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BEFORE THE INVESTIGATIONS AND OVERSIGHT SUBCOMMITTEE

UNITED STATES HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

Assessing the Threat to U.S. Funded Research

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Chairman McCormick, Ranking Member Sykes, and distinguished members of the subcommittee. Thank you for the opportunity to testify today on this issue which is vital to the national security and economic interests of our great country.

INTRODUCTION

My name is John Sargent, I recently retired from the Congressional Research Service (CRS), where I spent 15 years working for, and on behalf of, this august body as a Specialist in Science and Technology Policy. In this capacity, my work focused on federal, national, and international R&D and research security, as well as policy analysis related to Department of Defense (DOD) Research Development Test & Evaluation (RDT&E), the National Institute of Standards and Technology (NIST), and the White House Office of Science and Technology Policy. I was also the lead CRS analyst on nanotechnology, manufacturing technology, and the science and engineering (S&E) workforce.

I previously worked in the executive branch for the Commerce Department's Technology Administration, including the Under Secretary for Technology and the Office of Technology Policy, doing analytical work on issues affecting U.S. scientific and technological innovation, leadership, and competitiveness, including research and development (R&D) and S&E workforce. I also served as Director of the Secretariat for the Clinton Administration's Partnership for a New Generation of Vehicles, a multi-agency initiative with the U.S. auto industry, universities, and national laboratories. I earned my Bachelor of Science degree in systems engineering from the University of Virginia's School of Engineering and Applied Sciences.

A few opening thoughts. First, my testimony today is mine and mine alone. I do not speak for my former agencies or colleagues. My remarks, however, are based on my knowledge of science and technology policy and experience as gained through my work at those agencies.

Second, let me be clear: I am an unabashed supporter of the United States of America. You could say that I am America First, last, and always. It's in my family's blood. My father, John Francis Sargent, was a colonel in the U.S. Army Artillery and Air Defense Artillery. During World War II (WWII), he received an Army commission and was part of the forces that occupied Japan after its surrender, he then served in the Virginia Army National Guard

and went on to serve in Germany during the Korean War, and later in the Army Reserve. He also worked as a civilian engineer alongside my maternal grandfather (Rudolph J. Lambert, a draftsman) in the Newport News Shipbuilding and Drydock Company building U.S. warships. Years later, he became a civilian DOD marine engineer designing landing craft and hovercraft for U.S. Army logistics operations. My father-in-law, Robert L. Meares, served with a joint U.S. Army Air Corps-Royal Air Force unit in North Africa doing photo reconnaissance during WWII and survived being shot down. My paternal grandfather, John Samuel Sargent, was an enlisted cavalryman who served in Teddy Roosevelt's Rough Riders, as well as in Europe during WWI, rising to the rank of major. I, too, served in the U.S. Army during the Cold War. I was branched Army Corps of Engineers and later served as a command public affairs officer. My family takes our national security very seriously.

TECHNOLOGICAL LEADERSHIP IS CENTRAL TO NATIONAL ECONOMIC AND MILITARY STRENGTH

Following WWII, the United States emerged as a global leader in science and technology, building on the sophisticated infrastructure put in place to win that war—including our newly minted national laboratories that, among other things, developed and built the first nuclear weapons—and made a substantial investment in research and development and educating a new generation of scientists and engineers, following in large measure a vision set out by presidential science advisor Vannevar Bush at the request of President Roosevelt. For decades, the U.S. technological enterprise stood virtually alone at the top, followed by several European nations, before being joined by Japan in its rise to industrial prominence in the 1970s.

For perspective, in 1960, the United States accounted for approximately 69% of global R&D, most of which was funded by the federal government. Over time, other nations recognized the vital importance of science and technology and boosted their R&D spending. In 2022, the United States accounted for 30.3% of global R&D, China for 26.6%, and Japan for 6.6%.[1] China's growth in R&D expenditures has been the fastest, growing by 2,367% between 2000 and 2022, By comparison, U.S. R&D grew by 244%.

Technological progress is the key to economic growth. As the 1994 Economic Report of the President states correctly that "Time after time, epoch after epoch, and country after country, technological advance has produced higher wages and living standards…This is exactly what we expect to happen again in the 21st century." And my oh my, the 21st century has arrived—on steroids.

A panoply of emerging and enabling technologies—for example, artificial intelligence (AI), quantum computing, nanotechnology, biotechnology, robotics and autonomous systems—driven by massive global investments in R&D (over $3 trillion in 2022) hold the

[1] Author's analysis of Organisation for Economic Co-operation and Development (OECD), Gross Domestic Expenditure on R&D (GERD) data, Main Science and Technology Indicators (MSTI database), https://data-explorer.oecd.org.

potential for revolutionary advances in commercial and military technology, as well as the standard of living, job creation, public health, and quality of life. Leadership in these and other fields is likely to play a decisive role in countries' global economic leadership and military strength in the 21st century.

Not surprisingly, with so much on the line, the world is witness to extraordinary growth in R&D investments, and U.S. adversaries are looking to acquire scientific and technological knowledge by any available means.

