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SCIENCE AND TECHNOLOGY

Strengthening and Sustaining the Federal Science and Technology Workforce

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GAO Highlights

Highlights of GAO-21-461T, a testimony before the Subcommittee on Investigations and Oversight, Committee on Science, Space, and Technology, House of Representatives

March 17, 2021

SCIENCE AND TECHNOLOGY

Strengthening and Sustaining the Federal Science and Technology Workforce

Why GAO Did This Study

The federal workforce is critical to agencies' ability to address the complex social, economic, and security challenges facing the United States. However, across government, mission critical skill gaps are undermining the ability of federal agencies to carry out their missions. Federal agencies face the difficult task of staying apace of advances in science and technology while competing for talent with the private sector, universities, and non-profit research centers. GAO has had long-standing concerns about federal agencies' strategic human capital management, an issue highlighted in GAO's High Risk Series since 2001.

This testimony summarizes GAO's insights based on a wide range of GAO work covering various human capital management- and science and technology-related issues from March 2015 through February 2021. In particular, the statement focuses on (1) workforce planning to help ensure agencies are better positioned to implement their missions; (2) opportunities and challenges to recruiting a diverse, high-qualified science and technology workforce; and (3) factors that can affect the work environment.

For this testimony, GAO selected prior work across human capital management- and science and technology-related topics.

What GAO Recommends

GAO has made numerous recommendations to address human capital management and other issues covered in this testimony. Federal agencies have implemented some of these recommendations, but have not fully implemented others.

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What GAO Found

Strengthening human capital management at federal agencies, particularly those with science and technology missions, can help agencies build a diverse, highly qualified, and agile workforce. GAO's past work demonstrates three key areas for strengthening and sustaining the federal science and technology workforce.

Strategic workforce planning to identify gaps and future needs. To successfully implement their missions, agencies need to identify current skill gaps and future needs in their workforce, and select the right human capital strategies to address them. However, GAO's prior work has identified science and technology workforce strategic planning challenges that agencies have not fully addressed. For example, in October 2019, GAO evaluated major agencies' implementation of cybersecurity workforce planning strategies for information technology (IT) workers. GAO found that most of the 24 federal agencies had not fully implemented five of the eight key workforce activities that GAO identified because of reasons such as competing priorities and limited resources. GAO recommended that the 18 agencies fully implement the eight key IT workforce planning activities. Thirteen agencies agreed with the recommendation, while the other five expressed a range of views; however, while some agencies have made progress, none have fully implemented the recommendation.

Improving federal pay and hiring. Agencies may experience challenges in recruiting and retaining a diverse, highly-qualified workforce due to differences in pay compared to private sector employers and challenges related to the hiring process. Generally, federal agencies have seven broadly available government-wide special payment authorities to help address recruitment and retention challenges. In December 2017, GAO reported that the Office of Personnel Management (OPM) collects data on use of these authorities but had not analyzed how much the authorities help improve recruitment and retention. GAO also reported that the agency may be missing opportunities to promote strategic use of these authorities by providing guidance and tools on assessing effectiveness. Similarly, in August 2016, GAO reported that OPM and hiring agencies had not used hiring data to analyze the effectiveness of hiring authorities. Across these reports, GAO made six recommendations to assess and improve the use of pay and hiring authorities. OPM generally agreed with GAO's recommendations, and has implemented two of the six recommendations, but has not fully implemented the other four.

Addressing factors that affect the federal work environment. Factors affecting the working environment may also influence agencies' ability to attract, hire, and retain personnel. For example, GAO reported in September 2020 that individuals who experience sexual harassment are more likely to leave their jobs. Also, in March 2015, GAO reported that impediments to interacting with non-federal scientific peers because, for example, of restrictions on conference participation can be a disincentive to federal employment. Agency officials told GAO that scientists and engineers establish their professional reputations by presenting research at conferences to have their work published and, without such opportunities, researchers may find federal employment less desirable. Addressing such factors could help agencies build and sustain a diverse, highly-skilled science and technology workforce.

