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Staff Research Report



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Overseas Chinese Students and Scholars in China's Drive for Innovation

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Table of Contents

Executive Summary.....	4
Introduction	4
Dramatic Increase in Chinese Graduate Students and Research Scholars in U.S. STEM Fields	6
Beijing Relies on Overseas Chinese Students and Scholars for Its National Development and Military Goals.....	10
China’s S&T Transfer Ecosystem for Overseas Chinese Students and Scholars.....	11
Pillar 1: China’s Scholarship Programs Prioritize Strategic Fields, Mandate Two-Year “Service” Commitment	12
China Scholarship Council Study Abroad Programs.....	12
PLA and Chinese Defense SOE Study Abroad Programs.....	14
Pillar 2: Returning Home to Serve the Country: Talent Recruitment Programs and Other Incentives for Eventual Return to China	15
Talent Recruitment Programs.....	15
Entrepreneurship Parks and Business Incentives	17
Pillar 3: China’s Transnational Network for Acquiring S&T from Chinese Students and Scholars in the United States	18
“Service Activities” Requiring Short-Term Travel to China or Cooperation with Chinese Institutions.....	18
Innovation and Startup Competitions	19
Transnational Professional Associations Connect S&T Experts with the United Front	19
Implications for the United States	23
Appendix I: China’s Programs for Overseas Students and Scholars with S&T Expertise.....	26
Appendix II: Nonimmigrant STEM Visas Granted to Chinese Nationals in U.S. States and Washington, DC by Degree Level, 2015–2020	29

This report surveys an array of programs and policies the Chinese government has established over decades to exploit the scientific expertise of Chinese students and scholars studying in the United States for the purpose of accelerating China’s economic and military modernization. While the report examines the elaborate system of incentives the Chinese government employs to induce Chinese students and scholars to contribute scientific expertise to China’s national modernization goals, it does not intend to “profile” students from China, or to evaluate the degree of agency Chinese students and scholars have when faced with the opportunity to participate in these government-sponsored programs. This report assumes these programs target a minority of the overall Chinese student body, and that the majority of Chinese students contribute positively to U.S. research and society.

Executive Summary

- Chinese leaders have long viewed advanced science and technology (S&T) as key to China’s comprehensive national power and sought to acquire it through licit and illicit means from developed countries like the United States. Since the 1990s, China’s government has built a sprawling ecosystem of structures, programs, and incentives to coopt and exploit Chinese students and scholars for the S&T they acquire abroad.
- This ecosystem sponsors promising Chinese students and scholars at U.S. and other foreign universities, incentivizes their return to China for the long term, and employs transnational organizations to channel S&T know-how from those remaining abroad back to mainland China. The purpose of this ecosystem is to leverage the resources of American universities to provide the technology and talent Beijing needs to win its national competition with the United States.
- Many programs associated with Beijing’s S&T transfer ecosystem—including scholarships to study abroad, talent recruitment plans, and entrepreneurship parks—contribute to China’s military-civil fusion strategy by collecting specific technologies and know-how that improve the capabilities of the People’s Liberation Army (PLA) and advance the goals” of the Chinese Communist Party (CCP).
- The overall population of Chinese students and research scholars in the United States rose dramatically from around 68,000 in the 2006–2007 school year to about 370,000 in January 2020, a trend driven by China’s modernization policies and reinforced by U.S. policy decisions and the interests of colleges and universities in diversifying their revenue sources in the wake of the Great Recession. Approximately 130,000 of these students and scholars are pursuing graduate degrees in science, technology, engineering, and mathematics (STEM) fields. Chinese students and scholars, who constitute roughly a third of all foreign students in the United States, have made significant contributions to academia and the U.S. economy. The majority of Chinese students and scholars who come to the United States engage in legitimate academic activities and are part of the cultural exchange that undergirds U.S. influence in the world. However, a minority of undetermined size participates in China’s technology transfer apparatus and supports a system antithetical to U.S. national security interests.
- Fewer than five percent of visa applications flagged as technology transfer risks are ultimately denied. U.S. agencies involved in screening for illicit technology transfer continually struggle with analyst shortages and high backlogs of analytical reviews assessing technology transfer risk. Moreover, the existence of interagency concern about possible transfer of sensitive technologies is not always a legal basis for denying applications.
- U.S. law does not account for the global and increasingly integrated nature of China’s technology acquisition architecture or its shift toward prioritizing licit transfer of S&T knowledge. The Chinese government aggressively seeks to acquire scientific knowledge, technical processes, and expertise considered “fundamental research” because of its potential applications to commercial and military technologies. U.S. law permitting the legal transfer of this knowledge is predicated on potentially outdated assumptions that do not consider the increasingly close involvement of both U.S. and Chinese academia in sensitive research.
- The scope and voracity of the Chinese government’s S&T acquisition and exploitation ecosystem has concerning implications for the United States. When Chinese students and scholars trained at U.S. universities return to China to commercialize research they developed overseas, U.S. firms that would have employed them lose a first-mover opportunity, and the U.S. institutions that funded them—including U.S. taxpayers—are deprived of a return on their investment. More worryingly, because Beijing has promulgated a strategy of “military-civil fusion” and dictated that those with S&T expertise should serve the cause of national rejuvenation, state-affiliated institutions likely absorb and leverage this expertise to improve China’s military capabilities and further the interests of the CCP.

Introduction

Since the late 19th century, China’s leaders have viewed their country’s deficiencies in advanced S&T as a grave threat to national security. To remedy this vulnerability, successive Chinese governments have relied on overseas

Chinese students and scholars to acquire S&T knowledge from the world’s most advanced economies, focusing on the United States.

In just the four decades since reform and opening up, Beijing has sent millions of graduate students and research scholars overseas to pursue education in STEM fields. At the same time, it has built a sprawling ecosystem of programs and incentives designed to ensure the scientific know-how and technologies these students and scholars acquire abroad are absorbed to advance its military-civil fusion strategy, benefitting China’s commercial and defense sectors. This ecosystem sponsors promising Chinese students and scholars to study at foreign universities, incentivizes or requires their return to China in exchange for this support, and recruits researchers via hundreds of talent programs. Moreover, it integrates Chinese students and scholars remaining abroad with organizations that facilitate the transfer of S&T back to the Mainland, where it can be exploited by the PLA, government ministries, state-owned enterprises (SOEs), state-run laboratories, and startups.

As the scope of Beijing’s technology transfer ecosystem has expanded, the U.S. Department of Justice (DOJ) has deployed its China Initiative to more aggressively prosecute cases of intellectual property (IP) theft and espionage. Yet most of the S&T targeted for acquisition by Beijing is not covered by export controls or IP laws because much of it is fundamental research or general management expertise such as laboratory design. U.S. law enforcement and counterintelligence authorities have struggled to respond effectively to such technology transfer activities, which have been legal since the promulgation of National Security Decision Directive (NSDD) 189 in 1985 but nonetheless may be contrary to U.S. economic and security interests amid the ongoing strategic competition with China. As the United States considers defensive measures in response, it must work to precisely define the scope of concerning activities involving Chinese students and scholars while striking a balance between security and the openness that is one of its greatest strengths.

This staff report first describes the population of Chinese graduate students and research scholars studying in STEM fields in the United States* and examines the rapid growth of this population.† It then analyzes China’s policies toward overseas Chinese students and scholars with S&T expertise before illustrating three central pillars of the associated S&T transfer ecosystem. Finally, it explores the commercial and military implications of this phenomenon for the United States. The COVID-19 pandemic has had a significant impact on the U.S. education sector, complicating analysis of their numbers in the United States, but to the extent possible this report examines preexisting trends and themes. This report focuses only on the subpopulation of graduate students and research scholars who are both Chinese nationals and in STEM fields. Its scope does not include U.S. citizens or permanent residents of Chinese ethnicity, Chinese nationals at the undergraduate level, or Chinese nationals in non-STEM fields. It assumes that Chinese students and scholars here in the United States whose disciplines fall outside of STEM fields are not subject to the pressures and incentives of China’s S&T transfer ecosystem. Moreover, this report seeks to assess the implications of Chinese government policies that exploit the U.S. academic system by providing incentives to overseas Chinese students and scholars. It does not aim to profile students from China or Hong Kong.

* For purposes of this report, the phrase “overseas Chinese students and scholars” refers only to graduate students and research scholars in STEM fields at U.S. universities who are Chinese nationals. The ecosystem of incentives and programs discussed in this report also targets Chinese students and scholars at universities in other countries, but this report focuses on the implications for the United States specifically. “Students” refers to those in degree-granting programs at the graduate level and “scholars” refers to postdoctoral researchers and visiting fellows, though it is not possible to distinguish between the two in public data released by the U.S. government.

† This report uses data from both Student and Exchange Visitor Information Service (SEVIS), which releases combined data from the Departments of Homeland Security (DHS) and the U.S. Department of State, and the Institute of International Education (IIE), a nonprofit organization that conducts surveys of universities with support from State. IIE *Open Doors* and SEVIS data are compared annually and often closely align, though there are variations due to differences in the survey population and timeframe. SEVIS releases combined data from both agencies concerning F-1 and M-1 nonimmigrant visas (academic or vocational nonimmigrant student) and J-1 exchange visitor visas (though not all J-1 visa holders are in the United States in an academic capacity) by level and type of education. However, the SEVIS data set does not distinguish between the three relevant visa types or between graduate and postgraduate studies. Peggy Blumenthal, Senior Counselor to the President, IIE, interview with Commission staff, March 25, 2020; U.S. Immigration and Customs Enforcement, *Student and Exchange Visitor Program*. <https://opendoorsdata.org/data/international-students/all-places-of-origin/>.

Dramatic Increase in Chinese Graduate Students and Research Scholars in U.S. STEM Fields

The number of Chinese students in the United States has increased dramatically since the middle of the first decade of the 2000s and remains high at about 370,000 as of January 2020, the last date for which public information is available.¹ About 130,000 of the 370,000 Chinese students in the United States are in STEM fields at the master's or doctoral levels.^{*} ² This 130,000-strong category includes postdoctoral researchers and visiting researchers who would be better classified as “scholars,” but it is unclear exactly how many of these older researchers there are relative to master's students and PhD students. As of the 2018/2019 school year, Chinese nationals accounted for approximately a third of the roughly 1.1 million foreign students in the United States, more than those from any other country (see Appendix III for a table of nonimmigrant STEM visas granted to Chinese nationals by U.S. state since 2015).[†] ³ According to a March 2020 report from the International Institute of Education, less than 0.4 percent of Chinese students at U.S. educational institutions have been affected by COVID-19-related travel restrictions since most remained in the United States.⁴

This growth in student numbers was driven by several important changes during the George W. Bush and Barack Obama administrations, which reflected an assumption in U.S. policy that China would gradually liberalize as the result of increased engagement.[‡] U.S. policymakers expected international student exchanges to play a role in driving this liberalization: in 2002, then Secretary of State Colin Powell argued, “Foreign students ... return home with a greater knowledge of [U.S.] democratic institutions, and ... values.”⁵ The Bush Administration then relaxed student visa policies for Chinese nationals in 2005 as part of its effort to facilitate educational exchange.⁶ The Obama Administration further relaxed visa policies for Chinese students in 2014 and introduced measures to increase U.S. students' exposure to China.[§] ⁷ The number of Chinese nationals studying in the United States

* An additional 62,000 Chinese students are in STEM fields at the undergraduate level but are likely not targeted by the Chinese government recruitment incentives discussed in this report to the same degree as those in advanced programs. Overall, according to SEVIS data more than half of visas granted to Chinese students at all levels in the United States are for studies in STEM fields. According to the Institute of International Education, Chinese students at all levels in fields other than STEM are concentrated in business/management (18.9 percent), education (1.7 percent), fine/applied arts (6.5 percent), health professions (1.4 percent), humanities (1 percent), intensive English (1.7 percent), other fields (11 percent), and undeclared fields (2.3 percent). Institute of International Education, “Fields of Study by Place of Origin,” 2020. <https://opendoorsdata.org/data/international-students/fields-of-study-by-place-of-origin/>; U.S. Department of Homeland Security, *SEVIS by the Numbers Data*, January 2020. <https://studyinthestates.dhs.gov/sevis-by-the-numbers/sevis-by-the-numbers-data>.

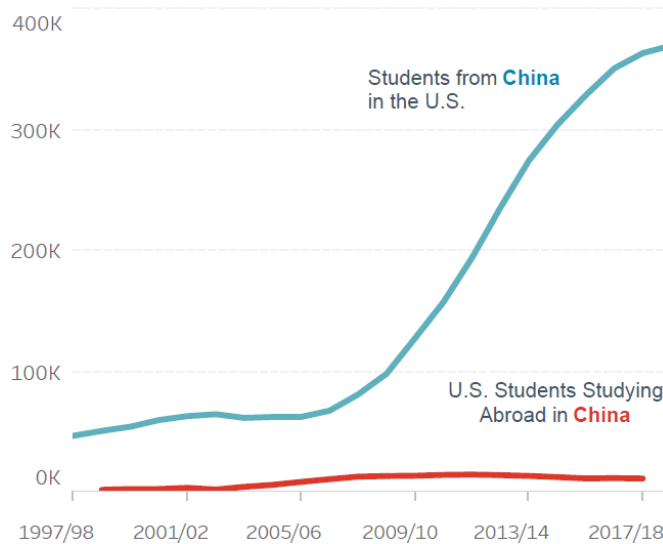
† According to the Institute of International Education, the top countries of origin for total foreign students in the United States as of the 2018/2019 school year were China (369,548), India (202,014), South Korea (52,250), Saudi Arabia (37,080), and Canada (26,122). Institute of International Education, “Fields of Study by Place of Origin,” 2020. <https://opendoorsdata.org/data/international-students/fields-of-study-by-place-of-origin/>.

