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**on
“Securing the U.S. Research Enterprise from China’s Talent Recruitment Plans”**

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Introduction

Chairman Portman, Ranking Member Carper, and Members of the subcommittee, it is a privilege to be here with you today to discuss the steps that the National Science Foundation (NSF) is taking to advance the United States’ position as a global innovation leader, ensure our economic strength, and provide for national security. NSF takes all matters of national and economic security very seriously, and we work closely with our partners in academia, the federal law enforcement agencies, and the Administration to identify and address foreign threats to taxpayer-funded research. NSF is committed to implementing all reasonable and necessary steps to ensure the integrity of federally-funded research while protecting the ecosystem of innovation and discovery that has propelled the United States to global leadership in science and engineering.

Established by the National Science Foundation Act of 1950 (P.L. 81-507), NSF is an independent Federal agency whose mission is “to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes.” NSF is unique in carrying out its mission by supporting fundamental research across all fields of science, technology, engineering and mathematics (STEM) and all levels of STEM education. NSF is also committed to the development of a future-focused science and engineering workforce that draws on the talents of all Americans. NSF accounts for approximately 25 percent of the total federal budget for basic research conducted at U.S. colleges and universities and has been vital to many discoveries that impact our daily lives and drive the economy. NSF is and will continue to be a responsible steward of taxpayer dollars, operating with integrity, openness, and transparency.

NSF investments sustain, accelerate, and transform America's globally preeminent innovation ecosystem. This investment in basic research is responsible for many of the technological advancements we rely upon today—from the internet and touchscreen technology to advanced medical imaging and improved organ donor matching systems. A long-term vision dedicated to expanding human knowledge and a commitment to pursuing risky, yet potentially extraordinary discoveries are the hallmarks of NSF. NSF's investments empower researchers to ask the questions and develop the technologies that lead to extraordinary breakthroughs.

In a given year, NSF awards reach over 1,800 colleges, universities, and other public and private institutions in the 50 states, the District of Columbia, and U.S. territories. In FY 2020, NSF expects to support approximately 350,000 researchers, postdoctoral fellows, trainees, teachers, and students, with roughly 93 percent of the agency's annual budget used to fund research and education grants and research infrastructure in the science and education communities. NSF's merit-based, competitive proposal review process fosters the highest standards of excellence and accountability—standards that have been adopted around the world. These expert reviewers evaluate which proposals have the greatest potential to promote the progress of science and seek to identify two key factors in every proposal: intellectual merit and broader impacts. Evaluating proposals based on these factors ensures that the Foundation's activities are in the national interest.

The Global Science Enterprise

International collaboration is essential to advancing the frontiers of science. This was most recently illustrated by the Event Horizon Telescope (EHT) team's successful work to produce the first image of a black hole. The EHT team included more than 200 members representing 60 institutions, operating in over 20 countries and regions. They used a planet-scale array of eight ground-based radio telescopes, forged through international collaboration, to image the black hole at the center of a massive galaxy in the Virgo galaxy cluster, 55 million light-years from Earth. This momentous achievement was the product of a team building on decades of investment in telescopes, computing, and training the next generation of scientists.

The need for such global cooperation in fundamental research is essential as the scientific community strives to answer complex questions dealing with everything from the evolution of cells to the origins of the universe. Cooperation underpins Nobel prize-winning work such as the discovery of gravitational waves and can currently be seen in the ambitious Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAIC) project, a partnership between 19 countries, where scientists from around the world will be iced-in on a vessel above the Arctic Circle to study Arctic changes. These impressive scientific inquiries are illustrative of what can be accomplished when scientists around the globe work together to solve problems that are otherwise too complex for any given nation to pursue unilaterally.

NSF has developed criteria to determine when international engagement is appropriate. Consistent with our mission, any collaboration must expand knowledge in science, engineering, and education. First, we expect every partner to contribute; the research should leverage the resources of all. Second, the benefit of cooperation must be clearly demonstrable, and results should be shared equitably. Lastly, we expect reciprocity. Such reciprocity includes not only the timely sharing of data and samples, but also recognition of contributions in all appropriate forms. Maintaining the right balance between collaboration at an international scale and protection of the taxpayer's interest in federally-funded science is critical to the United States' long-term success.