Chairman Foster, Ranking Member Obernolte, and Members of the Subcommittee:

Thank you for the opportunity to contribute to today's discussion of the science and technology workforce. The federal workforce is critical to agencies' ability to address the complex social, economic, and security challenges facing the country. However, across government, critical skill gaps are undermining the ability of federal agencies to carry out their missions. In GAO's prior work, we have seen how agencies often struggle to attract and retain a workforce that meets their agency's needs and positions them for the future.

My remarks today focus on what we have found in our prior work on (1) workforce planning to help ensure agencies are better positioned to implement their missions; (2) opportunities and challenges to recruiting a diverse, highly qualified science and technology workforce; and (3) factors that can affect the work environment.

This testimony is based on our body of work on federal human capital management and selected science and technology reports issued primarily between March 2015 and February 2021. More detailed information on the objectives, scope, and methodology for that work can be found in the issued reports.

We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Since 2001, GAO has included strategic human capital management on its High Risk list.[1] Without such management, agencies may not have the

[1]The GAO High Risk list contains programs and operations that are 'high risk' due to their vulnerabilities to fraud, waste, abuse, and mismanagement, or that need transformation. The list is issued every 2 years at the start of each new session of Congress. https://www.gao.gov/high-risk-list

staff with the necessary knowledge, skills, and abilities to support their missions and goals. Agency efforts to identify skill gaps and future needs in the expertise of their scientific and technical staff through strategic workforce planning can help ensure they are better positioned to implement their missions. In light of trends and other challenges facing the government's human capital management efforts, our prior work has identified actionable strategies that agencies may be able to use to effectively manage the future federal workforce in key talent management areas (see table 1).

Table 1: Key Strategies and Practices for Managing the Current and Future Federal Workforce

Function	Strategy	Practice
Align human capital strategy with current and future mission requirements	Set workforce goals and assess skills and competencies needed to achieve them	Identify existing skills and competencies
		Assess gaps in existing and future skills and competencies
		Monitor progress toward closing skills gaps
Acquire and assign talent	Source and recruit talent	Cultivate a diverse talent pipeline
		Highlight agency mission
		Recruit continuously and start the hiring process early in the school year
		Strategically leverage available hiring flexibilities
		Write user-friendly vacancy announcements
	Assess and screen candidates	Use relevant assessment methods and share hiring lists
		Improve the security clearance process
	Assign employees where needed	Develop a culture of agility
Incentivize and compensate employees	Leverage benefits and incentives	Increase awareness of benefits and incentives, such as work-life programs
		Tailor benefits and incentives to employees' needs
		Address barriers to telework
	Leverage existing pay authorities	Use special payment authorities strategically
Engage employees	Manage employee performance and create a "line of sight" between individual performance and organizational results	Improve selection and training of supervisors and managers
		Link agency's mission and employees' work
		Implement meaningful rewards programs
		Share innovative approaches to performance
	Involve employees in decisions	Increase support for an inclusive work environment
	Develop employees	Prioritize training for employees and managers
		Encourage details, rotations, and other mobility opportunities

Source: GAO-19-181. | GAO-21-461T

Strengthening and Sustaining the Federal Science and Technology Workforce

Strengthening human capital management at federal agencies, particularly those with science and technology missions, can help agencies build a diverse, highly-qualified, and agile workforce. Our past work and recommendations demonstrate three key areas for building the science and technology workforce: strategic workforce planning to identify skill gaps and future needs; improving federal pay and hiring; and addressing factors that affect the federal work environment.

Strategic Workforce Planning to Identify Gaps and Future Needs

Federal agencies face the difficult task of staying apace of advances in science and technology while competing for talent with the private sector, universities, and non-profit research centers. In our prior work, we reported that high-performing organizations define what they want to accomplish and what kind of organization they want to be.[2] They then identify and analyze the personnel skills, competencies, number of positions, and other factors needed to achieve those objectives.[3] Identifying the skills needed to achieve their mission and to close any gaps in their current workforce helps agencies to select the right human capital strategies to address those needs. However, these steps are a challenge for agencies that lack the capacity for, or commitment to, strategic workforce planning.