‡ U.S. missions abroad continually seek increasingly progressive visa regimes for U.S. citizens, and U.S. visa policy toward a given country is set on the basis of reciprocating this treatment. In June 2005, the Bush Administration began granting 12-month, multiple entry visas for study, exchange, or vocational training to Chinese nonimmigrants and their dependents, doubling the previous validity of six months, and the Chinese side did the same for U.S. nationals. In 2014, the Obama Administration then began issuing Chinese nonimmigrant students, exchange visitors, and their dependents multiple entry visas valid for five years or the length of their program, and China did the same for U.S. nationals. The Chinese X1 five-year, multiple-entry student visa is currently available to U.S. students, though U.S. students have not chosen to study in China to the extent Chinese students have sought to study in the United States. Embassy of the People's Republic of China in the United States, “How to Apply,” March 22, 2017. <http://www.china-embassy.org/eng/visas/hrsq/>; U.S. Department of State, “The United States and China Agree to Extending Visas for Short-term Business Travelers, Tourists, and Students: Frequently Asked Questions,” November 2014. <https://travel.state.gov/content/travel/en/us-visas/visa-information-resources/us-china-agree-to-extend-visas.html>; U.S. Department of State, *The United States and China to Extend Visas for Short-term Business Travelers, Tourists, and Students*, November 10, 2014. https://travel.state.gov/content/travel/en/us-visas/visa-information-resources/visas-news-archive/20141110_us-and-china-to-extend-visas-for-short-term-business-travelers-tourists-and-students.html; U.S. Department of State, “AILA/Department of State Liaison Meeting,” October 9, 2014, 4. <https://travel.state.gov/content/dam/visas/AILA/AILA%20DOS%20October%202014.pdf>; U.S. Department of State Office of the Spokesman, *U.S. Extends Visa Validity for Chinese Students and Exchange Visitors*, June 15, 2005. <https://2001-2009.state.gov/r/pa/prs/ps/2005/47974.htm>; U.S. Department of State.

§ Then President Obama declared in 2009 that his administration intended to increase the total number of Americans studying in China to 100,000 over a four-year period, a goal met in 2014. President Obama later announced a new goal to increase U.S. students of Mandarin to one million. The White House, “FACT SHEET: President Xi Jinping's State Visit to the United States,” September 25, 2015. <https://obamawhitehouse.archives.gov/the-press-office/2015/09/25/fact-sheet-president-xi-jinpings-state-visit-united-states>; The White House, “Remarks by President Barack Obama at Town Hall Meeting with Future Chinese Leaders,” November 16, 2009. <https://obamawhitehouse.archives.gov/the-press-office/remarks-president-barack-obama-town-hall-meeting-with-future-chinese-leaders>.

dramatically increased soon after the 2005 policy change shift, steadily increasing from around 68,000 (excluding Hong Kong and Macau) in the 2006/2007 school year to the current all-time high.⁸

Figure 1: U.S. and Chinese Nationals Studying in China and the United States, 1997–2018



Source: Institute of International Education, “Open Doors: Report on International Educational Exchange 2019 Fact Sheet: China,” 2019. <https://www.iie.org/-/media/Files/Corporate/Open-Doors/Fact-Sheets-2019/Country/China.ashx?la=en&hash=105FBA7FAB23FED694F051945E16CB51064120DC>.

Chinese Students’ Contributions and U.S. Universities’ Views on Diversity

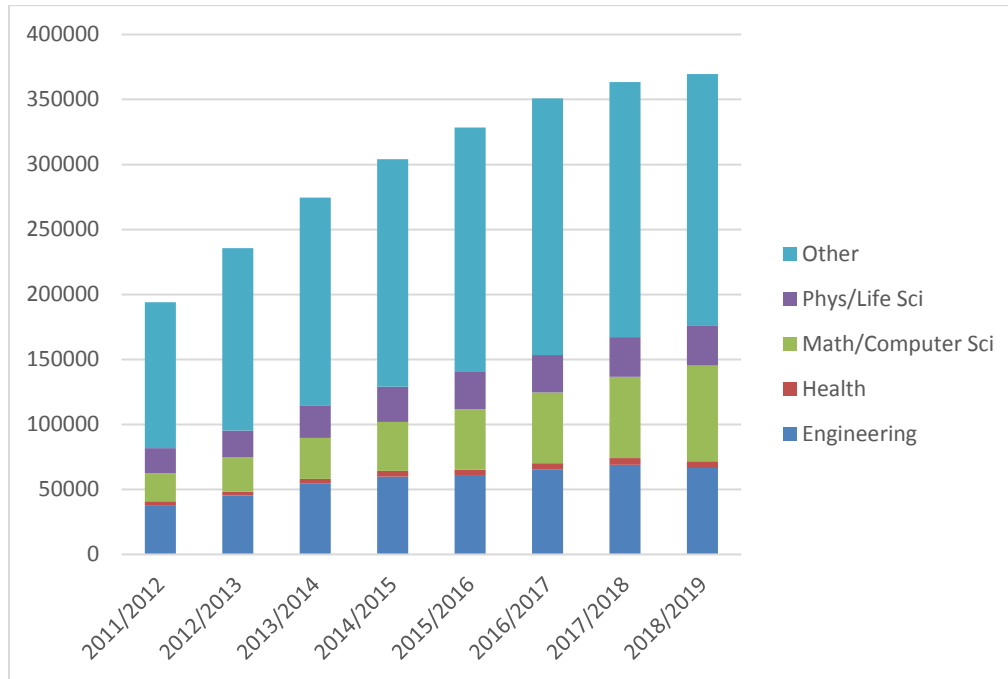
International students from China have become an important source of revenue for the U.S. education system since the global financial crisis, which drained state budgets and university endowments even as education costs in the United States rose.⁹ Chinese students, like most foreign students, typically pay full tuition, which can be up to three times more than U.S. students, since they often do not receive the financial aid domestic students do. They sometimes pay additional fees, providing much-needed funds that universities use to subsidize less profitable departments and to support programs such as scholarships for domestic students.¹⁰ Whereas earlier generations of Chinese students studying abroad were largely government-sponsored, a 2018 report by China’s Ministry of Education indicated that around 89 percent of all Chinese students abroad are self-funded.¹¹ Overall, including tuition, rent payments, and consumer spending, Chinese students generated almost \$15 billion in economic activity in the United States in 2018.¹² U.S. universities continue to recruit Chinese students aggressively: according to a 2019 survey by the Institute of International Education, 58 percent of U.S. institutions say they prioritize China above all other countries in their international student outreach, while 80 percent are concerned about maintaining or increasing international student numbers from China.¹³

Academic research in the United States also benefits from the contributions of Chinese students and scholars. Professors and administrators at many U.S. universities believe Chinese students and scholars are among the most qualified candidates in the world and will conduct cutting-edge research.¹⁴ In a 2018 opinion editorial opposing a reported plan by the Trump Administration to ban Chinese students, president of Dartmouth College Philip J. Hanlon argued that immigration measures sharply reducing the number of Chinese students in the United States would harm U.S. competitiveness. “Foreign-born students won’t stop being innovators if the U.S. decides to keep them out,” President Hanlon and his co-author Matthew J. Slaughter wrote.¹⁵ “They will stop being innovators in America. America’s loss—of new ideas, new companies, new jobs—would be the rest of the world’s gain. Why close the door to so many great innovators when we need them?”¹⁶

Some university administrators, such as Pomona University President G. Gabrielle Starr, also argue that Chinese students bring “diversity of thought and culture” to campus.¹⁷ U.S. policymakers have historically championed the idea that Chinese students’ experience studying at U.S. universities makes them more appreciative both of the

United States and of democratic governance, though recent studies suggest they may sometimes develop more favorable views of China’s government as well.¹⁸ The majority of Chinese students and scholars in the United States are likely engaged in legitimate academic activities. While the U.S. government has yet to publicly determine how many Chinese students and scholars studying in the United States participate in the state-backed technology transfer programs surveyed in this report, they may make up only a minority of this broader population.

Table 1: Chinese Nationals Studying in STEM and Other Fields in the United States, All Levels, 2011/2012–2018/2019

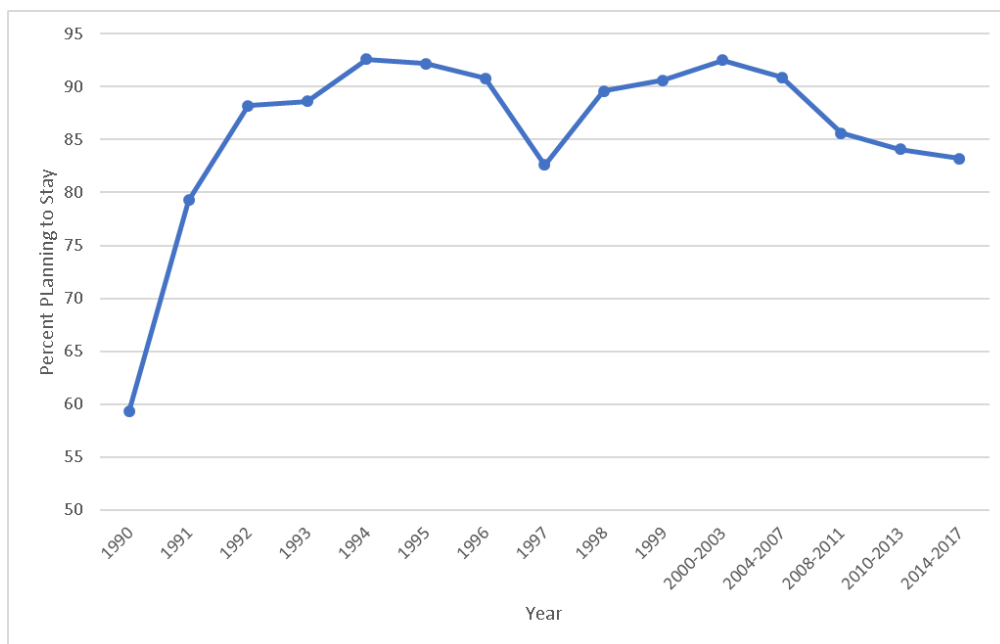


Source: Institute of International Education, “Fields of Study by Place of Origin,” 2020. <https://opendoorsdata.org/data/international-students/fields-of-study-by-place-of-origin/>.

Chinese students and scholars have generally sought to remain in the United States after completing their studies, whether via DHS’s Optional Practical Training (OPT) program, continuing education with a new visa, lawful permanent residency, or an H-1B temporary work visa.* Throughout most of the 1990s, approximately 90 percent of Chinese science and engineering doctorate recipients reported they intended to stay in the United States to seek employment.¹⁹ This number remained above 90 percent in the early 2000s before falling in the mid-2000s to slightly above 80 percent in the 2010s.²⁰

* In June 2020, the Trump Administration announced a suspension of new guest worker visas, including H-1B visas, to those currently outside the United States, but this measure did not include OPT. While it includes some J visas, according to a senior Administration official quoted by NPR, this does not include professors and scholars. Franco Ordoñez, “Trump Freezes Green Cards, Many Work Visas until End of Year,” *NPR*, June 20, 2020. <https://www.npr.org/2020/06/20/881245867/trump-expected-to-suspend-h-1b-other-visas-until-end-of-year>.

Figure 2: Percentage of Chinese Nationals Receiving U.S. Science and Engineering Doctorates Intending to Stay in the United States, 1990–2017



Source: Various.²¹

OPT grants up to an extra year of residency for non-STEM students and up to an additional two years of residency for STEM students on top of that, making it a popular method of securing continued residence in the United States after completing university programs.*²² Neither the base OPT program nor the STEM extension have numerical caps, so they are widely available to those students seeking to extend their residency by working in a field directly related to their studies.²³ In the 2018/2019 school year, according to the Institute of International Education (IIE), about 223,000 international students participated in OPT following multiple years of double-digit percentage increases.²⁴ According to a June 2020 letter from 21 Republican representatives to the secretary of state and the acting secretary of homeland security in support of maintaining OPT at its current levels, the OPT program helps the United States “globally compete for market share of international students,” who in 2018 and 2019 along with their families contributed \$41 billion to the U.S. economy.²⁵ OPT allows nonimmigrant students to effectively secure four years of STEM-related study and work by combining the base one-year OPT and the two-year STEM extension with a one-year F-1 visa.²⁶ The OPT program has recently come under scrutiny due to its potential to be

* The base OPT program and STEM OPT extension, respectively, grant employment directly related to a nonimmigrant’s field of study for a period of up to 12 months and an additional 24 months after that. The STEM OPT extension was expanded to two years in 2016 as part of an effort to increase U.S. competitiveness and improve retention of key STEM talent. Congressional Research Service, “Foreign STEM Students in the United States,” November 1, 2019, 2. <https://crsreports.congress.gov/product/pdf/IF/IF11347>; U.S. Department of Homeland Security, “Improving and Expanding Training Opportunities for F-1 Nonimmigrant Students with STEM Degrees and Cap-Gap Relief for All Eligible F-1 Students,” *Federal Register* 81:13117–13121, March 11, 2016. <https://www.federalregister.gov/documents/2016/03/11/2016-04828/improving-and-expanding-training-opportunities-for-f-1-nonimmigrant-students-with-stem-degrees-and>.

exploited for fraudulent extension of residence in the United States, though it is not clear how significantly this actually contributes to overstays, and Chinese nationals have a very low overall suspected overstay rate.*

Beijing Relies on Overseas Chinese Students and Scholars for Its National Development and Military Goals

China's leaders have long sought to harness the intellect of overseas Chinese students and scholars for the state's development and strategic priorities, but over the last 30 years their efforts have become more systematic and sophisticated. Beginning in the late 19th century, successive Chinese governments sought to accelerate economic and military modernization by sponsoring their best and brightest to study STEM disciplines in the world's most technologically advanced countries. Qing dynasty officials sent 120 young boys to the United States between 1872 and 1881 to study science and engineering as part of China's "self-strengthening" movement.²⁷ The newly established People's Republic of China (PRC) under Chairman Mao Zedong dispatched 38,000 students, scientists, and other personnel to the Soviet Union between 1950 and 1960 for scientific training so China could "catch up" with the technologically advanced Western powers.²⁸ Paramount leader Deng Xiaoping revived study abroad programs after a period of economic stagnation caused by the Cultural Revolution to accelerate the transfer of S&T that could support his "reform and opening up" strategy.²⁹ When the Tiananmen Square Massacre drove large numbers of Chinese students to seek asylum in the United States, internal CCP documents began to articulate the competition for human talent in a globalized world as a "struggle of life and death" for the regime.³⁰ In the early 1990s, Chinese leaders introduced a series of programs and policies designed to ensure that those trained in S&T disciplines served the state's needs regardless of where they physically resided.