LAYING A FOUNDATION FOR UNDERSTANDING U.S. R&D FUNDING AND PERFORMANCE

The United States funds more research and development annually than any other country in the world, an estimated $940.0 billion in 2023. This includes $709.2 billion in private expenditures (75.5% of the total), $172.3 billion in federal government expenditures (18.3%), $29.0 billion in higher education expenditures (3.1%), with the balance provided by non-federal governments and non-profit organizations. These investments—much of which are in dual-use, leading-edge fields (having commercial and military applications)—are the targets for China.

With its funding, the U.S. government supports a broad range of scientific and engineering R&D. Its purposes include addressing national defense, health, safety, the environment, and energy security; advancing knowledge generally; developing the U.S. scientific and engineering workforce; strengthening the capacity of U.S. institutions and firms to conduct cutting-edge scientific research and to develop innovative technologies; and enhancing the global competitiveness of U.S. institutions and firms. Most of the R&D funded by the federal government is performed in support of the unique missions of individual funding agencies.

R&D is characterized in terms of basic research, applied research, and development (federal R&D is divided further into experimental development and non-experimental development). Basic and applied research are sometimes collectively referred to as research. In contrast to most development work, such research is generally non-proprietary and often published openly, though it can lead to important proprietary research and patents.

> **Basic Research.** Basic research is defined as experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts.
>
> **Applied Research.** Applied research is defined as original investigation undertaken in order to acquire new knowledge. Applied research is, however, directed primarily towards a specific practical aim or objective.
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> **Experimental Development.** Experimental development is defined as creative and systematic work, drawing on knowledge gained from research and practical

> experience, which is directed at producing new products or processes, or improving existing products or processes. Like research, experimental development will result in gaining additional knowledge.[2]

Development means "the translation of research findings or other knowledge into a plan or design for a new product or process or for a significant improvement to an existing product or process whether intended for sale or use."[3] Non-experimental development is all development work except that which fits the definition of experiment development (above). The Department of Defense (DOD) and the National Aeronautics and Space Administration (NASA) are the primary funders of non-experimental development.

U.S. R&D can be analyzed by who provides the funding (funders) and who performs the work with the funds (performers).

Funders. U.S. investments in R&D are made primarily by private industry and the federal government, and to a lesser degree by U.S. universities, non-profit organizations, and non-federal governments. In 2022, the private sector spent $672.9 billion (76.0%), the federal government spent $159.8 billion (18.0%), and universities spent ($25.5 billion).

Performers. Federal research funding ($97.4 billion in 2022) is performed primarily by universities (45.1%) and federal laboratories (21.8%), and federally-funded R&D centers (FFRDCs, 16.0%). Research performed by universities is generally unclassified and is frequently published in research journals and, therefore, publicly accessible.

Frequently, academic research is conducted solely at a university that receives a grant. The researchers who conduct this work can include professors; other university employees; and undergraduate, graduate, and post-graduate students. Many of these students are U.S. citizens, but a substantial number are from foreign countries, by some estimates as many as 70-80% in certain disciplines (e.g., computer science, petroleum engineering).[4] China is the largest source of foreign science and engineering students.

The Center for Security and Emerging Technology (CSET) estimates that approximately 16% of all science, technology, engineering, and mathematics (STEM) graduate students in the United States are Chinese nationals. According to the CSET report, the number varies by discipline: 33% in mathematics and statistics, 19% in engineering, 14% in physical sciences, 14% in computer science, 10% in agricultural sciences, and 7% in biological

[2] Executive Office of the President, Office of Management and Budget, Circular No. A-11, "Preparation, Submission, and Execution of the Budget."
[3] "Definitions of Research and Development: An Annotated Compilation of Official Sources," National Science Foundation, March 2018, https://wayback.archive-it.org/5902/20240829040334/https://www.nsf.gov/statistics/randdef/rd-definitions.pdf.
[4] See, for example, "More International Students Enroll in U.S. Grad STEM Programs: The Numbers and Their Impact," Educational Testing Services, website, https://www.ets.org/grad-school-journey/international-students-stem-programs.html#:~:text=In%20industries%20such%20as%20computer,rates%20as%20high%20as%2081%25.

sciences.[5] A 2018 Defense Innovation Unit Experimental (DUIx) report estimated that the percentage of Chinese nationals in graduate STEM programs is as high as 25%.[6]

Frequently, U.S. academic researchers conduct their research with academics at other universities. Sometimes they establish centers that focus on a specific scientific or engineering field, some of these in conjunction with external partners including other universities, private companies, nonprofit organizations. Research can also be conducted with university and other partners outside the United States, including China. Several U.S. universities have established R&D centers with Chinese universities to conduct joint efforts.