Thoughtful workforce planning efforts can lead to concrete benefits to agencies' ability to achieve their missions. For example, in May 2015, we recommended that the U.S. Department of Agriculture (USDA) assess and address veterinarian workforce needs for emergency response to an animal disease outbreak.[4] USDA implemented this recommendation by, among other things, analyzing its response to the 2015 avian influenza

[2]GAO, *Human Capital: A Self-Assessment Checklist for Agency Leaders*, GAO/OCG-00-14G (Washington, D.C.: Sept. 1, 2000).

[3]GAO, *Human Capital: Strategies to Help Agencies Meet Their Missions in an Era of Highly Constrained Resources*, GAO-14-168 (Washington, D.C.: May 7, 2014).

[4]GAO, *Federal Veterinarians: Efforts Needed to Improve Workforce Planning*, GAO-15-495 (Washington, D.C.: May 26, 2015).

outbreak and completing an analysis of simulated outbreaks of foot-and-mouth disease and estimates of veterinarian surge demand for responding to the outbreaks. These efforts increase confidence that USDA will be well-positioned to respond to any future zoonotic disease outbreaks.

However, we have found a number of instances where agencies faced strategic workforce planning challenges related to science and technology that have not yet been fully addressed.

- In October 2019, our evaluation of major agencies' implementation of cybersecurity workforce planning strategies for information technology (IT) workers found that 23 of 24 Chief Financial Officer Act agencies had at least partially implemented three of eight key workforce planning activities, including identifying staffing needs and assessing gaps. However, most agencies minimally implemented or had not implemented five other workforce planning activities, including developing strategies to address those gaps.[5] Agencies provided various reasons for their limited progress in implementing workforce planning activities, including competing priorities and limited resources. We made a recommendation to 18 of the 24 federal agencies to fully implement the eight key IT workforce planning activities. Thirteen agencies agreed with the recommendation, while the other five expressed a range of views. Some agencies have made progress implementing the recommendation; however, as of March 2021, all of the recommendations remain open pending agency actions to fully implement them.
- In March 2019, we reported that most of the 24 Chief Financial Officer Act agencies had likely miscategorized the work roles of many IT and cybersecurity positions.[6] For example, at least 22 of the 24 agencies designated positions as not performing IT, cybersecurity, or cyber-related functions, when they did most likely perform these functions. By assigning work roles that are inconsistent with the IT, cybersecurity, and cyber-related positions, the agencies were diminishing the reliability of the information they need to improve workforce planning. We made 28 recommendations to 22 agencies to address these issues, and the majority of the agencies agreed with

[5]GAO, *Information Technology: Agencies Need to Fully Implement Key Workforce Planning Activities*, GAO-20-129 (Washington, D.C.: Oct. 30, 2019).

[6]GAO, *Cybersecurity Workforce: Agencies Need to Accurately Categorize Positions to Effectively Identify Critical Staffing Needs*, GAO-19-144 (Washington, D.C.: Mar. 12, 2019).

the recommendations. As of March 2021, 8 of our 28 recommendations from this review had not been implemented.

- At the National Science Foundation (NSF) we recently made two recommendations related to identifying and closing skills gaps.
  - In September 2018, we reported on NSF's use of rotators—outside scientists, engineers, and educators on temporary assignment—and recommended that NSF complete development of an agency-wide workforce strategy for balancing the agency's use of rotators with permanent staff.[7] Completing the strategy would help the agency determine what skills and competencies are critical to its mission and how to address any gaps. NSF agreed with this recommendation and in November 2018 indicated it had plans to do so, but as of March 2020 NSF had not completed the strategy.
  - In March 2019, we recommended that NSF evaluate the project management competencies of staff overseeing major research facilities projects, such as NSF's contributions to upgrades of the Large Hadron Collider.[8] NSF agreed with the recommendation and since that time has secured a contractor to help evaluate its competencies and training.
- In July 2018 we found that, to fulfill its mission to promote U.S. innovation and industrial competitiveness, the National Institute of Standards and Technology (NIST) relies on the expertise and research of its staff, and that it is challenging for the agency to stay abreast of the breadth of U.S. industry and research.[9] NIST's primary method for assessing industry and other stakeholders' needs for NIST's measurement services and standards development efforts is through outreach by individual technical staff and their expertise in relevant disciplines and related industries. We recommended that NIST comprehensively assess the measurement needs of its stakeholders, which would allow the agency to then identify and

[7]GAO, *National Science Foundation: A Workforce Strategy and Evaluation of Results Could Improve Use of Rotating Scientists, Engineers, and Educators,* GAO-18-533 (Washington, D.C.: Sept. 5, 2018).

