Testimony before the SSCI

Anna B. Puglisi
Senior Fellow, Center for Security and Emerging Technology, Georgetown University
August 4, 2021

Chairman Warner, Ranking Member Rubio, members of the Committee: Thank you for the opportunity to testify. Perhaps no other issue is as controversial or challenging as the one we are discussing today. It is wrapped up in the fundamental feelings we have as Americans regarding democracy, opportunity, capitalism, open markets and the importance of immigrants throughout U.S. history.

My own grandparents were immigrants who came to this country with little formal education, worked menial jobs and made a new life for themselves. My presence here today is a testament to the American Dream. I want to start with saying that there is no room for xenophobia or ethnic profiling in the United States -- it goes against everything we have stood for as a nation.

And precisely because of these values, the issues we are discussing today will make us uncomfortable as we move forward to find principled ways to mitigate the policies of a nation-state that is ever more authoritarian, does not share our values and seeks to undermine the global norms of science and commerce. These challenges are not about the concerns of one administration or the policies of one political party, but the actions of a nation-state with a different system, different regard for human rights and different view of competition. The PRC has demonstrated a will to flaunt global norms to reach its strategic goals, and has put in place policies and programs that undermine the very values we hold dear: a fair and level playing field, transparency, reciprocity and market-driven competition.[i] These actions have far-reaching implications for the future of our nation and our ability to compete. On the committee's request, my testimony today will focus on China's use of non-traditional collectors, targeting of academia and theft of intellectual property, what is at stake and the long-term consequence of inaction. I will cover the following points:

- China is engaged in a strategic rivalry with the United States, centered on economic power. It has an all of-government strategy to target the foundation of that power—our technology and human capital.
- China's management of its relationship with the United States, despite implementing these policies, has been designed to mask key aspects of this rivalry. This is part of what makes these discussions so difficult.
- Beijing in many ways understands our societal tensions, which include race issues, and its statecraft is directed at them, exploiting identity politics by promoting any changes in U.S. policy as ethnic profiling, offering a narrative about being merely a proponent of "development" and science, in order to divert attention from its own questionable behavior. This is a well-funded effort.[ii]
- China has controlled the narrative despite violating the global norms of business and research, and as a result, many of the impacted groups do not recognize the growing challenge that this rivalry poses and often questions if there is actually a problem, despite the growing evidence that China is doubling down on its policies and programs.

- Beijing has made talent development and the exploitation of overseas students, universities, and government labs a central part of its technology acquisition strategy since the country's "opening" around 1978[iii]

- Regardless of their personal views, Chinese scientists, businesspeople and officials have to respond to the government or security services if they are asked for information or data. China intimidates and harshly silences its critics—this has only grown more so in the past few years.[iv]

- Our institutions were not designed to counter the threat to academic freedom and manipulation of public opinion that China's policies and actions pose.

- China's engagement with U.S. companies, universities and civic organizations has not led to a more open society in China or an equal playing field for Western companies in China. On the contrary, it has led to U.S. companies self-censoring themselves when it comes to human rights and issues of importance to the PRC—such as Taiwan—and U.S. universities accepting limits on academic freedom and freedom of speech. This is evidenced by those that criticize the Chinese government being denied visas and also more recently the harassment of foreign journalists. [v]

- Extreme propositions, such as closing our eyes (laissez faire) or closing our doors, only benefit China—the latter by discrediting en masse all efforts to address the problem and by depriving ourselves of the contributions of foreign-born scientists.

What is at stake: The importance of S&T

China's stated goal is to dominate in key technology areas. The United States' science and technology (S&T) dominance since World War II has underpinned U.S. national strength and soft power. Losing our technological edge and the influence it entails will have far-reaching implications beyond scientific disciplines. This is not to say that the United States needs to lead in every area, but that there are key economic and national security relevant areas and infrastructure that are at stake. Increasingly this is also not about military technologies, but dual-use technologies and commercial applications. Future strength will be built on 5G, AI and biotechnology. We have not lived in a world where the United States has been number two in foundational technology areas such as these.

- Beijing views technology—and the robust S&T infrastructure needed to develop it—as a national asset. The way it has structured its system to reach this goal is inherently at odds with key assumptions of globalization including open markets, reciprocity, transparency and findings being shared equally and unencumbered.[vi] China's leaders make no effort to hide their views of the importance of technological and commercial dominance, and how they view a robust S&T infrastructure as key to building a modern advanced economy, not necessarily an open market economy.

