives from across all fields of science and engineering to support NSF’s mission. However, IPAs can have a heightened risk of conflicts of interest while working at NSF because most come from institutions receiving NSF grants. Also, because individuals only serve in a temporary capacity for up to 4 years, there is frequent turnover in staff at NSF, especially in senior leadership positions filled by IPAs. In addition, IPAs are not subject to Federal pay and benefits limits, and can spend up to 50 days each year on Independent Research/Development (IR/D).

NSF has continued to strengthen its management of the program. We resolved and closed all four recommendations from our 2017 audit report on IPA conflicts of interest. We are encouraged that the IPA Steering Committee — established in 2016 in response to our 2013 audit report — has developed and tracked metrics related to the use of IPAs, facilitating better oversight and a cost-sharing pilot. Specifically, the committee analyzed program costs, identified potential areas for cost savings, and pursued implementation of these approaches. For example, NSF adopted the committee’s recommendation for a pilot requiring 10 percent cost-sharing by every IPA’s home institution of the IPA’s academic-year salary and benefits.

<sup>7</sup> Pub. L. No. 91-648

**Completed Actions**

- ☑ Clarified NSF Proposal & Award Policies & Procedures Guide requiring a substitute negotiator on proposals submitted by former NSF staff, including IPAs, for 1 year after their departure.
- ☑ Issued memoranda to NSF staff and supervisors reminding them of the importance of high ethical standards and their ethics responsibilities.
- ☑ Developed and communicated a merge process for principal investigators with multiple IDs.
- ☑ Extended cost-share pilot into FY 2018 to continue to evaluate effectiveness.
- ☑ Analyzed IPA years of service.
- ☑ Delivered report on benefits of IR/D program.

**Ongoing Actions**

- Complete the first IPA Program Annual Report.
- Provide data on time spent on IR/D by both permanent and rotating staff.
- Report on year two of the cost-share pilot.
- Report to Congress justifications for rotator pay exceeding the maximum SES pay.
- Implement an electronic separation clearance process to track completion of exit interviews, including separating staff acknowledgement of post-employment restrictions.
- Complete the development of an agency-wide workforce strategy for balancing use of IPA and other rotators with permanent staff.

**Looking Ahead**

We continue to monitor the IPA Steering Committee’s progress in considering IPA Program policies, overseeing budgeting approaches, and developing and tracking IPA Program-related metrics. In FY 2019, we plan to audit NSF’s IR/D program, including reviewing implementation of our 2012 audit report recommendations.

**CHALLENGE 5****Managing the U.S. Antarctic Program****Why is this a serious management challenge?**

This challenge involves an operation that is critical to an NSF core mission. In addition, there is a risk of fraud, waste, or abuse of NSF or other Government assets.

NSF, through the United States Antarctic Program (USAP), manages U.S. scientific research in Antarctica. NSF awarded the Antarctic Support Contract (ASC) for USAP logistical support to Lockheed Martin in December 2011. As a result of a merger in August 2016, Leidos Innovations Corporation (Leidos) now holds the ASC. It is NSF's largest contract, currently valued at \$2.1 billion over 13 years. In such a remote and isolated environment, USAP management faces heightened challenges in areas such as 1) fiscal oversight of the ASC and its subcontractors, 2) management of inventory, 3) health and safety of researchers and contractors, and 4) modernization of facilities in the Antarctic Infrastructure Modernization for Science (AIMS) project.

NSF has prior experience managing USAP's construction projects and contractor changes, and, according to NSF, the transition to Leidos occurred without disruptions in operations or unnecessary cost increases. According to NSF, it has used management controls and operating procedures for monitoring invoice processing and systems performance. However, NSF's frequent turnover of the contracting officer for ASC may pose challenges to consistent fiscal oversight of this complex project.

USAP is also entering a highly complex and risky program with AIMS — a \$355 million endeavor that will stretch agency resources and may present additional challenges for NSF to overcome. The inherent risk of ASC's size, the Antarctic environment, and the upcoming AIMS project require continued vigilance.

**Completed Actions**

- ☑ Obtained incurred costs audits both of the contractor for ASC and the ASC's largest subcontractor for FYs 2012 and 2013.
- ☑ Assessed ASC performance annually to identify cargo failures and contractor response.
- ☑ Obtained a law enforcement site visit.
- ☑ Reviewed the legality of requiring breathalyzer testing for USAP participants.
- ☑ Conducted root cause analyses in response to FY 2017 challenges, followed by process improvements.
- ☑ Updated long-range capital plan to include lifecycle and real property investments.

**Ongoing Actions**

- Obtain incurred costs audits of the ASC, including an agreed-upon audit of Leidos' incurred costs for ASC from August 2016-December 2016.
- Select a pharmacy management software system.
- Conduct AIMS Final Design Review.
- Engage scientific community in efforts to minimize potential disruption of AIMS planning and construction on Antarctic science.
- Evaluate an automated process to review invoices and identify inaccuracies.

**Looking Ahead**

NSF has begun obtaining incurred costs audits and plans to continue to do so for every year of the contract. We are planning a site visit to Antarctica in FY 2019.

**CHALLENGE 6****Encouraging the Ethical Conduct of Research****Why is this a serious management challenge?**

This challenge involves an operation that is critical to an NSF core mission. In addition, there is a risk of fraud, waste, or abuse of NSF or other Government assets.

Congress passed the *America COMPETES Act*<sup>8</sup> in 2007 to increase innovation through research and development and to improve U.S. competitiveness in the world economy. As part of the law, institutions applying for NSF funding must describe a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to participating students and researchers. NSF recognizes that the responsible conduct of research (RCR) — the practice of scientific investigation with integrity — is critical for maintaining excellence, as well as the public's trust, in science and engineering. NSF also recognizes that education in RCR is essential to prepare future scientists and engineers.

RCR is more than avoiding research misconduct (fabrication, falsification, and plagiarism). RCR also includes protecting the integrity of data; complying with relevant requirements; communicating openly with researchers, institutions, and funding agencies; mentoring; ensuring responsible authorship; managing conflict of interests; and establishing research environments free of harassment.

NSF has been receptive and responsive to our research misconduct reports and has taken appropriate actions against individuals who committed research misconduct. Further, NSF has taken positive steps to encourage RCR training at funded institutions in response to our 2017 report on institutional implementation of RCR training. In addition, NSF's September 2018 policy requiring grantees to notify NSF of those found to have committed sexual harassment is commendable.

NSF is in a unique position to foster the implementation of effective RCR training — including its content and how it is delivered — for all researchers, especially new members of the research community.

<sup>8</sup> *America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act*, Pub. L. No. 110-69

**Completed Actions**

- ☑ Revised Cultivating Cultures for Ethical STEM program solicitation to include information about the most effective RCR training.
- ☑ Provided information about RCR requirement at NSF Grants Conferences and other outreach events.
- ☑ Emphasized integrity in NSF's strategic plan.
- ☑ Briefed NSF senior management on importance of involving principal investigators and co-principal investigators in the RCR requirement.
- ☑ Issued memorandum on commitment to stop harassment in research/learning environments.

**Ongoing Actions**

- Draft additional guidance for the 2020 Proposal & Award Policies & Procedures Guide on research misconduct and available NSF-funded resources for RCR training.
- Conduct outreach to faculty to encourage them to participate in RCR training.
- Encourage STEM faculty to incorporate RCR in their mentoring, teaching, and curriculum development.
- Incorporate new term and condition requiring notification of harassment and assault.

**Looking Ahead**

We continue to monitor NSF's efforts in this area and encourage NSF to provide substantive guidance to the research community on mentoring and RCR training to accomplish the goals of the *America COMPETES Act*.

## Appendix A

## Relevant Reports

Please visit <http://www.nsf.gov/oig> for our reports and publications.

### Introduction

- NSF OIG, Management Challenges for the National Science Foundation in Fiscal Year 2018, October 12, 2017
- NSF OIG Report No. 17-3-003, NSF's Relocation to Its New Headquarters Location — Records Management, Sept. 28, 2017
- NSF OIG Report No. 17-2-009, NSF Could Strengthen Key Controls Over Electronic Records Management, July 6, 2017

### Managing Major Multi-User Research Facilities

- NSF OIG Report No. 17-3-004, NSF Needs Stronger Controls Over Battelle Memorial Institute Award for the National Ecological Observatory Network, May 12, 2017

### Meeting DATA Act Reporting Requirements

- NSF OIG Report No. 18-2-001, Implementation of the Digital Accountability and Transparency Act of 2014, November 17, 2017

### Eliminating Improper Payments

- NSF OIG, IPERA Compliance, April 30, 2018
- NSF OIG Report No. 17-3-005, Inspection of the National Science Foundation's Compliance with the Improper Payments Elimination and Recovery Act of 2010 for FY 2016, May 16, 2017
- NSF OIG Report No. 16-3-005, NSF's Compliance with the Improper Payments Elimination and Recovery Act for FY 2015, May 12, 2016

### Managing the Intergovernmental Personnel Act Program

- NSF OIG Report No. 17-2-008, NSF Controls to Mitigate IPA Conflicts of Interest, June 8, 2017
- NSF OIG Report No. 13-2-008, Audit of Cost Associated with NSF's Use of Intergovernmental Personnel Act Assignees, March 20, 2013

### Managing the U.S. Antarctic Program

- NSF OIG Report No. 15-2-009, Audit of Health and Safety in the U.S. Antarctic Program, July 2, 2015

### Encouraging the Ethical Conduct of Research

- NSF OIG Tracking No. PR12030006, OIG Review of Institutions' Implementation of NSF's Responsible Conduct of Research Requirements, July 25, 2017
- NSF Office of the Director Important Notice No. 140, *Training in Responsible Conduct of Research – A Reminder of the NSF Requirement*, August 17, 2017

## Additional Information

### **About NSF OIG**

We promote effectiveness, efficiency, and economy in administering the Foundation's programs; detect and prevent fraud, waste, and abuse within NSF or by individuals who receive NSF funding; and identify and help to resolve cases of research misconduct. NSF OIG was established in 1989, in compliance with the Inspector General Act of 1978, as amended. Because the Inspector General reports directly to the National Science Board and Congress, the Office is organizationally independent from the National Science Foundation.

### **Obtaining Copies of Our Reports**

To view this and any of our other reports, please visit our website at: [www.nsf.gov/oig](http://www.nsf.gov/oig).

### **Connect with Us**

For further information or questions, please contact us at [oig@nsf.gov](mailto:oig@nsf.gov) or 703.292.7100. Follow us on [Twitter](#) at @nsfoig. Visit our website at [www.nsf.gov/oig](http://www.nsf.gov/oig).

### **Report Fraud, Waste, Abuse, or Whistleblower Reprisal**

- File online report: <https://www.nsf.gov/oig/report-fraud/form.jsp>
- Anonymous Hotline: 1.800.428.2189
- Mail: 2415 Eisenhower Avenue, Alexandria, VA 22314 ATTN: OIG HOTLINE



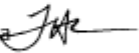


National Science Foundation  
Office of the Director

**MEMORANDUM**

DATE: **OCT 23 2018**

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

FROM: Dr. France Córdova   
Director, National Science Foundation

SUBJECT: Acknowledgement of the Inspector General's FY 2019 Management Challenges Memorandum and Transmittal of NSF's Progress Report on the FY 2018 Management Challenges

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As Director of the National Science Foundation (NSF), I recognize the importance of acknowledging, understanding, and mitigating risk to the execution of our mission and stewardship of taxpayer dollars. Consistent with this focus, as well as statute, this memorandum provides you with NSF's Progress Report for the Office of Inspector General's (OIG) Management Challenges for FY 2018 and acknowledges my receipt of the OIG's Management Challenges for FY 2019. As you consider our Progress Report and the new challenges, here are three considerations:

First, this year our Progress Report applies the Enterprise Risk Management framework at NSF to documenting our assessments of the inherent and residual risks for each of the OIG's Challenges for FY 2018, including actions to mitigate risks. Correspondingly, we appreciate the OIG's clear and concise identification of the Management Challenges for FY 2019 in its new reporting format. The improvements in both reports enable constructive dialogue between NSF and the OIG about risk and advance fulsome consideration by NSF of the OIG's new challenges.

Second, we are pleased that the OIG recognizes our progress by removing two Management Challenges cited for FY 2018; specifically, Management of the Government's Records and Cybersecurity and Information Technology Management.

Third, I have already engaged the Chief Operating Officer, Assistant Directors, and the Chief Financial Officer to identify owners and paths forward for FY 2019, for each of the six management challenges.

- **Managing Multi-User Facilities:** We appreciate that the OIG has acknowledged that 90% of the open recommendations directed to multi-user facilities are now closed. We look forward to completing corrective actions for the remaining open recommendations as part of our continuous improvement of the oversight and management of major facilities.
- **Meeting Digital Accountability and Transparency Act of 2014 (DATA Act) Reporting Requirements:** In partnership with the Office of Management and Budget, the Department of

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Treasury, and the Chief Financial Officers Council, NSF and the Department of Health and Human Services have led governmentwide efforts to improve DATA Act policy and develop implementation guidance through a “Data Quality Playbook.”