[8]GAO, *National Science Foundation: Cost and Schedule Performance of Large Facilities Construction Projects and Opportunities to Improve Project* Management, GAO-19-227 (Washington, D.C.: Mar. 27, 2019).

[9]GAO, *National Institute of Standards and Technology: Additional Review and Coordination Could Help Meet Measurement Service Needs and Strengthen Standards* Activities, GAO-18-445 (Washington, D.C.: Jul. 26, 2018).

analyze the personnel skills, competencies, numbers, and other factors needed to achieve those objectives. NIST agreed with this recommendation and had taken some steps to implement it, but, as of May 2020, had not fully implemented the recommendation.

- In April 2017, we recommended that the Nuclear Regulatory Commission (NRC) set agency-wide goals for overall workforce size and skills composition that extend beyond the 2-year budget cycle to improve NRC's ability to strategically manage the size and composition of its workforce and respond to changes in the nuclear industry.[10] Since then, NRC completed a workforce planning pilot project and now forecasts its workload over a 5-year time frame. However, NRC does not establish specific goals for the size of the workforce beyond the 2-year budget cycle as part of the process. As of September 2020, NRC officials said they do not plan to do so due to concerns about their ability to do so with a sufficient level of accuracy.
- In February 2021, we reported that Department of Energy (DOE) laboratory researchers we spoke with who participated in entrepreneurship and commercialization training, such as its Energy I-Corps program, said that it greatly helped them communicate with potential customers, understand industry priorities, and consider how technologies could solve real-world issues.[11] Agencies can use career developmental opportunities, including training, to (1) help their workforce develop skills to meet evolving mission requirements, (2) ensure managers are well qualified, and (3) appeal to current and future workers' desires for career mobility. However, the department had not conducted an assessment of researchers' entrepreneurship skills and competencies. Understanding the research, business, and entrepreneurial skills of DOE researchers may allow the department to better meet industry needs and increase technology commercialization. We recommended that DOE assess researchers' skills to support technology transfer efforts and provide training to address any skills gaps—DOE agreed with this recommendation.

[10]GAO, *Strategic Human Capital Management: NRC Could Better Manage the Size and Composition of Its Workforce by Further Incorporating Leading* Practices, GAO-17-233 (Washington, D.C.: Apr. 27, 2017).

[11]GAO, *Department of Energy: Improved Performance Planning Could Strengthen Technology Transfer*, GAO-21-202 (Washington, D.C.: Feb. 1, 2021).

Improving Federal Pay and Hiring

We have found in our prior work that agencies may experience challenges recruiting and retaining a diverse, highly-qualified scientific and technical workforce due to differences in pay compared to private sector employers and challenges related to the hiring process.

Pay

Generally, federal agencies have seven broadly available government-wide special payment authorities to help address recruitment and retention challenges related to pay. In December 2017, we reported that fewer than 6 percent of the over 2 million employees at 27 agencies with Chief Human Capital Officers received compensation from at least one of the authorities in fiscal year 2016.[12] Some of these authorities target employees with science and technology skills. The two most frequently used—special rates and retention incentives—were used for over 74,000 employees and over 13,000 employees, respectively.[13] The least-used—critical position pay—was used for as few as seven employees a year.[14] The other authorities are recruitment incentives, relocation incentives, student loan repayments, and superior qualification and special needs pay setting.[15]

In our December 2017 report, we found that the Office of Personnel Management (OPM) collects data on use of these authorities but had not

[12]GAO, *Federal Pay: Opportunities Exist to Enhance Strategic Use of Special Payments*, GAO-18-91 (Washington, D.C.: Dec. 7, 2017).

[13]Special rates may apply to an occupation or group of occupations to address significant handicaps in recruiting and retaining employees. Retention incentives may be paid to a current employee, group, or category of employees if the agency determines that the unusually high or unique qualifications of the employee or a special need of the agency for the employee's services makes it essential to retain the employee and the employee is likely to leave federal service in the absence of such an incentive.

