

Government and the Evolving Research Profession

As the old saying goes, “A jack of all trades is a master of none, but oftentimes better than a master of one.” What, then, is the name for a jack of all trades who is also a master in *one*—or even several—fields? The answer: the modern researcher.

Research today requires crossover-artists: biologists who can code, chemists who understand diplomacy, electrical engineers who can monetize an idea for investment potential. In addition to building expertise in a scientific field, today’s researchers need skills in technology development, scaling a product to profitability, and information security. Public mistrust of science and research creates a necessity for researchers to be sophisticated communicators, well informed on public policy and national security risks. The expanding role of the individual scientist reflects the way research itself has transformed into a global, multidisciplinary endeavor. This is a difficult and complicated time to be a researcher.

For those who work in science and technology, this paradigm shift has become obvious—but it is now clear that the increasingly complex role of the researcher has important implications for the relationship between science and the public at large. First, researchers are key to performing the cutting-edge research and creating the innovations that advance science and technology, driving the economy, improving quality of life, and increasing health and well-being. And second, the federal government recognizes that research is critically important to the strength and progress of society and invests heavily in it. In recent work at the Government Accountability Office (GAO), where I lead the Science,

Technology Assessment, and Analytics team, we highlighted that the federal government has continuously expanded its funding of research and development since the 1950s, reaching a peak of about \$147 billion in fiscal year 2010.

Because American society is a collective stakeholder in research, there is widespread benefit from increased policy and public attention focused on ensuring that researchers are properly supported in their work. Succeeding in that effort requires working with all those involved in the research community—including public and private funders, policymakers, and the researchers themselves—to acknowledge that research has changed and will continue to change, and how those changes affect the way that researchers engage with society. It is now time to work together to transform the research organizations, management strategies, and policy approaches surrounding the relationship between researchers and the public.

Collaborating through crises

As the world battles the COVID-19 pandemic, the symbiosis between government and private enterprise has faced a historic test—in particular, how effectively government and industry can collaborate to address a major public health crisis. The development and distribution of vaccines and tests, the transition from research to treatments, and the production and distribution of masks and other medical equipment have all required public and private partnership. Both government and private-sector approaches serve critical purposes but

come from differing perspectives and motivations: the government is mandated to provide public services, while private industry pursues profit. In research, these differences call into question the motivations that drive the research profession and define the value of research to the public.

A generation ago, it was clear that researchers owed their allegiance to the lab that employed them; today a researcher might have multiple funders, each with different goals. A recent GAO report highlighted the need for scientists at the US Department of Energy to develop entrepreneurship skills and other means to better commercialize their work, acknowledging pressure to align research goals with private industry needs. Just what does it mean to be a researcher today, and what influences should motivate their work? As the profession evolves, these questions become more pressing, and for many researchers there is no immediate clear answer. In the absence of explicit clarification, the public—as both a beneficiary and funder of research—would be right to

conditions would need to be met to ensure public benefit. Some experts emphasized the importance of using public-private R&D partnerships to increase commercialization and close the gap between research and actual semiconductor production. This is another example of the need to resolve the tension between the government’s responsibilities to safeguard the public good and the private sector’s profit-driven motivations to innovate rapidly.

Second, experts suggested increased coordination with international partners to help the United States improve global supply chain resilience. Many of those we interviewed agreed that the United States alone cannot fix semiconductor supply issues and must work with trading partners, and even strategic competitors, to strengthen the supply chain. This coordination would include joint technology development and innovation, updating trade agreements, and ensuring open communication between governments. Accomplishing such necessary global collaboration brings another

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question in whose interests researchers are working.

The question of safeguarding public investment in science becomes even more complicated when considering the daunting global challenges that require collaboration between government and private industry, sometimes across international borders. This is another place where acknowledging complexity when approaching research is necessary. We examined one such challenge, the global semiconductor shortage, in a recently published report. Since the semiconductor shortage began in 2020, it has exposed raw materials scarcities and long-term supply chain risks, causing delays in the production of everything from medical devices and appliances to automobiles and missiles. The perspectives of leading experts we highlighted in this report reinforce both the importance of research and the need for collaboration.

First, numerous experts supported efforts to bolster domestic R&D to aid commercialization and help the United States maintain its position as a technological leader. Among these efforts, some experts recommended financial incentives to encourage private R&D on semiconductors, but they also acknowledged that

level of complexity to the tensions between federal and private research agendas. Whether it’s a pandemic or a critical manufacturing shortage, these differing crises demonstrate the critical role that research plays throughout industries and across borders.