What is clear and well documented is that Beijing—especially Xi—looks at development as a zero sum game and that government support for key industries—the emerging technologies such as AI, next generation communications and biotechnology—gives China an advantage. Xi's statements include the following[vii]:

- "We should seize the commanding heights of technological innovation" May 2018

- "Artificial Intelligence is a vital driving force for a new round of technological revolution and industrial transformation. China must control artificial intelligence and ensure it is securely kept in our own hands." October 31, 2018. [viii]

- "Science and technology is a national weapon" and that "if China wants to be strong… it must have powerful science and technology." [ix]

- "In today's world, S&T innovation has become a critical support for increasing comprehensive national strength…whoever holds the key to S&T innovation makes an offensive move in the chess game of S&T innovation and will be able to preempt the rivals and win the advantages." [x] June 9. 2014.

Our Systems are not the Same

The current debate on how to deal with China as a strategic competitor rarely acknowledges the assumptions that have shaped how the United States and other economically developed nations forged ahead with engagement, commerce and scientific collaborations with China. Discussions about the benefits of globalization, decoupling, techno-nationalism and what it takes to be innovative are all shaped by this. These core beliefs have the following underlying assumptions: that you need democracy to be innovative and creative, that you need a market economy to be successful, and that we—especially the United States—will always out-innovate them. In practice, these beliefs play out in the following way:

· We are not a US business, we are a global one
· Innovation comes from the private sector, not government investments
· Everyone has the same driver—making money

However, the biggest assumption has been that China would change and acquiesce to the belief system of western capitalism and globalization. But China's actions tell a different story.

China's system is different because of the role of the state that permeates all aspects of society from Party cells in businesses-including western ones, a Party Secretary at universities that has more power than the university president and the social credit system that impacts daily life. Chinese students are sent overseas to learn with a purpose, and its business and S&T collaborations are designed to deliver maximum returns to the state[xi]. Although Beijing has not always been successful in this endeavor, its strategy illustrates a government with a plan and the political will to take a long-term view of development, invest in infrastructure and people and put in place the building blocks it needs to support China's economy and military modernization. It is masterful at setting the terms of those engagements to achieve long-term goals determined by the state.[xii]

What China has done with 5G is an example of how China pursues technologies that are critical foundational elements of the modern world. China uses its instruments of national power to position its companies in leading roles in critical technology niches, such as the next generation of communications infrastructure. China does this because it recognizes the many economic and security benefits these sectors will produce. This is what is at stake. [xiii]

Human Cost of China's Behavior: The Role of Non-Traditional Collectors

One of the biggest challenges to understanding the scale and scope of China's actions, and designing mitigation strategies is China's use of what are called "non-traditional collectors." These are the experts—scientists, students and business people—who work on particular research projects in different industries and target technology and technological information. This is a different methodology and is documented in Chinese language policy documents over the last several decades[xiv]. Our system—and I would add our institutions and the authorities we have granted them—is not designed to counter this kind of threat. Traditionally counterintelligence has focused on intelligence officers, military end-use and

illegal activities. I tell you today, if we only focus on trying to mitigate China's illegal actions, or those undertaken by intelligence officers or only are related to military technology, we will fail.

The Chinese government's explicit efforts to exploit its diaspora—and our innovation base—must be addressed and countered. China's exploitation of its diaspora is also a threat to the great majority of persons of Chinese ethnicity who play no part in this, but are tarnished and may be subject to unjustified criticism because of China's actions. This makes for a difficult balance. Our response must be two-handed—protect the rights of the people targeted by the Chinese Communist Party (CCP) while dealing with transgressions. Notable here is the fact that increasingly, the CCP targets non-ethnic Chinese, too, showing how this issue is not, in essence, one of ethnicity. Thus, the United States must continue to encourage academic exchange and an influx of scientific "talent" while at the same time find nuanced policy solutions, not only to stop the hemorrhaging of critical military and industrial technologies, but also, crucially, to "play offense" and continue to grow our national innovation base. This is also true for U.S. allies and like-minded countries worldwide.

The human cost of China's policies accrues in both directions, as Beijing disadvantages and tarnishes its own scientists who are trying honestly to work within global norms, because its domestic laws compel the disclosure of data/information. In this sense, the U.S. and other western countries are also culpable. By treating China as a neutral actor, and pretending that we operate within the same kind of system, we undercut those scientists and institutions in China trying to follow international norms. By not holding the Chinese government accountable, we give credence to a system that deprives China's educated elite from the dignity they aspire to and deserve. The Chinese people deserve better.