THE PEOPLE'S REPUBLIC OF CHINA IS NOT OUR FRIEND

With respect to the topic of today's hearing: **THE PEOPLE'S REPUBLIC OF CHINA (CHINA) IS NOT OUR FRIEND**, no matter how much we would like them to be. They could be (and one day, I hope they will be), but they have chosen, and continue to choose, not to be. Among the things to keep in mind with respect to how to view the U.S. relationship with China:

- China's *People's Liberation Army* plans for war against U.S. forces and capabilities.
- There is no separation between commercial and defense companies in China. If a U.S. company engages in what it sees as a purely commercial activity with a Chinese entity, any insights and knowledge gained by the Chinese entity will be shared throughout the Chinese commercial and military complex. This policy is China's Military-Civilian Fusion (MCF) strategy. Under MCF, China is systematically reorganizing its science and technology enterprise to ensure new technology and innovations, whether developed indigenously or from external sources, simultaneously advance its economic and military development.
- China is building military capabilities explicitly needed to defeat U.S. forces in battle.
- China engages in trade in illicit goods and use of forced labor, creating low-priced goods that undercut American products in the global marketplace.
- China conducts cyber-attacks on U.S. government, private sector, and critical infrastructure.[7]

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[5] *Estimating the Number of Chinese STEM Students in the United States,* Center for Security and Emerging Technology, Georgetown University, https://cset.georgetown.edu/publication/estimating-the-number-of-chinese-stem-students-in-the-united-states/

[6] Michael Brown and Pavneet Singh, *China's Technology Transfer Strategy: How Chinese Investments in Emerging Technology Enable a Strategic Competitor to Access the Crown Jewels of U.S. Innovation*, DIUx, January 2018, https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_(1).pdf. DIUx is now DIU having dropped the "x" as the organization was no longer considered experimental.

[7] "China remains the most active and persistent cyber threat to U.S. Government, private-sector, and critical infrastructure networks. If Beijing believed that a major conflict with the United States were imminent, it would consider aggressive cyber operations against U.S. critical infrastructure and military assets. Such a strike would be designed to deter U.S. military action by impeding U.S. decisionmaking, inducing societal panic, and interfering

- China has been complicit in the overdose deaths of hundreds of thousands of Americans and the destruction of the lives of many more. The government of China has subsidized and otherwise incentivized PRC chemical companies to export fentanyl and related precursor chemicals used to produce synthetic opiodssold illicitly in the United States.[8] China (along with Mexico and India) is the primary source country for fentanyl and fentanyl-related substances trafficked directly into the United States.[9] Opiate-related fatal overdoses in the United States from 2020-2024 are estimate at over 350,000, far in excess of total U.S. war deaths since WWII (including in Vietnam and Korea).
- China steals intellectual property from U.S. companies, universities, federal agencies, and federal laboratories. China conducts widespread espionage and talent recruitment against U.S. targets, including academic institution, corporations, and even federal laboratories and their staffs. According to a 2022 report by Strider Technologies, a provider of strategic intelligence, between 1987 and 2021, at least 162 scientists who worked at Los Alamos National Laboratory, one of America's leading nuclear weapons laboratories, returned to China to support their R&D enterprise. These scientists and engineers have since conducted research for China on sensitive technologies such as hypersonics, deep earth penetrating vehicles, unmanned aerial vehicles, jet engines and submarine noise reduction. One even held a Q clearance, allowing access to Top Secret restricted data and national security information.[10]

China also does not share American values on human rights, engaging in

> widespread coercive population control methods [including forced abortion, forced sterilization, and involuntary implantation of birth control], forced labor, arbitrary detention in internment camps [including detention of more than one million Uyghurs, ethnic Kazakhs, ethnic Kyrgyz, and members of other Muslim minority groups], torture, physical and sexual abuse, mass surveillance, family separation, and repression of cultural and religious expression.[11]

So why do we choose to not only allow, but to facilitate, and in some cases even fund scientific and technological development in China through U.S. academic institutions, U.S. corporations, and even federal laboratories and federal scientists?

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with the deployment of U.S. forces." Office of the Director of National Intelligence, 2024 Annual Threat Assessment, https://www.cisa.gov/topics/cyber-threats-and-advisories/nation-state-cyber-actors/china.

[8] "Imposing Duties to Address the Synthetic Opioid Supply Chain in the People's Republic of China," Executive Order, The White House, February 1, 2025.

[9] U.S. Drug Enforcement Agency, *Fentanyl Flow into the United States*, DEA-DCT-DIR-008-20, January 2020, https://www.dea.gov/sites/default/files/2020-03/DEA_GOV_DIR-008-20%20Fentanyl%20Flow%20in%20the%20United%20States_0.pdf.

[10] The Los Alamos Club, Strider Technologies, Inc., 2022, https://content.striderintel.com/wp-content/uploads/2022/09/Strider-Los-Alamos-Report.pdf.

[11] U.S. Department of State, "The Chinese Communist Party's Human Rights Abuses in Xinjiang," website, https://2017-2021.state.gov/ccpabuses/.