- **Eliminating Improper Payments:** We recognize that, while NSF has completed all corrective actions for the most recent audits for these areas, the OIG will be conducting new audits in FY 2019 to test our actions.
- **Managing the Intergovernmental Personnel Act (IPA) Program:** The OIG has now closed its sole open recommendation related to IPAs, which was directed to NSF’s implementation of a separation clearance process. We continue to identify areas of improvement for the IPA program.
- **Managing the U.S. Antarctic Program:** We note that the OIG has closed all but one open recommendation for its last audit of the U.S. Antarctic Program. In FY 2019, NSF will complete the Antarctic Infrastructure Modernization for Science Final Design Review.
- **Encouraging the Ethical Conduct of Research:** We appreciate the OIG’s recognition of NSF’s leadership in addressing sexual harassment as well as its identification of areas for improvement. We will continue outreach to the community on the Responsible Conduct of Research through a “Promising Practices Summit” in FY 2019.

We look forward to addressing the OIG’s Management Challenges for FY 2019 and, more broadly, to continuing our constructive engagement with the OIG about risk management for NSF.

Enclosure

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

# National Science Foundation (NSF)

## FY 2018 Progress Report on OIG Management Challenges

### MANAGEMENT CHALLENGE: Major Multi-User Research Facilities Management

**NSF Lead: Teresa Grancorvitz, Chief Financial Officer, NSF and Jim Ulvestad, Chief Officer for Research Facilities**

| Summary of OIG Identified Challenge   |  |
|---|--|
|   | Ensure consistent implementation of its expanded controls for major facilities oversight.  |
| NSF's Key Actions to Address the Challenge  |  |
| <b>Agency Actions Taken in Prior Fiscal Years</b>   |  |
| <ul style="list-style-type: none"> <li>• Strengthened controls over NSF's major facility portfolio through the development of several new policies and procedures in FY 2016 and FY 2017 including: (1) retaining a portion of the recipients' contingency funds; (2) periodically conducting cost incurred audits; (3) completing a cost proposal review for reasonableness of proposed costs; (4) obtaining an independent cost review of the proposed budget; (5) conducting earned value management system verification, validation and acceptance; and (6) reviewing proposed fees and requiring recipients to track fee expenditures.</li> <li>• Developed the Major Facilities A-123 Oversight Process Narrative and revised the <i>Large Facilities Manual (LFM)</i> to incorporate new guidance for recipients related to cost estimating and analysis.</li> </ul> |  |
| <b>Actions Taken in FY 2018</b>   |  |
|   | <ul style="list-style-type: none"> <li>• Appointed a new Chief Officer for Research Facilities (CORF) in the Office of the Director to ensure agency-wide acceptance of policies and procedures related to oversight of major facilities.</li> <li>• Appointed Accountable Directorate Representatives (ADR) in each Directorate with major facilities and formed the Major Facilities Working Group (consisting of the ADR's) to review and socialize policies and procedures related to the oversight of major facilities.</li> <li>• Formed the Facilities Governance Board to approve major facility oversight policies and procedures at the agency level.</li> <li>• Revised the Integrated Project Team (IPT) Standard Operating Guidance (SOG) to include facilities in the Operations Stage.</li> <li>• Developed the Core Competency SOG to codify the minimum competencies for the core IPT members.</li> </ul> |

- Conducted an independent third-party review of NSF’s strengthened policies and procedures related to cost surveillance.

### NSF Management’s Overview of the Challenge

***NSF’s view of the residual risk in light of key actions already taken to address the OIG-identified challenge.***

NSF understands the importance of overseeing its recipients’ management of major facility awards. The agency also recognizes the importance of assessing prospective recipients’ capabilities for managing proposed awards. Over the past several years, NSF has been in the process of strengthening its policies and procedures as illustrated above. This includes an annual major facilities portfolio risk assessment to determine the necessary BFA-led reviews and audits to be conducted by the Large Facilities Office (LFO) and the Cooperative Support Branch (CSB). In close cooperation with program, LFO and CSB conduct the reviews described above, which were specifically created to safeguard NSF’s investments in supporting the scientific endeavor. NSF leadership has shown its commitment to oversight in the past several years by strengthening the LFO and in establishing the new CORF position. The new governance structure now in place will help ensure consistent implementation of its expanded controls for major facilities oversight.

NSF has recently undergone a Government Accountability Office (GAO) review related to its No Cost Overrun Policy and oversight practices related to recipient cost and schedule development. In the June 2018 report entitled National Science Foundation: Revised Policies on Developing Costs and Schedules Could Improve Estimates for Large Facilities (GAO-18-370), the GAO recommended that NSF should revise its policies for estimating and reviewing the costs and schedules of large facilities projects to better incorporate the best practices in GAO’s guides. NSF agreed with the GAO recommendations and has a corrective action plan in place to address the findings.

Based on NSF’s risk-based evaluation of this Management Challenge, coupled with activities already completed and those planned for FY 2019, NSF has determined that the residual risk impact is “very low” and the likelihood is “low.” NSF is confident that its current and planned policies and procedures related to major facility cost and schedule oversight adequately consider and balance risk, resources, and stewardship of federal funds.

### NSF’s Anticipated Milestones

***NSF management developed the anticipated milestones below in consideration of NSF’s strategic objectives, the risks inherent to NSF’s work, and the key actions NSF has already taken to address those risks.***

- Anticipate receipt of independent third-party report related to cost surveillance – Q1 FY2019.
- Finalize Selection of Independent Cost Estimate Review SOG already implemented in practice – Q1 FY2019.
- Describe the purpose and customary methods for sensitivity analysis and application of GAO’s 12 steps of a high-quality cost estimating process (LFM Section 4.2) – Q3 FY 2019.
- Finalize and align BFA SOGs related to selection of independent cost estimate reviews, standardized cost analysis, and pre-award budget reviews to specifically address American Innovation and Competitiveness Act requirements and GAO good practices – Q4 FY 2018.

- Develop and implement a new Major Facilities Review SOG to more fully utilize external review panels in addressing elements of cost and schedule – Q2 FY 2019.
- Create a new LFM Section 4.3, *Schedule Development, Estimating, and Analysis* – Q3 FY 2019.
- Update BFA Cooperative Support Branch’s Standardized Cost Analysis Guidance SOG to include assessment of schedule due to the potential impact scheduling has on costs – Q4 FY 2018.

## MANAGEMENT CHALLENGE: Business Operations Management – Improper Payments

**NSF Lead: Teresa Grancorvitz, Chief Financial Officer, NSF**

### Summary of OIG Identified Challenge

*(a) Ensure proper payments to awardees for the \$7 billion issued annually in grant and cooperative agreement payments without verification; (b) address substantial concerns with the depth, substance, and documentation of the NSF risk assessment; (c) address significant limitations in NSF’s analysis of six of the nine OMB risk factors; and (d) improve assessment of NSF payments to employees.*

### NSF’s Key Actions to Address the Challenge

#### **Agency Actions Taken in Prior Fiscal Years**

- Developed and published SOG for improper payments risk reviews incorporating the nine Improper Payment Elimination and Recovery Act (IPERA) risk factors and additional considerations from the OIG review report.
- Completed improper payments risk reviews for FY 2016 and FY 2017. The risk reviews included input from subject matter experts (SMEs) for grants, contracts, charge cards, and payments to employees. Both reviews concluded that NSF did not have a significant risk of improper payments.
- OIG inspection of the FY 2016 and FY 2017 risk reviews found NSF in compliance with IPERA requirements.

#### **Actions Taken in FY 2018**

- Conducted advanced and baseline grant monitoring activities including grant payment testing.
- Operated, evaluated, and reported on an effective internal controls program providing assurance that NSF controls over grant and grant payment processes are properly designed and operating effectively.
- Collaborated with the OIG, BFA, and program offices on risk reduction activities including completion of an initial fraud risk assessment for grants under the Fraud Reduction and Data Analytics Act.
- Completed an improper payments risk assessment for FY 2018 that built on the improper payments risk reviews completed during FY 2016 and FY 2017.

### NSF Management’s Overview of the Challenge

***NSF’s view of the residual risk in light of key actions already taken to address the OIG-identified challenge.***

NSF appreciated the OIG’s current determination of NSF’s compliance with IPERA and closure of all recommendations from the previous OIG reports. The reports clearly validate that NSF has taken the steps necessary to demonstrate compliance and effectiveness in the agency’s implementation of IPERA because 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;
- Developed and completed a corrective action plan in July 2016 that addressed the root causes of the IPERA reporting issue, implemented solutions, and completed all OIG recommendations;
- Established processes to monitor and validate the effectiveness and sustainability of the corrective measures; and
- Incorporated corrective measures into policy and process documentation.

### NSF’s Anticipated Milestones

***NSF management developed the anticipated milestones below in consideration of NSF’s strategic objectives, the risks inherent to NSF’s work, and the key actions NSF has already taken to address those risks.***

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

## MANAGEMENT CHALLENGE: Business Operations Management – DATA Act

**NSF Lead: Teresa Grancorvitz, Chief Financial Officer, NSF**

### Summary of OIG Identified Challenge

*Address challenges set forth in OIG audit report 18-2-001, dated November 17, 2017, reporting on the OIG’s assessment of completeness, timeliness, quality, and accuracy of data submitted by NSF in accordance with the DATA Act.*

## NSF's Key Actions to Address the Challenge

### **Actions Taken in FY 2018**

Developed and implemented Corrective Action Plan in response to the FY 2017 audit with the following actions:

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

## NSF Management's Overview of the Challenge

### ***NSF's view of the residual risk in light of key actions already taken to address the OIG-identified challenge.***

The Digital Accountability and Transparency Act (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. On April 28, 2017, NSF successfully met the DATA Act's requirement for federal agencies to begin submitting data to Treasury. From the outset, NSF prioritized DATA Act implementation, initially naming an SAO from the Office of the Director and later transitioning that role to the NSF Chief Financial Officer where it remains. The agency allocated appropriate resources to both the implementation and operations phases of its DATA Act work, leveraging agency staff from BFA and OIRM as well as contract resources. Early on, NSF recognized the importance of government-wide engagement and earned the Treasury Secretary's Certificate of Appreciation in recognition of NSF's outstanding commitment to collaboration on this government-wide implementation challenge.

The DATA Act required the OIG of each federal agency to review a sample of the financial data submitted by the agency and report on its completeness, timeliness, quality, and accuracy, as well as the implementation and use of consistent data standards by each agency. The NSF OIG issued its report on November 17, 2017. NSF generally agreed with the audit recommendations and has addressed them all, developing corrective actions that have been resolved and closed by the OIG. In connection with this work, NSF staff conducted a root cause analysis of its challenges, noting that many of the OIG-identified errors were government-wide in nature and beyond NSF’s control, which the OIG recognized in its report.

Among the corrective actions NSF has implemented is the agency’s continued leadership and engagement in government-wide DATA Act-related work. On June 6, 2018, OMB issued new guidance, Appendix A of OMB Circular A-123, superseding prior DATA Act guidance and creating a requirement for agencies to develop data quality plans that include management assurance in the quality of its data. NSF analysis confirmed that the prior guidance had dramatically amplified NSF error rates because auditors relied on it to evaluate errors at the transaction level, rather than at the data element level. Agencies will now be audited against the revised approach, and NSF is confident that the agency’s reported error rate will drop significantly as a result.

NSF’s progress on the DATA Act has been enabled by the NSF Deputy CFO’s deep engagement in supporting the activities relating to the Audit Collaboration Working Group of the CFOC and CIGIE, which will develop agency best practices for implementing the new guidance. The CFOC is also collaborating with GAO and CIGIE as they develop their related audit guidance, which will take the new OMB guidance into account. In addition, the NSF Division Director for BFA’s Division of Institution and Award Support and other NSF senior staff are supporting the government-wide financial assistance community’s work to develop a framework for the required data quality plans, which NSF will leverage as it prepares its own required plan.

Based on NSF’s risk-based evaluation of this Management Challenge, along with the causes analyzed and actions that NSF has taken to date, NSF believes that its risk of reporting inaccurate, incomplete, and untimely data has been significantly reduced.

### NSF’s Anticipated Milestones

***NSF management developed the anticipated milestones below in consideration of NSF’s strategic objectives, the risks inherent to NSF’s work, and the key actions NSF has already taken to address those risks.***

- Participate in government-wide working groups to develop a DATA Act Playbook to support federal agencies’ compliance and audit readiness;
- Develop an NSF DATA ACT data quality plan; and
- Monitor changes to NSF systems to determine impact on DATA Act reporting.