Balancing free exchange of ideas with security risks

The burgeoning international research environment brings with it new and exciting opportunities for collaboration and partnership in innovation. But as the door for collaborative progress opens wider, it also opens for national security risks—and nefarious foreign influence has been discovered in labs and on campuses across the country. A recent GAO report highlighted concerns over foreign government talent recruitment programs, noting that these programs can influence researchers receiving federal funding to divert intellectual property and federally funded research to other countries.

Several reports by GAO as well as the work of other organizations have reinforced the importance of maintaining an open research environment that fosters

collaboration, transparency, and the free exchange of ideas, while balancing these obvious benefits against the risk of foreign influence and nefarious conduct. Although it is in many ways beneficial to innovation and progress, the globalized collaboration environment also calls for new core competencies: researchers are asked to be part science diplomats and part counterintelligence operatives. This also places a heavy burden on universities that are ill equipped to identify and mitigate the risks of foreign influence. For example, in a recent GAO report examining foreign influence on federal research, university administrators expressed the need for federal agencies to provide training on how to identify potential conflicts. They also requested clearer communication of threats to university officials so they can take steps to address the risks on their campuses.

A balanced approach is necessary to confront this challenge. An open research environment is beneficial to fostering innovation and maximizing public benefit, but a lack of effectively targeted policies and oversight leaves the nation open to unacceptable risk. With growing concern about threats of foreign influence, agencies must clearly define and address conflicts of interest, or researchers may not fully understand what they need to report on their grant proposals. Without explicit policies in place, a steady stream of headlines has caught the public's attention, demonstrated the prevalence of an active risk, and called into question what kind of influence remains undiscovered. There is significant work to be done here, and our report recommended strengthening existing policies to address conflicts of interest and for agencies to develop written procedures for addressing cases of failure to disclose required information. As the research profession continues to evolve, policymakers and leaders in science must work together to develop responsive, well-crafted, and forward-thinking policy to ensure that research remains free of the damaging bias of foreign influence.

Rigor and transparency, values and opportunity

When leaders in government and in science ask the public to trust science for public health reasons, or to justify the spending of billions of taxpayer dollars on research, they should remember that trust must be earned and re-earned. From our vantage point at GAO, at the crossroads of government oversight of science and technology, the key to reinforcing trust in the research profession as it navigates this transformative paradigm shift is to uphold standards, values, and strong research practices. This past July, GAO examined the actions and strategies needed to improve the reliability of federally funded research. This work was structured around two fundamental factors to reinforce trust in research: rigor and transparency.

According to those we interviewed for the report, federal agencies can do more to increase both the rigor

and the transparency of research they fund. Experts suggested that agencies could incentivize or mandate that researchers preregister their studies as a means to share their plans before starting research. Doing so would enable other researchers to comment on and strengthen the methodology. They also advised that agencies help improve standards for data repositories where research data are stored publicly, encourage the publication of null research results, and support training in statistical analysis and study design. We recommended that agencies collect information on the rigor and transparency of the research they fund in order to facilitate taking actions like these.

In a functioning research environment, a social contract exists between science and society: researchers have an obligation to their profession, their funders, and society to ensure that their work builds upon the existing body of knowledge, dutifully serves scientific progress, and improves the lives of all. Whether for profit or public service, researchers must act with integrity in their intent, accountability in their actions, and reliability in their methods. To fall short of these standards is to do harm to the research profession as a whole, especially at a time when scientists need to be breaking down barriers and reinforcing trust in their work.

The ongoing paradigm shift in research presents significant challenges, but also exciting opportunities. There is no doubt that the role of the researcher will continue to change. But with careful attention to policy and support, the relationship between science and the people whose lives it aims to improve can also evolve to meet the moment. As much as this may feel like a time of crisis, such junctures offer an opportunity to build bridges to the general public and demonstrate the critical value of research to society. Now is the time to redefine the research profession, reinforce the values and standards that guide science, and build strength to endure the uncertainty ahead.

In contemplating the future of the research profession, I see parallels to GAO's mission values of integrity, accountability, and reliability. This set of core values forms a strong reputational foundation for our work. Building a culture that adheres to our three mission values enables us to serve the public with the trust of Congress, providing professional, objective, fact-based, nonpartisan, and nonideological support. These independent values are as important to government audit work as they are to the research conducted in a lab.

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