[14]Critical position pay permits an agency to set a higher rate of basic pay for a position that requires expertise of an extremely high level in a scientific, technical, professional, or administrative field and is critical to the successful accomplishment of an important mission.

[15]Superior qualification and special needs pay setting allows an agency to set the rate of basic pay of a newly-appointed employee at a rate above the minimum rate of the appropriate General Schedule (GS) grade because of the superior qualifications of the candidate, or a special need of the agency for the candidate's services.

analyzed how much the authorities help agencies improve recruitment and retention government-wide.[16] We also found that OPM may be missing opportunities to promote strategic use of these authorities by providing guidance and tools to assess effectiveness, and that OPM had not established documented procedures to assess and potentially streamline reviews of agency requests to use these authorities. We made three recommendations to address these issues, with which OPM agreed, or partially agreed. As of June 2020, OPM had taken some steps to implement these recommendations but had not fully implemented any of them.

Additionally, our prior work has addressed use of these authorities at some agencies and use of some additional pay authorities that are limited to individual agencies.

- In August 2018, we found that the National Institutes of Health's (NIH) loan repayment program—which includes scientists at NIH and extramural scientists at universities or other research institutions—may help attract, retain, and develop scientists from underrepresented groups.[17] Further, the 21st Century Cures Act included new authorities for NIH to expand its loan repayment program by increasing the eligible annual loan repayment amount from a maximum of $35,000 to $50,000 and giving the NIH Director discretion to amend eligibility based on emerging scientific priorities or workforce needs. At the time of our review in 2018, NIH had not yet implemented this expansion.
- In September 2016, we found that the Department of the Interior had begun to use special salary rates to give higher pay to certain key staff in its three bureaus that oversee oil and gas resources and some bureaus increased the number of staff receiving student loan repayments and other incentives.[18] We recommended that Interior regularly evaluate the effectiveness of its available incentives in hiring and retaining key oil and gas staff. To implement this recommendation, in November 2019, Interior officials provided a

[16]GAO-18-91.

[17]GAO, *NIH Research: Action Needed to Ensure Workforce Diversity Strategic Goals Are* Achieved, GAO-18-545 (Washington, D.C.: Aug. 10, 2018).

[18]GAO, *Oil and Gas Oversight: Interior Has Taken Steps to Address Staff Hiring, Retention, and Training but Needs a More Evaluative and Collaborative* Approach, GAO-16-742 Washington, D.C.: Sept. 29, 2016).

summary of their evaluation of workforce data from fiscal years 2016 through 2018. Interior's summary concluded that the three bureaus had experienced an aggregate gain in their key oil and gas staff and officials attributed this gain to use of special salary rates.

- In May 2020, we reported that the Department of Health and Human Services (HHS) issued regulations but had not yet begun to use new authorities for recruiting and retaining biomedical research scientists.[19] The authorities include changes to the Senior Biomedical Research Service, which allow for pay of up to the President's salary (currently $400,000 per year) for up to 2,000 research service members. HHS officials said that the HHS agencies that are expected to use the research service authorities for recruitment and retention are NIH, Food and Drug Administration, the Centers for Disease Control and Prevention, and the Agency for Healthcare Research and Quality. At the time of our review, HHS needed to distribute the 2,000 member cap among the agencies before it could select members.

Hiring Authorities

In our prior work we found that to acquire needed talent, agencies need a hiring process that is applicant-friendly, flexible, and meets policy requirements, such as hiring on the basis of merit, among other things.[20] Agencies have flexibility in what authorities they use to fill positions, some of which apply specifically to science and technology positions. A hiring authority is the law, executive order, or regulation that allows an agency to hire a person into the federal civil service. Amongst other roles, hiring authorities determine the rules that agencies must follow throughout the hiring process. These rules may include whether a vacancy must be announced, who is eligible to apply, how the applicant will be assessed, whether veterans' preference applies, and how long the employee may stay in federal service.

In August 2016, we reported on the 105 hiring authorities used to make nearly 200,000 appointments in fiscal year 2014.[21] Among the most used

[19]GAO, *Biomedical Research: HHS Has Not Yet Used New Authorities to Improve Recruitment and Retention of* Scientists, GAO-20-531R (Washington, D.C.: May 8, 2020).