## MANAGEMENT CHALLENGE: Business Operations Management – Managing the Government’s Records

**NSF Lead: Wonzie Gardner, Acting Office Head, OIRM**

| Summary of OIG Identified Challenge   |  |   |
|---|--|---|
| <i>Ensure compliance with the National Archives and Records Administration’s (NARA) August 24, 2012, Managing Government Records Directive (M-12-18) to take specific actions to reform records management policies and practices by appointed dates.</i> | <i>Continue initiatives to reduce the amount of paper, supplies and equipment that NSF uses and stores given less office space available in the new NSF headquarters as well as efficiently and effectively manage the scanning/digitization effort to reduce the amount of paper.</i> | <i>Provide updated records management training to staff in accordance with NARA Bulletin 2017-01 (Agency Records Management Training Requirements).</i> |

| NSF’s Key Actions to Address the Challenge   |     |   |   |     |   |  |     |  |
|--|-----|---|---|-----|---|--|-----|--|
| <p><b>Agency Actions Taken in Prior Fiscal Years</b></p> <ul style="list-style-type: none"> <li>• Verified and validated the accuracy of the report on records that were 30-years old or more and determined there are no records meeting this criterion in existence within the agency. (October 2015)</li> <li>• Conducted a review of records at the Federal Records Center (FRC) locations where agency records are stored and determined that no unscheduled records remain there. (October 2015)</li> <li>• Began presenting an overview of general records management responsibilities at NSF’s New Employee Orientation sessions. (August 2017)</li> <li>• Revised NSF records management training course to cover all NARA-required elements. (June 2017)</li> <li>• Scanned over 7,000 permanent and temporary records from August 2016 to August 2017 during the process of relocating to the new NSF headquarters as part of an agency-wide “green” initiative to eliminate paper and property. The initiative ultimately reduced 1,200,000 pounds of paper and property, compared to a goal of 500,000 pounds.</li> </ul> |     |   |   |     |   |  |     |  |
| <p><b>Actions Taken in FY 2018</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; vertical-align: top;"> <ul style="list-style-type: none"> <li>• Issued NSF Bulletin 18-05, Records Management Program, and NSF Bulletin 18-04, Managing Records in Electronic Messages, to identify staff responsibilities at all levels of the agency.</li> </ul> </td> <td style="width: 33%; vertical-align: top; text-align: center;">(b)</td> <td style="width: 33%; vertical-align: top;"> <ul style="list-style-type: none"> <li>• Implemented a full-text search capability in the Electronic Records Management System (ERMS).</li> <li>• Created an online training for the ERMS.</li> </ul> </td> </tr> <tr> <td></td> <td style="text-align: center;">(c)</td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>• Issued NSF Bulletin 18-06, Required Records Management Training, to implement new requirement for all staff to take annual records</li> </ul> </td> </tr> </table>   |     |   | <ul style="list-style-type: none"> <li>• Issued NSF Bulletin 18-05, Records Management Program, and NSF Bulletin 18-04, Managing Records in Electronic Messages, to identify staff responsibilities at all levels of the agency.</li> </ul> | (b) | <ul style="list-style-type: none"> <li>• Implemented a full-text search capability in the Electronic Records Management System (ERMS).</li> <li>• Created an online training for the ERMS.</li> </ul> |  | (c) | <ul style="list-style-type: none"> <li>• Issued NSF Bulletin 18-06, Required Records Management Training, to implement new requirement for all staff to take annual records</li> </ul> |
| <ul style="list-style-type: none"> <li>• Issued NSF Bulletin 18-05, Records Management Program, and NSF Bulletin 18-04, Managing Records in Electronic Messages, to identify staff responsibilities at all levels of the agency.</li> </ul>  | (b) | <ul style="list-style-type: none"> <li>• Implemented a full-text search capability in the Electronic Records Management System (ERMS).</li> <li>• Created an online training for the ERMS.</li> </ul> |   |     |   |  |     |  |
|  | (c) | <ul style="list-style-type: none"> <li>• Issued NSF Bulletin 18-06, Required Records Management Training, to implement new requirement for all staff to take annual records</li> </ul>                |   |     |   |  |     |  |

|   |  |   |
|---|--|---|
| <ul style="list-style-type: none"> <li>• Issued guidance for executing NSF’s Capstone Officials’ Email Management Program under Bulletin 18-03.</li> <li>• Issued NSF Bulletin 18-12, Managing Email of Supervisory, Support and/or Administrative Personnel as Records</li> <li>• Classified OIG and Office of the General Counsel’s electronic records as official records.</li> <li>• Completed an analysis of records at the FRC.</li> <li>• Implemented blacklist capability on NSF-managed mobile devices to prohibit restricted application downloads.</li> <li>• Issued updated NSF Bulletin 18-07, Mobile Communications Devices, to include guidance related to electronic records on NSF-issued smartphones.</li> <li>• Updated mobile device rules of behavior to comply with NSF Bulletin 18-07.</li> <li>• Added instructions to the agency’s standard operating procedures (SOP) for social media on how to capture and retain records in social media posts on NSF accounts.</li> </ul> |  | <p>management training. New personnel on boarding after April 30, 2018 are required to complete the course within 60 days of employment and annually each fiscal year thereafter. All other personnel are required to complete this course by September 30, 2018, and annually each fiscal year thereafter.</p> |
|---|--|---|

**NSF Management’s Overview of the Challenge**

***NSF’s view of the residual risk in light of key actions already taken to address the OIG-identified challenge.***

NSF is on track to comply with NARA’s 2012 directive (M-12-18) to take specific actions by appointed dates to reform the policies and practices for the management of government records. The agency has committed appropriate resources to prioritize its compliance and has already met the requirements for Goal 2 in the 2012 directive. NSF’s anticipated milestones focus on completing the requirements for Goal 1 and ensuring it maintains compliance with Goal 2. The Foundation has worked closely with senior management and the OIG to formulate corrective action plans that outlined many of the actions taken in FY 2018 and to be taken in the future. Actions taken to-date have significantly reduced the inherent risk, such as non-compliance and lost records, to a low level.

The NSF digitization project in preparation for the move to Alexandria was a great success. Multiple offices around the building not only reduced their paper footprint to fit into their new space, but now have excess storage capacity they are looking to repurpose. Among other benefits, NSF’s

above-described actions reduced the inherent risk associated with paper records, including space limitations and loss of records; therefore, the agency plans to continue to promote digitization of paper records.

NSF records management training content and policy complies with NARA Bulletin 2017-01. Formalized, required records management training will promote transparency and accountability in the management of federal records. NSF implementation of this training has addressed the inherent risk set forth in the OIG’s management challenge, bringing the residual risk to a low level. Agency progress in this area is demonstrated by the results of the NARA on-site assessment conducted in May 2018 where NARA reviewed NSF’s Records Management Training Program and policies related to records management. Senior staff within the NSF Division of Administrative Services Records Management Section were engaged with NARA and demonstrated the new *Records Management for Everyone and eRecords Management System* online training courses. NARA reviewed five recently issued records management-related NSF Bulletins. At the end of the assessment, NARA praised the training modules and bulletins, and said they would like to highlight NSF’s records management program as a model for the federal government.

### NSF’s Anticipated Milestones

***NSF management developed the anticipated milestones below in consideration of NSF’s strategic objectives, the risks inherent to NSF’s work, and the key actions NSF has already taken to address those risks.***

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|---|--|--|
| <p>(a)</p> <ul style="list-style-type: none"> <li>• Update remaining records schedules to classify electronic records as official agency records and get approval from the Archivist of the United States by the end of FY 2019.</li> <li>• Issue a policy on managing email of supervisory, support, and administrative personnel as records by December 2018.</li> <li>• Complete the NARA 2019 Annual Records Management Self-Assessment, the Annual Federal Email Management Report, and the Annual Senior Agency Official for Records Management Report by April 2019.</li> <li>• Implement a tool for automated capture of text messages on NSF-managed mobile devices by November 2018.</li> </ul> | <p>(b)</p> <ul style="list-style-type: none"> <li>• Destroy all records at the FRC that have met their disposition date by the end of FY 2018.</li> <li>• Complete an agency-wide records inventory by November 2018.</li> <li>• Continue to scan records to put in ERMS.</li> </ul> | <p>(c)</p> <ul style="list-style-type: none"> <li>• Monitor compliance with annual records management training requirement for staff utilizing LearnNSF automatic tracking capability.</li> <li>• Initiate quarterly workshops for NSF-wide Division Records Custodians by December 2018.</li> </ul> |
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## MANAGEMENT CHALLENGE: Business Operations Management – Subrecipient Monitoring

**NSF Lead: Teresa Grancorvitz, Chief Financial Officer, NSF**

### Summary of OIG Identified Challenge

*Transparency and oversight of NSF funds passed through to subrecipients (e.g. ensure awardees review sufficient cost information to demonstrate that subrecipients' costs are allowable, fair, and reasonable).*

### NSF's Key Actions to Address the Challenge

#### **Actions Taken in FY 2018**

- Piloted a Targeted Review Assessment (TRA) methodology to assess compliance with prime awardee oversight of subrecipients.
- Reviewed NSF's Advanced Monitoring Program subaward module assessment protocols based on TRA findings and *Uniform Guidance* requirements.
- Continued to require prime awardees to take corrective actions for findings related to subaward monitoring.
- Continued practice of applying 1 to 5 risk points to awards containing subawards at or exceeding \$100,000 as part of NSF's annual risk assessment process.
- Updated the standard NSF budget form to eliminate awardee confusion around subcontracts vs. subawards. The form now only allows for subawards.
- Changed award notification language to reflect subaward vs. subcontract.
- Updated NSF's fact sheet on subrecipient monitoring to reference requirements in 2 CFR §200.331 for pre- and post-award monitoring.

### NSF Management's Overview of the Challenge

#### ***NSF's view of the residual risk in light of key actions already taken to address the OIG-identified challenge.***

Historically, NSF has understood the importance of overseeing its recipients' management of large and multiple subawards. The Foundation also recognizes the importance of assessing prospective awardees' capabilities for managing proposed subawards. NSF currently has in place a risk-based approach to oversee its award recipients' subaward management through advanced monitoring activities, including Advanced Monitoring Site Visits, Desk Reviews, and Business Systems Reviews (BSRs). NSF leadership has shown its commitment to oversight for nearly two decades by the establishment and continued support for the Division of Institution and Award Support (DIAS) and the Large Facilities Office (LFO) within NSF's Office of Budget, Finance, and Award Management. These offices were specifically created to safeguard NSF's investments in science and conduct the reviews described above. NSF also assesses risk related to subaward monitoring during its pre-award reviews, specifically for proposals of \$10M and greater. Advanced pre-award reviews are handled by expert cost analysts within DIAS, and NSF also utilizes expert advice of outside sources as warranted.

NSF has recently undergone an OIG audit of the agency’s monitoring of recipients managing subawards. The OIG stated that “in most cases, NSF’s processes for monitoring grantees were sufficient to ensure that pass-through entities monitored subrecipients properly.” The audit report recommended that NSF strengthen several policies and procedures to better align with the *Uniform Guidance* (2 CFR § 200) as it relates to subrecipient compliance. NSF agreed with all OIG recommendations, has already acted on several issues, and intends to take additional actions to address all recommendations in the audit report pursuant to a corrective action plan.

Based on NSF’s risk-based evaluation of this process, coupled with the extensive OIG audit of this area, NSF believes that the residual risk to the agency is low and is consistent with NSF’s low risk appetite for misuse of funds and non-compliance with reporting and performance requirements. NSF is confident that its current pre- and post-award processes adequately consider and balance risk, resources, and stewardship.

### NSF’s Anticipated Milestones

***NSF management developed the anticipated milestones below in consideration of NSF’s strategic objectives, the risks inherent to NSF’s work, and the key actions NSF has already taken to address those risks.***

- Revise DIAS’s Subrecipient Review module to require review of awardee compliance with 2 CFR § 200.331 by October 2018.
- Revise the DIAS Over-\$10M SOG to align with 2 CFR § 200 as it relates to the agency’s responsibility to oversee its prime recipients managing subawards by October 2018.
- Revise the BSR Guide to align with 2 CFR § 200 as it relates to the agency’s responsibility to oversee its prime recipients managing subawards by November 2018.
- Revise the Large Facilities Manual to align with 2 CFR § 200 as it relates to the agency’s responsibility to oversee its prime recipients managing subawards by June 2019.
- Revise the “DACs/CSB Standardized Cost Analysis Guidance” to align with 2 CFR § 200 as it relates to the agency’s responsibility to oversee its prime recipients managing subawards by September 2018.