Congress and the President need to make this clear to the American people and to the world. And our policies—including, and maybe especially, our science and technology policies—need to reflect this view. The U.S. government often uses diplomatic and obfuscatory terms like "countries of concern" and "strategic competitor" to describe our relationship with China, but these terms do not convey the seriousness with which we need to take China and our China-focused policies. Perhaps something more akin to Cold War II adversary would be more appropriate. I know that I am not alone in this view. I suspect that some members of this subcommittee share this perspective. As U.S. Director of National Intelligence, now-CIA Director, John Ratcliffe warned in 2021, "[China] poses the greatest threat to America today, and the greatest threat to democracy and freedom world-wide since World War II."[12] Let me put an exclamation point on this—this period would include the U.S. Cold War with Soviets. Take that in: a threat greater than the Soviets posed during the Cold War! The Senate's bipartisan confirmation of Director Ratcliffe suggests that his views are in the mainstream.

Accordingly, I believe we are approaching S&T cooperation with China from the ayong direction. **We should start with the rebuttable presumption that S&T cooperation with China is not in the U.S. national interest. Instead of the default position of looking only for reasons why a proposed R&D project might be harmful to U.S. interest, we should assume that it will be. Instead we should start by asking (1) whether any proposed research with China is absolutely essential and indispensable to U.S. national security, the U.S. economy, or U.S. public health; (2) whether China is the only partner in the world with whom we can do such proposed research with effectively; and (3) whether the proposed research advances U.S. national security, economic, or public health interests more than it does China's.**

This approach is certainly true for federally-funded research but may also be appropriate to apply to private sector research funding and activities as well.

CHINA'S GOALS

Let's be clear—China is an ascendant economic and military power that seeks global leadership in emerging, enabling, and critical technologies. They see the United States as both their economic and military competition, while also a major trading partner and source of technology and innovation. More than ever, the future of national economic and military power will be built on technological leadership. Speaking broadly: We have it, they don't.

China seeks to build an indigenous technological and innovative capacity equal to or exceeding that of the United States and it is investing heavily to build that capacity. China's R&D investments have soared since the turn of the millennium (rising from $32.9 billion

[12] John Ratcliffe, *China Is National Security Threat No.1*, Wall St. J. (Dec. 3, 2020).

(PPP) to $811.9 billion in 2022, an increase of 2,367%).[13] And they have many exceptional scientists and engineers, many of them trained in the United States, and who have experience from working in leading U.S. corporations and startups. But until China can achieve self-sufficiency, they will seek to acquire it from the United States and other advanced countries.

In fact, China has built a complex set of laws, directives, and policies to achieve this self-sufficiency. Collectively, these constitute not just a WHOLE OF GOVERNMENT approach, but rather they are pursuing a WHOLE OF COUNTRY approach to acquiring it.

This approach involves their national and provincial government agencies and institutions, their corporations, their academic institutions, their charitable and cultural foundations, their non-governmental organizations (NGOs), and their people, both in China and their expats living in the United States and elsewhere. China seeks to achieve technological leadership by any means necessary. This is a massive and centrally enforced effort. And China considers it a patriotic duty of their citizens to acquire advanced technology and send it home.

China is very explicit in articulating its national goals, frequently publishing its national plans, including Five-Year Plans, like the Soviet Union did before them. For example:

- The 13th Five Year Plan of the PRC
    - Achieve a leading position in semiconductors, chip materials, robotics, aviation equipment, quantum computing, and satellites
    - Increase R&D spending to 2.5% of GDP
    - Create a $4.4 billion investment fund for startups and new technology
- The 14th Five-Year Plan of the PRC
    - Focus on indigenous innovation, reduce reliance on foreign inputs
    - Upgrade human capital, including improving the use of English to "facilitate the absorption of benefits deriving from technology transfer and innovation."
    - 10-year action plan for basic research
    - Increase R&D by at least 7% a year
    - Focus areas include aerospace, biotech, neuroscience, AI, quantum computing, and semiconductors
- Made in China 2025
    - Align state and private efforts to make China the pre-eminent manufacturing power by 2049
    - Improve integration of information technology

[13] Author's analysis of Organisation for Economic Co-operation and Development (OECD), Gross Domestic Expenditure on R&D (GERD) data, Main Science and Technology Indicators (MSTI database), https://data-explorer.oecd.org. China's growth is the fastest of any country tracked and published by the OECD. During this period, China's R&D has grown from 12.3% the size of the U.S. investment in R&D to 87.9%. In 1991, the first year of OECD published data for China's GERD, China accounted for less than 6% of the level of U.S. R&D.

    - Priority sectors identified as advanced IT, automated machines tools and robotics, aerospace and aeronautical engineering, maritime equipment and high tech shipping, and biopharma and advanced medical products
- China's Mega Projects
    - Manhattan Project-style efforts to meet dual-use needs; projects include fusion, manned spaceflight, chemical production, offshore oil, two-way connection between 5G devices and satellites, and intelligent computing.
- China's State Council established a roadmap to make China the world leader in AI by 2030.

HOW DID WE GET HERE? A BRIEF HISTORY OF U.S.-CHINA SCIENCE AND TECHNOLOGY COOPERATIVE

Let's take a stroll down memory lane to understand how we got here.

