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Written Testimony

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Chairwoman Stevens, Chairman Foster, Congressman Waltz, Congressman Obernolte and Members of the Subcommittees,

Thank you for inviting me to testify. I should say at the outset that the views I will be expressing today are my own, and that in particular, I am not expressing the views of the National Academies of Sciences, Engineering, and Medicine as an institution or my co-chairs or participants in the National Science, Technology and Security Roundtable, unless otherwise noted.

I appreciate the opportunity to speak about research security. The topic is important because how we handle our scientific and technological rivalry with China will help determine how prosperous and secure the U.S. is in the future. It's complex because we need to guard against China's improper activities without harming the U.S. scientific enterprise or cutting off collaboration that benefits us.

Striking that balance requires the federal government and universities to be as clear as possible about what we're trying to prevent, and what requirements are being imposed. Beyond outright theft and espionage, there are at least three kinds of activities we should be trying to stop.

First, China should not be allowed to pay U.S. faculty – especially not surreptitiously – to transfer work that is funded by federal grants, or to recruit researchers for China, or to spend time in China that conflicts with commitments to U.S. institutions. Second, research collaborations with China should be structured so that they are truly reciprocal – so that each party has clear, legitimate benefits from the work. Third, universities should not enter into collaborations that would harm U.S. national or economic security, or threaten human rights.

FEDERAL ACTIONS

To ensure that we focus on genuine concerns, federal agencies need to clarify reporting requirements, which too often remain conflicting and inconsistent. Fortunately, the Administration is preparing guidance for implementing National Security Presidential Memorandum (NSPM)-33. I have contributed to that process, and I am confident that the guidance will be helpful.

NSPM-33 as initially released left many questions unanswered. For example, it required major research universities to have a "research security program" in place, but the document was vague about what such a program should entail and about what additional security program requirements the government might impose.

Agency processes should also enable researchers to correct honest mistakes on disclosure forms. Informal paths agencies once had in place to correct information have fallen into disuse as formal enforcement and even prosecution have increased. A process for correcting unintentional mistakes would enable the federal government to better target resources to genuinely problematic cases of non-disclosure, would increase the level of trust between

researchers and the government, and would reduce the chance that researchers will be deterred from legitimate collaborations because of fears of enforcement.

The government also needs to be clearer about what it considers a "foreign talent program." This is not an easy task – such programs go by many names, can have many attributes, and tend to change over time. But it is essential that the definition of "malign foreign talent program" not be so broad that it effectively prevents legitimate scientific work with China. My institution MIT appreciates the effort the Committee has made to craft a workable definition, but we believe that the current definition in the "National Defense Authorization Act" needs further refining to be appropriately targeted.

In developing a definition, the Committee could be guided productively by the language it included in the "Committee Views" in the report accompanying the "NSF for the Future Act," which outlined well both the hallmarks of malign talent programs and of legitimate joint activities that ought to continue.

More broadly, the federal government should not impose restrictions that would damage U.S. research capacity more than China's. To date, there has not been compelling evidence presented to support changing National Security Decision Directive (NSDD) – 189, enshrined in policy since the Reagan Administration, that states that research should generally be published openly. The 2019 JASON report "Fundamental Research Security," lays out the case well for maintaining NSDD – 189 as bedrock U.S. policy due to the enormous benefit the U.S. has experienced with its culture of open research. Any change without extraordinary justification runs the risk of creating a bigger problem than such a change would be intended to solve.

Congress also should not move ahead with broad, poorly-targeted measures that would reduce the ability of U.S. universities to fund research, such as the proposal to subject many foreign gifts to review by the Committee on Foreign Investment in the U.S. (CFIUS), an activity CFIUS is not set up to do. Congress should also refrain from granting undefined authority to impose new restrictions on university research, such as the provisions related to the Office of Management and Budget in the "Safeguarding American Innovation Act."

The government should also refrain from promulgating policies that broadly discourage Chinese graduate students from coming to the U.S. These students strengthen our research capacity, and the vast majority remain after completing their studies. According to the latest statistics from the National Science Foundation, 83 percent of Chinese students who received U.S. science and engineering doctorates between 2011 and 2013 were still in the U.S. five years later.

There are many kinds of federal actions that can unduly discourage Chinese graduate students from coming to the United States. The most obvious, beyond simply denying visas, is making the visa process so arduous and unpredictable that students hesitate even to apply to study in the U.S. Presidential Proclamation 10043 continues to raise concerns in this regard. It is unclear what kinds of student connections to which Chinese institutions are deemed by the U.S. government as reasons for visa denial. The State Department should clarify how the Presidential Proclamation is being implemented if it remains in effect.