## MANAGEMENT CHALLENGE: Management of the IPA Program

**NSF Lead: Joanne Tornow, Acting Assistant Director, BIO and Wonzie Gardner, Acting OIRM Office Head**

| Summary of OIG Identified Challenge |   |     |   |
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| (a)                                 | <i>Because individuals can serve in a temporary capacity for up to four (4) years, there is frequent turnover in staff at NSF, especially in senior leadership positions.</i> | (b) | <i>The amount of time IPAs spend on Independent Research/Development (IR/D) at their home institution raises concern about the ability of IPAs to fulfill their responsibilities at NSF and to be fully engaged in the agency’s mission.</i>            |
|                                     |   | (c) | <i>NSF’s reliance on IPA’s comes at an added cost because IPAs are not subject to Federal pay and benefits limits. The American Innovation and Competitiveness Act (AICA) requires a report on NSF’s efforts to control costs associated with IPAs.</i> |
|                                     |   | (d) | <i>NSF could strengthen some of its internal controls to improve NSF’s ability to identify and or mitigate IPA conflicts of interest.</i>   |

| NSF’s Key Actions to Address the Challenge               |  |
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| <b><i>Agency Actions Taken in Prior Fiscal Years</i></b> |  |
| (a)  | <ul style="list-style-type: none"> <li>Established an ongoing culture of staff development to ensure that there is a “bench” of staff ready for developmental detail assignments in the event that there are vacancies in executive positions, to include the Federal Executive Institute (FEI), American University Executive Leadership Program, Harvard Business School Leadership Training, Individual Development Plans, and NSF Academy training activities.</li> <li>Developed and implemented a new employee onboarding program, the New Executive Transition Program (NeXT) in 2009 (NSF has historically held new employee onboarding sessions that include IPAs). The NeXT program supports the onboarding of employees and IPAs transitioning into executive-level positions. The program provides a comprehensive set of tools and information to help new executives reach full performance as quickly as possible by developing executive knowledge about NSF mission, culture, organization, people, and business processes. The NeXT Program currently includes a three-day Executive Leadership Retreat and a one-day Oversight of Merit Review, which applies to most executive IPAs. NSF also offers executive coaching to help IPAs and all executives understand their new roles and navigate the Federal environment.</li> <li>Instituted mandatory and optional training for Program Officers, who comprise a large proportion of IPAs, on NSF’s Merit Review process which teaches how research proposals are evaluated and how to execute the Program Officer role. There is a Merit Review Basics series (MRB I through MRB IV), and the first two modules have been required since 2011 and the remaining two are optional. NSF is in the process of changing the requirement to include all four one-day modules. There is also an optional two-day capstone workshop called the Program Management Seminar which is typically taken by a majority of Program Officers (including IPAs).</li> </ul> |

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|     | <ul style="list-style-type: none"> <li>• Created a parallel performance management system in 2014 for IPAs to ensure clarity in setting expectations and providing feedback on performance.</li> <li>• Established a knowledge transfer process in 2015, by which exiting executives can transfer key pieces of knowledge and information to incoming executives.</li> <li>• Implemented a required three-day supervisory training and development course in 2015 called Federal Supervision at NSF designed to assist new federal supervisors (including IPAs) in understanding their roles and all of the requirements pertaining to federal human capital management.</li> <li>• Established a Steering Committee for Policy and Oversight of the IPA Program (IPA Steering Committee) in April 2016 to serve as the primary body for considering policy on NSF’s use of IPAs, and to oversee common approaches to budgeting and implementation of the IPA program. A key responsibility of the Steering Committee is to develop and track metrics related to the use of IPAs.</li> </ul>   |
| (b) | <ul style="list-style-type: none"> <li>• Established an IR/D Council in October 2011 to develop and monitor internal controls related to the IR/D program, including tracking the time spent on IR/D activities. Data from these internal controls are disseminated to NSF senior management quarterly, for use in managing the IR/D program within each organization.</li> <li>• Developed an IR/D Guide in 2012 to clearly communicate NSF policies on the use of IR/D, including the possibility that participation in the IR/D program could be curtailed if it compromised the completion of NSF duties.</li> <li>• Designated IR/D experts in each Directorate/Office who receive annual training to ensure that NSF policies are implemented appropriately.</li> <li>• Instituted a requirement that all IR/D plans provide an explanation of how the IR/D activities enhance the requestor’s ability to perform NSF duties.</li> <li>• Published a revised IR/D Guide in January 2017 that includes guidance limiting NSF payment of IPAs’ IR/D travel to their home institutions to 12 trips per year. The guidance encourages IPAs to combine other NSF official business and/or telework with these trips to get the most efficient use of those travel dollars.</li> </ul>   |
| (c) | <ul style="list-style-type: none"> <li>• Completed an IPA Steering Committee analysis of costs associated with the IPA program in FY 2016 and determined that the incremental cost of the program (i.e., computing the cost differential if the positions held by IPAs were instead filled with federal employees) was approximately \$5M (or 0.07% of the NSF budget). Proportionally, this cost differential only nominally increases the total IPA program costs. As part of this analysis, the IPA Steering Committee did identify opportunities for potential cost savings, and NSF in turn initiated a pilot requiring 10% cost sharing by IPAs’ home institutions of their academic-year salaries and fringe benefits (per NSF Bulletin 16-11). This pilot applies to all new IPA agreements initiated in FY 2017 and beyond, including those for executive and program level staff. Additionally, NSF eliminated reimbursement for lost consulting.</li> <li>• Designed and began data collection for an evaluation led by the NSF Office of Integrated Activities Evaluation and Assessment Capability to determine the cost implications associated with the 10% cost sharing pilot and the extent to which the policy change impacts NSF’s ability to recruit strong IPAs.</li> <li>• Received notice from the OIG closing the sole open audit recommendation related to IPA costs as a result of these efforts. Recommendation closed in February 2017.</li> </ul> |
| (d) | <ul style="list-style-type: none"> <li>• Continued to apply the same suitability, credentialing, and security vetting process for employees and IPAs alike, and to require IT security and privacy training for all employees and IPAs for physical and logical access to facilities and systems.</li> </ul>   |

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| <ul style="list-style-type: none"> <li>Continued to implement NSF’s long-standing policy with respect to statutory and perceived conflicts of interest (COIs) for staff and reviewers. Staff who manage the merit review process are required to take training on the agency’s ethics rules. These policies and requirements apply to all staff, including IPAs.</li> <li>Formulated a corrective action plan in response to the OIG’s recommendations to strengthen and add to existing controls its June 2017 audit report, <i>NSF Controls to Mitigate IPA Conflicts of Interest</i>. The report concluded that NSF had “implemented internal controls to identify and mitigate IPA conflicts of interest.”</li> <li>Issued a memorandum (OD 17-03) in March 2017 to all staff, including IPAs, reminding them of the importance of high ethical standards. NSF also issued a notice to supervisors in August 2017 (OD 17-17), reminding them of their ethics responsibilities, specifically the responsibility to ensure that all subordinates, including IPAs, comply with the agency’s ethics rules.</li> <li>Reviewed and updated core policies relating to IPAs in the NSF Personnel Manual.</li> <li>Developed a required online ethics training module for all new employees, including IPAs.</li> </ul> |  |     |   |     |   |     |  |
| <b>Actions Taken in FY 2018</b>  |  |     |   |     |   |     |  |
| (a)  | <ul style="list-style-type: none"> <li>Conducted analysis (January 2018) on IPA years of service and found that, on average, IPA executives serve 3.1 years at NSF (January 2018) and are 3 times more likely to stay for 3-4 years compared to staff-level IPAs. Non-executives serve, on average, 2.3 years at NSF. Per OPM, the average time a career SES spends in a position is 3.4 years and non-career SES is 1.7 years.<sup>1</sup></li> <li>Engaged with the GAO on an inquiry into the turnover of IPAs. NSF embraces IPA turnover as it helps enable NSF to keep</li> </ul> | (b) | <ul style="list-style-type: none"> <li>Delivered the IR/D Annual Report to NSF Deputy Assistant Directors (DADs) (November 2017) indicating, on average, 72% of IPAs participated in IR/D, down from 76% two years ago. On average, IPA IR/D plans requested 37 days of IR/D, yet only 19 days were used. As of October 2017, active IR/D plans for IPAs totaled \$1.36M in dollars requested with an expected actual spend of approximately \$680,000.</li> <li>Delivered a “Benefits of the NSF IR/D Program” report to the DADs (March 2018), highlighting the value of IR/D in recruitment, research</li> </ul> | (c) | <ul style="list-style-type: none"> <li>Extended the Cost-Share Pilot into FY 2018 to continue to evaluate the effectiveness of the 10% cost-share requirement. An evaluation of the effectiveness of the IPA Cost-Share Pilot that was launched for FY 2017 indicated that there was a cost-share percentage increase from 7.2% in FY 2016 to 7.9% in FY 2017, resulting in an average cost-share increase of almost \$5,000 per IPA assignment.</li> <li>Engaged with the GAO on the salary reimbursements associated with IPAs. NSF does not set the salaries for rotators who are detailed to NSF using the IPA authority, as their</li> </ul> | (d) | <ul style="list-style-type: none"> <li>Clarified NSF Policy (<i>Proposal &amp; Award Policies &amp; Procedures Guide</i>) requiring a substitute negotiator on proposals submitted by former NSF staff, including IPAs, for one year after their departure.</li> <li>Addressed the corrective actions associated with the OIG audit NSF Controls to Mitigate IPA Conflicts of Interest (17-2-008). Three of the four recommendations in the corrective action plan have been closed by the OIG.</li> </ul> |

<sup>1</sup> <https://www.opm.gov/policy-data-oversight/senior-executive-service/facts-figures/#url=Demographics>



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| <p>pace with rapidly changing scientific advancements. NSF makes every effort to match those changes with a continuous cycle of deep scientific expertise and strong ties to the scientific community. The short-term nature of the rotator tenure allows NSF to continuously renew and align resources to our core mission requirement to promote the progress of science.</p> | <p>currency, and ethics protection. IPAs participating in IR/D are at the forefront of the research landscape and impact merit review decisions using the latest knowledge, thus having a direct impact on the NSF mission.</p> | <p>salaries are set by their home institutions.</p> <ul style="list-style-type: none"> <li>Submitted to Congress responses to the American Innovation and Competitiveness Act of 2017 (P.L. 114-329) (AICA), Section 111 (Personnel Oversight), regarding the Justifications for Rotator Pay Exceeding the SES Pay Max; and Evaluation of the Cost-sharing Pilot (January 2018).</li> </ul> |  |
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**NSF Management’s Overview of the Challenge**

***NSF’s view of the residual risk in light of key actions already taken to address the OIG-identified challenge.***

NSF provides the opportunity for scientists, engineers, and educators to rotate into the Foundation as temporary Program Directors, advisors, and leaders. Rotators bring fresh perspectives from across the country and across all fields of science and engineering supported by the Foundation, helping influence new directions for research in science, engineering, and education, including emerging interdisciplinary areas. In fact, many of these rotators remain involved in their professional research and development activities while working at NSF through participation in the IR/D program, which is managed by the NSF IR/D Council.

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

**Demonstrated Top Leadership Commitment:**

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

The IPA Steering Committee is charged with ensuring NSF is best utilizing the IPA hiring authority. It advises the Foundation’s senior leadership on matters that directly concern policy on the use of the IPA program, and on common approaches to budgeting and implementation of the

program. It also regularly reports on its oversight and stewardship of the IPA program, including costs associated with the program, to the Director and COO; to OMB; and to Congress, pursuant to the AICA.

**Capacity:**

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

**Corrective Action Plan:**

With this support, the IPA Steering Committee is pursuing an enterprise risk management approach to identify and understand the potential risks associated with the IPA program, the inherent impacts and likelihood of these risks, the risk reduction steps being undertaken to address these risks, and the residual risk impacts and likelihood. As part of this approach, and given the management challenges identified by OIG, four risks have been identified: frequent turnover in staff, particularly in senior leadership positions; the time that IPAs spend away from NSF, e.g., as part of their IR/D activities; internal controls associated with IPAs' conflicts of interest; and the costs associated with the IPA program.

NSF has addressed the corrective action plan associated with the most recent OIG audit on NSF Controls to Mitigate IPA Conflicts of Interest (17-2-008). Three of the four recommendations in the corrective action plan have been closed by the OIG. NSF has successfully closed all recommendations from previous OIG audits and reviews of the IPA program.

**Monitoring:**

Coupled with rigorous data capture, analysis, and sharing across the agency, the IPA Steering Committee is now enabling rigorous decision making to improve directional oversight for the management of the program. For example, the IPA Steering Committee analyzed the costs of the IPA program, identified potential areas for cost savings, and pursued implementation of these approaches. Additionally, it led the design and data collection effort for an evaluation of the associated policy implementation, in conjunction with NSF's Evaluation and Assessment Capability within OIA.