[20]OPM is responsible for ensuring that the personnel management functions it delegates to agencies are conducted in accordance with merit principles, and the standards established by OPM for conducting those functions. 5 U.S.C. § 1104(b).

[21]GAO, *Federal Hiring: OPM Needs to Improve Management and Oversight of Hiring Authorities*, GAO-16-521 (Washington, D.C.: Aug. 2, 2016).

authorities were direct-hire authority, which allows agencies to fill positions OPM has determined have a severe candidate shortage or a critical hiring need—including science, technology, engineering, and mathematics personnel—and authority allowing Department of Defense (DOD) to hire science and technology personnel at defense research labs.

However, we found that while OPM—the agency responsible for overseeing the delegated hiring authority and managing federal civilian personnel data—tracks data on agency time-to-hire, manager and applicant survey results, and compliance audits to assess the hiring process, this information is not used by OPM or agencies to analyze the effectiveness of hiring authorities. We recommended, among other things, that OPM should use this information to determine whether opportunities exist to refine, consolidate, eliminate, or expand agency-specific authorities to other agencies and develop legislative proposals for changes or implement them where allowed.[22] While OPM agreed with this recommendation and the agency has made some progress, we believe it will be important for the agency to prioritize and follow through on its planned actions to streamline hiring authorities. Expanding access to hiring authorities found to be highly efficient and effective while eliminating those found to be less effective would help simplify and improve the federal hiring process.

We have also reported on the use of these authorities in some science and technology agencies:

- In May 2018, we reported on hiring efforts at the defense labs and found the labs had used the laboratory-specific direct hire authorities more than any other category of agency-specific or government-wide hiring authority for science, technology, engineering, and mathematics personnel.[23] Lab officials, however, identified challenges to hiring highly qualified candidates, such as delays in processing security clearances, despite the use of additional hiring authorities. We made three recommendations, including that DOD should develop performance measures to evaluate the effectiveness of the defense

[22]OPM implemented our other two recommendations regarding studying the use of hiring authorities and providing information, tools, and support to agencies.

[23]GAO, *DOD Personnel: Further Actions Needed to Strengthen Oversight and Coordination of Defense Laboratories Hiring Efforts*, GAO-18-417 (Washington, D.C.: May 30, 2018).

laboratories hiring authorities. DOD agreed with our recommendations, but they remain open as of March 2021.

- In May 2015, we reported that OPM granted government-wide direct-hire authority in 2009 to enable agencies to hire qualified veterinarians without regard to certain federal hiring requirements.[24] We recommended OPM evaluate whether the need for government-wide direct-hire authority for veterinarians continued to exist and OPM completed an evaluation in June 2017. According to OPM's summary, the evaluation suggested that the government-wide direct-hire authority should remain active.

USAJOBS

We have also reported on efforts to enhance USAJOBS, the central website for posting federal job openings. In October 2020, we reported that various factors, such as unclear application processes and long wait times for job offers, had been identified as contributing to the federal government's workforce deficiencies in certain areas and job categories.[25] We found that since the agency's redesign of USAJOBS in 2016, OPM has taken a number of actions in an effort to address feedback and improve the USAJOBS user experience. For example, in 2021 OPM officials expected to begin providing information on job status for each posting, such information would include the number of applicants and when the job has been filled.

Addressing Factors that Affect the Federal Work Environment

In our March 2019 federal workforce report, we found that, according to experts, employees are seeking greater developmental opportunities and would prefer longer-term employment where they can continue to build their skills.[26] While federal agencies offer unique opportunities to pursue meaningful work, achieve autonomy, and have a healthy work-life balance, experts also highlighted key challenges regarding perceptions surrounding federal work from the potential applicants. These challenges

[24]GAO-15-495.

[25]GAO, *USAJOBS Website: OPM Has Taken Actions to Assess and Enhance the User Experience*, GAO-21-31 (Washington, D.C.: Oct. 13, 2020).

