CANDICE WRIGHT

Hiring for the Future of the Science and Technology Enterprise

What the COVID-19 pandemic has revealed is what we have long known: scientific innovation cuts across every aspect of our lives. The vaccines developed, the supplies manufactured, and the doses administered all demonstrate that the future of scientific research hinges on innovation. Underlying this reality is a pressing question: How does the government recruit and retain the people needed to drive that innovation on a national scale?

In my work on the Science, Technology Assessment, and Analytics team at the US Government Accountability Office (GAO), I have examined this question and what it might mean for the future of the science and technology (S&T) workforce. Our agency, long known as the congressional watchdog, aims to inform lawmakers about the central issues facing the federal government and, more importantly, what can be done to address them. To accomplish this task, it's critical to strengthen the S&T workforce, which requires not only finding the skilled workers to solve our nation's challenges but also preparing the next generation of scientists to do the same.

Over the course of our research, GAO has found that although some federal agencies are making progress toward building a strong S&T workforce, on balance, many face significant challenges in strengthening and sustaining highly trained talent. Addressing this will take concerted effort and require that we identify gaps in the skills of our current workers while also taking steps such as building an inclusive workplace to recruit and retain new workers. Failing to do so will mean falling behind on a global stage, missing out on unrealized innovations, and creating fewer possibilities for the future.

As we see it, there are three key areas to consider in strengthening and sustaining the federal S&T workforce: identifying skill gaps and future needs, improving federal pay and hiring procedures, and addressing workplace culture. Improvements in all three areas are not only possible, but steps to realize them are already being implemented in some agencies. Adopting these strategies more broadly and in a coordinated fashion could help federal agencies provide S&T leadership.

Identifying skill gaps and future needs

The principal challenge federal agencies face in recruiting and retaining a strong S&T workforce is understanding their own needs and how to find people who can meet them. Many agencies require S&T talent who can help fulfill their missions by performing cutting edge research while transitioning that research to products and services that have real-world applications. Meeting this need requires hiring people with specialized skills and qualifications as well as a thoughtful, strategic approach to the hiring process. Before beginning recruitment, then, federal agencies need to understand what their mission is, where the skill set of their current workforce is lacking, and what strategies can be put in place to align the two. Doing this calls for an agency capable of and committed to strategic workforce planning.

Without such a comprehensive workforce plan, federal agencies are likely to put themselves in the precarious position of losing talent to private sector companies, universities, and nonprofit research centers that have prioritized workforce planning and are hiring accordingly. And the ripple effects of these losses could be far-reaching.

Consider, for example, the March 2019 report in which we recommended that the National Science Foundation (NSF) evaluate the project management skills of all staff overseeing major research facilities projects. In looking at NSF's contributions to upgrades of the Large Hadron Collider, we recommended that NSF not only examine which project

management skills are needed to oversee this project, but also whether NSF staff, or employees of the universities, companies, and nonprofits receiving NSF funding, have those skills. Aligning its mission and its workforce plan in this way could help NSF to understand what skills are needed to manage these large-scale projects, while allowing them to deliberately nurture those skills in their staff and among the awardees with whom they work.

Likewise, we found another opportunity for alignment when we spoke with Department of Energy (DOE) laboratory researchers who participated in entrepreneurship and commercialization training, including its Energy I-Corps program. This program pairs teams of researchers with industry mentors for a two-month training, during which researchers define technology value propositions, conduct customer discovery interviews, and draw up viable commercial pathways for their technologies.

The participants told us that the training greatly helped them communicate with potential private sector customers, understand industry priorities, and consider how technologies could solve real-world issues. Other agencies could adopt or expand similar career development programs to help their workers develop new skills to meet evolving mission requirements and appeal to current and future workers' desires for career mobility.

However, DOE has not fully assessed how many and which types of researchers on their staff could benefit from such training. Without such an assessment, DOE will not have the information needed to ensure its training resources target the researchers who would benefit most from them. We recommended that DOE assess researchers' skills to support technology transfer efforts and provide training to address any skills gaps.

Prioritizing workforce planning is a prescription for success in hiring and retention. And, as NSF and DOE prove, planning ensures that a federal agency's mission inspires workers—and that those workers are prepared to fulfill it.

Improving federal pay and hiring

Once agencies have aligned their mission and their needs, the question invariably arises of how to attract and recruit qualified talent. What quickly becomes apparent are stark differences in pay between federal and private sector employers, as well as underlying hiring challenges.

Some federal agencies have found an alternative to offering higher pay by investing in benefits and other incentives. For instance, we found that the National Institutes of Health's (NIH) loan repayment program for NIH-funded scientists may help attract, retain, and develop scientists from underrepresented populations.

Further, the 21st Century Cures Act includes new measures for NIH to expand its loan repayment program by increasing the eligible annual loan repayment amount from an annual maximum of $35,000 to $50,000. It also gives the NIH director discretion to amend eligibility based on emerging scientific priorities or workforce needs. Taken together, these loan repayment incentives could go a long way to attract and retain skilled scientists.

The hiring process, too, poses its own suite of challenges. Many agencies have outdated approaches to filling critical vacancies in a timely manner; these include lengthy processes to define job qualifications, advertise open positions, and rank applicants. For instance, the current federal hiring process is so cumbersome that managers often bypass it, relying on contractors to fill vacancies. Making things worse, by relying on contractors, agencies fall even further behind in building the in-house skills and institutional knowledge needed to effectively manage federal programs and address national challenges.