**Demonstrated Progress:**

Based on the above, NSF has taken several steps to further strengthen the IPA program. The NSF Director issued a memorandum to all NSF staff, including IPAs, in March 2017 reminding them of the importance of high ethical standards (Staff Memorandum OD 17-03); and a separate notice to supervisors, in August 2017, reminding them of their ethics responsibilities, specifically the responsibility to ensure that their subordinates, including IPAs, comply with agency ethics rules (Staff Memorandum OD 17-17). Further, the IPA Steering Committee recommended, and NSF adopted, the initiation of a pilot requiring 10% cost-sharing by every 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-level staff. NSF has also ended support for lost consulting payments and, in January 2017, published a revised IR/D Guide that includes guidance limiting NSF payment of IPAs' IR/D travel to their home institutions to 12 trips per year. This encourages IPAs to combine other NSF official business

and/or telework with these trips to get the most efficient use of those travel dollars. Pending the basis for an evaluation of these changes, particularly the cost-sharing pilot, NSF extended the pilot through FY 2018.

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

**NSF’s Anticipated Milestones**

***NSF management developed the anticipated milestones below in consideration of NSF’s strategic objectives, the risks inherent to NSF’s work, and the key actions NSF has already taken to address those risks.***

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| <p>(a)</p> <ul style="list-style-type: none"> <li>• Deliver the first IPA Program Annual Report to the Director of NSF. This report will provide annual data and trend analyses on various aspects related to the use of IPAs at NSF, for use by the Director and NSF senior managers in assessing and overseeing the program.</li> <li>• Develop the CAP in response to the GAO report, “A Workforce Strategy and Evaluation of Results Could Improve Use of Rotating Scientists, Engineers, and Educators” (GAO-18-533).</li> </ul> | <p>(b)</p> <ul style="list-style-type: none"> <li>• Monitor time spent on IR/D by both permanent and rotating staff, and provide data to NSF senior managers to ensure appropriate oversight of IR/D.</li> </ul> | <p>(c)</p> <ul style="list-style-type: none"> <li>• Develop the year two cost-share pilot evaluation report for submission to the IPA Steering Committee and the Office of the Director.</li> <li>• Submit to Congress responses to the American Innovation and Competitiveness Act (P.L. 114-329) (AICA), Section 111 (Personnel Oversight), regarding the Justifications for Rotator Pay Exceeding the SES Pay Max; and Evaluation of the Cost-share Pilot.</li> </ul> | <p>(d)</p> <ul style="list-style-type: none"> <li>• Implement an electronic separation clearance process that tracks completion of the OGC ethics exit interviews where separating staff will acknowledge their responsibility for being familiar with post-employment restrictions.</li> </ul> |
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## MANAGEMENT CHALLENGE: U.S. Antarctic Program (USAP) Management

**NSF Lead: William Easterling, Assistant Director, Directorate for Geosciences and Kelly Falkner, Office Director, Polar Programs**

| Summary of OIG Identified Challenge |  |     |   |  |
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| (a)                                 | <p><i>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.</i></p> | (b) | <p><i>Continue to coordinate with the ASC to soundly manage the acquisition and shipment of Antarctica-bound inventory stored and maintained at Port Hueneme, California; Punta Arenas, Chile; and Christchurch, New Zealand.</i></p>   |  |
|                                     |  | (c) | <p><i>Ensure modernization of McMurdo Station as it proceeds to construction under the Antarctic Infrastructure Modernization for Science (AIMS) project by obtaining the necessary funding from Congress, capitalizing on lessons learned from NSF’s large facility work as appropriate, and minimizing the impact that the AIMS planning and construction process will have on Antarctic science.</i></p> |  |
|                                     |  |     | (d)   | <p><i>Continue to address misconduct in the Antarctic as set forth in the 2015 OIG Report, Audit of Health and Safety in the U.S. Antarctic Program.</i></p> |

| NSF’s Key Actions to Address the Challenge |   |
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| Agency Actions Taken in Prior Fiscal Years |   |
| (a)  | <ul style="list-style-type: none"> <li>• Held routine executive meetings with Lockheed Martin leadership to understand the strategic rationale for the transition to Leidos and the impact to the ASC.</li> <li>• Began implementing the novation agreement processed by the Defense Contract Management Agency (DCMA) as the cognizant Federal Agency, which concluded that restructuring was in the best interest of the government.</li> <li>• 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.</li> </ul> |
| (b)  | <ul style="list-style-type: none"> <li>• Conducted two detailed root cause analyses in response to early fiscal year (FY) 2017 failures, followed by process improvements. NSF directed the ASC to develop reports on the damaged science equipment and mishandled science samples explaining how and why the damage occurred, and to implement corrective actions to avoid such damage in the future. NSF then approved the action plans and monitored contractor activity for effectiveness.</li> </ul>   |

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|     | <ul style="list-style-type: none"> <li>• 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.</li> <li>• Ensured that appropriate mitigation for the risk of loss or damage was implemented by November 2016.</li> </ul>  |
| (c) | <ul style="list-style-type: none"> <li>• Continued progress on the 2012 Blue Ribbon Panel (BRP) recommendations, including investment in lifecycle acquisitions and infrastructure upgrades.</li> <li>• Addressed major infrastructure upgrades recommended by the BRP report for McMurdo Station through the following design efforts:             <ul style="list-style-type: none"> <li>– 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.</li> <li>– Completed designs of the Vehicle Equipment/Operations Center using NSF Research and Related Activities Funding.</li> <li>– Continued design on the Information Technology &amp; Communications (IT&amp;C) Primary Operations Center, Lodging, and Palmer Pier Replacement Projects.</li> <li>– 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.</li> <li>– Completed ~ \$2M in infrastructure investments in the Black Island Telecommunications Facility to address BRP Recommendation 4.7-5, Black Island Telecommunications Facility risk management.</li> <li>– Issued a Sources Sought Notice on FBO.gov to apprise potential offerors on the AIMS project.</li> </ul> </li> <li>• 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 <i>Large Facilities Manual</i> (NSF 17-066).</li> </ul> |
| (d) | <ul style="list-style-type: none"> <li>• <u>Code of Conduct</u>:<br/>Developed a process for reporting and reviewing Code of Conduct violations, which states that each year the Office of Polar Programs will send a request to all USAP employing organizations and NSF’s on-site representatives (for grantees) for a report of all significant instances of on ice misconduct for the previous 12 months. <b>This audit action item (#1) regarding the USAP Code of Conduct was formally closed by the OIG on March 28, 2017.</b></li> <li>• <u>Law Enforcement</u>:             <ul style="list-style-type: none"> <li>– Oversaw NSF’s law enforcement program’s achievement of full compliance with all U.S. Marshals Service requirements for certification and training, and recommendations for law enforcement tools made by the Service.</li> <li>– Initiated planning for a future site visit to Antarctica, resources and schedules permitting. OPP had internal conversations with OGC and reached out to law enforcement organization contacts.</li> </ul> </li> <li>• <u>Breathalyzer Testing</u>:             <ul style="list-style-type: none"> <li>– Procured breathalyzer units that do not require calibration. These units provide redundancy for the existing breathalyzer inventory. <b>This audit action sub-item (#4.2) regarding breathalyzer calibration was formally closed by the OIG on 12/22/2015.)</b></li> <li>– Continued to explore the advisability and feasibility of the OIG-recommended requirement for breathalyzer testing for all USAP participants. Consultations with the Department of Justice on policy and legal concerns are being planned.</li> </ul> </li> </ul>                   |

| <b>Actions Taken in FY 2018</b> |   |
|---------------------------------|---|
| (a)                             | <ul style="list-style-type: none"> <li>• Monitored the transfer of business systems from Lockheed Martin to Leidos. Subsequently, the Leidos DCMA Divisional Administrative Contracting Officer reviewed and approved Leidos business systems.</li> <li>• Continued to monitor invoices, Annual Program Plans, business system reviews (accounting, estimating, purchasing systems), indirect rates and financial reporting for the USAP contractor to ensure strong cost controls continue with the new entity.</li> </ul>   |
| (b)                             | <ul style="list-style-type: none"> <li>• Directed NSF’s annual assessment of ASC performance, which will identify cargo failures and contractor responses. Emphasis will be placed on opportunity costs of mishandled science samples and replacement costs of damaged inventory. Penalties will be considered in the contractor award fee.</li> <li>• Continued to monitor cargo shipments during the August 2017 - February 2018 cycle.</li> <li>• Conducted weekly NSF-led meetings with the prime contractor focused on protecting government property.</li> </ul>  |
| (c)                             | <ul style="list-style-type: none"> <li>• Authorized additional design to advance the AIMS design beyond bridging documents (35%). Initiated and completed necessary initial solicitation efforts for individual AIMS components.</li> <li>• Completed designs for and awarded IT&amp;C Primary Addition for construction.</li> <li>• Initiated acquisition of major components of the Ross Island Satellite communications Earth Station (RIES) to address Black Island Telecom Facility deficiencies.</li> <li>• Prepared for AIMS Final Design Review (FDR), anticipated in Q1 of FY 2019.</li> <li>• Continued to update the long-range capital plan to include lifecycle and real property investments for all Antarctic locations.</li> </ul>  |
| (d)                             | <ul style="list-style-type: none"> <li>• <u>Code of Conduct:</u> <ul style="list-style-type: none"> <li>– Continued to implement NSF process for reporting and reviewing Code of Conduct violations.</li> <li>– Updated Code of Conduct to clarify to the community the consequences (e.g., potential removal) of misconduct in Antarctica.</li> </ul> </li> <li>• <u>Law Enforcement:</u> <ul style="list-style-type: none"> <li>– Reviewed the final report dated March 12, 2018 of a group of law enforcement officials who had conducted an on-site evaluation in February 2018. The Law Enforcement Review and Site-Visit assessed equipment and training for special deputies and reviewed other areas, such as legal jurisdiction, USAP law enforcement staffing, facilities, communications with the U.S. Marshals Service, and detainment and transportation of suspects. The report contains recommendations and suggestions. <b>This audit action item (#3) regarding USAP Law Enforcement was formally closed by the OIG on June 12, 2018.</b></li> </ul> </li> <li>• <u>Breathalyzer Testing:</u> <ul style="list-style-type: none"> <li>– Finalized a memo detailing the results of NSF exploration of the advisability and feasibility of implementing a requirement for breathalyzer testing for all USAP participants. NSF determined that since USAP supporting organizations have their own breathalyzer testing programs, the benefit of establishing and enforcing an NSF-managed breathalyzer program would not be worth the legal, contractual and financial obligations. NSF decided to accept the risk of not implementing its own breathalyzer program. <b>This audit action sub-item (#4.1) regarding the legality of requiring breathalyzer testing for all USAP participants was formally closed by the OIG on 02/05/2018.)</b></li> </ul> </li> </ul> |

**NSF Management’s Overview of the Challenge**

**NSF’s view of the residual risk in light of key actions already taken to address the OIG-identified challenge.**

NSF—through the Office of Polar Programs (OPP) in the Directorate for Geosciences (GEO)—funds and manages the U.S. Antarctic Program (USAP). The USAP supports United States’ research and national policy goals in the Antarctic. The inherent risks associated with Antarctica’s remote location, extreme environment, and the short period of time during which the continent is accessible has precipitated several actions under the USAP management challenge for NSF. These actions include: a) ensuring a successful transition from Lockheed Martin to Leidos as the Antarctic Support Contractor (ASC) while preventing unwarranted increases in cost; b) ensuring sound management of the acquisition and shipment of Antarctica-bound property and inventory stored and maintained at three ports—Port Hueneme, California, Punta Arenas, Chile, and Christchurch, New Zealand; c) ensuring modernization of McMurdo Station as it proceeds to construction under the Antarctic Infrastructure Modernization for Science (AIMS) project; and d) continuing to address misconduct in the Antarctic, including items noted in the 2015 OIG Report, *Audit of Health and Safety in the U.S. Antarctic Program*.

Through leadership commitments, dedication of staff and resources, corrective action planning, and monitoring implementation of plans, NSF has demonstrated significant progress in reducing the inherent risk to residual risk levels for USAP management that are well within acceptable ranges. The transition of the ASC responsibilities to Leidos has occurred without disruptions in operations or unwarranted increases in cost. Management controls and operating procedures for monitoring invoice processing and systems performance are in place. Efforts are underway to evaluate an automated process to review invoices and identify inaccuracies. NSF performed root cause analyses of issues pertaining to the shipment and storage of property and inventory, and consequently developed and implemented process improvements. Routine NSF-led meetings are held with Leidos to emphasize prime contractor responsibilities to protect government property. Planning and implementation of the modernization of McMurdo Station and other large facilities work in Antarctica are underway with cognizance by the National Science Board (NSB), the Office of Management and Budget (OMB), and Congress. Plans going forward include engaging the scientific community in efforts to minimize disruption that the AIMS planning and construction process might have on Antarctic science. NSF has dedicated staff with primary responsibility of stewardship for the long-range capital plan, to include lifecycle and real property investments for all Antarctic locations. All 2015 OIG misconduct-related action items, as expressed in the *Audit of Health and Safety in the U.S. Antarctic Program*, were closed by the OIG. NSF and USAP efforts have been positive steps and continuing efforts will help ensure USAP is well poised to address misconduct in the future.