In 1972, during the Cold War and in the midst of the Vietnam War, when China was essentially the largest third world country, President Richard Nixon made an unprecedented trip to China to open diplomatic and cultural relations. At that time, China had no industrial or technological base, or military strength to speak of. The relationship was sought as a hedge against the Soviet Union (Russia). According to historian Ken Hughes, the effort sought to "play China against the Soviet Union, the Soviet Union against China, and both against North Vietnam."[14] With trade liberalization providing access to inexpensive goods and labor, it also put downward pressure on U.S. inflation.

In the 1980s, under President Ronald Reagan, the issue arose of how to prevent foreign government interference and exploitation of U.S. S&T, especially with respect to the Soviet Union. In 1985, President Reagan issued National Security Decision Directive (NSDD)-189. This directive states:

> *It is the policy of this Administration that, to the maximum extent possible, the products of fundamental research remain unrestricted. It is also the policy of this Administration that, where the national security requires control, the mechanism for control of information generated during federally-funded fundamental research in science, technology and engineering at colleges, universities and laboratories is classification. Each federal government agency is responsible for: a) determining whether classification is appropriate prior to the award of a research grant, contract, or cooperative agreement and, if so, controlling the research results through standard classification procedures; b) periodically reviewing all research grants, contracts, or cooperative agreements for potential classification. No restrictions may be placed upon the conduct or reporting of federally-funded*

[14] Ken Hughes, "Nixon on China," University of Virginia Miller Center, https://millercenter.org/the-presidency/educational-resources/nixon-china.

> *fundamental research that has not received national security classification, except as provided in applicable U.S. Statutes.*[15]

Economic, cultural, and scientific cooperation presented no significant threat to the United States. Eventually, China's large, cheap labor pool and potential consumer market proved a magnet to U.S. and other western countries. U.S. companies flocked there in the hopes of serving and benefitting from the Chinese market.

Trade accelerated with the accession of China into the World Trade Organization in 2001, after President Bill Clinton gained congressional approval for the *United States–China Relations Act of 2000*. It was expected (hoped!) that China would play by the established international norms of trade, but China chooses instead to play by its own rules.

> *China has a long record of violating, disregarding and evading existing WTO rules. China has also sought to frustrate WTO oversight and accountability mechanisms, such as through its poor record of adhering to its WTO transparency obligations. In addition, and more critically, after more than two decades of WTO membership, China still embraces a state-led, non-market approach to the economy and trade, despite other WTO Members' expectations–and China's own representations – that China would transform its economy and pursue the open, market- oriented approach endorsed by the WTO.*[16]

With few exceptions, American companies found themselves in a Charlie Brown-and-Lucy situation with the Chinese pulling the football out at the last moment, time and time again, foiling our corporations' desires to sell into their market. China seeks to extract trade, technology, and other concessions in exchange for access to their labor, markets, and minerals. China's goal was, and remains today, to establish national champions (Chinese-owned/controlled companies) in key industries that can compete with the best in the world. China seeks to do this through technology substitution, relying temporarily (which in their framework can mean decades) on U.S. and other western countries' technology for leading manufacturing and services, while building a national capability that can eventually replace it (i.e., substituting China's indigenous technology—both home-grown and stolen—for U.S. and other western countries' technology). For examples, China currently relies on U.S. and other countries' semiconductor manufacturing capabilities. It seeks to replace this capability with its own companies and technology to produce high-end chips crucial for its technological advancements, especially in areas like artificial intelligence and military applications. This has become more essential due to the tightening of U.S. export controls limiting China's access to advanced semiconductor.

Shortly after the United States and China established diplomatic relations in 1979, President Jimmy Carter and China's Chairman Deng Xiaoping signed the U.S.-China

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[15] NSDD-189 states that " 'Fundamental research' means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons."

[16] *2023 Report to Congress on China's WTO Compliance,* U.S. Trade Representative, 2023.

Science and Technology Cooperation Agreement (STA), the first major agreement between the two governments. The STA was a part of the U.S. strategy at the time to counter the influence of the Soviet Union by building ties with China. During the 1980s and 1990s, U.S. strategy vis-a-vis China shifted toward enhancing S&T ties as part of a broader U.S. effort to integrate China into the global system and influence its development trajectory and behavior.

President Barack Obama expanded S&T ties with China to address global challenges in areas such as health, energy, and climate change. Many U.S. universities have engaged in extensive research and development activities across a wide range of scientific and engineering fields, including critical emerging technologies such as AI, nanotechnology, biotechnology hypersonic weapons, fourth generation nuclear weapons technology, and semiconductor technology.[17]

Under President Donald Trump, the United States' posture toward China increasingly emphasized protecting and advancing U.S. interests in the context of China as a strategic competitor. STA proponents and critics both say that the STA does not reflect this U.S. policy shift or U.S. concerns about PRC S&T practices and industrial policies. Some say the most recent STA did not address China's growing technological capabilities and restrictive and potentially risky operating environment for cross-border research.[18]

The Biden Administration renewed this agreement last year with minor changes. There is still no database of activities under this authority that would allow for congressional oversight, public and legal scrutiny, and accountability.