Policies That Create a Different System: Central Government S&T PLANS

Beijing's policies are dynamic and tailored to the changing landscape of technology development. The MLP, Made in China 2025, policies for Strategic Emerging Industries and the Five Year Plans are all policies that support China's S&T development.[xv] These are not isolated plans but a complementary web of development and industrial policies for emerging technologies to achieve its goal of technological leadership. The policies focus not only on specific technology areas but seek to create the environment to foster innovation and development, and most importantly build a national innovation base that will be the foundation for future economic growth and military modernization that Beijing controls.

- This is best illustrated by the "13th Five-year Plan for Military and Civil Fusion"[xvi] established in 2017 and focused on emerging technologies. The plan specifically calls for a "cross-pollination of military and civilian technology in areas not traditionally seen as 'national security issues,' such as quantum telecommunication and computing, neuroscience and brain-inspired research," and states that such projects will be supported by foreign outreach initiatives. In addition to these overarching projects, there are programs to develop specific high-tech areas such as biotechnology, integrated circuits, and "next-generation" artificial intelligence.
- Each of these programs highlights the role foreign "talent" is expected to play and how it is to fill key knowledge gaps. This is also reflected in earlier central government plans such as the Medium Long Term Plan for S&T development that explicitly calls out leveraging collaborations with universities and multinational corporations to gain key technology for China.

Civil-Military Fusion/Civil Military Integration

China says it will use any knowledge or technology it acquires for its military. This is not conjecture, profiling, or analysis, but China's stated position for decades. From early military-civilian integration (军民结合) policies to the more recent military-civilian fusion (军民融合), China takes a holistic approach to development, blurring what is civilian, what is military, what is private and what is public. This impacts the basis for entry of Chinese students and post-docs into U.S. labs because of China's ability to compel citizens to share information. It also challenges existing export and visa policies that build their restrictions around affiliations with a military end-user but make exceptions for civilian uses. To the Chinese leadership, every civilian use is also a potential military use.

Talent Programs[xvii]

The CCP and Chinese government continue to view Western education—and universities—as an entry point into the U.S. innovation base because it is an easier target. Xi has called human capital the "first resource" [xviii] and China's policies reflect this.

- Chinese government's National Medium and Long-term Talent Development Plan (2010–2020), stated that talent was core to the country's social and economic development and set detailed national talent targets. [xix]
- 2017: "Plan to Build a National Technology Transfer System." A comprehensive articulation of China's tech transfer system. The acquisition of "high-level overseas talent"—both ethnic Chinese scientists from abroad and other foreign scientists—is emphasized throughout.
- 2016: "Planning Guide for Manufacturing Talent Development." Joint plan to import (another) "1000" foreign experts able to make "breakthrough" improvements, via talent programs and other venues. Emphasizes recruiting from "famous overseas companies."
- CAST's "HOME Program" (or Haizhi Plan, 海智计划)," instituted in 2004 by the Chinese Association for Science and Technology to "Help Our Motherland through Elite Intellectual Resources from Overseas," and supported by China's central and local governments. Its 2019 slate includes 29 projects.[xx]

In addition to these overarching projects, as mentioned previously there are programs to develop specific high-tech areas such as biotechnology, integrated circuits, and "next-generation" artificial intelligence. Each such program highlights the role foreign "talent" is expected to play. [xxi]

What is at Stake: Non-Military Examples of China's Policies--Biotechnology and Renewable Energy

GMOs

Food security, throughout history, has been a major issue for Chinese leaders and related to ensuring regime stability. While other countries have similar goals, what is different is the role of the State in technology acquisition programs that target foreign technology and knowledge to meet this goal. China has made developing genetically modified crops a key part of its development strategy. They are not only highlighted in the general "biotechnology" area of the MLP and Five Year Plans, but are also called out as a mega-project, a Strategic Emerging Industry and mentioned in what was Made In China 2025. [xxii] To put in perspective what is at stake for U.S. farmers, the USDA estimates China's corn consumption will increase by 41% by 2023.

The case of Mo Hailong illustrates how China's policies lead to technology acquisition and the behaviors we are discussing today. Mo and his co-conspirators were found digging up test seed in an Iowa field in 2011[xxiii]. Mo operated a subsidiary of a state-supported Chinese company Da Bei Nong called

KingsNower and was sending these seeds to China. While Mo was arrested, spent time in prison and had to pay restitution, these seeds represent the most time and resource intensive portion of the development cycle for U.S. industry. China still acquired the technology. More seeds that a company in China sells—that were based on proprietary technology valued at millions of dollars—means fewer seeds that can be sold by U.S. companies. Given how China leverages and restricts its market, U.S. farmers may find themselves having to buy seeds from China's companies in order to sell their products in China.