**NSF’s Anticipated Milestones**

**NSF management developed the anticipated milestones below in consideration of NSF’s strategic objectives, the risks inherent to NSF’s work, and the key actions NSF has already taken to address those risks.**

|     |  |     |   |     |   |     |  |
|-----|--|-----|---|-----|---|-----|--|
| (a) | <ul style="list-style-type: none"> <li>Continue to apply invoice processing in accordance with the current NSF “Guidance and Instructions for Invoice</li> </ul> | (b) | <ul style="list-style-type: none"> <li>Monitor cargo during the upcoming shipment cycle (August 2018 - February 2019).</li> </ul> | (c) | <ul style="list-style-type: none"> <li>Complete necessary solicitation efforts for AIMS project.</li> </ul> | (d) | <ul style="list-style-type: none"> <li><u>Code of Conduct:</u> <ul style="list-style-type: none"> <li>Continue to implement its process for reporting and reviewing Code of Conduct violations.</li> </ul> </li> </ul> |
|-----|--|-----|---|-----|---|-----|--|

|  |  |   |   |
|--|--|---|---|
| <p>Review and Processing” SOP.</p> <ul style="list-style-type: none"> <li>• Evaluate an automated process to review invoices and identify inaccuracies.</li> </ul> | <ul style="list-style-type: none"> <li>• Continue to conduct weekly NSF-led meetings with the prime contractor focused on protecting government property.</li> </ul> | <ul style="list-style-type: none"> <li>• Conduct AIMS Final Design Review (FDR) in Q1 of FY 2019.</li> <li>• Engage the scientific community in efforts to minimize disruption that the AIMS planning and construction process might have on Antarctic science.</li> <li>• Advance the long-range capital plan to include lifecycle and real property investments for all Antarctic locations.</li> </ul> | <ul style="list-style-type: none"> <li>– Continue to update the Code of Conduct as circumstances required.</li> <li>• <u>Law Enforcement</u>:             <ul style="list-style-type: none"> <li>– Implement appropriate changes in response to the Federal Law Enforcement Site Visit Report.</li> </ul> </li> </ul> |
|--|--|---|---|

## MANAGEMENT CHALLENGE: Cybersecurity and IT Management

NSF Lead: Dorothy Aronson, Chief Information Officer, NSF

| Summary of OIG Identified Challenge  |   |   |
|--|---|---|
| <p>(a) <i>System Monitoring: Protect information systems against unauthorized access or modification to decrease the risk of unauthorized transactions and unauthorized changes to data, audit logs, and configurations that remain undetected and affect the integrity of financial transactions.</i></p> | <p>(b) <i>USAP IT Security: Allocate appropriate resources to correct IT weaknesses related to the U.S. Antarctic Program (USAP) and ensure the systems and information are adequately protected.</i></p> | <p>(c) <i>Mobile Devices: Develop effective measures to preserve social media messages, capture text messages on NSF-owned devices, and monitor downloads of smartphone applications to ensure compliance with Federal requirements and guidance for electronic records management.</i></p> |



| <b>NSF's Key Actions to Address the Challenge</b> |  |     |  |
|---|--|-----|--|
| <b>Agency Actions Taken in Prior Fiscal Years</b> |  |     |  |
| (a)   | <ul style="list-style-type: none"> <li>Continued monitoring activities to comply with the Federal Information Security Modernization Act (FISMA) and ensured ongoing operational security throughout the system lifecycle.</li> <li>Implemented numerous risk mitigating actions in FY 2017 to address the OIG's management challenges.</li> <li>Established configuration baselines for production systems and implemented the Department of Homeland Security Continuous Diagnostics and Mitigation (CDM) program Phase I with more frequent configuration scans.</li> <li>Documented user administration processes for the Award System and webTA.</li> </ul> | (b) | <ul style="list-style-type: none"> <li>Adjusted the USAP security plan review and updated process to provide earlier updates to validate controls being in place for the year.</li> </ul>  |
|   |  | (c) | <ul style="list-style-type: none"> <li>Implemented a mobile device management (MDM) capability to enforce configuration management and ensure the integrity of agency information.</li> </ul>  |
| <b>Actions Taken in FY 2018</b>                   |  |     |  |
| (a)   | <ul style="list-style-type: none"> <li>Established technical controls to monitor the NSF network for unauthorized access to reduce the risk of unauthorized transactions, changes to data, audit logs and configurations.</li> <li>Conducted configuration scans and regular reviews of audit logs and reported results to management.</li> <li>Proactively assessed the security state of systems through NSF's IT security continuous monitoring program.</li> </ul>   | (b) | <ul style="list-style-type: none"> <li>Allocated appropriate resources to the USAP IT security program to address FISMA findings.</li> <li>Completed security plan updates and a business impact analysis to address recovery priorities.</li> </ul>   |
|   |  | (c) | <ul style="list-style-type: none"> <li>Updated and issued guidance related to the use of smartphone applications that support encryption and/or automatically delete messages.</li> <li>Implemented controls in May 2018 that prohibit applications identified as violating NSF policy from being downloaded onto NSF-issued mobile devices.</li> <li>Prohibited applications that support encrypted communication unless their use is approved by the OGC and NSF Records Officer per federal guidance.</li> <li>Implemented quarterly monitoring of applications.</li> </ul> |

## NSF Management's Overview of the Challenge

### ***NSF's view of the residual risk in light of key actions already taken to address the OIG-identified challenge.***

The availability of information technology (IT) resources and security posture of its IT systems is vital to NSF's ability to carry out its mission. The agency's Chief Information Officer is part of the Office of the Director and oversees the Foundation's proactive IT security management structure that takes a risk-based approach and provides timely and relevant information to stakeholders. The agency has assessed the risks in the three areas set forth in the OIG Management Challenge for Cybersecurity and Information Technology Management and is confident that overall the residual risks remaining are low.

As of July 2018, NSF analyzed the root causes, e.g. people, process and tools, and agency staff implemented solutions to address the three challenges noted above. NSF senior management established and committed to a Plan of Action and Milestones (POA&M) as a performance measure to monitor corrective action progress. The POA&M incorporates the IG Management Challenges for systems monitoring, USAP IT security, and mobile devices. The POA&M is updated quarterly, and a progress report is distributed to senior management for review.

*Systems Monitoring.* NSF established a system-wide audit log review process by implementing procedures and tools to monitor the system and report results to senior management on a regular basis. While NSF acknowledges the potential impact of unauthorized activity on agency systems, based on these actions and the above described evaluation of this risk, causes and outcomes, NSF is confident that the remaining residual risk is low.

*USAP IT Security.* The Office of Polar Programs (OPP), U.S. Antarctic Program (USAP) Section for Antarctic Infrastructure and Logistics (GEO/OPP/AIL) prioritized IT security initiatives and committed resources to address FISMA findings. Specifically, GEO/OPP/AIL conducted a Business Impact Analysis (BIA) to identify mission and business processes, prioritize the processes, and determine the impact on the processes if systems are unavailable. The OPP BIA identifies important functional relationships and interdependencies, as well as time sensitivities that impact the USAP mission. OPP implemented the National Institute of Standards and Technology Risk Management Framework to enable GEO/OPP/AIL to prepare, execute, and communicate in keeping with cybersecurity risk management best practices. OPP's risk-based approach to cybersecurity is supported by operational activities, regular program reviews and management reporting that support risk decisions and risk mitigation actions. Through improved oversight and resource allocation to priority tasks, OPP continues to manage the residual risk for USAP information systems.

Monitoring and reporting processes communicate cybersecurity risk to senior management to assess risk and determine appropriate courses of action consistent with organizational risk tolerance. The IT security program is evaluated in accordance with the FISMA. NSF is proactive in reviewing security controls and identifying areas to improve the IT security program and incorporates information gained and lessons learned to strengthen NSF's cybersecurity posture. NSF's adaptive risk management is very responsive to a changing cybersecurity environment with low residual risk.

*Mobile Devices.* In addition to ensuring the availability and strong security posture of agency IT systems, NSF recognizes the importance of protecting the integrity of information on, and appropriate use of, NSF-issued mobile devices. Part of this responsibility is ensuring that

information on agency mobile devices, including smartphones and tablets, is captured and retained per Federal recordkeeping requirements. NSF’s mobile device management capability enforces configuration requirements on mobile devices that access NSF email, contacts, and calendars, and provides mechanisms to ensure compromised devices are disconnected from agency systems so information is not lost. Additionally, NSF has implemented new procedures and controls which allow specific applications to be blacklisted, preventing their use on NSF-issued mobile devices. NSF has blacklisted two mobile applications that support encryption and/or the ability to automatically delete messages after they are read or sent, which could be used to circumvent agency recordkeeping systems. NSF is monitoring installed applications on agency-issued mobile devices each quarter to identify if there are new applications that should be restricted from use. Furthermore, NSF continues to research alternatives for the automatic capture and retention of text messages on NSF-issued mobile devices and plans to have this capability in place by November 2018.

In addition to the technical controls previously described, NSF continues to educate mobile device users on their responsibilities for ensuring the capture and retention of information mobile devices per Federal records management guidance. In May 2018, the Foundation published a revised NSF Bulletin related to the assignment and use of agency mobile devices, including more detailed information on protecting and preserving agency information. The May 2018 NSF Bulletin revision updated the rules of behavior outlining responsibilities for individuals with NSF-issued mobile devices. With recent and planned actions related to NSF’s mobile device services program, comprising technology controls and policy guidance, there is low residual risk of loss for electronic records requiring capture and retention. NSF continues to evaluate its mobile device services program offerings to focus on the intersection between users and technologies, with the goal of protecting agency information against loss or disclosure.

### NSF’s Anticipated Milestones

***NSF management developed the anticipated milestones below in consideration of NSF’s strategic objectives, the risks inherent to NSF’s work, and the key actions NSF has already taken to address those risks.***

|     |  |     |  |  |
|-----|--|-----|--|--|
| (a) | <ul style="list-style-type: none"> <li>• Employ capabilities to further strengthen the cybersecurity program and implement application event monitoring tools and audit log reviews to detect potential unauthorized changes to financially significant data or configuration changes that affect NSF’s security process.</li> </ul> | (b) |  | <ul style="list-style-type: none"> <li>• Maintain OPP operational IT security awareness, review program priorities, and allocate resources to ensure IT security program infrastructure and staffing requirements are adequate.</li> <li>• Ensure OPP’s NextGen project addresses IT infrastructure upgrades.</li> <li>• Continue to research alternatives for the automatic capture and retention of text messages on NSF-issued mobile devices and plans to implement this capability by November 2018.</li> <li>• Continue to evaluate additional enhancements to NSF mobile device services program, including new capabilities to preserve information and ensure the retention of agency electronic messaging and information per federal guidance.</li> </ul> |
|-----|--|-----|--|--|