LEGAL AND ILLEGAL WAYS CHINA USES TO ACQUIRE U.S. TECHNOLOGY

China engages in both legal and illegal efforts to acquire U.S. and other foreign technology. Much of the public anger and outrage is focused on China's **illegal** acquisition of U.S. and western intellectual property, and rightfully so. For example, in 2019 the FBI reported that the United States loses between $225 billion and $600 billion annually due to Chinese IP theft (including counterfeit goods, pirated software, and theft of trade secrets), or about 1%-5% of U.S. GDP.[19] A survey of chief financial officers found that one in five corporations report China having stolen IP within the previous year.[20] China also requires U.S. companies to transfer technology to Chinese corporate or governmental entities (i.e., forced technology transfer). This can occur, for example, when China requires U.S. companies operating in China to form joint ventures with local companies, or when China

[17] "*CCP on the Quad: How American Taxpayers and Universities Fund the CCP's Advanced Military and Technological Research*," Majority Staff Report, The Select Committee on the CCP, U.S. House of Representatives, September 2024.
[18] "*In Focus: U.S.-China Science and Technology Cooperation Agreement*," Congressional Research Service, Emily Blevins, updated December 5, 2024.
[19] *China: The Risk to Corporate America,* Federal Bureau of Investigation, 2019.
[20] Eric Rosenbaum, *1 in 5 Corporations Say China Has Stolen Their IP Within the Last Year: CNBC CFO Survey*, CNBC, 2019.

requires U.S. companies to share technology with local firms to get approvals from state regulators.

Nevertheless, of equal or great concern is the myriad of **legal** ways in which China acquires U.S. technology. These include:[21]

- Sending Chinese students to study STEM in the United States and other western countries (The Center for Security and Emerging Technology estimates that approximately 16% of all STEM graduate students in the United States are Chinese nationals. According to the CSET report, the number varies by discipline: 33% in mathematics and statistics, 19% in engineering, 14% in physical sciences, 14% in computer science, 10% in agricultural sciences, and 7% in biological sciences).[22] A 2018 Defense Innovation Unit Experimental (DUIx) report estimated that the percentage of Chinese nationals in graduate STEM programs is as high as 25%.[23]
- Sponsorship of, and acquisition of intellectual property rights in, U.S. academic R&D.
- Access to information (i.e., information that's available to the public without special permission, including published research results, scientific publications, news media, public data, and information from social media).
- Foreign direct investment by Chinese firms in U.S. firms ($28.0 billion in 2023, down from a high of $38.8 billion in 2019.[24]), including acquisition of U.S. companies, giving them access to companies' IP.
- Investment by Chinese companies in U.S. venture-backed deals.
- Private equity investments.
- Investments through special purpose vehicles (designed to obscure the source of capital).
- U.S.-based associations sponsored by the Chinese government to recruit talent.
- Acquisition of technical and business expertise from U.S. firms.

[21] These mechanisms have been discussed by a number of analysts, but the author would like to recognize the DIUx for identifying many of them in its report, *China's Technology Transfer Strategy: How Chinese Investments in Emerging Technology Enable a Strategic Competitor to Access the Crown Jewels of U.S. Innovation*.
[22] *Estimating the Number of Chinese STEM Students in the United States,* Center for Security and Emerging Technology, Georgetown University, https://cset.georgetown.edu/publication/estimating-the-number-of-chinese-stem-students-in-the-united-states/
[23] Michael Brown and Pavneet Singh, *China's Technology Transfer Strategy: How Chinese Investments in Emerging Technology Enable a Strategic Competitor to Access the Crown Jewels of U.S. Innovation*, DIUx, January 2018, https://admin.govexec.com/media/diux_chinatechnologytransferstudy_jan_2018_(1).pdf. DIUx is now DIU having dropped the "x" as the organization was no longer considered experimental.
[24] Statista.com, https://www.statista.com/statistics/188935/foreign-direct-investment-from-china-in-the-united-states/.

And of course, China invests in its own indigenous R&D activities. Investments in its domestic R&D totaled a reported $811.9 billion in 2022, as measured in U.S. dollars using PPP, up 15.8% over its 2021 investment level.[25]

U.S. UNIVERSITIES AND CHINA

U.S. research universities are a prime target for China due to the billions of dollars they perform annually on leading-edge R&D, including billions performed on behalf of U.S. defense agencies. China uses a complex and broad set of tools to acquire U.S. academic research and knowledge through illicit, gray area, and illegal mechanisms.