The Chinese government's efforts to leverage Chinese students and scholars for their S&T expertise—a task now viewed as vital to regime survival—coalesced over the 1990s into a complex ecosystem offering them powerful incentives to participate. The CCP's current General Secretary, Xi Jinping, has continued in his predecessors' footsteps by making clear that overseas Chinese students and scholars are key to his plans to transform China into an innovative and militarily formidable world power. As early as 2013, he argued publicly that Western countries' leadership of the world depended on their mastery of advanced technologies and that China "must adopt an asymmetrical strategy of catching up."³¹ Of particular importance were the key fields and areas in which General Secretary Xi perceived "a [Western] stranglehold" and in which "it would be impossible for [China] to catch up [by itself] by 2050."³²

Moreover, the CCP has explicitly linked China's ability to attract and retain S&T expertise to its ambitions for a leading role in the 21st century world order. "In the final analysis, competition for comprehensive national strength is competition for talents," General Secretary Xi said in a 2013 speech, invoking a Chinese strategic concept describing the totality of a country's power.³³ "Whoever can cultivate and attract more outstanding talents will have an advantage in the competition."³⁴ He praised the patriotism of overseas Chinese students and scholars who returned home after the founding of the People's Republic of China, invoking a number of foreign-educated Chinese scientists who pioneered China's nuclear and missile programs as "outstanding examples" for emulation.

* There are known examples of fraudulent OPT schemes, but it is not clear how widespread such schemes are or whether they represent a significant proportion of OPT participants in general or of Chinese participants specifically, who have a low overall overstay rate. According to DHS data, in 2018, among nationalities with a suspected in-country overstay rate above zero, all Chinese nonimmigrants had a suspected rate of only .98 percent, far below the average rate of 7.41 percent and 148th out of 180 countries. Possible OPT fraud is not captured in these numbers, however, because participants cannot be found out of status until the fraud is discovered. DHS does not actively keep track of OPT participants' status; rather, sponsoring universities must update participants' files in SEVIS. In March 2019, DOJ prosecuted a California-based company called Findream for overseeing a scam that provided false verification of employment, fraudulently causing universities to register students as being employed in fulfillment of their OPT requirements. Findream founder Kelly Weiyun Huang, who also founded a related company, Sinocontech, pled guilty in December 2019, facing up to five years in prison and a fine of up to \$250,000. Gabe Gutierrez and Rich Gardella, "Thousands of Foreign Students in U.S. on Student Visas May Have 'Worked' for Fake Companies," *NBC*, January 2, 2020. <https://www.nbcnews.com/politics/immigration/thousands-foreign-students-u-s-student-visas-may-have-worked-n1109286>; United States of America v. WEIYUN HUANG, March 26, 2019, 11–12. <https://www.documentcloud.org/documents/5792687-Visa-Fraud.html>; U.S. Department of Homeland Security, *Fiscal Year 2018 Entry/Exit Overstay Report*, 2018, 20. https://www.dhs.gov/sites/default/files/publications/19_0417_fy18-entry-and-exit-overstay-report.pdf; U.S. Citizenship and Immigration Services, *Optional Practical Training (OPT) for F-1 Students*. <https://www.uscis.gov/working-in-the-united-states/students-and-exchange-visitors/optional-practical-training-opt-for-f-1-students>.

He concluded with an appeal to the “vast majority” of overseas students and scholars to contribute their talents to strengthening the country.

China’s S&T Transfer Ecosystem for Overseas Chinese Students and Scholars

China’s S&T transfer ecosystem offers an array of scholarships, talent recruitment programs, and other preferential policies to induce foreign-educated Chinese students and scholars to work in ventures improving the state’s industrial or military capacity. Some features of the ecosystem, such as talent recruitment programs and entrepreneurship parks, may be jointly administered by the central, provincial, and/or municipal authorities, while others may be administered by a single level of government.* Broadly speaking, Beijing targets foreign-educated Chinese students and scholars with expertise in fields and technologies identified in China’s plans for industrial policy and military-civil fusion. These range from mobile communication and aviation to biotechnology and new materials.³⁵

The ecosystem rests on three mutually reinforcing pillars: scholarships that send promising Chinese students and scholars overseas with a requirement to return, policies encouraging Chinese students and scholars to return to China in the long term, and policies enabling Chinese students and scholars who remain overseas to transfer knowledge and technology back to the Mainland.

- The first pillar uses government-run scholarship programs to fund Chinese students to study STEM fields at foreign universities in exchange for an obligation to return home immediately and complete a national service work requirement lasting several years.
- The second pillar offers robust incentives to Chinese students who are studying or working abroad to return to China at some point in the future. These incentives include perks associated with talent programs, like the opportunity to conduct research at prestigious institutions, employment in specialized entrepreneurship parks, and special government subsidies to start their own businesses.
- The third pillar uses a network of transnational technology transfer organizations to target Chinese students and scholars who have permanently settled in other countries. These transnational organizations are part of the CCP’s United Front system, which is tasked with mobilizing Chinese citizens and ethnic Chinese in pursuit of the Party’s goals.† Such transnational organizations incentivize Chinese students and scholars to contribute to China’s national rejuvenation‡ through appeals to national pride, ethnic identity, or desire for financial reward. While these organizations are headquartered in China, they operate on the local level throughout the United States and in other countries.

* The Organization Department, State Council, Ministry of Human Resources and Social Services (MHRSS, formerly known as the Ministry of Personnel), Ministry of Science and Technology, Ministry of Industry and Information, Ministry of Education (MOE), and Ministry of Finance all appear involved to varying extents in the formulation and implementation of related policies. For an overview of China’s national-, provincial-, and municipal- level organizations for technology transfer, see William C. Hannas, James Mulvenon, and Anna B. Puglisi, *Chinese Industrial Espionage: Technology Acquisition and Military Modernization*, Routledge, 2013, 78–93.

† For more information on the United Front, see Alexander Bowe, “China’s Overseas United Front Work: Background and Implications,” *U.S.-China Economic and Security Review Commission*, August 24, 2018. https://www.uscc.gov/sites/default/files/Research/China's%20Overseas%20United%20Front%20Work%20-%20Background%20and%20Implications%20for%20US_final_0.pdf.

‡ National rejuvenation, or “the great rejuvenation of the Chinese nation,” is the CCP’s broad goal to restore China to what its leaders perceive as its rightful position as the most powerful country in the world, a status it lost as a result of what is now called the “century of humiliation” beginning in the mid-19th century. This aspiration involves transforming China into a modern, wealthy, powerful country that not only excels across all aspects of its society, including military strength, cultural influence, scientific advancement, and economic prosperity, but that also is universally recognized for its accomplishments. Daniel Tobin, written testimony for U.S.-China Economic and Security Review Commission, *Hearing on A “China Model”? Beijing’s Promotion of Alternative Global Norms and Standards*, March 13, 2020, 2–3, 33.

Pillar 1: China’s Scholarship Programs Prioritize Strategic Fields, Mandate Two-Year “Service” Commitment

China’s government-sponsored study abroad programs aim to cultivate a highly skilled work force that will drive the country’s future economic and military modernization. In exchange for the Chinese government’s financial support to study STEM fields at foreign universities, Chinese students and scholars must return to China after their studies and complete a service commitment lasting multiple years. In some cases, they must also meet specific conditions for political loyalty. The most representative educational initiatives of this type are those run by the China Scholarship Council (CSC), but the PLA and Chinese defense firms also administer study abroad programs for their employees that serve the same modernization goals.

China Scholarship Council Study Abroad Programs

The CSC describes itself as a nonprofit organization affiliated with China’s Ministry of Education that administers a variety of study abroad funds and programs for Chinese nationals,³⁶ including some designed to cultivate human talent for China’s industrial and defense aims. The CSC’s website indicates that its advisory board includes ten ministries and academies, at least eight of which are known to be involved in talent recruitment or technology transfer activities.* One of its programs, the National Study Abroad Fund, requires recipients to study scientific fields prioritized by the state, support the CCP’s leadership, and return to China for a two-year work commitment (see “Appendix I” for more information about CSC programs).³⁷ According to a 2020 application cycle notice, the National Study Abroad Fund plans to select 30,000 applicants for study abroad in 2020, though it is likely the COVID-19 pandemic has reduced the number of Chinese students able to travel abroad for study.³⁸

CSC Scholarships Require Political Loyalty

CSC scholarships differ from most government-sponsored scholarships in the world in that they require recipients to pledge allegiance to a Marxist-Leninist authoritarian political party, the CCP. The 2020 application guidelines for the three CSC programs surveyed in this staff report all insist that applicants “support the leadership of the Communist Party and the path of socialism with Chinese characteristics; love the motherland; have a sense of responsibility to serve the country, society, and the people; and to have a correct world view, outlook on life, and values system.”³⁹ The scholarship targeting researchers more advanced in their careers, known as the National Government-Sponsored Program for Senior Research Scholars, Visiting Scholars, and Postdoctoral Scholars, appears to have particularly strict conditions. The scholarship’s guidelines emphasize not only the importance of predeparture ideological indoctrination but also that the program will “not send out those who have [political] problems.”⁴⁰ Such conditions suggest that despite decades of patriotic education, CCP leaders still fear that Chinese students and scholars who study abroad may develop critical views of the Party after being exposed to democratic ideals and an open media environment. CSC scholarships also mention that recipients must accept the “guidance and management” of Chinese embassy and consular officials while abroad and submit periodic “research reports” to them, but the exact nature of these interactions and the content of the reports is unclear.⁴¹

Another CSC scholarship, the National Government-Sponsored Graduate Student Program for the Building of Top Universities, targets doctoral students who are already affiliated with universities belonging to China’s military-industrial complex. Like the National Study Abroad Fund, this scholarship requires political loyalty and a two-year service commitment upon returning to China but also emphasizes that applicants must secure admission to well-known universities in technologically advanced countries.⁴² The list of “accepting units” approved to solicit and sponsor applications on the scholarship’s behalf includes a host of institutions tied to China’s military, defense

* The CSC’s board members are the Ministry of Education, Ministry of Finance, National Development and Reform Commission, Ministry of Foreign Affairs, Ministry of Human Resources and Social Services, Ministry of Public Security, Chinese Academy of Sciences, Chinese Academy of Engineering, Chinese Academy of Social Sciences, and National Natural Science Foundation of China. See China Scholarship Council, “Institutional Configuration” (机构设置). Translation. <https://web.archive.org/web/20180804223209/http://www.csc.edu.cn/about/jigoushezhi>.

industry conglomerates, SOEs, and other government agencies.*⁴³ Prominent examples include the PLA National University of Defense Technology (NUDT), Beihang University, and the Harbin Institute of Technology, all three of which support the PLA's classified research and development projects. NUDT, which is subordinate to the Central Military Commission and jointly administered by the Ministries of National Defense and Education, focuses on indigenous development of China's cutting-edge military technologies in quantum computing, artificial intelligence, and nanotechnology.⁴⁴ Beihang University is the self-described "leader and backbone" of China's national defense and aerospace industry, while the Harbin Institute of Technology maintains a close relationship with China's primary state-owned space contractor specializing in long-range ballistic missile and satellite technology, China Aerospace Science and Technology Corporation (CASC).⁴⁵ The scholarship program aims to recruit 11,000 people for 2020.⁴⁶

A final CSC scholarship, the National Government-Sponsored Program for Senior Research Scholars, Visiting Scholars, and Postdoctoral Students, targets S&T researchers who are advanced in their careers and already work for an employer linked to the Chinese government, like SOEs. This scholarship's 2020 selection guidelines indicate that recipients must follow the study plan agreed upon with their employer, regularly submit "training reports" on their progress to the Chinese consulate while abroad, and communicate the results of their study upon returning home.⁴⁷ The program aims to send 3,500 people abroad in 2020.⁴⁸

CSC Online Jobs Platform Connects Chinese Students with the Military-Industrial Complex

In addition to administering scholarships, the CSC runs an online careers platform to recruit Chinese students and scholars for institutions affiliated with China's military-industrial complex, advancing the country's military-civil fusion strategy. The platform extends the pool of potential recruits to all Chinese students and scholars with an internet connection, all at relatively low cost and without the high visibility of formal talent recruitment programs. The CSC's platform has hosted job advertisements for China's premier nuclear weapons facility as well as the so-called "seven sons of national defense,"[†] a group of universities deeply integrated with China's defense industry that are subordinate to the Ministry of Industry and Information Technology.