In addition to global cooperation, the United States benefits significantly from the influx of international talent to our country. Dating back to the Manhattan Project era, the United States has attracted the best and brightest scientists from around the world by allowing great thinkers to pursue, and benefit from, their ideas. Since its creation in 1950, NSF has supported 242 Nobel Prize winners at some point in their career. Most recently, this includes two of the three winners of the 2019 Nobel Prize for Economics who immigrated to the United States as students and stayed here to build their careers. According to research from the National Foundation for American Policy, more than one-third of the U.S. Nobel Prizes winners in Chemistry, Medicine and Physics since 1901 have been immigrants.¹

The need to continue to attract and cultivate this talent has been reinforced by countless studies of the research enterprise, including most recently by the National Security Commission on Artificial Intelligence, whose *Interim Report to Congress* states that “One of America’s advantages is the fact that its universities, companies, and innovation culture are magnets for the world’s best AI talent. We need to encourage that talent to come, contribute, and stay.”² Indeed, historically, a majority of foreign students receiving post-graduate training in the U.S. prefer to stay here once they receive their degrees. Overall, about 80% of all science and engineering doctoral students coming from abroad report a definite postgraduate commitment to remain in the U.S. for employment or further training. The long-term stay rates, defined as remaining 10 years or more in the U.S., stood at 70% in computer and mathematical sciences in 2015. However, recent reports suggest this stay rate may be decreasing.

Discoveries do not happen without discoverers. At NSF, we are focused on cultivating the talent pool domestically through our robust support for science and engineering education, as well as ensuring that we are fostering an environment that welcomes those international researchers and students who share our values.

Addressing Risks to NSF-Funded Research

Values that drive the NSF and its global research partners are openness, transparency, and reciprocal collaboration for mutual benefit. These values are essential for advancing the frontiers of knowledge and are consistent with the democratic principles of the United States. The science and engineering enterprise, however, is put at risk when other governments endeavor to benefit from it without upholding these values. Indeed, some governments sponsor activities that pose risks to this system, such as foreign-government-sponsored talent recruitment programs that incentivize behavior that is inconsistent with the values cited above.

NSF, together with its colleagues across the government, is working to address these risks, which include conflicts of interest and commitment; breaches in confidentiality of the merit review process; and leakage of pre-publication data before researchers are ready to release that information. The agency is taking steps both internally and externally to ensure that NSF staff and researchers are aware of these threats and is putting in place policies and procedures to protect NSF-funded research. On July 11, NSF issued a Dear Colleague Letter to its entire research

¹ NFAP Policy Brief, “Immigrants and Nobel Prizes: 1901 – 2019” <https://nfap.com/wp-content/uploads/2019/10/Immigrants-and-Nobel-Prizes.NFAP-Policy-Brief.October-2019.pdf> (October 2019)

² National Security Commission on Artificial Intelligence, *Interim Report to Congress*, <https://www.nscai.gov/about/reports-to-congress> (November 2019).

community reiterating these values and the requirements for NSF staff and NSF-funded institutions detailed below.

NSF requires that everyone who works at NSF, where they have access to sensitive merit review and other information be U.S. citizens or in the process of applying for citizenship. This includes those on assignment to NSF from outside the federal government. NSF has also issued a policy making it clear that NSF personnel cannot participate in foreign government talent recruitment programs. Such participation poses significant risks of inappropriate foreign influence on NSF policies, programs, and priorities, including the integrity of NSF's merit review process—risks we simply do not accept. We have reminded all NSF staff that government ethics regulations require accurate and timely financial disclosure reports and that Federal ethics rules cover gifts and other remuneration from foreign governments. To assist our staff, we have just created and released a training module that will convey the importance of their own disclosures and that of those seeking funding from us.

We are also working to ensure that the institutions funded by NSF are aware of, and complying with, these requirements. Each NSF grantee has full responsibility for the conduct of the project or activity supported under an NSF grant and for the results achieved. An organization must have a plan in place to provide appropriate training and oversight in the responsible and ethical conduct of research to those who will be supported by NSF to conduct research. NSF has the authority to address concerns that awardees are not meeting their obligations, or the terms and conditions of their awards, including the ability to suspend or terminate an award.