[26]GAO, *Federal Workforce: Key Talent Management Strategies for Agencies to Better Meet Their Missions*, GAO-19-181 (Washington, D.C.: Mar. 28, 2019).

include perceptions that the federal work is too bureaucratic, lacks innovation and involves maintaining the status quo, is less prestigious than the private sector, and makes it difficult to see the immediate effect of their work. In addition, in our prior work on science and technology issues, we identified several factors that can negatively affect the working environment of federal scientific and technical staff. Taking steps to address these factors can help agencies sustain the expertise needed to achieve their missions. Such factors include:

- **Sexual harassment.** In a September 2020 report, we found that there is limited nationwide data to help comprehensively understand the prevalence and costs of workplace sexual harassment.[27] However, one study we reported on found that 63 percent of women working in science, engineering, and technology—historically male-dominated fields—said they experienced sexual harassment.[28] We also reported that individuals who experience sexual harassment are more likely to subsequently leave their jobs. We have also reported recently on steps federal agencies can take to address sexual harassment both in their own workforce and at academic institutions that receive federal research funding, as these institutions serve as a pipeline for future federal scientists. In April 2020, we identified several opportunities for the Smithsonian Institution to strengthen its policies and procedures to respond to allegations of sexual harassment by, for example, developing written guidance for supervisors on how to address complaints and establishing a tracking mechanism to monitor complaints filed.[29] More broadly, in March 2020, we found that agencies have taken action, but need complaint procedures, overall plans, and better coordination to address sexual harassment faced by university researchers in science, technology, engineering, and

[27]GAO, *Workplace Sexual Harassment: Experts Suggest Expanding Data Collection to Improve Understanding of Prevalence and Costs*, GAO-20-564 (Washington, D.C.: Sept. 30, 2020).

[28]Sylvia Ann Hewlett, et al., "The Athena Factor: Reversing the Brain Drain in Science, Engineering, and Technology," Harvard Business Review (Boston, Mass.: 2008).

[29]GAO, *Sexual Harassment Policies: Smithsonian Has Procedures for Prevention, but Could Improve Guidance and Monitoring*, GAO-20-414R (Washington, D.C.: Apr. 9, 2020).

mathematics.[30] We provided 17 recommendations to five different agencies to address these issues, many of which remain open pending agency action.

- **Diversity and underrepresented groups.** In August 2018, we evaluated NIH's efforts to support investigators from racial and ethnic groups considered by NIH to be underrepresented in biomedical research.[31] Although this work addressed extramural grantees, it speaks to the pipeline of scientific talent agencies draw from. Our analysis showed disparities for underrepresented racial and ethnic groups, and for female investigators, from 2013 through 2017. For example, in 2017, about 17 percent of investigators from underrepresented racial groups—African Americans, American Indians/Alaska Natives, and Native Hawaiian/Pacific Islanders combined—who applied for large grants received them. In contrast, about 24 percent of Hispanic or Latino applicants, an underrepresented ethnic group, received such grants. Asians and whites are not considered to be underrepresented in biomedical science research—and were successful in receiving large grants about 24 and 27 percent of the time, respectively.
- **Limitations on engagement with peers.** In a March 2015 report, we reviewed DOD and DOE implementation of Office of Management and Budget requirements to establish senior-level review of conference attendance.[32] Following agency implementation of conference approval policies, attendance at science and technology conferences declined according to DOD and DOE officials; although the officials cited other contributing factors such as mandated travel reductions and sequestration. DOD and DOE officials identified several risks to achieving their agencies' science and technology missions associated with changes in conference participation, including difficulty in recruiting and retaining qualified scientists and

[30]GAO, *Sexual Harassment in STEM Research: Agencies Have Taken Actions, but Need Complaint Procedures, Overall Plans, and Better Collaboration*, GAO-20-187 (Washington, D.C.: Mar. 19, 2020). This report includes further detail on preliminary observations we provided in testimony before the House Science, Space, and Technology Committee in June 2019. GAO, *Sexual Harassment in STEM Research: Preliminary Observations on Policies for University Grantees and Information Sharing among Selected Agencies*, GAO-19-583T (Washington D.C.: June 12, 2019).

[31]GAO-18-545.