A July 2017 advertisement posted by the Chinese Academy of Engineering Physics (CAEP), a research complex that develops and tests China's nuclear and directed energy weapons, illustrated how CSC's online careers platform facilitates recruiting for enterprises that contribute directly to the PLA's military capabilities.⁴⁹ The advertisement exhorted applicants to "join the national defense cause" and indicated that recruits with overseas educations could work in departments researching areas ranging from explosives and detonation physics to laser development.⁵⁰ CAEP is on the U.S. Department of Commerce's Entity List, which restricts exports of certain sensitive technologies to organizations involved in activities that threaten U.S. national security or foreign policy interests.⁵¹

CSC's website hosted two other advertisements in 2017 that sought to recruit overseas Chinese students and scholars for institutions affiliated with weapons science and aeronautics. The Beijing Institute of Technology, which is ranked by the Ministry of Education as one of China's top universities for weapons science, sought postdoctoral students with strong academic qualifications from institutions at home or abroad.⁵² The advertisement noted that additional compensation was available to those with doctoral degrees from the "top 100 overseas universities in the

* The "accepting units" for the 2018 scholarship cycle of the National Government-Sponsored Graduate Student Program for the Building of Top Universities included universities known to be associated with China's military-industrial complex, according to a publicly available list on the CSC's website. For example, the list includes all of the "seven sons" universities: Beihang University, Beijing Institute of Technology, Harbin Institute of Technology, Harbin Engineering University, Nanjing University of Aeronautics and Astronautics, Nanjing University of Science and Technology, and Northwestern Polytechnical University. Military-affiliated institutions on the list include the National University of Defense Technology, Navy Medical University, Army Medical University, and Air Force Medical University. Selected party organizations and government ministries on the list include the CPC International Liaison Department, Ministry of Foreign Affairs, Ministry of Science and Technology, Ministry of Agriculture, Chinese Academy of Science, Chinese Academy of Social Science, State Oceanic Administration, China Earthquake Administration, State Bureau of Survey and Mapping, and National Forestry and Grassland Administration. See China Scholarship Council, "List of Accepting Units for the 2018 National Government-Sponsored Graduate Student Program for the Building of Top Universities" (2018 年国家建设高水平大学公派研究生项目受理单位一览表), January 10, 2018. Translation. <http://web.archive.org/web/20180801175627/http://www.csc.edu.cn/article/1142>.

† The "seven sons" of national defense include Beijing Institute of Technology, Beihang University, Harbin Engineering University, Harbin Institute of Technology, Nanjing University of Aeronautics and Astronautics (NUAA), Nanjing University of Science and Technology, and Northwestern Polytechnical University. Alex Joske, "China Defence Universities Tracker: Exploring the Military and Security Links of Chinese Universities," *Australian Strategic Policy Institute*, Report No. 23, November 2019, 6–7.

world.”⁵³ The Nanjing University of Aeronautics and Astronautics (NUAA), which works closely with the PLA, military aviation companies, and military aircraft manufacturers, posted an advertisement seeking to recruit overseas students for research projects in fields like mechanical engineering, aerospace engineering, computer science, and materials science.⁵⁴ NUAA’s advertisement left no doubt as to the military applications of the work recruited overseas students might do: “Nanjing University of Aeronautics and Astronautics warmly welcomes outstanding young students at home and abroad to serve the motherland ... and contribute to the country’s industrialization, informationization, and national defense modernization.”⁵⁵

PLA and Chinese Defense SOE Study Abroad Programs

Another way China uses foreign universities to train personnel who contribute directly to improvements in its military capabilities is via study abroad programs arranged by the PLA and Chinese defense SOEs. The PLA has sponsored at least 2,500 military scientists and engineers to study advanced scientific fields abroad over the past decade in a process it describes as “picking flowers in foreign lands to make honey in China,” according to Australian Strategic Policy Institute researcher Alex Joske, likening foreign S&T expertise to flowers that scholars bring back to China to serve as sources of nourishment and inspiration for buzzing hives of research and innovation.⁵⁶

The true number of scholars and students the PLA sponsors abroad is likely much higher, however. A 2012 Chinese media article about NUDT claimed that in the five years prior more than 300 of the academy’s faculty had gone abroad for study or visiting research positions, while more than 400 of its graduate students had gone to developed countries for doctoral study.⁵⁷ In the eight years since then, Beijing’s military modernization plans have only underscored the importance of sending personnel abroad to study foreign S&T, and most of the PLA’s academies and affiliated universities have probably formulated their own study abroad programs as a response to this political pressure.

At least 500 Chinese military scientists have been sent to study at U.S. universities since 2007, Mr. Joske writes, an outflow coupled with efforts by PLA universities to establish cooperative arrangements with U.S. institutions.⁵⁸ While these military scientists and engineers sometimes disclose their affiliations with the PLA, others deliberately obscure them.⁵⁹ An October 2018 *Wall Street Journal* investigation confirmed a number of cases in which PLA scientists and engineers who hid their ties to the PLA studied with professors at U.S. institutions like Carnegie Mellon University and Ohio University.⁶⁰ In these cases, U.S. institutions were initially unaware of their students’ military ties, assuming instead that the State Department would have vetted and denied a visa to military personnel who were cause for concern. The United States’ July 2020 decision to close the Chinese Consulate in Houston reportedly stemmed in part from U.S. officials’ assessment that diplomats posted there facilitated technology transfer by Chinese postgraduate researchers in areas such as artificial intelligence and biology who had hidden their active-duty status with the PLA from U.S. immigration authorities.⁶¹

The recent case of Wang Xin, a PLA officer and scientist arrested in June 2020 for alleged visa fraud, illustrates how Beijing sends military personnel to U.S. universities to collect information that advances its military capabilities. According to DOJ, Wang allegedly lied about his ongoing employment as a PLA technician in order to gain admission to the University of California, San Francisco (UCSF) in 2019.⁶² Once at UCSF, Wang’s PLA supervisor tasked him with observing the layout of UCSF’s lab—which conducted some research projects funded by grants from the National Institutes of Health—and bringing back information to help his military university replicate the lab in China. U.S. Customs and Border Patrol found that Wang had emailed research to his lab in China and had in his possession UCSF studies he was intending to share with PLA colleagues when he was apprehended at Los Angeles International Airport. Wang also allegedly told his supervisor at UCSF that he had already succeeded in duplicating some of the UCSF lab’s research in China. While in the United States, Wang received financial support from the PLA, the CSC, and UCSF.

The PLA also actively targets returning overseas students in its recruitment efforts to ensure the technical proficiency of its personnel. A 2019 article published by the Political Work Department of the PLA’s Western Theater Command noted that along with other technically talented groups, the 2.6 million overseas Chinese students and scholars studying abroad provide “fertile soil” for the PLA’s efforts to recruit capable civilian personnel.⁶³ The PLA has worked to boost its recruitment of returning overseas students since at least 2013 to make up for insufficient

expertise in key technical areas, as indicated in a 2013 *People's Liberation Army Daily* article summarizing changes to personnel regulations.⁶⁴

PLA personnel may serve in advisory roles for initiatives that seek to leverage returned Chinese students and scholars' S&T expertise for the state. The sixth China Returnee Investment Forum, held in Beijing in January 2020, brought together 400 people from China's government, SOEs, companies, and universities to discuss how returnees can contribute to technological innovation in China.⁶⁵ The forum also disbursed competitive awards to returnees who conducted outstanding S&T research in fields with clear military applications, including categories like military-civil fusion, aviation manufacturing, and logistics and supply chain management.⁶⁶ A Chinese media article summarizing the event noted that a former political commissar from the PLA's general staff and a former PLA pilot had been hired as "senior consultants" for the initiative.⁶⁷

Chinese defense firms also sponsor technical personnel to study abroad with an eye toward improving their organization's capabilities. The China Aerospace Science and Industry Corporation (CASIC), an SOE that contracts with China's space program and is the country's largest missile manufacturer, advertises study abroad as part of its broad array of staff development opportunities.⁶⁸ A 2011 article on the Chinese central government's official web portal shows that CASIC personnel participated over multiple years in a state-sponsored study abroad program to learn technical skills and further develop the organization's capabilities.⁶⁹ The Aviation Industry Corporation of China (AVIC), another state-owned aerospace and defense conglomerate, posted on its website a 2017 article that described a predeparture orientation for young aviation professionals from AVIC and other aerospace organizations going abroad for study.⁷⁰ While not specified in the articles, it is highly likely at least some of the CASIC and AVIC personnel were sent to the United States for study.

Pillar 2: Returning Home to Serve the Country: Talent Recruitment Programs and Other Incentives for Eventual Return to China

While Beijing requires some Chinese students and scholars to return home for service immediately after their scholarships conclude, it also promotes policies to incentivize overseas Chinese scholars and those who have chosen to remain in foreign countries after their studies to eventually return to China. These policies include talent recruitment programs, some of which are organized by the central government and feed directly into China's military industrial complex; massive state-run entrepreneurship parks, which exist to commercialize foreign S&T; and attractive business incentives that draw Chinese students and scholars away from U.S. businesses that would have employed them. Chinese officials such as Premier Li Keqiang have publicized their efforts to resolve obstacles to the return of highly skilled personnel to China, such as inadequate IP protections.⁷¹ They also increasingly appeal to overseas students and scholars on the basis of patriotism or the chance to be a part of China's rise as a world power.⁷²

Talent Recruitment Programs

There are hundreds of different talent recruitment plans administered by the central, provincial, and local levels of government.⁷³ The purpose of such programs is to incentivize both non-Chinese people and overseas Chinese students and scholars to eventually return to China to augment its scientific and military capabilities instead of contributing to the scientific activities of the foreign countries in which they were trained. One prominent example of a non-Chinese researcher recruited by a talent program is former Harvard chemistry department chair Dr. Charles M. Lieber, who in June 2020 pleaded not guilty to lying to the federal government about receiving funding from the Thousand Talents Program (though his work with the talent program itself was not a crime).⁷⁴ Most U.S. media and law enforcement scrutiny has focused on only a few of the hundreds of Chinese talent programs known to exist, allowing the vast majority to operate effectively unchecked.

Many of these talent programs focus not only on foreign education and training for their talents, but also on the transfer of fundamental research, as has occurred in the case of Project 111, a key Chinese talent program. Fundamental research is inherently not subject to export controls and thus does not qualify as IP that can be stolen. The case of Liu Ruopeng, for example, demonstrates the difficulty of preventing transfer of fundamental research that is not export controlled but nonetheless strategically important. Dr. Liu studied at Duke University beginning in 2006 under Professor David Smith, a prominent expert in new materials working on U.S. Department of Defense-

supported fundamental research. According to author Daniel Golden’s testimony before the House Science, Space, and Technology Committee, Dr. Liu was a recruiter for Project 111 and tricked Professor Smith into contributing to it.⁷⁵ He also brought several colleagues from China to Duke to photograph and measure the equipment used to measure the effects of the new material and then build an exact replica of the equipment in China.⁷⁶ Dr. Liu is now chairman of Kuang-Chi Science Ltd., a Hong Kong-listed firm that hosts a key Chinese state metamaterials lab in Shenzhen and has partnered with the PLA’s Hunan Space Bureau and CASIC.*⁷⁷

Talent programs may also facilitate efforts to engage in visa fraud or circumvent protections for IP developed within the United States. For example, a September 2019 Department of Justice complaint alleges a Chinese government official and several accomplices, including the Chinese director of a U.S. university’s Confucius Institute, tried to fraudulently convince at least seven U.S. universities to sponsor visas for Chinese scholars who were actually tasked with recruiting candidates for technology transfer.⁷⁸ Thousand Talents contracts also require participants to patent inventions in China, effectively ordering technologies to be transferred before they are protected.⁷⁹

NSDD 189 and the Open International Research System

At the height of the Cold War in the 1980s, defense technology acquisition efforts by Eastern Bloc countries posed a “significant threat” to U.S. leadership in science and technology, which the Reagan Administration regarded as “an essential element in [U.S.] economic and physical security.”⁸⁰ Following a national study that found that universities and “open scientific cooperation” played only a minor role in technology transfer to the Soviet Union, in 1985 the Administration issued NSDD 189, which established national policy governing the flow of scientific, technical, and engineering information produced by federally funded research at universities and laboratories. NSDD 189 defined fundamental research as “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 and industrial information protected for national security or commercial reasons.[†]⁸¹ The policy asserted that fundamental research should remain unrestricted “to the maximum extent possible” in order to preserve the creativity and collaboration necessary for healthy innovation, while proprietary or national security-related research should be restricted.⁸²

The NSDD 189 formulation process may have foreseen the weaknesses of such a policy in light of the current extensive U.S.-Chinese academic links and tight integration between universities, industry, and government on both sides. Dale Corson of Cornell University, who led the 1982 study on controls of scientific information, reasoned that academia’s minor role as a vector for technology transfer to the Soviet Union made it safe to preserve as an open environment. Dr. Corson warned, however, that “a more significant problem may well develop” if links grew between the U.S. government, industry, and universities.⁸³ When the directive was issued in 1985, technology transfer to the Soviet Union occurred through many routes, but since U.S. scientific research was largely siloed between government, academia, and industry, transfer through academic collaboration was only a minor risk. This has significantly changed over the past 35 years, however. Not only are the academic and financial connections between different components of the U.S. national security innovation base much more robust now, but academic links are also much stronger with counterparts in China than was the case with the Soviet Union. Furthermore, much more cutting-edge technology is dual use than was the case previously. It is therefore not clear whether a policy developed to govern the flow of scientific information during the Cold War can adequately protect U.S. interests in the face of the complex challenge from Beijing and its military-civil fusion strategy, which exploits these extensive academic links to target a much broader range of militarily applicable research.

* For more information on Kuang-Chi and its connection to China’s space program and domestic innovation, see Mark Stokes et al., “China’s Space and Counterspace Activities” (prepared on behalf of the U.S.-China Economic and Security Review Commission), May 11, 2020, 76–77. <https://www.uscc.gov/research/chinas-space-and-counterspace-activities>.

† Since about the mid-2000s, translational research has emerged as a new category in the medical field. Whereas fundamental research seeks to make scientific discoveries without specific applications in mind and applied research seeks to apply this type of general scientific understanding to develop specific products, according to the National Institutes of Health translational research seeks to apply observations from laboratories and preclinical trials directly toward developing medical interventions or to improving best practices. National Institutes of Health National Center for Advancing Translational Science, “About Translation.” <https://ncats.nih.gov/translation>; National Institutes of Health, “Institutional Clinical and Translational Science Award,” March 2007. <http://grants.nih.gov/grants/guide/rfa-files/RFA-RM-07-007.html>.