We are also concerned that increasingly federal agencies are attempting to impose limits on the kinds of research projects in which Chinese students can participate. The government should, of course, strictly vet which students are admitted to the United States. However, once a Chinese student is admitted, he or she should be able to participate in any unclassified research

project, just like any other student, except in very limited circumstances such as when participation would violate export controls. U.S. universities should not be routinely required to treat students differently based on nationality alone.

In general, limiting or discouraging Chinese students is the last step the U.S. should consider in countering China. There is little, if any, evidence that Chinese students present a significant security threat, and abundant evidence that they contribute to U.S. research accomplishments and to U.S. economic growth. The federal government should be developing more policies to encourage and enable Chinese Ph.D students to remain in the U.S. rather than motivating them, purposely or not, to study in other countries that are all too eager to recruit them.

The federal government also should avoid policies that would broadly block research collaborations with Chinese universities and companies. China is arguably ahead of the U.S. today in some aspects of fields such as artificial intelligence, telecommunications, and quantum information sciences, and it has some world-class scientific instrumentation and facilities. Research collaborations in such areas can advance U.S. progress. Research collaboration also gives the U.S. better insight into what is happening in Chinese laboratories. As noted above, universities should take steps to assure that all collaborations have reciprocal benefit. Finally, in some areas of study, such as aspects of food safety, public health, environmental pollution and climate change, societal progress is more likely if researchers from the world's two largest economies work together.

UNIVERSITY ACTIONS

That said, universities need to redouble our efforts to ensure that research collaborations are appropriate and would not undermine U.S. national or economic security, or human rights.

As a starting point, universities need to ensure that their faculty are aware of all disclosure and export control requirements, and are on guard against conflicts of interest and commitment. As the JASON study suggested, abiding by disclosure requirements could be considered in a comparable manner as research integrity.

Moreover, universities should put in place clear and rigorous processes to review collaborations with China. At MIT, we formally instituted a process in early 2019 under which all collaborations with China, Russia and Saudi Arabia are reviewed by what's known as the Senior Risk Group (SRG). The members of the SRG are the associate provost for international affairs, the general counsel and me, in my role as vice president for research. The SRG meets with faculty proposing collaborations, and seeks guidance from relevant university offices. We approve some projects, put in place conditions or require modifications on others, and reject some. The process seems to be well received by the faculty, who frankly crave guidance in the current climate.

The SRG tries to be consistent and clear in its review criteria and to think in terms of precedent. But an important lesson has been that each proposal has its own characteristics and raises its own conundrums; there are few decisions that are cut and dried. It's a process of learning and judgment.

University and federal officials need to engage in a continuing dialogue to learn from each other as we sort through the evolving situation. The nation will benefit if universities and the government can develop a relationship that enables an open exchange of views on which

collaborations are beneficial and which present unacceptable risks. There needs to be room to work through honest differences of opinion.

We will never strike the right balance on security if universities reflexively assume that the government just wants to cut off all engagement with China, and if the government reflexively believes that universities are all simply naïve, or worse. Trust leads to better decisions. For example, MIT was one of the first institutions to cut off research relationships with Huawei because we were given credible information from trusted sources that raised concerns.

Distrust of the government can lead universities to continue potentially problematic relationships because they consider federal concerns unpersuasive, but such distrust can also lead universities to refrain from valuable partnerships on the belief, justified or not, that the federal government will come after any and all foreign collaborations. And distrust of universities can cause the federal government to misallocate resources, hindering the ability to identify the most worrisome threats.

NATIONAL ACADEMIES OF SCIENCES, ENGINEERING, AND MEDICINE

The imperative to build trust through dialogue is why Congress established the National Science, Technology and Security Roundtable at the National Academies of Sciences, Engineering, and Medicine (NASEM). The Roundtable brings together individuals from the research agencies, national intelligence, law enforcement, academic research and business communities.

NASEM is an ideal venue for these sorts of discussions. NASEM is a trusted, neutral party with deep understanding of the underlying policy and scientific issues, and with a long

history of working with a variety of federal agencies, academia, and business to gain understanding and build consensus.

The legislation establishing the Roundtable directs it to: 1) explore critical issues related to protecting U.S. national and economic security while ensuring the open exchange of ideas and international talent required for scientific progress and American leadership in science and technology; 2) identify and consider security threats and risks associated with federally funded research and development; 3) identify effective approaches to communicating threats and risks; 4) share best practices for addressing and mitigating the threats and risks; and 5) examine potential near- and long-terms responses by stakeholders in the research enterprise to mitigate and address the risks associated with foreign threats.