[32]GAO, *Defense Science and Technology: Further DOD and DOE Actions Needed to Provide Timely Conference Decisions and Analyze Risks from Changes in Participation*, GAO-15-278 (Washington, D.C.: Mar. 4, 2015).

engineers. For example, Naval Research Laboratory officials said that conference attendance constraints were cited in exit interviews as a contributing factor in nine staff resignations. Also, DOD and DOE officials told us that scientists and engineers establish their professional reputations by presenting research at conferences in order to have their work published. Without such opportunities, officials said that researchers may not be attracted to employment or continued employment at a federal lab as a means of accomplishing their professional objectives.[33] To help manage such risks, we recommended that DOD and DOE, among other things, develop a plan to analyze and periodically reevaluate the risks from changes in participation at science and technology conferences on their ability to meet their scientific missions. Officials at the DOD and DOE cited improvements to their conference approval guidance and processes respectively as sufficient and told us such plans were unnecessary. We disagreed, but DOD and DOE have not taken additional action to implement our recommendation. .

- **Scientific integrity issues.** In an April 2019 report, we reviewed agencies' scientific integrity policies and actions agencies have taken to implement them.[34] According to guidance the Office of Science and Technology Policy issued in 2010 and reaffirmed in a 2021 Presidential memorandum, agencies' scientific integrity policies should, among other things, ensure a culture of scientific integrity and political appointees should not suppress or alter scientific or

[33]These concerns echoed an August 2013, Office of Science and Technology Policy memorandum which stated that reductions in the ability of federal scientists and engineers to attend science and technology conferences would, if continued, encourage the best scientists and engineers to leave federal service—ultimately degrading the overall quality of the workforce and its research, and diminishing the capabilities of the federal labs. National Science and Technology Council, *Implementation of Federal Travel and Conference Policies with Respect to Scientific and Technical Conferences*, Memorandum for National Science and Technology Council Committees and Subcommittees (Aug. 5, 2013). The Office of Science and Technology Policy provides administrative support to the National Science and Technology Council.

[34]GAO, *Scientific Integrity Policies: Additional Actions Could Strengthen Integrity of Federal Research*, GAO-19-265 (Washington, D.C.: Apr. 4, 2019). This report was summarized in testimony we provided before the House Science, Space, and Technology Committee's Subcommittees on Research and Technology and Investigations and Oversight in July 2019. GAO, *Federal Research: Agency Actions Could Strengthen Scientific Integrity Policies*, GAO-19-674T (Washington D.C.: July 17, 2019).

technological findings.[35] Robust agency implementation of sound scientific integrity policies can help to assure the public of the integrity of federally funded science that informs public policy decisions. It may also help to ensure that scientific integrity issues do not negatively affect the federal workforce. The potential for this was raised in the 2021 presidential memo, which directed the convening of an interagency task force on scientific integrity that will evaluate whether deviations from existing scientific integrity polices led to suppression or distortion of scientific findings or disproportionately harmed federal scientists and researchers from groups that are historically underrepresented, among other things. Our April 2019 report found that, while the selected agencies we reviewed had taken various actions to help achieve the objectives of their scientific integrity policies, additional actions could strengthen the integrity of federal research.[36] Specifically, we made 10 recommendations to six agencies to address issues related to educating staff, providing oversight, monitoring and evaluating policy implementation, and developing procedures to identify and address policy violations. Nine of these recommendations remain open pending agency action.

In conclusion, our prior work shows that federal agencies face significant challenges in their human capital management. Concerted efforts are needed to identify skill and competency gaps at agencies prior to choosing the right strategies for filling those gaps. Agencies also need to ensure that they build an inclusive and supportive workplace that attracts and retains talent.

Chairman Foster, Ranking Member Obernolte, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

[35]Office of Science and Technology Policy, *Scientific Integrity,* Memorandum for the Heads of Executive Departments and Agencies, (Dec. 17, 2010). In addition, in January 2021, President Biden issued a memorandum reaffirming and building upon the 2010 memo. Presidential Action Memorandum of Jan. 27, 2021, *Memorandum on Restoring Trust in Government Through Scientific Integrity and Evidence-Based Policymaking*, 86 Fed. Reg. 8845 (Feb. 10, 2021).

[36]GAO-19-265.

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