But there are measures in place to address this, including direct-hire authorities, which allow federal agencies to eliminate time-consuming procedures like competitive rating and ranking to expedite hiring when a critical need or severe shortage of candidates exists.

We reported on hiring efforts at Department of Defense (DOD) labs and found that they had used direct-hire authorities for S&T personnel more than any other category of agency-specific or government-wide hiring authority. Despite using direct-hire authorities, however, lab officials identified challenges to hiring highly qualified candidates, such as delays in processing security clearances. We made recommendations, including that DOD should develop performance measures to evaluate the effectiveness of the defense laboratories' hiring authorities. DOD agreed with our recommendations, but they have not implemented them as of March 2021.

Another vitally important issue is updating job classifications to meet today's needs. Hiring based on outdated job descriptions, as happens when updating these classifications is not prioritized, only puts the federal workforce that much further behind.

Additional changes to the hiring process could make it more welcoming to applicants. We have evaluated efforts to enhance USAJOBS, the central website for posting federal job openings. In October 2020, we reported that unclear application processes and long wait times for job offers were among the factors that contributed to the federal government's workforce deficiencies in certain areas and job categories. We found that since the Office of Personnel Management (OPM) redesigned USAJOBS in 2016, the agency has taken a number of actions in an effort to address feedback and improve the site's user experience. For example, in 2021 OPM officials planned to provide information on job status for each posting, including data on the number of applicants and whether the job has been filled.

Whether it takes the form of loan repayments, direct-hire

authorities, or an improved application interface, there are many promising measures that could make the government more competitive in the process of hiring and compensating S&T talent.

Addressing workplace culture

Finally, as an employer, the federal government should try to offer employees more professional development opportunities as well as longer-term employment where they can continue to build their skills for the future—as we recommended in March 2019.

Although agencies have made progress in offering opportunities for employees to pursue meaningful work, achieve autonomy, and have a healthy work-life balance, workers have expressed some negative perceptions about federal work. These perceptions include concerns that federal work is too bureaucratic, lacks an innovative mindset, is too invested in maintaining the status quo, is less prestigious than the work in the private sector, and seldom allows employees to see the immediate effects of their work.

The federal government also has room to grow in branding and promoting its S&T jobs. In this, federal agencies would benefit from showcasing the exciting opportunities available to scientists, especially when competing with fast-paced private sector companies pursuing the same talent.

One complication in the perception of federal jobs involves concerns about a harassment-free workplace. For instance, we identified several opportunities for the Smithsonian Institution to strengthen its policies and procedures for responding 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.

More broadly, we found that many agencies have taken action to address sexual harassment, but need to implement complaint procedures, overall plans, and better coordination to deal with concerns of university researchers in the fields of science, technology, engineering, and mathematics.

These concerns also extend to disparities in diversity and representation in US universities. We evaluated NIH's efforts to support researchers from racial and ethnic groups considered by NIH to be underrepresented in biomedical research. Our analysis showed disparities for underrepresented racial and ethnic groups and for female researchers from 2013 through 2017.

In 2017, for example, about 17% of biomedical researchers from certain underrepresented racial and ethnic groups—African Americans, American Indians or Alaska Natives, and Native Hawaiian or Pacific Islanders combined—who applied for large grants received them. In contrast, about 24% of Hispanic or Latino applicants 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% of the time, respectively. The federal government could be a leader in addressing these disparities, setting the stage for more diverse recruitment and retention in the research enterprise.

The sciences are collaborative by design and require an open workplace that supports these interactions. This is particularly true when it comes to workplace conferences and the federal government's perceived restrictions on participation. For instance, we reviewed DOD and DOE implementation of the Office of Management and Budget requirements to establish senior-level review for conference attendance.

Following agency implementation of conference approval policies, attendance at science and technology conferences declined. DOD and DOE officials cited other contributing factors, such as mandated travel reductions and sequestrations, but it's clear that limiting conference participation in this way could present new challenges in attracting and retaining talent, as well as impede the free flow of ideas that drives innovation.

Addressing these workplace concerns—perceptions of bureaucracy, sexual harassment reporting mechanisms, diversity and inclusion, and more—will be critical in the years to come.

Failing to change puts the mission at risk

To the extent that federal agencies prioritize workforce planning, pay and hiring, and addressing workplace concerns, they will have a better chance of attracting and retaining a skilled S&T workforce. Every day, scientists are deciding between jobs in the federal government and jobs in private sector companies, universities, and nonprofit research centers. Although greater federal investment in scientific research is promising and could support a growing workforce dedicated to science in the public interest, the federal government must nurture the talent to make this progress possible. Failing to provide workers with the benefits they need to thrive in the federal workplace is putting US research—and our nation's global standing—at risk.

However, multiple agencies are willing and able to make changes to better attract and retain S&T talent. It is now time to coordinate their efforts. At GAO, we are studying how federal agencies can strengthen and sustain this workforce to shape innovation today and for years to come. The path forward may be challenging and require new approaches, but significant progress is not impossible. In the sciences, we set a high task for ourselves: we revel in the unknown, we find new solutions, and we always aim for what's just beyond our reach.

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