The powerful CCP Organization Department, which controls all staffing decisions within the CCP, directly oversees many talent programs, emphasizing the Party's explicit role in both setting the programs' goals and identifying and recruiting candidates. Some of the most prominent talent recruitment plans include the CCP Organization Department's Thousand Talents Program (TTP), the Ministry of Education's Changjiang Scholar Award Plan (also known as the Yangtze Scholar Award Plan) and Returned Student Scientific Research Start-Up Fund, the Chinese Academy of Science (CAS)'s "Hundred Talents Plan" and Return to Work in China Fund, and the National Post-Doctoral Science Fund.⁸⁴ These formal programs are designed to attract high-quality researchers, often with expertise in emerging technologies or areas with potential military applications.

To take one example, the Hundred Talents Program, established by CAS in 1994, offers academic appointments to overseas Chinese students and scholars aged 50 or younger who have received their doctorates and have a distinguished record of research.⁸⁵ In addition to committing to work at the awarding institution for a long period of time, applicants must be Chinese citizens or be willing to renounce their foreign citizenship, conditions that underscore the talent program's role in facilitating the eventual return of S&T expertise to China.⁸⁶ Despite the civilian veneer granted by its CAS affiliation, the Hundred Talents Program seeks to attract researchers who can contribute to projects furthering military-civil fusion. A 2019 CAS guidebook about the Hundred Talents Program noted that priority funding would be available to researchers whose work concerned core technologies associated with China's strategic priorities like deep space, deep sea, and military-civil fusion.⁸⁷ Perhaps with an eye toward obscuring these ties, the guidebook cautioned applicants for a "military-civil fusion group" within the program to submit their application materials by disc rather than email.⁸⁸

In addition to transferring technology, talent programs can attempt to replicate high-end U.S. technical educational curricula in China. The Dragon Star program, for example, showcases how talent recruits can expand Beijing's technology transfer apparatus from within the U.S. federal research funding system. Dragon Star was created in 2002 and belongs to an explicitly national defense-oriented component of CAS, the Institute of Computing Technology.⁸⁹ According to the program's website, it recruits ethnic Chinese computer science and engineering experts "who have achieved accomplishments and status in U.S. academia" to "systematically teach a U.S. research curriculum of 15–30 hours each" at Chinese universities and hold discussions with Chinese scientists working on those topics.⁹⁰ As of February 2019, more than 14,000 students in China had participated in nearly 200 such courses taught by almost 100 scholars.⁹¹

Entrepreneurship Parks and Business Incentives

China's specialized "entrepreneurship parks" target overseas Chinese students and scholars for recruitment to appropriate their knowledge to Beijing's commercial and potentially military benefit.

These parks partner with local universities and research institutes to spin off the knowledge and technical processes returned students and scholars had acquired while abroad into successful Chinese technology companies. A 2019 article in the *People's Daily* estimated that there are currently 367 pioneer parks for returned overseas students and scholars hosting more than 23,000 businesses and employing 93,000 personnel.⁹² It is difficult to estimate how many of the returnees in these entrepreneurship parks would otherwise have started businesses in the United States, and in any case the types and amount of technology transferred—rather than the number of businesses—are the more important indicators. However, anecdotal examples suggest the proportion of businesses established in entrepreneurship parks that otherwise would have been founded in the United States may be significant. According to the authors of the authoritative book *Chinese Industrial Espionage*, of the 95 businesses founded by returned overseas Chinese students and scholars in the Shanghai-based Caohejing park, half were founded by those who had studied in the United States.⁹³

Entrepreneurship parks for returnees may also be located near science and technology complexes that are designated centers for military-civil fusion. For example, the Mianyang Science and Technology Innovation Zone in Sichuan Province is a large complex that was authorized to conduct military-civil-fusion-related projects in 2002.⁹⁴ The Mianyang Overseas Students Pioneer Park, which itself incubates around 30 businesses, is located close to the zone's administrative headquarters, suggesting a high likelihood that cross-pollination occurs between the parks.⁹⁵ A 2016 article in the *People's Daily* praising the dynamism of military-civil-fusion-related research at Mianyang

Science and Technology Innovation Zone quoted the head of one of its centers who noted that more than 60 of his employees were returned overseas students and scholars.⁹⁶

Beijing also provides attractive business incentives to overseas Chinese students and scholars to return to China permanently to start their own companies, creating yet another channel for the absorption of foreign technologies. These incentives include central government financial support for returnees seeking startup capital, increased space for returnee startups in science parks, greater participation by government-owned venture capital funds in financing returnee startups, preferential tax policies, discounts on rent and land for business facilities, policy changes allowing returnee businesses to compete for government procurement contracts, and simplified business registration procedures.⁹⁷ In apparent recognition of returnee concerns about adequate protections for IP and quality of life, the new policies also included more support for returnees' patent applications, greater ease in acquiring household registration permits in desirable locations like Beijing and Shanghai, and more robust support to returnees' spouses and children to help them adjust to life in China. As researchers Yuping Ma and Suyan Pan note, "Returnees' contribution to the development of China's technological enterprises cannot be overestimated" because this population is largely responsible for the introduction of new high technologies and foreign capital to China.⁹⁸

Pillar 3: China's Transnational Network for Acquiring S&T from Chinese Students and Scholars in the United States

Beijing has also developed a robust transnational network of organizations designed to transfer scientific knowledge and technology from the Chinese diaspora in countries like the United States to mainland China. While there are thousands of components to this transnational network, a few of the most important include short-term "service activities" organized by government ministries and talent programs to bring overseas Chinese students and scholars back to China for short periods, innovation and startup competitions, and the "bridge"- building activities of organizations that purport to be part of Chinese civil society but are actually associated with the CCP's influence work. These transnational organizations allow China to benefit from Chinese students and scholars' intellectual activities even when they are physically located in the United States.

"Service Activities" Requiring Short-Term Travel to China or Cooperation with Chinese Institutions

China's government runs myriad programs to bring Chinese students and scholars living in the United States back to China temporarily to engage in scientific activities relevant to its economic and military modernization. One prominent program targets high-profile Chinese scholars appointed to teaching positions at prominent universities. Known as the Ministry of Education's Chunhui ("Spring Sunshine")^{*} Academic Vacations Program, the program recruits "overseas Chinese talents who have been appointed as assistant professors or above at famous foreign universities" in emerging technologies and other areas important to national development.⁹⁹ The program provides funding, housing, and medical insurance to overseas Chinese scholars in exchange for a commitment to travel back to China over school breaks to lecture and conduct research at domestic universities for three months to a year at a time.¹⁰⁰

Another notable program is the Ministry of Human Resources and Social Services' "Homeland-Serving Action Plan for Overseas Chinese," which organizes overseas Chinese students and scholars to participate in state-funded "service activities" like scientific training seminars or technical cooperation projects with domestic universities.¹⁰¹ According to a 2019 ministry press release, in 2018 the plan supported 500 training projects, led to more than 7,000 signed or promised cooperation agreements, and involved more than 18,000 participants in technical cooperation projects.¹⁰² Such projects may play a crucial role in transferring fundamental research and management expertise that advances a variety of Beijing's innovation priorities in a way that is arguably more effective than the occasional theft of a particular technology.

References to some short-term service programs that were heavily promoted on government websites in the past seem to have disappeared over the last two years, suggesting Chinese officials may be suppressing information about these programs to avoid raising other countries' suspicions. For example, the Short-Term Return Financial

^{*} "Chunhui" (春晖) is also a figurative expression referring to parental love.

Assistance Program boasted on its website that it selects “outstanding overseas students” to “participate in research work on important scientific research topics of the state, ministries, commissions, provinces and cities” and “return to China for cooperative research, lectures, training, project development, technology transfer [and] technology exchange.”¹⁰³ The program was still being advertised as of 2018 on a website affiliated with the Chinese consulate in San Francisco, but there have been no obvious references to it since that time.

Innovation and Startup Competitions

Another way China exploits the knowledge and skills of Chinese students and scholars in the United States is overseas innovation and startup competitions, which China’s embassy and consulates in the United States frequently advertise and delegate nonprofit organizations to run. These competitions function to repatriate overseas Chinese students and scholars before they have a chance to commercialize their ideas in the United States or other developed countries in which they have been educated and developed those ideas. The ideas targeted by these competitions could in some cases have the potential to help China gain dominance in key technologies at the United States’ expense.

The most prominent China-sponsored startup competitions for overseas students and scholars is the annual Chunhui Cup, which is distinct from the aforementioned Chunhui Academic Vacations Program and appears to heavily target Chinese students and scholars in the United States. The startup competition was established in 2006 to support the implementation of a major Chinese state development plan known as the National Medium- and Long-term Plan for Science and Technology Development (2006–2020). Sponsored by both the Ministry of Education and the Ministry of Science and Technology, the Chunhui Cup is administered by Chinese diplomatic outposts as well as the Ministry of Education’s Chinese Service Center for Scholarly Exchange (CSCSE).^{*} According to ProPublica, the CSCSE’s subsidiary in San Francisco is registered as a 501(c)(3) nonprofit organization.¹⁰⁴

According to the 2019 competition guidelines, applicants must “be Chinese students studying or working abroad (with overseas study experience)” and submit project proposals in high-tech fields such as electronics, new materials, new energy, environmental science, biology, medicine, and agriculture.¹⁰⁵ The competition involves three rounds, culminating in an all-expenses paid trip to China for finalists to meet with representatives from local government, commercial enterprises, venture capital funds, innovation parks, or universities that can offer them financing or physical space for their startups. A 2019 *Xinhua* article indicated that more than 2,500 projects have been selected as finalists over the competition’s 14-year lifetime, with almost 500 people returning to China to start businesses in 76 cities.¹⁰⁶ A list of prefinalist projects for 2016 suggests that about half came from the United States.¹⁰⁷

Transnational Professional Associations Connect S&T Experts with the United Front

China’s technology transfer efforts also rely on the work of large transnational organizations affiliated with the United Front that seek to harness overseas Chinese students and scholars as a labor pool for national priorities. According to a Georgetown Center for Security and Emerging Technology study analyzing 208 such Chinese professional associations, 61 percent advertised that they participate in technology transfer, including bringing scientists to China or participating in specific talent programs.¹⁰⁸ Two of the most important of these organizations are the Western Returned Scholars Association (WRSA) and the China Association for Science and Technology (CAST). While these organizations appear to be independent professional associations for returnee and diaspora communities, they are in fact subordinate to organs affiliated with the CCP’s United Front work. WRSA is subordinate to the United Front Work Department (UFWD), the CCP agency tasked with coordinating influence

^{*} The CSCSE is affiliated with China’s Ministry of Education and provides services to Chinese students and scholars going abroad as well as those returning to China. The CSCSE’s website notes that one of its divisions administers a “personnel record database of Chinese students and scholars studying overseas.” It also notes the CSCSE has founded a company known as Beijing Yinhong International Education Consulting Co., Ltd., which facilitates “talents hunting, technology transfer and [the provision of] internet-related information to help the scholars returning and investing in China.” Chinese Service Center for Scholarly Exchange, “About Us.” <http://webcache.googleusercontent.com/search?q=cache:FjlceNyCIB8J:studyinchina.cscse.edu.cn/publish/portal4/tab542/+&cd=2&hl=en&ct=clnk&gl=us>; Embassy of the People’s Republic of China in India, “Chinese Service Center for Scholarly Exchange.” <http://webcache.googleusercontent.com/search?q=cache:DMJViTNOz0MJ:in.chineseembassy.org/eng/jy/cglx/t61158.htm+&cd=3&hl=en&ct=clnk&gl=us>.

operations at the operational level, while CAST is an official constituent of the Chinese People’s Political Consultative Conference (CPPCC), the most important institutional embodiment of the United Front.^{*109} The United Front’s role in channeling overseas S&T expertise toward China’s development has grown since a 2013 directive from General Secretary Xi to focus on incentivizing overseas Chinese to contribute their technical skills and expertise to China’s national rejuvenation.¹¹⁰

Western Returned Scholars Association

The WRSA is a transnational organization for returned overseas Chinese students and scholars, many of whom are experts in STEM fields.¹¹¹ According to its website, the WRSA seeks to “meet the requirements of the [CCP] leadership that it should ‘become a bridge between the Party and overseas students and scholars, an assistant in the work of the Party and government towards them, and a warm home.’”¹¹² The website describes the WRSA’s activities in service-oriented terms, noting that the organization “has established bases for overseas scholars to make contributions to China and provided a large number of ideas and proposals for the [CCP] and government.”¹¹³ The organization has at least 17 country- or region-level branches, including one for the United States that boasts more than 6,000 members in the Beijing chapter alone as well as alumni from renowned universities such as Harvard and the Massachusetts Institute of Technology.¹¹⁴

The WRSA’s website notes that its various departments carry out scientific exchange activities, solicit recommendations for the Chinese government’s scientific policymaking, organize overseas students and scholars to “actively participate in national and local economic construction,” and engage in scientific collaborations.¹¹⁵ The WRSA also promotes talent recruitment programs such as the Thousand Talents Plan and runs the official association for Thousand Talents participants.¹¹⁶ According to a 2017 article posted on the WRSA’s website, the deputy minister of the UFDW gave specific guidance to the Thousand Talents Plan Experts Association and the WRSA to jointly support talent program selectees within China.¹¹⁷

Like the CSC, the WRSA also maintains an online job recruitment platform for returned overseas students that facilitates recruiting for national defense universities. Harbin Institute of Technology posted an advertisement on WRSA’s platform in December 2018 for research positions work in its newly established military-civil fusion institute.¹¹⁸ Beihang University also used WRSA’s platform in September 2019 to post an advertisement for postdoctoral students to join a research group focusing on engines, gas turbines, and fluid machinery for aircraft.¹¹⁹

The WRSA also carries out influence operations by disseminating propaganda that praises overseas Chinese students and scholars who repay China by bringing back their expertise.¹²⁰ A good example of WRSA propaganda can be found in a 2018 article summarizing a study session held by the Chengdu branch of the WRSA that featured a patriotic testimonial by a professor with expertise in new materials.¹²¹ The professor praised the CCP and vowed to use his scientific knowledge to make great contributions to social and economic development.