I co-chair the Roundtable with Richard A. Meserve, president emeritus of the Carnegie Institution for Science, and John C. Gannon, former chairman of the National Intelligence Council. The Roundtable currently has 15 members, and is being expanded to engage more perspectives. So far, the Roundtable has had three meetings with a fourth scheduled for this month.

One of the Roundtable's priorities now is to gain a better understanding of the scope and nature of the security problem in academia. The Roundtable is working with law enforcement agencies to get the information needed to evaluate what percentage of faculty may be engaging in improper activities, and how big a threat they represent. This may well require a classified briefing.

I hope the Roundtable discussions will help academia get a fuller understanding of the basis of law enforcement's concerns, and will help law enforcement better understand how academia operates.

A clearer understanding of the threat could also better target university and federal resources – as well as industry's. While academia is often the focus of attention, security breaches in industry may represent a bigger threat.

Roundtable discussions may also help define ways that security can be enhanced without raising the specter of racial targeting or over-zealous prosecution.

The briefings the Roundtable has had so far have deepened our understanding of the concerns of the research agencies. These have tended to center on non-disclosure, conflict of commitment and intellectual property transfer, as opposed to espionage per se.

STRENGTHENING THE U.S.

One final point. As important as the focus of today's hearing is, U.S. competitiveness depends less on defensive measures than on what we do to strengthen our own capabilities. As MIT President Rafael Reif has noted, the real crisis in U.S. science and technology will be when we have nothing worth stealing.

As you know, there is now broad, bipartisan interest in Congress in strengthening the nation's capacity for innovation. This will require increasing research spending, developing new funding mechanisms to address research gaps, and speeding the path from laboratory to market. Congress should move expeditiously to negotiate the differences between the House and Senate on the "NSF for the Future Act" and "U.S. Competitiveness and Innovation Act;" to approve funding increases at least as large as those included in this Committee's portion of the Reconciliation bill; and to approve the spending increases in the annual appropriations for fiscal 2022. The U.S. needs new institutions like ARPA-H and the new directorate at NSF to spur fresh approaches to fundamental research focused on pressing problems.

The heart of U.S. strategy must be to look ahead and invest in our future; we are likely to trip ourselves up if we devote too much of our attention instead to looking over our shoulder at our competitors. Thank you.

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Maria Zuber is Vice President for Research and the E. A. Griswold Professor of Geophysics at MIT, where she is responsible for research administration and policy.

She oversees MIT Lincoln Laboratory and more than a dozen interdisciplinary research laboratories and centers, including the Koch Institute for Integrative Cancer Research, the MIT Energy and Environmental Solutions Initiatives, the Plasma Science and Fusion Center, the Research Laboratory of Electronics, the Materials Research Laboratory, MIT.nano, and Haystack Observatory. She also oversees MIT's Climate Action Plan for the Decade. Vice President Zuber is responsible for intellectual property and research integrity and compliance, as well as research relationships with the federal government. She serves as the senior officer responsible for the Institute's postdoctoral scholars and research staff.

Zuber's research bridges planetary geophysics and the technology of space-based laser and radio systems. Since 1990, she has held leadership roles associated with a dozen scientific experiments or instrumentation on ten NASA missions, most notably serving as Principal Investigator of the Gravity Recovery and Interior Laboratory (GRAIL) mission. She currently serves as Chair of the Standing Review Board of NASA's Mars Sample Return mission.

Zuber holds a B.A. from the University of Pennsylvania and an Sc.M. and Ph.D. from Brown. She has won numerous awards including the MIT James R. Killian, Jr. Faculty Achievement Award, the highest honor the MIT faculty bestows to one of its own. She is a member of the National Academy of Sciences and the American Philosophical Society, and is a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the Geological Society of America, and the American Geophysical Union. In 2012 she was awarded AGU's Harry H. Hess Medal, and in 2019 she was awarded the Gerard P. Kuiper Prize of the Division for Planetary Sciences of the American Astronomical Society.

Vice President Zuber is the first woman to lead a science department at MIT and the first to lead a NASA planetary mission. In 2004, appointed by President George W. Bush, she served on the Presidential Commission on the Implementation of United States Space Exploration Policy. In 2002 *Discover* magazine named her one of the 50 most important women in science and, in 2008 she was named to the *USNews*/Harvard Kennedy School List of America's Best Leaders. In 2021, then President-elect Biden named her as co-chair of the President's Council of Advisors on Science and Technology (PCAST). In 2013, President Obama appointed her to the National Science Board, and in 2018 she was reappointed by President Trump. She served as Board Chair from 2016-2018.