## MANAGEMENT CHALLENGE: Encouraging the Ethical Conduct of Research

**NSF Lead: Fleming Crim, Chief Operating Officer, NSF**

| Summary of OIG Identified Challenge  |  |     |   |     |  |
|--|--|-----|---|-----|--|
| (a)  | <i>It is essential that NSF continue to recognize the importance of its Responsible Conduct of Research (RCR) requirement. It is important to emphasize research integrity as a core value.</i>  | (b) | <i>NSF awardees could benefit from NSF providing written guidelines or templates for universities to follow. NSF has an opportunity to encourage incorporation of best practices into RCR programs.</i>   | (c) | <i>NSF should encourage institutions to extend their RCR programs to faculty.</i>  |
| NSF's Key Actions to Address the Challenge   |  |     |   |     |  |
| <b>Agency Actions Taken in Prior Fiscal Years</b>  |  |     |   |     |  |
| Issued Important Notice No. 140, Training in Responsible Conduct of Research – A Reminder of the NSF Requirement from the NSF Director on August 17, 2017. |  |     |   |     |  |
| <b>Actions Taken in FY 2018</b>  |  |     |   |     |  |
| (a)  | <ul style="list-style-type: none"> <li>Evaluated themes and common threads of research misconduct cases and used the analysis to draft additional guidance for the FY 2019 Proposal and Award Policies and Procedures Guide (PAPPG) on the definition and consequences of research misconduct and on NSF-funded resources available for RCR training.</li> <li>Revised Cultivating Cultures for Ethical STEM (CCE STEM) program solicitation to incorporate specific references to RCR training and online resources to assist with RCR training.</li> <li>Sponsored an SBE special lecture at NSF, "Fighting against Doubt and Promoting Public Trust in Research Practices", presented by Kristen Intemann.</li> </ul> | (b) | <ul style="list-style-type: none"> <li>Incorporated a reference to Chapters 9 ("Identifying and Promoting Best Practices for Research Integrity") and 10 ("Education for the Responsible Conduct of Research") of <i>Fostering Integrity in Research</i> (National Academies of Sciences, Engineering, and Medicine, 2017) (NASEM Report) into the draft PAPPG scheduled for publication in October 2018.</li> <li>Encouraged awardees to incorporate promising RCR practices by initiating outreach regarding proposed PAPPG changes.</li> <li>Revised the CCE STEM program solicitation to incorporate the</li> </ul> | (c) | <ul style="list-style-type: none"> <li>Produced a set of slides on RCR and research misconduct for use in NSF staff outreach to the research community, suggesting that STEM faculty incorporate RCR into their mentoring, teaching, and curriculum development.</li> <li>Held NSF senior management briefings about the importance of involving PIs and Co-PIs in the RCR requirement.</li> <li>Drafted guidance language for the FY 2020 PAPPG: "NSF encourages training of faculty</li> </ul> |

|   |  |   |
|---|--|---|
| <p>Emphasized integrity as a core value in the NSF strategic plan, <i>Building the Future: Investing in Discovery and Innovation</i>, by specifically stating that “We hold each other and our awardees to the highest standards of ethical behavior. We strive to ensure the trustworthiness of the results of NSF-funded research by promoting the responsible conduct of research.” (available at: <a href="https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf18045">https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf18045</a>)</p> <ul style="list-style-type: none"> <li>• Included RCR requirement in NSF outreach at the NSF Grants Conference and other outreach events.</li> </ul> | <p><i>Fostering Integrity in Research</i> conclusion that “training for responsible conduct of research is most effective when it is part of a comprehensive approach to enhance an organization’s research enterprise.”</p> <ul style="list-style-type: none"> <li>• Synthesized a set of findings regarding best ethical research practices based on reports from three of the ethics workshops NSF funded over the past three years.</li> <li>• Held meeting with CCE STEM PIs to review synthesized workshop findings and receive input on dissemination plans.</li> </ul> | <p>in the responsible and ethical conduct of research.”</p> |
|---|--|---|

**NSF Management’s Overview of the Challenge**

***NSF’s view of the residual risk in light of key actions already taken to address the OIG-identified challenge.***

NSF leadership emphasizes that NSF does not tolerate research misconduct, which means fabrication, falsification, or plagiarism in proposing or performing research funded by NSF, in reviewing research proposals submitted to NSF, or in reporting research results funded by NSF. The OIG investigates allegations of research misconduct and makes recommendations to NSF for disposition. NSF’s Chief Operating Officer decides on disposition of the referrals for research misconduct based on input from staff in the Office of General Counsel, the Office of Integrative Activities, and the Office of the Director. In 2017, the NSF Director issued an Important Notice reminding NSF awardees of the NSF requirement for training in responsible conduct of research, and NSF’s strategic plan for FY2018-2022 emphasizes integrity as a core value. As reported by the OIG in its Spring 2017 Semiannual Report, the number of research misconduct referrals to NSF from FY 2005 through FY 2017 has remained relatively low and has not trended upward. NSF also performed a more detailed root cause analysis of referrals to the agency by the OIG in FY 2016 and FY 2017. In this 2-year period, NSF made 23 findings of research misconduct based on 24 referrals (excluding referrals arising from the Small Business Innovation Research/Small Business Technology Transfer programs). Nine of the findings arose from plagiarism by faculty in proposals to NSF that were not funded. Considering that the total number of referrals by the OIG is relatively low and NSF reviewed over 98,000 proposals and funded over 23,000 proposals in the same period, it is difficult to identify trends. However, NSF notes that a significant subset of findings involve plagiarism by faculty in unfunded proposals. NSF is addressing these issues through additional guidance and outreach. NSF will continue to track and analyze the OIG’s investigation referrals to assess responsive actions and identify new trends. NSF recognizes the potential high impact of research misconduct and has taken actions to reduce the likelihood of such activities.

| <b>NSF’s Anticipated Milestones</b>   |   |     |  |     |  |
|---|---|-----|--|-----|--|
| <b><i>NSF management developed the anticipated milestones below in consideration of NSF’s strategic objectives, the risks inherent to NSF’s work, and the key actions NSF has already taken to address those risks.</i></b> |   |     |  |     |  |
| (a)   | <ul style="list-style-type: none"> <li>• Publish the 2019 PAPPG with the additional language on the definition and consequences of research misconduct and on the NSF-funded resources available for RCR training.</li> </ul> | (b) | <ul style="list-style-type: none"> <li>• Continue to fund the Online Ethics Center and research on best practices.</li> <li>• Incorporate workshop findings into the Online Ethics Center.</li> <li>• Hold a “promising practices summit” conference with examples of effective RCR approaches.</li> <li>• Publish revised PAPPG incorporating a reference to Chapters 9 (“Identifying and Promoting Best Practices for Research Integrity”) and 10 (“Education for the Responsible Conduct of Research”) of the NASEM report.</li> <li>• Continue to encourage awardees to incorporate promising RCR practices by initiating outreach regarding new PAPPG changes.</li> </ul> | (c) | <ul style="list-style-type: none"> <li>• Use the new outreach materials for encouraging faculty to participate in RCR training and demonstrate best practices.</li> <li>• Encourage STEM faculty to incorporate RCR in their mentoring, teaching, and curriculum development.</li> </ul> |

## FY 2018 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 2018 AFR can be found at <https://paymentaccuracy.gov/>.

### I. Payment Reporting

Not applicable.

### II. Recapture of Improper Payments Reporting

a. NSF is continuing its payment integrity risk mitigation activities by investing significant resources in its grant monitoring program. As a key component of the agency's grant monitoring program, NSF completes advanced monitoring activities that 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. For other payments, NSF has implemented robust control activities to mitigate the risk of improper payments.

#### *b. Payment Recapture Audits Narrative*

NSF did not conduct payment recapture audits during FY 2018. On September 30, 2015, OMB agreed with NSF's analysis that it would not be cost effective for the agency to conduct a recapture audit program.

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

OMB Circular A-123, Appendix C, Part III.C.6 provides guidance on "What should an agency do if it determines that a payment recapture audit program would not be cost effective?" 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). 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.

NSF has leveraged the results of the work performed under IPERA, audits, grant monitoring programs, and internal control reviews. All consistently demonstrated that there is not a significant risk of unallowable costs/improper payments within NSF's single grant program and other activities. For FY 2018, 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 assessment for FY 2018 was completed during the third and fourth quarter of FY 2018 and used qualitative factors to assess NSF's singular grant program and other activities. The risk assessment found there was not a significant risk of improper payments. This was consistent with the agency's history of low risk findings.

In the March 2018, NSF OIG Semi-Annual Report to Congress, the OIG's independent public accounting contractor identified projects that had total questioned costs of \$409,104; and the OIG investigative recoveries totaled \$1.53 million. These amounts are consistent with prior year's recoveries and indicate that there are no significant changes or emerging issues within the grantee

community that would signal increased risk for payment integrity. 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.

NSF’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.

**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 Table 3.3 below.

**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  | \$13.433          | \$13.470          | 100.3%             |
| Contracts   | \$0.360           | \$0.314           | 87.2%              |
| Travel  | \$0.038           | \$0.023           | 60.5%              |
| Purchase Cards  | \$0.000           | \$0.000           | N/A                |
| Payroll and Other   | \$0.114           | \$0.093           | 81.6%              |
| <b>TOTAL</b>  | <b>\$13.945</b>   | <b>\$13.900</b>   | <b>99.7%</b>       |

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

Not applicable.

**f. *Aging Schedule of the Amount of Overpayments Identified Through the Payment Recapture Audit Program That are Outstanding***

Not applicable.

**g. *Overpayments Identified Through Payment Recapture Audit Program Determined to Not be Collectable***

Not applicable.

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

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 (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 Treasury’s DNP online portal for adjudication purposes. No additional data sources are available in the Treasury payment integration process at this time. In FY 2018, 51,222 payments totaling \$7 billion were screened through the Treasury DNP process (Table 3.4). NSF did not have positive matches for DMF or 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 – 2017 to zero in FY 2018. This has produced resource savings for the agency from not having to manually research each false positive using the DNP 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                               | 51,222   | \$7,000.39  | 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.

**VIII. Risk Assessment**

NSF conducted an improper payments risk assessment during the third and fourth quarters of FY 2018. NSF conducted risk reviews during FY 2016 and FY 2017, the first two years of the 3-year risk assessment cycle. The results of the risk reviews were rolled forward to inform and supplement the risk assessment in the third year. The risk reviews document the risk assessment and identify trends or issues that may have to be further explored during the risk assessment. The documentation is used to inform and support the conclusions for the risk reviews and risk assessment. The primary difference between the risk reviews and risk assessment is the breadth of input from Subject Matter Experts throughout the agency and increased coordination of activities with the Internal Controls and Quality Assurance program.

The risk reviews and assessments take into account the OMB risk factors likely to contribute to improper payments. NSF enhances the OMB risk factors with additional considerations that are intended to further refine the risk factors relative to NSF payment activities.

The risk reviews and risk assessment covered disbursements for the grants and cooperative agreements programs and administrative support functions for Contracts, Credit Cards and Payments to Employees through June 30, 2018. Disbursements for the fiscal year were reviewed after September 30, 2018 in order to validate that there were no significant changes during the period July 1 to September 30. The data source for the disbursement information was the general ledger of NSF's core financial management system, iTRAK. The disbursement data were reconciled to the gross outlays amount from the Statement of Budgetary Resources at June 30 and September 30 to provide assurance of coverage for the grants and cooperative agreements programs and administrative support functions.

## 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.

NSF used the GAO Green Book and leading practices from the Fraud Risk Management Framework methodology as the basis for continuing to develop its 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. NSF took into consideration the potential for fraud when prioritizing the FRDAA implementation activities. This included considering the types of fraud that could occur, fraud risk factors, and the agency response to identified fraud.

In FY 2018, NSF continued its implementation of the FRDAA requirements by conducting a fraud risk assessment of NSF's grants program. The assessment was conducted using four steps:

- Collected and analyzed information on: (1) grant policies, (2) past grant fraud cases, and (3) OIG activities to identify potential types of fraud and to better understand the operating environment;
- Interviewed stakeholders to identify types of grant fraud throughout the phases of the grant lifecycle;
- Completed an exploratory data review to identify key data elements that aligned with potential fraud schemes; and
- Developed a fraud map to outline potential fraud schemes and identify proposed analytics for possible future utilization to enhance fraud mitigation activities through pre-award reviews.

The FY 2018 fraud risk activities underscore NSF's commitment to reducing the risk of fraud. Further, they demonstrate the viability of analytic activities to improve monitoring activities and insure the effective operation of control activities. As NSF's fraud risk assessment program continues to mature, the risk assessment methodology implemented for the charge card and grants projects will be used as a model for application in other NSF business areas such as payments to employees and contracts. For FY 2019, NSF plans to conduct a fraud risk assessment within NSF's contracts area. NSF will continue to identify fraud risks and identify data and information that can be leveraged to improve controls and monitoring activities.

It is important to note that the data analytics capability developed during the FY 2017 fraud risk assessment of the credit card program was utilized by NSF to examine travel and purchase card data for the FY 2018 internal control review. The use of these analytics enabled NSF to identify trends in the data and to focus the internal control testing items on controls and fraud risks.

## Undisbursed Balances in Expired Grant Accounts

In FY 2018, NSF funded research and education in science and engineering through grants and cooperative agreements to over 1,800 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 and Education and Human Resources. 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 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 3.5. The numbers and balances reflect a point in time before expired awards are closed out during normal processes described above. For FY 2018, there were 5,225 expired grants with undisbursed balances of \$107,860,158.

**Table 3.5 – Status of Undisbursed Balances in Expired Grants**

|  | FY 2018<br>(as of 9/30/18) | FY 2017<br>(as of 9/30/17) | FY 2016<br>(as of 9/30/16) |
|--|----------------------------|----------------------------|----------------------------|
| Number of expired grants               | 5,225                      | 4,982                      | 5,132                      |
| Undisbursed balances prior to closeout | \$107,860,158              | \$95,235,628               | \$113,215,313              |

**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 the funds obligated during 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 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 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 of each year, all undisbursed grant balances in canceling appropriations are de-obligated and subsequently returned to Treasury.

## Grants Oversight & New Efficiency (GONE) Act Report

The GONE Act was enacted in 2016 ([P. L. 114-117](#)) with the goal of holding federal awarding agencies accountable for the timely closeout of 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. The total number of financial assistance awards, including grant, cooperative agreement, and fellowship awards that expired on or before September 30, 2015 but have not been closed out, was initially reported in NSF's FY 2017 AFR. Table 3.6, below, has been updated to reflect progress made in closing these awards during FY 2018.