China Association for Science and Technology

CAST is a transnational organization and constituent member of the CPPCC whose stated mission is to serve “as a bridge that links the Communist Party of China and the Chinese government to the country’s science and technology community.”¹²² CAST’s subordination to the CPPCC suggests the organization is concerned with the intersection of national S&T priorities and China’s influence activities, particularly those targeting overseas Chinese students and scholars. CAST maintains at least 12 chapters with about 8,000 members located across the United States.¹²³ These local chapters operate under the ostensibly independent but undoubtedly related affiliate, CAST-USA. CAST-USA’s chapters are located in Arizona, Connecticut, Dallas, Florida, Los Angeles, the greater New York area (New York and New Jersey), North Carolina, Pittsburgh, San Diego, Silicon Valley, Utah, and Washington,

* Under the leadership of the CCP Politburo Standing Committee member responsible leading the United Front, the CPPCC is a forum for “consulting” with approved sectors of Chinese society to facilitate the CCP’s leadership, even though in reality the CCP controls these constituents. Alexander Bowe, “China’s Overseas United Front Work: Background and Implications,” U.S.-China Economic and Security Review Commission, August 24, 2018, 3-4, 9. https://www.uscc.gov/sites/default/files/Research/China's%20Overseas%20United%20Front%20Work%20-%20Background%20and%20Implications%20for%20US_final_0.pdf.

DC.¹²⁴ The organization appears to be registered under the name “Chinese Association for Science and Technology USA Foundation Inc” as a 501(c)(3) in New York.¹²⁵

CAST contributes to China’s overseas technology acquisition efforts chiefly through the “Haizhi Plan,” a sprawling program that conducts a plethora of outreach initiatives to overseas Chinese students and scholars.¹²⁶ For the first ten years of its existence, the Haizhi Plan engaged in many of the activities typically associated with talent programs, such as sponsoring short-term trips to China, maintaining lists of prominent overseas Chinese students and scholars regarded as experts in their scientific field, organizing recruitment events, sponsoring startup competitions, offering incentives to entrepreneurs to return to China, and enabling scientific cooperation projects between overseas and domestic institutions.¹²⁷ After 2014, however, CAST’s Haizhi Plan expanded to encompass a series of “offshore innovation and entrepreneurship bases” that went a step beyond China’s domestic entrepreneurship parks by leveraging organizations already established on foreign soil to tap into overseas Chinese S&T talent.¹²⁸

Located in major Chinese cities, CAST’s 20 offshore entrepreneurship bases manage a network of overseas “workstations” in foreign countries.¹²⁹ The workstations offer virtual or physical office spaces provided by pseudo-professional organizations affiliated with the United Front to serve as platforms for overseas Chinese students, scholars, and professionals to work on research similar to that conducted during their day jobs.¹³⁰ According to Strider Technologies intelligence team lead Andrew Spear, research conducted at these overseas workstations is then fed back to startups or existing enterprises incorporated in the China-based offshore entrepreneurship bases.¹³¹ Mr. Spear notes that overseas Chinese researchers who work at these workstations can be compensated by receiving equity in a startup incorporated in China, among other things.¹³² Chinese media articles indicate that a number of overseas workstations are based in major U.S. cities, including the Silicon Valley area and Boston.¹³³

Visa Screening to Mitigate Technology Transfer Results in Few Denials

The U.S. interagency process to screen visa applicants for technology transfer risks, which relies on matching applicants to known sources of concern, reviews applicants from China more than those from any other country.¹³⁴ The review process is slow, since relevant agencies continually struggle with high backlogs of reviews, delays, and analyst shortages. The U.S. government screens over 100,000 visa applications annually for risks, including illicit technology transfer, proliferation of weapons of mass destruction, and terrorism.¹³⁵ According to one former State Department employee familiar with the process, it is like “drinking from a fire hose.”¹³⁶

The screening process is cumbersome since the system used is outdated and the bar for visa denial is high: applicants may be denied if they are deemed likely to violate specific export controls, but not if they are deemed likely to transfer sensitive emerging technologies that are not subject to export controls.¹³⁷ The Consular Lookout and Support System, which is used to cross-check potential concerns, also has several shortcomings.* The system does not directly collect information from applicants, and it appears not to be able to automatically recognize text, meaning that consular officers must manually input relevant data.¹³⁸ Following this initial processing, when an applicant’s background or proposed activities indicate they may seek access to a technology contained in the State

* Inputs into the system include past visa refusals, immigration violations, and terrorism concerns from external federal agencies, which can then be checked against other consular databases for accuracy. CLASS can also receive other information independently of a current visa application. The U.S. Departments of State and Homeland Security and other U.S. border agencies can then use CLASS data to perform name checks and match applicants with information in the system to assess whether or not an individual should be issued a visa. Based on information entered into CLASS, consular officers can request a specific type of special advisory opinion if an applicant warrants further review. U.S. Department of State, *Consular Lookout and Support System (CLASS) PIA*, September 2018, 3, 6. <https://www.state.gov/wp-content/uploads/2019/05/Consular-Lookout-and-Support-System-CLASS-PIA.pdf>; U.S. Department of State, *AILA/Department of State Liaison Meeting*, October 9, 2014, 10. <https://travel.state.gov/content/dam/visas/AILA/AILA%20DOS%20October%202014.pdf>; U.S. Department of Homeland Security Office of Inspector General, *DHS’ Efforts to Screen Members of Foreign Terrorist Organizations*, July 2013, 7. https://www.oig.dhs.gov/assets/Mgmt/2013/OIG_13-103_Jul13.pdf; U.S. Department of Homeland Security Office of Inspector General, *U.S. Immigration and Customs Enforcement Visa Security Program*, July 2008, 7. https://www.oig.dhs.gov/sites/default/files/assets/Mgmt/OIG_08-79_Jul08.pdf; Government Accountability Office, *Border Security: Streamlined Visas Mantis Program Has Lowered Burden on Foreign Science Students and Scholars, but Further Refinements Needed*, February 18, 2005, 4–5. <https://www.gao.gov/products/gao-05-198>; U.S. Department of State, *Exchange Visitor Program Facts and Figures*. <https://j1visa.state.gov/basics/facts-and-figures/>; U.S. Department of State, *Student Visa*. <https://travel.state.gov/content/travel/en/us-visas/study/student-visa.html>.

Department's interagency Technology Alert List,* consular officers can request a Visa Mantis security advisory opinion (SAO), a type of analytical review to assess technology transfer risk.^{† 139}

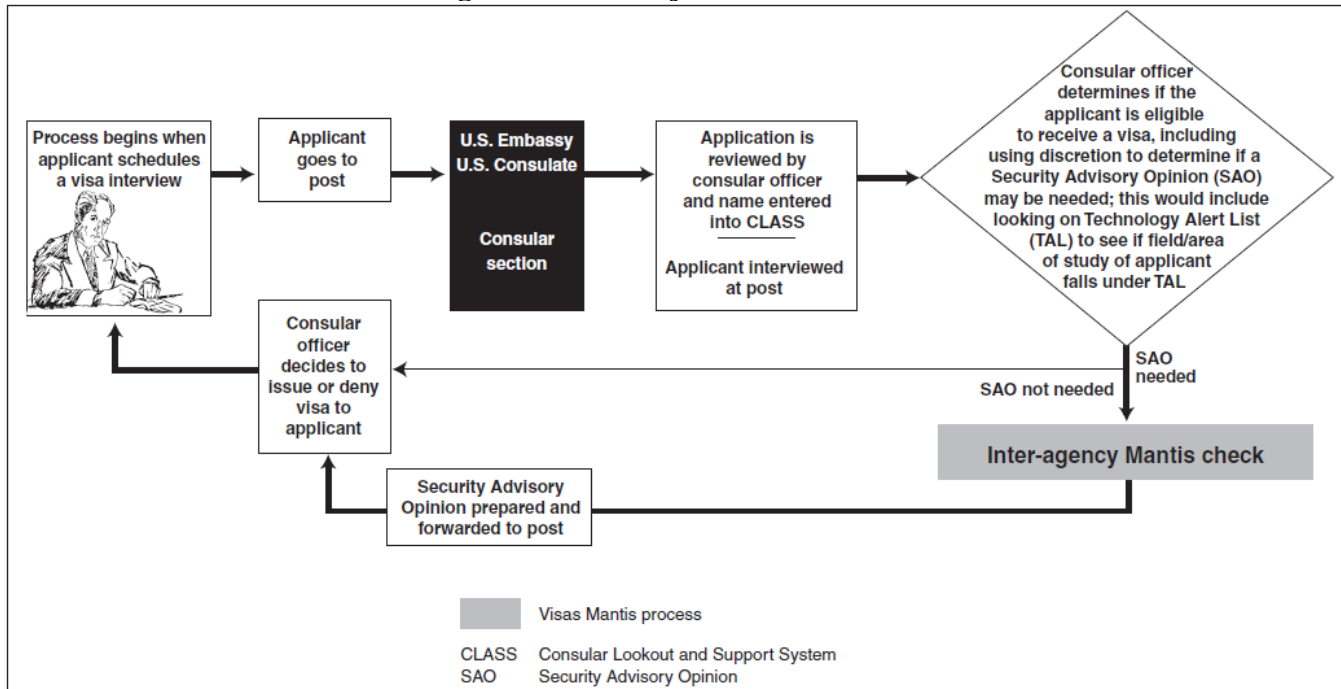
The SAO process can help consular officers judge whether a visa applicant poses a risk for technology transfer, but the finding cannot rely on past violations, the likely transfer of uncontrolled but sensitive technologies, or participation in talent programs. Ultimately, less than five percent of Chinese visa applications flagged for a Visa Mantis SAO are denied.¹⁴⁰ After the initial flag, if a Mantis SAO indicates an applicant “seeks to ... solely, principally, or incidentally” violate U.S. export control laws or engage in espionage, this finding is a basis to deny the visa under the Immigration and Nationality Act.¹⁴¹ However, the relevant portion of the law does not include past instances of engaging in such activities as a basis for denial, only the risk of future transgressions.¹⁴² Furthermore, even if an applicant poses a likely risk for future transfer of an uncontrolled technology, potentially sensitive emerging technologies are often not subject to export controls, so this is insufficient basis to deny a visa.¹⁴³ Finally, not only is participation in foreign talent programs not a basis for visa denial under U.S. law, but the State Department also does not even systematically track participation in such programs.¹⁴⁴ According to Assistant Secretary of State for Educational and Cultural Affairs Marie Royce, as of July 2019 only 0.0001 percent of all Chinese student visa applications had been denied due to concerns relating to espionage or theft of IP.¹⁴⁵

Immigration and Customs Enforcement (ICE) developed a pilot program known as the Domestic Mantis Initiative to track risks related to nonimmigrant and student exchange visitors who transfer into a sensitive field of study after receiving a visa to study in a nonsensitive field.¹⁴⁶ ICE's Counterterrorism and Criminal Exploitation Unit estimated in an August 2016 report that vetting is required for 600 such students per semester, requiring analysts to “conduct continuous vetting and monitoring” of relevant cases by pulling data from SEVIS on students from countries that pose a high risk.¹⁴⁷ According to testimony before the Senate Finance Committee by Louis A. Rodi III, a senior ICE official, this semiannual review checks students' status against “Intelligence Community holdings for additional derogatory information, open source information, and academic journals” for indications students may pose an increased risk of technology transfer.¹⁴⁸

* The list, which is updated annually but is not publicly available, is based on items subject to export controls such as nuclear and missile technologies. The items on the list, however, are not necessarily themselves all subject to export controls. Consular officers must manually review an applicant's background and proposed activities to determine whether they pertain to any technologies included on the list. Officers can then flag an application for further review to determine whether the applicant poses a risk of illicit transfer of the technology in question. U.S. Senate Permanent Subcommittee on Investigations, Committee on Homeland Security and Governmental Affairs, *Threats to the U.S. Research Enterprise: China's Talent Recruitment Plans*, November 2019, 79–80. <https://www.hsgac.senate.gov/imo/media/doc/2019-11-18%20PSI%20Staff%20Report%20-%20China's%20Talent%20Recruitment%20Plans.pdf>; Government Accountability Office, *Border Security: Streamlined Visas Mantis Program Has Lowered Burden on Foreign Science Students and Scholars, but Further Refinements Needed*, February 18, 2005, 5–6. <https://www.gao.gov/products/gao-05-198>.

† Mantis is one of several types of SAO known to exist. All are named for animals, and they screen visa applicants for different reasons. Not all information pertaining to SAO types is public, but other confirmed types as of 2003 include, for example, Bear, for officials from certain countries; Condor, for certain counterterrorism concerns; Donkey, for applicants who have a hit in CLASS or are from countries with special processing requirements; Eagle, for certain applicants from China, Cuba, Iran, Russia and Vietnam; Merlin, for refugees with a hit in CLASS, certain Cuban parolees, or following-to-join asylees; Pegasus; and Horse. Janice L. Jacobs, testimony before Senate Committee on Foreign Relations Subcommittee on International Operations and Terrorism, October 23, 2003. <https://www.govinfo.gov/content/pkg/CHRG-108shrg92725/html/CHRG-108shrg92725.htm>.