Many of these approaches came to light with the Trump Administration's "China Initiative," a Department of Justice (DOJ) effort to counter nation-state threats to the United States. According to DOJ, the initiative sought to:

- Identify priority trade secret theft cases, ensure that investigations are adequately resourced, and work to bring them to fruition in a timely manner and according to the facts and applicable law;
- Develop an enforcement strategy concerning non-traditional collectors (e.g., researchers in labs, universities and the defense industrial base) that are being coopted into transferring technology contrary to U.S. interests;
- Educate colleges and universities about potential threats to academic freedom and open discourse from influence efforts on campus;
- Apply the Foreign Agents Registration Act to unregistered agents seeking to advance China's political agenda, bringing enforcement actions when appropriate;
- Equip the nation's U.S. Attorneys with intelligence and materials they can use to raise awareness of these threats within their Districts and support their outreach efforts;
- Implement the Foreign Investment Risk Review Modernization Act (FIRRMA) for DOJ (including by working with Treasury to develop regulations under the statute and prepare for increased workflow);
- Identify opportunities to better address supply chain threats, especially those impacting the telecommunications sector, prior to the transition to 5G networks;
- Identify Foreign Corrupt Practices Act (FCPA) cases involving Chinese companies that compete with American businesses;
- Increase efforts to improve Chinese responses to requests under the Mutual Legal Assistance Agreement (MLAA) with the United States; and
- Evaluate whether additional legislative and administrative authorities are required to protect our national assets from foreign economic aggression.[26]

According to then-FBI Director Wray in July 2020, "Through talent recruitment programs like the Thousand Talents Program … China pays scientists at American universities to

[25] Author's analysis of Organisation for Economic Co-operation and Development (OECD), Gross Domestic Expenditure on R&D (GERD), Main Science and Technology Indicators (MSTI database), https://data-explorer.oecd.org.

[26] "Information About the Department of Justice's China Initiative and a Compilation of China-Related Prosecutions Since 2018," Federal Bureau of Investigation, November 19, 2021, https://www.justice.gov/archives/nsd/information-about-department-justice-s-china-initiative-and-compilation-china-related.

secretly bring our knowledge and innovation back to China—including valuable, federally funded research. To put it bluntly, this means American taxpayers are effectively footing the bill for China's own technological development. China then leverages its ill-gotten gains to undercut U.S. research institutions and companies, blunting our nation's advancement and costing American jobs. And we are seeing more and more of these cases."[27]

Examples of successful prosecutions under the DOJ's China Initiative include:

- In May 2020, former Emory University professor Xiao-Jiang Li pled guilty to filing a false tax return for failing to report the income he'd received through China's Thousand Talents Program. The FBI stated that it discovered that while Li was researching Huntington's disease at Emory, he was also pocketing half a million unreported dollars from China.
- In May 2021, Song Guo A Zheng, was sentenced to 37 months in prison for making false statements to federal authorities as part of an immunology research fraud scheme. Zheng pleaded guilty and admitted he lied on applications to use approximately $4.1 million in grants from the National Institute of Health (NIH) to develop China's expertise in the areas of rheumatology and immunology. As part of his sentence, Zheng was also ordered to pay more than $3.4 million in restitution to NIH, and approximately $413,000 to The Ohio State University.
- In December 2021, Charles Lieber, chair of Harvard University's Department of Chemistry and Chemical Biology, was found guilty by a jury of two counts of making false statements to federal authorities, two counts of making and subscribing a false income tax return, and two counts of failing to file reports of foreign bank and financial accounts (FBAR) with the Internal Revenue Service (IRS). He was sentenced to time served (two days) in prison; two years of supervised release with six months of home confinement; a fine of $50,000; and $33,600 in restitution to the IRS.
- In January 2022, Simon Saw-Teong Ang, a University of Arkansas scientist conducting research for NASA pleaded guilty to making a false statement to the FBI about the existence of patents for his inventions in China. The FBI asserted that Ang committed fraud by concealing his participation in Chinese talent recruitment programs while accepting millions of dollars in American federal grant funding.

Additional examples of FBI China Initiative efforts can be found at: https://www.justice.gov/archives/nsd/information-about-department-justice-s-china-initiative-and-compilation-china-related.

In February 2022, after a review under the Biden Administration, the DOJ announced it was shutting down the China Initiative. "DOJ will no longer use the framework of the China Initiative to organize or to describe our efforts to counter threats by the PRC government,"

[27] "The Threat Posed by the Chinese Government, and the China Communist Party to the Economic and National Security of the United States," Christopher Wray, Director, Federal Bureau of Investigation, July 7, 2020.

said Assistant Attorney General for National Security Matthew Olsen. “We are ending the China Initiative.” [28]

The Administration and the FBI faced criticism from Asian-American organizations, civil liberty organizations, and others that believed the initiative fostered discrimination against Asian-Americans, broadly, and Chinese-Americans in particular. A number of these groups have asked President Trump not to revive the initiative.[29] Olsen further explained the agency’s reasoning saying, “By grouping cases under the China Initiative rubric, we helped give rise to a harmful perception that the department applies a lower standard to investigate and prosecute criminal conduct related to that country or that we in some way view people with racial, ethnic or familial ties to China differently.”[30]

U.S. ACADEMIC BIAS TOWARDS FREE-SHARING, OPEN PUBLISHING OF KNOWLEDGE

A key ideal of U.S. universities is the commitment to advancing the state of knowledge. Central to this belief is one of communal sharing of knowledge. In fact, for U.S. academics, historically the path to career success has been enshrined as, “publish or perish,” that is the sole path to tenure and esteem is to put your research into the public record.