**Table 3.6 – Age and Balances for Expired Awards not Closed**

(Dollars in Millions)

| CATEGORY   | 2 – 3 Years | >3-5 years | >5 years |
|--|-------------|------------|----------|
| Number of Grants/<br>Cooperative Agreements<br>With Zero Dollar Balances | 64          | 237        | 50       |
| Number of Grants/<br>Cooperative Agreements<br>With Undisbursed Balances | 0           | 0          | 0        |
| Total Amount of<br>Undisbursed Balances                                  | \$0         | \$0        | \$0      |

Information shown above is as of 9/30/2018.

During FY 2018, NSF closed 132 awards, leaving 351 awards that had a period of performance ending on or before September 30, 2015 for which closeout had not occurred. These 351 expired awards shown in Table 3.6 were financially closed (i.e., there were no undisbursed balances), at 120 days after the award expiration date pursuant to NSF policy, but remain open for administrative reasons. Federal requirements incorporated into NSF policy state that a financial assistance award cannot be administratively (i.e., completely) closed until all the required project reports have been submitted, approved, and posted.

All except one of the remaining 351 awards reported above are open because the awardees have not yet provided the requisite final project reports.

NSF's continuous efforts to administratively close grants and cooperative agreements in a timely manner focus on obtaining these reports through system-driven and enforced business rules, including sending out due and overdue notices to the awardees; developing tools for awardee institutions and NSF program staff to identify outstanding reports; and blocking all financial and non-financial actions on any potential or active award by Principal Investigators (PIs) or co-PIs on projects with delinquent reports.

## Reduce the Footprint

NSF completed its headquarters relocation from Arlington to Alexandria, Virginia in early FY 2018. The new headquarters has 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. Of note, the new lease rates in Alexandria are lower than the lease rates in Arlington.

The square footage reported in Table 3.7, aligns with the data reported in the *Federal Real Property Profile* and *GSA's Occupancy Agreement (OA) Database* for FY 2017. This reporting shows an increase in the usable square footage (USF) from 597,354 USF to 886,903 USF. This is higher than the FY 2015 baseline primarily due to the timing of NSF's relocation. At the close of the reporting period, NSF partially occupied the Arlington buildings and fully occupied the new Alexandria building. NSF expects the USF will decrease by almost 280,000 USF in FY 2018. This reduction reflects the FY 2018 release of the Arlington buildings to GSA. NSF anticipates maintaining the total USF amount for the OAs with GSA from FY 2018 to FY 2033.

**Table 3.7 - Reduce the Footprint Policy Baseline Comparison**

| Description                    | FY 2015 Baseline | FY 2017 | Change<br>(from FY 2015<br>Baseline to FY 2017) |
|--------------------------------|------------------|---------|---|
| NSF Occupancy Agreements (USF) | 597,354          | 886,903 | 289,549   |

## Awards to Affiliated Institutions

The following chart lists institutions affiliated with members of the National Science Board (NSB) in FY 2018.

| Affiliated Institution <sup>1</sup>   | Awards Obligated in FY 2018 (Dollars in thousands) |
|---------------------------------------|--|
| Arizona State University              | \$55,216   |
| California Institute of Technology    | 89,258   |
| Cornell University                    | 12,055   |
| Georgetown University                 | 6,225  |
| Georgia Institute of Technology       | 76,410   |
| Illinois Institute of Technology      | 9,758  |
| Massachusetts Institute of Technology | 8,742  |
| Michigan State University             | 76,873   |
| Purdue University                     | 67,746   |
| Stanford University                   | 67,189   |
| Tufts University                      | 11,502   |
| University of California – Berkeley   | 18,438   |
| University of Colorado                | 107,405  |
| University of Florida                 | 37,605   |
| University of Michigan                | 102,140  |
| University of Oregon                  | 2,587  |
| University of Tennessee               | 28,386   |
| Washington University                 | 20,213   |
| <b>TOTAL</b>                          | <b>\$ 797,748</b>                                  |

<sup>1</sup>This table is provided solely in the interest of openness and transparency. This table lists the dollar value of the awards made to institutions affiliated with NSB members during their time on the NSB in fiscal year ended September 30, 2018. 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 in the Appendices at <https://www.nsf.gov/pubs/2018/nsf18020/pdf/nsf18020.pdf>. Because of the regular turnover among NSB membership, the information in these tables is not directly comparable across years.



## Awards to Assistant Director IPAs' Home Institutions by NSF Directorates

The following tables identify the awards made by directorates to the home institutions of Assistant Directors serving under the Intergovernmental Personnel Act (AD IPAs) during their time at NSF for the fiscal years ended September 30, 2018 and 2017. AD IPAs led six of the seven directorates during both fiscal years ended on September 30, 2018 and September 30, 2017. NSF executive staff formulate directorate or office scientific goals, objectives, and priorities. Federal conflict of interest rules prohibit executives, including IPA detailees who serve in AD positions, from participating in matters where they have a conflict of interest or an impartiality concern. NSF grant awards are made pursuant to a merit-review based process and are not routinely reviewed by IPAs serving in executive positions. If matters are brought to such IPAs, they do not participate in the review or approval of awards to their home institutions. The following tables are provided in the interest of openness and transparency.

**Table 3.8 – FY 2018 Awards to AD IPAs' Home Institutions**

(Dollars in Thousands)

| Directorate  | Total Dollars and Awards Made by Directorate in FY 2018 <sup>1</sup> | Home Institution of IPA Assistant Director | Total Dollars and Awards to Home Institution by Directorate in FY 2018 | Total Dollars and Awards to Home Institution by NSF in FY 2018 |
|--|--|--|--|--|
| Computer & Information Science & Engineering         | \$944,819<br>(3,427 awards)  | University of Massachusetts Amherst        | \$7,667<br>(28 awards)   | \$30,331<br>(106 awards)                                       |
| Engineering  | \$958,598<br>(3,624 awards)  | University of Michigan                     | \$16,328<br>(64 awards)  | \$102,140<br>(302 awards)                                      |
| Geosciences  | \$1,494,531<br>(2,601 awards)  | The Pennsylvania State University          | \$10,929<br>(37 awards)  | \$75,783<br>(253 awards)                                       |
| Mathematics & Physical Sciences                      | \$1,580,787<br>(4,816 awards)  | George Washington University               | \$2,599<br>(15 awards)   | \$20,086<br>(75 awards)  |
| Social, Behavioral, & Economic Sciences <sup>2</sup> | \$227,241<br>(1,252 awards)  | Northwestern University                    | \$2,194<br>(19 awards)   | \$43,221<br>(139 awards)                                       |
|  |  | University of Michigan                     | \$6,779<br>(5 awards)  | \$17,535<br>(27 awards)  |
| Biological Sciences                                  | \$762,918<br>(2,180 awards)  | George Mason University                    | \$0<br>(0 awards)  | \$100<br>(2 awards)  |
| <b>Total</b>   | <b>\$5,968,894</b><br><b>(17,900 awards)</b>                         |  | <b>\$46,496</b><br><b>(168 awards)</b>                                 | <b>\$271,661<sup>3</sup></b><br><b>(877 awards)</b>            |

<sup>1</sup> Some NSF awards are split funded, meaning an award is funded by two or more directorates. For a split-funded award in this column: the award is counted for each directorate; the award funding is only the split-funded amount.

<sup>2</sup> This directorate was led by two AD IPAs during the fiscal year. To reflect this, home institution award data is shown for the portion of the year each IPA served as AD.

<sup>3</sup> Two IPAs from the University of Michigan served as ADs during FY 2018. Award dollars and count have been reduced by \$17,535,000 and 27 awards, respectively, in this total box to avoid double counting.

**Table 3.9 – FY 2017 Awards to AD IPAs' Home Institutions**

(Dollars in Thousands)

| Directorate                                  | Total Dollars and Awards Made by Directorate in FY 2017 <sup>1</sup> | Home Institution of IPA Assistant Director | Total Dollars and Awards to Home Institution by Directorate in FY 2017 | Total Dollars and Awards to Home Institution by NSF in FY 2017 |
|--|--|--|--|--|
| Computer & Information Science & Engineering | \$921,475<br>(3,216 awards)  | University of Massachusetts Amherst        | \$11,905<br>(51 awards)  | \$54,313<br>(192 awards)                                       |
|  |  |  |  |  |
| Engineering                                  | \$910,819<br>(3,543 awards)  | University of Michigan                     | \$9,568<br>(38 awards)   | \$72,063<br>(184 awards)                                       |
|  |  |  |  |  |
| Geosciences <sup>2</sup>                     | \$1,403,842<br>(2,785 awards)  | University of Colorado-Boulder             | \$17,512<br>(76 awards)  | \$67,390<br>(201 awards)                                       |
|  |  | The Pennsylvania State University          | \$3,910<br>(22 awards)   | \$46,018<br>(162 awards)                                       |
| Mathematics & Physical Sciences              | \$1,445,057<br>(4,709 awards)  | University of Wisconsin Madison            | \$168<br>(2 awards)  | \$3,142<br>(17 awards)   |
|  |  |  |  |  |
| Social, Behavioral, & Economic Sciences      | \$245,594<br>(1,364 awards)  | Northwestern University                    | \$3,150<br>(16 awards)   | \$39,408<br>(133 awards)                                       |
|  |  |  |  |  |
| Biological Sciences                          | \$755,646<br>(2,299 awards)  | George Mason University                    | \$64<br>(2 awards)   | \$16,054<br>(62 awards)  |
|  |  |  |  |  |
| Total  | \$5,682,433<br>(17,916 awards)                                       |  | \$46,277<br>(207 awards)   | \$298,388<br>(951 awards)                                      |

## **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 1,552 NSF invention disclosures reported to NSF either directly or through the National Institutes of Health's iEdison database during FY 2018. 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

|          |  |        |  |
|----------|--|--------|--|
| ACMS     | Award Cash Management Service                                | HRM    | Division of Human Resource Management                              |
| ADA      | Anti-Deficiency Act  | IG     | Inspector General  |
| AFR      | Agency Financial Report                                      | IPA    | Intergovernmental Personnel Act                                    |
| AICA     | American Innovation and Competitiveness Act of 2017          | IPERA  | Improper Payments Elimination and Recovery Act of 2010             |
| AIMS     | Antarctic Infrastructure Modernization for Science           | IPERIA | Improper Payments Elimination and Recovery Improvement Act of 2012 |
| AOAM     | Agency Operations and Award Management                       | IT     | Information Technology   |
| APR      | Annual Performance Report                                    | K-12   | Kindergarten to Grade 12   |
| ASC      | Antarctic Support Contract                                   | LFM    | Large Facilities Manual  |
| BFA      | Office of Budget, Finance and Award Management               | LFO    | Large Facilities Office  |
| BOAC     | Business & Operations Advisory Committee                     | MREFC  | Major Research Equipment and Facilities Construction               |
| CCE STEM | Cultivating Cultures for Ethical STEM                        | NARA   | National Archives and Records Administration                       |
| CFO      | Chief Financial Officer                                      | NSB    | National Science Board   |
| DAS      | Division of Administrative Services                          | NSF    | National Science Foundation  |
| DATA Act | Digital Accountability & Transparency Act                    | O/D    | Office of the Director   |
| DIS      | Division of Information Systems                              | OIG    | Office of Inspector General  |
| DNP      | Do Not Pay (Initiative)                                      | OIRM   | Office of Information and Resource Management                      |
| DOL      | Department of Labor  | OMB    | Office of Management and Budget                                    |
| EHR      | Education and Human Resources                                | OPM    | Office of Personnel Management                                     |
| ERM      | Enterprise Risk Management                                   | PL     | Public Law   |
| FASAB    | Federal Accounting Standards Advisory Board                  | PP&E   | General Property, Plant, and Equipment                             |
| FBWT     | Fund Balance with Treasury                                   | R&D    | Research and Development   |
| FECA     | Federal Employees' Compensation Act                          | R&RA   | Research and Related Activities                                    |
| FFMIA    | Federal Financial Management Improvement Act of 1996         | RCR    | Responsible Conduct of Research                                    |
| FFRDC    | Federally Funded Research and Development Center             | RSSI   | Required Supplementary Stewardship Information                     |
| FISMA    | Federal Information Security Management Act of 2002          | SBR    | Statement of Budgetary Resources                                   |
| FMFIA    | Federal Managers' Financial Integrity Act of 1982            | SFFAS  | Statement of Federal Financial Accounting Standards                |
| FTE      | Full-Time Equivalent   | SOG    | Standard Operating Guidance  |
| FY       | Fiscal Year  | SSAE   | Statement on Standards for Attestation Engagements                 |
| GAAP     | Generally Accepted Accounting Principles                     | STEM   | Science, Technology, Engineering, and Mathematics                  |
| GAO      | Government Accountability Office                             | USAP   | United States Antarctic Program                                    |
| GEO      | Directorate for Geosciences                                  | USSGL  | U.S. Standard General Ledger                                       |
| 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                         |        |  |