Figure 3: Visa Adjudication Process



Source: Government Accountability Office, *Border Security: Streamlined Visas Mantis Program Has Lowered Burden on Foreign Science Students and Scholars, but Further Refinements Needed*, February 18, 2005, 6. <https://www.gao.gov/products/gao-05-198>.

Implications for the United States

While many countries institute preferential policies to attract highly skilled personnel to their economies, no country in the world employs an S&T transfer system that is remotely comparable to China's in terms of scale, comprehensiveness, or determination to leverage its overseas nationals. China's S&T transfer ecosystem exploits overseas Chinese students and scholars for technology and know-how that can be commercialized or militarized in China, depriving the United States of the benefits of research funded by U.S. taxpayers while directly contributing to a strategic competitor's technological advances. While the transfer of information and processes associated with fundamental research conducted in the United States is legal, the Chinese government vigorously seeks to acquire such research precisely because it recognizes its strategic value, and by extension, the advantages it confers in the emerging competition with the United States.

When Chinese students and scholars trained at U.S. universities return to China to commercialize the ideas and technologies they developed while abroad, the U.S. firms that would have employed them miss a crucial first-mover opportunity, and the U.S. institutions that trained them are denied a direct return on their investment. Moreover, this U.S.-funded research can ultimately benefit Chinese state-owned or defense enterprises that are competing with the United States. Even when overseas Chinese students and scholars do stay in the United States after graduation, China's transnational technology transfer organizations and talent recruitment plans provide a means to contribute to China's national rejuvenation by transferring technology and know-how without requiring physical return.

Because China's leaders have promoted a military-civil fusion strategy and dictated that those with S&T expertise serve the cause of national rejuvenation, state-affiliated institutions absorb the knowledge of overseas Chinese students and scholars and then leverage it to improve China's military capabilities. In effect, U.S. universities are training scientists and engineers who will work in a range of organizations antithetical to U.S. national security interests, including the PLA.

The U.S. government has well-established counterintelligence and law enforcement practices for monitoring and mitigating traditional espionage or IP theft. For example, Ji Chaoqun, an electrical engineering student in Chicago, was arrested in September 2018 and charged for working under the direction of the Jiangsu Province Ministry of

State Security to identify and assess potential recruits to help steal aerospace technology.¹⁴⁹ He allegedly provided biographical information on eight ethnic Chinese individuals in the United States for the Jiangsu Ministry of State Security to assess as candidates for recruitment, attempting to conceal the nature of the message by labeling the email attachment “Midterm Test Questions.”¹⁵⁰ When a foreign intelligence agency is involved and IP is targeted for theft in this way, the necessary U.S. legal response is clear. These counterintelligence and law enforcement protocols are not applicable to countering licit technology transfer, however, which can still serve the CCP’s strategic interests at the expense of U.S. interests despite being legal.

Successive U.S. administrations have struggled to respond effectively due to the seeming contradiction between attracting bright foreign STEM researchers and addressing the threat posed by nontraditional intelligence collectors.*¹⁵¹ Consular officers are unable to comprehensively and quickly assess visa applicants for risks at post. In June 2018, the Trump Administration implemented a new policy to limit the validity of visas to one year for some Chinese nationals seeking to study in STEM fields at the graduate level, effectively rolling the policy back to the one in place before the Obama Administration’s change in 2014.¹⁵² In November 2018, then Attorney General Jeff Sessions launched the China Initiative, a DOJ campaign to elevate the priority and urgency of countering economic espionage by China.¹⁵³ According to Federal Bureau of Investigation Director Christopher Wray in July 2020, China-related economic espionage cases have increased 1,300 percent over the past decade, though the size of this increase in absolute terms is unclear.¹⁵⁴ The bureau opens a new China-related counterintelligence case about every ten hours, and almost half of the nearly 5,000 open counterintelligence cases nationwide are China-related.¹⁵⁵

The fact that many of the problematic activities associated with Beijing’s technology transfer system are legal under U.S. law raises additional concerns. In the United States, it is not illegal for universities to admit Chinese graduate students and researchers who work for organizations affiliated with Beijing’s military-industrial complex, participate in talent recruitment programs, or are members of professional organizations affiliated with the UFWD. With the exception of a few notable cases of theft or attempted theft of IP, the United States’ law enforcement response to Beijing’s technology transfer programs has largely focused on secondary charges, such as visa fraud or making false statements, because most such transfers involve know-how or information that qualifies as fundamental research or is not theft of a specific technology.¹⁵⁶ Moreover, it is possible that the sprawling ecosystem of programs China has built for the licit transfer of fundamental research and management expertise could enhance the illicit transfer of IP or export-controlled technologies. In May 2020, the Trump Administration announced the suspension of F and J visas to Chinese graduate students and scholars who are or have been affiliated with institutions that “implement or support” military-civil fusion, but it is currently unclear precisely to which Chinese institutions this executive order will apply.¹⁵⁷

Disentangling U.S. experts and academic institutions from Beijing’s network of technology transfer initiatives would be a massive undertaking, complicated by the ever-expanding network of incentives it proffers. It is not clear that the current system of international collaboration, which is based on freely sharing fundamental research, can be mutually beneficial to all parties when one country systematically abuses the open nature of academic and scientific cooperation to enrich itself and strengthen its military at the expense of others. It is clear, however, that the Chinese government’s domestic innovation model relies on its network of technology transfer programs to exploit this cooperation, and the United States has not yet developed a coherent response to this challenge.

The idea that the United States must either bar all Chinese students from studying STEM fields or welcome them into every laboratory is a false choice.¹⁵⁸ In fact, there is a spectrum of policy options the United States can pursue to guard against the most pernicious programs enabling China’s technology transfer ambitions while minimizing the collateral damage done to foreign students and scholars. Whichever policies the United States pursues, they will

* “Nontraditional intelligence collector” generally refers to scientists, engineers, businesspeople, and students in academia, labs, and the defense industrial base who are coopted at mass scale into intelligence work such as recruitment, collection of intelligence, and technology transfer that is contrary to U.S. interests. However, given the scale of the centrally directed system designed to identify critical knowledge gaps, spot and assess foreign sources of needed information, and facilitate the transfer of relevant technology back to China, the distinction between nontraditional and clandestine or technical intelligence collection is somewhat artificial. Peter Mattis and Matthew Brazil, *Chinese Communist Espionage: An Intelligence Primer*, Naval Institute Press, 2019, 145–146; U.S. Department of Justice, *Attorney General Jeff Sessions’ China Initiative Fact Sheet*, November 1, 2018, 2. <https://www.justice.gov/opa/speech/file/1107256/download>; Olivia Gazis, “U.S.’ Top Spy-Catcher: China Brings ‘Ungodly Resources’ to Espionage,” *CBS*, September 5, 2018. <https://www.cbsnews.com/news/ncsc-director-says-china-is-the-largest-threat-to-national-security/>; Peter Mattis, “A Professional Assessment of Chinese Espionage,” *International Journal of Intelligence and Counterintelligence* 28:2 (2015): 400.

be most effective if implemented in conjunction with efforts to precisely characterize the scope of concerning technology transfer activities. Moreover, such policies will find the proper balance between U.S. interests and values if they adopt a targeted approach to dismantling the state-backed programs exploiting Chinese students and scholars. In other words, the United States can embrace Chinese students and scholars who choose to come here for their studies while systematically severing the ties that bind them to China's technology transfer ecosystem.

Appendix I: China's Programs for Overseas Students and Scholars with S&T Expertise

The following is a selection of Chinese state-sponsored programs for overseas Chinese students and scholars that facilitate the transfer of scientific knowledge and technology to facilitate China's economic and military modernization.

China Scholarship Council (CSC) Scholarships of Note

- The **National Study Abroad Fund** (国家留学基金) is a China Scholarship Council-administered fund that covers most costs associated with studying abroad for recipients whose intended course of study relates to “disciplines around national strategic tasks.”¹⁵⁹ A notice summarizing regulations for the National Study Abroad Fund's 2020 application cycle indicated that such areas include basic and applied research, key technologies, emerging technologies, modern engineering technologies, and disruptive innovation. To be eligible for the scholarship funds, applicants must “support the leadership of the Communist Party,” “have a sense of ... mission to return to China to serve the country,” and hold PRC citizenship without the right of permanent residency in any other country.¹⁶⁰ Moreover, the National Study Abroad Fund requires recipients to sign a 2018 CSC document entitled “Agreement on Funding Overseas Study Abroad,” which contains a clause requiring recipients to commit to at least a two-year service commitment upon returning home.¹⁶¹ The implication of these conditions is that the National Study Abroad Fund sends abroad only patriotic Chinese students and scholars who are willing to contribute their advanced skills directly to efforts filling China's key technological gaps upon their return home. According to the notice, the National Study Abroad Fund plans to select 30,000 applicants for study abroad in 2020.¹⁶²
- The **National Government-Sponsored Program for Senior Research Scholars, Visiting Scholars, and Postdoctoral Students** (国家公派高级研究学者、访问学者、博士后项目) is a scholarship supported by the China Scholarship Council's National Study Abroad Fund that targets S&T researchers who are advanced in their careers and thus in a position to directly contribute the fruits of their studies to their government-linked employer. This is reflected by the fact that senior researcher scholars must, in addition to meeting basic eligibility requirements, also meet one of the following: work for a state key laboratory; belong to the CAS, the Chinese Academy of Social Sciences or one of several well-known talent recruitment plans; or hold administrative positions of a certain level in one of the “central state organs” or in state-owned medium or large enterprises.¹⁶³ These conditions require applicants to simultaneously prove their professional excellence and connections to the state apparatus. The 2020 scholarship selection guidelines indicate that recipients must follow the study plan to which they and their sponsoring work unit originally agreed, regularly submit “training reports” on their progress to the Chinese consulate while abroad, and summarize the results of their study abroad upon returning home.¹⁶⁴ Notably, the guidelines emphasize the importance of predeparture ideological indoctrination and sternly notes that the program will “not send out those who have [political] problems.”¹⁶⁵ The program aims to send 3,500 people abroad in 2020, a small proportion of the 30,000 recipients funded by the National Study Abroad Fund.
- The **National Government-Sponsored Graduate Student Program for the Building of Top Universities** (家建设高水平大学公派研究生项目) is a scholarship funded by the China Scholarship Council that seeks to cultivate doctoral students who will form the backbone of a future world-class university system in China. Selection guidelines for this program contain similar language about political loyalty and a two-year service commitment upon returning to China but differ in their eligibility requirements. Applicants may be freshly graduated from domestic universities or research institutes; work fulltime for a domestic enterprise, government unit, or scientific research institution; or have earned their undergraduate degree from a foreign university.¹⁶⁶ To receive full coverage of tuition, applicants must be of “high comprehensive quality and development potential” and select foreign supervisors with “strong scientific research capabilities” in disciplines or departments with a “large international influence.”¹⁶⁷ The scholarship guidelines specify that “emphasis shall be placed on supporting overseas students to travel to well-known institutions ... in ... technologically-developed countries and regions.”¹⁶⁸ These stipulations

suggest that scholarship recipients are chosen for their potential to learn and transfer cutting-edge research from the world's leading institutions to Chinese universities.

Integrated Innovation and Entrepreneurship Initiatives

- The **National Returnee Innovation and Entrepreneurship Ecosphere Initiative** (共建全国海归创新创业生态圈倡议) is an integrated platform established in 2019 by three Beijing-based professional associations for returned overseas Chinese as well as those still abroad to share resources, conduct research, and convert scientific and technological advancements into industrial products.¹⁶⁹ In addition to this platform, the ecosphere promotes Communist party-building activities among still-overseas and returned overseas Chinese students and scholars as well as “theoretical research” on the political participation of Chinese students and scholars abroad.¹⁷⁰ A 2019 *China Business Net* article made the initiative's links to Chinese government priorities clear by stating that its purpose is to implement “the innovation-driven development strategy, and attract and organize returned overseas students and scholars to serve the motherland in various ways.”¹⁷¹ It appears that some form of the ecosphere initiative described as the “Capital Returnee Innovation and Entrepreneurship Ecosphere” (首都海归创新创业生态圈) has already been unveiled in Huairou Science City and Innovation Town (怀柔科学城创新小镇) just outside of Beijing.¹⁷² Little is known about the ecosphere, but media reports indicate that its “member units” include domestic industrial parks, science and technology innovation centers, associations for returned overseas Chinese students and scholars, and groups for those who remain overseas. At a 2019 meeting to discuss the ecosphere initiative, Beijing Science and Technology Incubator Returnee Association Chairman Guan Shuai noted that the initiative had already grown to more than 63 member units.¹⁷³ He also made a patriotic appeal to returned and still-abroad Chinese students and scholars in S&T fields targeted by the initiative, reminding them to “keep in mind the party's ideals ... and carry forward the great Long March spirit in entrepreneurship.”¹⁷⁴ The Sixth China Returnee Investment Forum held in January 2020 took place in conjunction with what was described as the “2020 Capital Overseas Returnees' Innovation Ecosphere Summit” in Beijing. More than 400 representatives from Chinese government departments, Chinese and foreign business associations, international financial institutions, SOEs, and research institutes attended the forum. In addition to announcing the “fourth batch” of new member units to the ecosphere initiative, the forum awarded several competitive awards to returnees who had conducted outstanding S&T research.