While this allows scientists and industrialists to build on the advances in knowledge of all, in a world with fierce economic competitors and military adversaries, it also provides them with the tools to compete and win—in the market and on the battlefield–especially in today’s technology-driven, technology-enabled times. When the United States was the world’s largest investor in R&D (say in 1960 when the United States accounted for 69% of global R&D) sharing knowledge was less risky because most countries were not in a position to assimilate and use that knowledge. This is no longer the case and hasn’t been for quite some time.

In the 1970s and 1980s, Japan’s acquisition of U.S. S&T knowledge and application of it to its industrial sectors played an important role in aiding in its rapid economic ascension.

Today, China does the same, except China is a military adversary, as well as an economic competitor. This creates a new environment with different challenges. And, as discussed previously, China is engaged in a Whole of Nation effort to acquire and use U.S. and other foreign technology.

[28] DOJ Shuts Down China-Focused Anti-Espionage Program,” *Politico*, February 23, 2022.
[29] See “Letter to Congress: Do Not Revive the China Initiative,” from a variety of organizations to congressional leaders, September 9, 2024, https://stopaapihate.org/2024/09/09/letter-to-congress-do-not-revive-the-china-initiative/.
[30] DOJ Shuts Down China-Focused Anti-Espionage Program,” *Politico*, February 23, 2022.

U.S. UNIVERSITIES ARE EXTRAORDINARY ASSETS, BUT…

America needs its academic community not only to be the discoverers, inventors, and innovators, but to also recognize that they are on the front line of defense against adversaries acquiring knowledge that can be a threat to U.S. security.

American universities have been and remain a pillar of American strength. U.S. academia is the best in the world. It's why hundreds of thousands from around the world flood to U.S. schools for post-secondary education. Their work in the classroom—preparing our workforce— and in the laboratory—creating valuable new knowledge—are essential to almost all aspects of American life and security.

The contributions made by American universities are countless. And we should all be grateful for their work, past and present. Nevertheless, America needs this community to pivot once again, in recognition of the nefarious actors who would apply the knowledge they create against the United States and its allies.

Change is hard, and I believe for America's academic community—largely free from external controls and market forces—I think it is particularly challenging. However, U.S. academia has shown itself adept at changing to meet pressing national needs and objectives—from building agricultural schools and departments in the 19th century under the Land Grant acts, to graduating a new generation of scientists and engineers after WWII (many under the GI Bill), to creating nuclear programs with the advent of nuclear power, to expanding aeronautical and astronautical programs with the Space Race.

Much has been done over the past eight years—by presidents, congresses, and the academic community—to better protect U.S. universities from nefarious actors, and keeping the products of their research from falling into their hands. And yet, here we are again, still trying to tamp down the seemingly ceaseless efforts by China and other adversaries to acquire U.S. scientific knowledge. Too often, government efforts have met resistance from the academic community, which, in large measure, would prefer to go about its business with no restrictions. I believe this attitude is detrimental to U.S. national security. It should be a core patriotic duty of every U.S. university to support, protect, and defend the country that provides them with a home, physical security, civil liberties, and protection of their IP, as well as billions of dollars for research and development and billions more toward educating students. This includes **f**inancial aid for students (e.g., scholarships, work-study, and loans) and funding for R&D and R&D facilities and equipment through grants and contracts

Many in the academic community revere Vannevar Bush for his support for free exchange of ideas in academia. However, this support was not asserted in a vacuum, but very much in the context of his WWII experience, well-grounded in concerns about future adversaries.

> *Our defense against aggression demands new knowledge so that we can develop new and improved weapons…*

The bitter and dangerous battle against the U-boat was a battle of scientific techniques—and our margin of success was dangerously small.

—Vannevar Bush, *Science: The Endless Frontier, 1945*

Too frequently, many in the academic community fail to recognize Vannevar Bush's foundational belief that U.S. government investment in academic research is justified and essential to protect the country and to drive its economic growth objectives (as well as to make advancements in human health and to address other societal needs). Bush was acutely aware of the role of science and technology in protecting the United States given his role as director of the Office of Scientific Research and Development during WWII.

MOVING FORWARD

America needs its academic community as a full partner in the protection of our country and its investments in academic research and development. We need a sea change in the way researchers understand their obligations to the country. We need the academic sector come to the table with Feds to strengthen and further develop research security protocols. And we need to more fulsomely implement what's in place. In addition, there is room for thought about whether new regimes are needed altogether.

And to emphasize one more time, we should start with the rebuttable presumption that S&T cooperation with China is not in the U.S. national interest. We should be asking (1) whether any proposed research with China is absolutely essential and indispensable to U.S. national security, the U.S. economy, or U.S. public health; (2) whether China is the only partner in the world with whom we can do such proposed research with effectively; and (3) whether the proposed research advances U.S. national security, economic, or public health interests more than it does China's.