NSF has reaffirmed its long-standing policy, in place since 1978, requiring full disclosure of current and pending support for researchers submitting proposals so that NSF and external reviewers can adequately assess potential research duplication and a researcher's capacity to conduct the proposed work. As sources of research support diversify, NSF has continued to remind the community of the requirement to disclose all current and pending support—domestic, international, government, corporate, nonprofit, crowd-sourced, etc. As noted above, we are providing training to our staff to help them identify researcher capacity and duplication of research projects, and we have solicited advice and comments from the research community to ensure that fully complying with these necessary disclosures is as efficient as possible. In May, we published in the Federal Register a proposed clarification of our proposal disclosure requirements, which includes clarifications regarding reporting requirements for both current and pending support and professional appointments. We have received comments from the public, including the research community, and are currently working to address those comments.

In addition, earlier this year, NSF commissioned the JASON advisory group - outside experts with top security clearances - to conduct a study and recommend ways for NSF to better protect its merit review system and for grantee institutions to maintain balance between openness and security of scientific research. The JASON report is nearly complete, and we expect it to be made public in the next few weeks. We plan to share its findings and recommendations widely, and NSF will act expeditiously to address its recommendations.

NSF works very closely with its Office of the Inspector General (OIG), an independent oversight office that reports directly to the National Science Board and Congress. The OIG is responsible for conducting audits, reviews, and investigations of NSF programs, and of organizations and individuals that apply for or receive NSF funding. This responsibility includes auditing awardees to ensure that they maintain an appropriate conflict of interest policy for employees consistent with

NSF requirements. The OIG also conducts financial audits and investigations to determine whether awardees are misusing taxpayer funds, failing to report financial support, duplicating research and violations of rules, regulations, or policy including allegations of research misconduct (falsification, fabrication, and plagiarism). NSF has taken, and will continue to take, swift action such as terminating grants and debarring researchers when the OIG reports incidents to NSF and such action is appropriate.

Finally, NSF coordinates its activities with many Departments and Agencies, including the Department of Justice and members of the Intelligence Community. NSF enjoys a deep and enduring relationship with the Department of State, regularly consulting with it on agreements with foreign partners and, on this topic of science and security, coordinating with State on engaging the international scientific community. We also work closely with the National Institutes of Health and the Department of Energy to support groundbreaking science that is of incredible value to the American taxpayer. In addition, we are also working closely with the White House Office of Science and Technology Policy (OSTP), which has formed the Joint Committee on the Research Environment (JCORE) through the National Science and Technology Council. Through JCORE, we are examining the most pressing challenges facing the research and scientific community in the United States, including research security. On September 30th, in a joint letter to the research community, the Director of OSTP, the NSF Director, the Director of the National Institutes of Health, the Undersecretary for Science at the Department of Energy, and the Undersecretary for Research and Engineering at the Department of Defense affirmed to the wider research community their commitment to the American research enterprise and to striking the appropriate balance between our open, collaborative environment while taking the necessary steps to mitigate threats to its integrity.

Conclusion

NSF is dedicated to maintaining a vibrant and diverse research community that thrives on the values of openness, transparency, and merit-based competition. NSF-funded research is a major contributor to U.S. economic growth, national security, and global leadership. To maintain our robust research ecosystem, it is important that we understand and vigilantly address emerging risks to the nation's science and engineering enterprise. Simultaneously, it is important that we acknowledge that a great strength of the U.S. research and engineering enterprise is the diversity of talent—both domestic and international—and we must commit to maintaining that strength. Therefore, NSF will continue to take steps to protect the integrity of the federal investment in basic research from those who do not share our values, while also fostering an environment of collaboration, innovation, and discovery that has allowed for unrivaled economic growth and global leadership in research and development. With communication and coordination across the federal government, including with our law enforcement and intelligence agencies, and collaboration with our colleagues in academia, we are confident we can maintain this careful balance of security and openness that allows our science and engineering ecosystem to thrive.

Thank you for the opportunity to testify before you today. I will be pleased to answer any questions you may have.