Wind turbines

Another example of the impact of China's policies is wind turbines. This technology has been deemed a "Strategic Emerging Industry" in China, and is also highlighted in Made In China 2025. China has legitimate reasons for wanting renewable sources of energy, including some of the worst air pollution in the world. However, it has also stated that it wants to dominate in these areas, seeing increasing demand for renewables worldwide growing as more and more countries try to cut back on fossil fuels as a way to mitigate climate change. This is another area where China is willing to pursue its development in ways that are not bound by normative principles of global norms and include technology acquisition from other companies. In 2005, American Superconductor Corporation (AMSC) entered into a partnership with the Chinese company Sinovel that included wind turbine design and engineering services, including the software to regulate the flow of electricity between the turbines and the grid—which is the key piece of technology.

By 2011 Sinovel was the largest wind turbine manufacturer in China and the second-largest in the world. In March of 2011, an employee of AMSC received $15,000 to transfer AMSC's proprietary control software technology to Sinovel managers, and Sinovel severed its business relationship with AMSC. At this point in time AMSC was not aware that the business deal was severed, because Sinovel now had the key piece of technology and no longer needed AMSC. When AMSC announced publicly that it lost its business deal with Sinovel, its stock price dropped 40% in one day. Over the following two years, 500 of AMSC's 700 employees lost their jobs.

This is the real impact that China's actions have on U.S. workers. Academics and economists often debate whether what China does is "efficient" and argue that its system is not sustainable. However, even if this is true, the amount of damage that this behavior has, and will continue to have, on U.S. companies and citizens is far-reaching. What happened to AMSC illustrates the cost of doing nothing and allowing China's state run central policies to continue unabated.

Medical Research

Medical research is usually not associated with national security, but China has made dominating biotechnology and the global pharmaceutical industry a priority, and has adopted supporting policies such as Made in China 2025 and the Precision Medicine Initiative to reach this goal. These activities include targeting early developments of cutting edge research—often at universities or government labs—buying companies with key technology, and becoming a chokepoint for vital pharmaceutical ingredients, generic medicines and non-human primates.

China targets not only cutting-edge technologies, but also key resources on which the world is dependent. The last U.S. manufacturer of penicillin went out of business after China dumped chemicals at low prices for a four-year period. The Chinese government in this case actually filed a brief saying the companies had to set prices because of China's law. China has also said that it wants to make generic versions of 90% of blockbuster drugs with expired patents. How many other companies will go out of business because of these actions? The United States is reliant on China for penicillin, many of the ingredients that go into other medicines, and as we recently saw, key parts of the personal protective equipment supply chain. [xxiv]

China, as it has become more capable, targets early in the development cycle—the basic and applied research at universities and government and corporate labs. Recent cases at MD Anderson illustrate this. In this instance, grant proposals sent to U.S. based scientists to be peer-reviewed—which is supposed to be confidential—were instead sent to colleagues of the U.S.-based reviewer in China. This information was used to set up "shadow labs" in China that utilized the data and scientific knowledge of the U.S. grant proposals. The benefits of that research went to the Chinese institution and researchers not the U.S. institution and the U.S. taxpayers funding the work. This illustrates how stealing ideas gives China an advantage in new areas, as they have their own ideas to work with, as well as ours. It is naïve at best to believe that developments made by China will be shared equally, without restrictions or strings attached, because it is what is best for humankind. The current COVID-19 pandemic, and China's lack of transparency, demonstrate that this is not the case. What is at stake, according to Dr. Pisters, President of MD Anderson Cancer Center, is "the integrity of the peer review system" and the "intellectual property that is being created by U.S. based investigators."[xxv] This system is what has sustained U.S. competitiveness and innovation for decades.