Transnational Pseudo-Professional Organizations

- The **Western Returned Scholars Association**, or WRSA (欧美同学会), is a mass organization for returned overseas Chinese students and scholars that is subordinate to the UFWD, which in turn is tasked with winning over allies for the CCP both at home and abroad.¹⁷⁵ According to its introductory webpage, the WRSA seeks to “meet the requirements of the CPC [Communist Party of China] leadership that it should ‘become a bridge between the Party and overseas students and scholars, an assistant in the work of the Party and government towards them, and a warm home.’”¹⁷⁶ The introductory webpage describes the WRSA's activities in service-oriented terms, noting that the organization “has established bases for overseas scholars to make contributions to China and provided a large number of ideas and proposals for the CPC and government.”¹⁷⁷ A webpage showing the WRSA's organizational chart makes clear how these bridging functions are operationalized through the activities of its Liaison Office and Social Services Department. The Liaison Office's main duties include “liaising with foreign embassies in China and other foreign institutions and personnel in the countries where the [overseas] students are located, and jointly organizing cultural, academic and scientific exchange activities.”¹⁷⁸ By contrast, the Social Services Department is responsible for “organizing overseas students to submit macro and micro suggestions for scientific decision-making to the central and national departments,” “organizing overseas students to actively participate in national and local economic construction,” and “organizing horizontal connections between overseas students and enterprises, scientific research institutions, and international friendly groups.”¹⁷⁹ The WRSA appears to have 17 “country-level” branches, including one for the United States that boasts more than 6,000 members in the Beijing chapter alone as well as alumni from renowned universities such as Harvard and the Massachusetts Institute of Technology.¹⁸⁰ In addition to these liaison

and advisory activities, the WRSA also promotes talent recruitment programs such as the Thousand Talents Plan.¹⁸¹ Other talent-related activities include the WRSA's startup competition, the Overseas Talents Innovation and Entrepreneurship Competition (海外留学人员创新创业大赛), and its online job recruitment platform for returned overseas students, the WRSA Returnee Talent Network (see previous sections for more). True to its role as part of the CCP influence apparatus, the WRSA engages in influence work, too: through appeals to patriotism, it seeks to induce overseas Chinese students and scholars to participate in technology and know-how transfer activities. Such influence work generally occurs through the dissemination of propaganda or through events held in conjunction with Chinese embassies and consulates, where WRSA officials may praise overseas Chinese students and scholars who have vowed to "repay" the motherland with their intellectual talents.

- The **China Association for Science and Technology**, or CAST, (中国科学技术协会) is a mass organization composed of science and technology personnel whose stated mission is to serve "as a bridge that links the Communist Party of China and the Chinese government to the country's science and technology community."¹⁸² CAST contains 210 national member societies, 96 overseas partner organizations, and 16 regional chapters in the United States. It is also a constituent member of the Chinese People's Political Consultative Conference (CPPCC), which is the highest-ranking entity overseeing the United Front system and is led by a member of the CCP Politburo Standing Committee.¹⁸³ CAST's subordination to the CPPCC thus suggests the organization is concerned with the intersection of national S&T priorities and China's influence activities, particularly those targeting overseas Chinese students and scholars. CAST contributes to China's overseas technology acquisition efforts chiefly through the Haizhi Plan (海外智力为国服务行动计划), which it established in partnership with the CCP Organization Department and the Ministry of Human Resources and Social Services in 2004. According to its website, the Haizhi Plan "aims to play the role of a bridge, strengthen ties with overseas Chinese science and technology groups, give full play to the advantages of overseas talents ... [and] ... build a platform for overseas talents to return to work and serve the country."¹⁸⁴ Colorless language notwithstanding, the website makes clear that the Haizhi Plan is a sprawling program designed expressly to facilitate knowledge and technology transfer from overseas Chinese students and scholars with S&T expertise to CAST. For the first ten years of its existence, the Haizhi Plan engaged in many of the activities typically associated with talent programs: sponsoring short-term trips to China for overseas activities, maintaining lists of prominent overseas Chinese students and scholars regarded as experts in their scientific field, organizing recruitment events, promoting other talent recruitment programs, sponsoring startup competitions, offering incentives to entrepreneurs to return to China, and enabling scientific cooperation projects between overseas and domestic institutions.¹⁸⁵ Like the WRSA, the Haizhi Plan supports the Thousand Talents Program and serves as a vehicle for canvassing overseas Chinese students and scholars for policy recommendations on S&T issues that can be conveyed to China's government. After 2014, however, CAST's Haizhi Plan expanded to encompass a series of so-called "Overseas Talent Offshore Innovation and Entrepreneurship Bases" (海外人才离岸创新创业基地) that went a step beyond China's domestic entrepreneurship parks by leveraging organizations already established on foreign soil to tap into overseas Chinese S&T talent.¹⁸⁶ Located in major Chinese cities,¹⁸⁷ CAST's 20 offshore entrepreneurship bases¹⁸⁸ manage a network of overseas "workstations" in foreign countries offering virtual or physical office spaces provided by pseudo-professional organizations affiliated with the United Front to serve as platforms for overseas Chinese students, scholars, and professionals to work on research similar to that conducted during their day jobs.¹⁸⁹ According to Strider Technologies intelligence team lead Andrew Spear, research conducted at these overseas workstations is then fed back to startups or existing enterprises incorporated in the China-based offshore entrepreneurship bases.¹⁹⁰ Mr. Spear notes that overseas Chinese researchers who work at these overseas workstations can be compensated by receiving equity in a startup incorporated in China, among other things.¹⁹¹ Chinese media articles indicate that a number of overseas workstations are based in major U.S. cities, including the Silicon Valley area and Boston.¹⁹² A 2017 *Ningbo Daily* article describing the launch of one such base wrote that its purpose is to provide "'matchmaking' for overseas innovation resources and domestic innovation teams" as well as "functions such as attracting talents [and] incubating businesses."¹⁹³ The article elaborated four innovation models the offshore entrepreneurship bases would pursue: "Chinese entrepreneurs + foreign scientists," "China's emerging markets + foreign advanced

technology,” “Chinese entrepreneurship + foreign innovation,” and “China’s financial innovation + foreign technological innovation.”¹⁹⁴

Appendix II: Nonimmigrant STEM Visas Granted to Chinese Nationals in U.S. States and Washington, DC by Degree Level, 2015–2020

	Dec. 2015				Nov. 2016				Dec. 2017				Dec. 2018				Mar. 2019				Jan. 2020			
	Bach.	Mast.	Doct.	Total	Bach.	Mast.	Doct.	Total	Bach.	Mast.	Doct.	Total	Bach.	Mast.	Doct.	Total	Bach.	Mast.	Doct.	Total	Bach.	Mast.	Doct.	Total
AK	4	8	14	26	6	7	12	25	3	5	11	19	3	5	8	16	4	6	10	20	4	7	7	18
AL	285	267	457	1009	347	283	462	1092	384	265	453	1102	485	229	469	1183	522	218	475	1215	541	171	410	1122
AR	89	65	91	245	94	68	97	259	100	70	97	267	101	57	96	254	97	62	97	256	102	108	99	309
AZ	881	600	677	2158	976	559	701	2236	1028	538	703	2269	1081	513	717	2311	1070	564	705	2339	1080	556	653	2289
CA	8121	7250	3775	19146	10156	8376	4085	22617	12110	10434	4409	26953	13563	12253	4856	30672	14467	12405	4880	31752	16482	17302	6787	40571
CO	583	281	420	1284	747	365	412	1524	833	416	412	1661	957	389	427	1773	950	391	424	1765	880	362	447	1689
CT	354	981	556	1891	519	1127	617	2263	665	1215	662	2542	774	1197	731	2702	780	1149	735	2664	901	1117	816	2834
DC	50	1231	209	1490	68	1586	223	1877	95	1874	231	2200	137	2166	291	2594	157	2177	291	2625	166	647	75	888
DE	230	249	345	824	237	293	336	866	256	302	342	900	291	265	327	883	295	255	316	866	310	225	288	823
FL	441	1565	1441	3447	491	1672	1439	3602	570	1611	1429	3610	668	1541	1489	3698	684	1514	1495	3693	841	1726	1461	4028
GA	873	1105	1208	3186	868	1265	1226	3359	772	1453	1270	3495	862	1598	1291	3751	929	1548	1287	3764	1072	1602	1248	3922
HI	14	27	43	84	9	27	42	78	20	31	41	92	22	23	45	90	26	23	46	95	29	27	47	103
IA	1302	374	672	2348	1353	343	663	2359	1236	359	654	2249	1106	345	658	2109	1046	353	642	2041	850	226	542	1618
ID	55	14	27	96	45	15	23	83	69	21	24	114	87	26	22	135	82	28	22	132	74	31	50	155
IL	2378	3565	1914	7857	2553	3949	2032	8534	2640	4432	2140	9212	2714	4782	2268	9764	2773	4544	2253	9570	2724	4315	2452	9491
IN	2754	912	1472	5138	2734	928	1526	5188	2596	937	1589	5122	2364	989	1653	5006	2336	970	1640	4946	1971	816	1572	4359
KS	371	180	316	867	347	167	312	826	309	146	291	746	290	146	310	746	294	144	303	741	268	117	262	647
KY	130	141	331	602	131	127	309	567	127	112	285	524	106	108	283	497	106	132	279	517	96	102	229	427
LA	68	252	422	742	68	241	410	719	75	572	399	1046	69	504	413	986	68	425	413	906	90	438	355	883
MA	1803	3856	2022	7681	2069	4710	2116	8895	2404	6358	2260	11022	2864	8126	2523	13513	3027	8223	2503	13753	3170	8563	2964	14697
MD	369	784	975	2128	437	1005	1017	2459	511	1492	1084	3087	588	1705	1154	3447	620	1642	1141	3403	707	1889	1273	3869
ME	91	16	20	127	101	16	19	136	107	10	23	140	106	9	24	139	110	8	24	142	129	5	22	156
MI	2202	2041	1441	5684	2268	2237	1467	5972	2089	2438	1538	6065	1933	2342	1580	5855	1904	2283	1544	5731	1702	2025	1467	5194
MN	870	427	557	1854	884	508	570	1962	951	524	581	2056	1051	543	613	2207	1110	534	602	2246	1012	525	624	2161
MO	791	990	781	2562	798	1212	799	2809	730	1318	852	2900	673	1514	893	3080	660	1476	899	3035	567	1669	834	3070
MS	35	52	148	235	41	48	137	226	48	52	139	239	37	52	144	233	37	50	147	234	19	36	119	174
MT	42	11	17	70	43	10	16	69	26	9	13	48	30	6	15	51	28	8	15	51	16	8	10	34
NC	639	1008	1301	2948	716	1118	1345	3179	788	1370	1382	3540	888	1594	1485	3967	897	1578	1457	3932	939	1606	1394	3939
ND	65	54	89	208	44	52	83	179	33	53	90	176	27	43	89	159	26	38	91	155	19	23	82	124
NE	259	98	337	694	330	91	337	758	332	86	322	740	386	82	320	788	356	82	310	748	302	83	251	636
NH	133	144	157	434	159	132	169	460	149	118	188	455	135	109	180	424	128	104	168	400	118	99	159	376
NJ	536	3046	1223	4805	735	3163	1269	5167	744	3198	1336	5278	663	3044	1367	5074	835	3012	1363	5210	1118	5397	1728	8243
NM	58	80	172	310	50	72	150	272	34	72	150	256	29	59	121	209	26	55	116	197	27	56	125	208
NV	23	22	63	108	29	25	79	133	24	24	86	134	23	38	87	148	21	41	88	150	26	67	84	177
NY	3342	9453	3341	16136	3828	11153	3401	18382	4876	13528	3520	21924	5895	15549	3661	25105	6471	15058	3628	25157	7513	14509	3543	25565
OH	2362	1612	1737	5711	2773	1592	1717	6082	3070	1560	1682	6312	3236	1585	1614	6435	3158	1567	1604	6329	3623	1507	1441	6571
OK	417	176	334	927	395	146	327	868	349	143	324	816	287	125	298	710	270	120	291	681	203	106	265	574
OR	712	347	208	1267	787	366	208	1361	763	355	197	1315	738	334	196	1268	758	325	192	1275	697	337	219	1253
PA	2660	4448	2205	9313	3188	4997	2261	10446	3516	5980	2365	11861	3685	6804	2569	13058	3760	6714	2541	13015	3714	4629	2509	10852
RI	83	209	245	537	82	218	245	545	91	241	293	625	122	477	292	891	133	465	291	889	172	428	263	863
SC	64	268	554	886	77	246	532	855	81	207	495	783	79	171	505	755	81	169	490	740	87	176	418	681
SD	31	29	59	119	32	29	51	112	40	25	46	111	40	21	39	100	42	20	39	101	38	23	32	93
TN	128	135	559	822	180	139	555	874	216	155	553	924	299	184	539	1022	289	175	527	991	356	254	565	1175
TX	948	2845	3462	7255	1040	3335	3572	7947	1083	3599	3598	8280	1147	3607	3769	8523	1158	3547	3768	8473	1270	3339	3683	8292
UT	279	137	333	749	261	153	316	730	243	179	322	744	247	198	323	768	245	199	316	760	311	226	286	823
VA	858	482	1095	2435	919	595	1105	2619	1140	666	1172	2978	1224	729	1189	3142	1288	847	1186	3321	1317	2885	1310	5512
VT	133	13	32	178	173	14	28	215	183	16	27	226	189	17	28	234	174	17	28	219	157	25	30	212
WA	1776	603	556	2935	1768	660	582	3010	1863	834	612	3309	2061	978	657	3696	2047	986	659	3692	2522	3479	994	6995
WI	922	362	725	2009	887	543	783	2213	1054	575	794	2423	1233	565	809	2607	1314	579	795	2688	1334	632	717	2683
WV	21	92	119	232	18	93	115	226	14	84	100	198	15	53	93	161	15	58	92	165	13	28	68	109
WY	28	17	98	143	19	17	97	133	16	11	92	119	15	6	98	119	13	4	97	114	14	9	64	87
Total	41663	52924	39355	133942	46880	60093	40395	147368	51456	70073	41678	163207	55625	77805	43628	177058	57687	76892	43325	177904	61693	84538	45343	191574

Source: U.S. Department of Homeland Security, *SEVIS by the Numbers Data*. <https://studyinthestates.dhs.gov/sevis-by-the-numbers/sevis-by-the-numbers-data>.

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