CONCLUSIONS

China's strategy to target U.S. technology is coordinated, massive, comprehensive and effective. While its goal is technological self-sufficiency, China is not taking the path of free and fair market competition to achieve this goal. Instead, China uses a variety of methods to achieve a playing field tilted entirely in its favor. These methods include cooperative agreements that are leveraged and exploited to obtain technology above and beyond what is agreed upon, illicit front companies, end-user acquisition, and cyber and non-traditional collectors. Our companies and researchers are not competing on an equal and level playing field, but are instead up against the strategy—and power and money—of a nation-state that has the political will to see these efforts through over decades. These cases highlight the challenge that the United States and like-minded countries face in developing mitigation strategies to address the following:

- Clear policies and guidelines set forth by the Chinese government that incentivize all aspects of China's S&T infrastructure—including universities, companies and S&T Diplomats[xxvi]—to meet the nation's goals.
- Detailed technical requirements that come straight from the Chinese entity in need of specific technology or technological know-how.
- Support from Beijing that isn't focused on private wealth generation or efficiency in the short-term, but designed to build capacity and foundations for future industries and growth.

Given the scope and scale of this activity, and that fact that it is often focused on civilian technologies, a re-evaluation of our underlying assumptions and how we evaluate risk will be essential to counter these efforts. Therefore, I recommend the following:

Improve ourselves: The United States and other liberal democracies must invest in their futures. Not all discovery has immediate commercial applications—it took 30 years from discovery to development of the Lithium ion battery. We must accept that everything should not be only about the lowest cost, but instead focus on the highest value for the nation. We must build research security into future funding programs. What has been laid out here demonstrates the depth and breadth of China's efforts to target our technology, and the lengths it will go through to acquire it.

- The United States must encourage STEM education and create support networks for under-represented populations in the STEM fields. Many students leave STEM fields in the first year. If students are working their way through college, they may not have time for lab work or research

experiences. Funding should be provided for this, as we are leaving whole segments of our population behind.

Face the facts: Beijing doesn't play by free-market rules, it does not respect intellectual property, it is willing to act directly or indirectly to ensure its favored companies win in the market, and it doesn't share the same views on political openness the United States, Europe and other "like-minded" countries have long shared. Engagement with China has not made it more open, and it has not acquiesced to existing norms and rules. Acknowledging this reality complicates mitigation, because we are not negotiating on individual policies but against a different system. Moreover, the people who come here, however well-meaning they are personally, are to a greater or lesser extent beholden to China's system.

Increase Transparency*:* Existing policies and laws are insufficient to address the level of influence the Chinese Communist Party exerts in our society—especially in academia. The CCP exploits identity politics through United Front influence campaigns. This must be addressed and made public. By the same token, we must increase reporting requirements for foreign money at our academic and research institutes, as well as state and local governments to better identify these avenues of influence. Talent programs set up by the Chinese government, because of the restrictions and rules they place on the participants, present a conflict of commitment-where participants are often serving two different organizations which at best introduces conflicts of interest and in some cases fraud, and other illegal activity. Universities, government labs and research institutions should have clear reporting requirements and rules on participation.

Ensure True Reciprocity: Connecting China's reciprocity and sharing of scientific data to its access to U.S. institutions and big science facilities is a leverage point. For too long we have looked the other way when China has not followed through on the details of the agreements that it has entered into.

Bolster Cooperation and Alliances: Greater cooperation and integration with like minded countries of the European Union and Japan will not only foster the development of emerging tech industries, but also create alternative innovation hubs that mitigate China's unfair practices and continue to foster the global norms of science.

In closing, what will also make this difficult is that the reality that China is presenting is inconvenient to those benefiting in the short-term. This includes companies looking for short-term profits, not long-term sustainability of a particular industry, academics that benefit personally from funding or cheap labor in their labs, and former government officials who cash in as lobbyists for China's state-owned and state-supported companies. China is masterful at divide-and-conquer, identity politics, controlling the narrative and falsely presenting engagements as "win-win." In reality, China wins twice—both by gaining technology and controlling the narrative in such a way that its behavior, over time, gains legitimacy.

The United States has in many ways lost the PR war with China by not talking about the structural differences in our systems and instead focusing on individual instances of bad behavior that can seem anecdotal. This has essentially been a tactical approach—playing "whack a mole"—instead of a strategic one that presents a narrative painting the full picture of how China flaunts the values of globalization and increasingly promotes an alternative authoritarian system.

I want to thank the committee again for continuing to discuss this issue. These are hard conversations that we as a nation must have if we are to protect and promote U.S. competitiveness, future developments, and our values. If we do not highlight and address China's policies that violate global norms and our values we give credence to a system that undermines fairness, openness and human rights, and deprives China's educated elite of the dignity they aspire to and deserve. The Chinese people deserve better. The U.S. people deserve better. Our future depends on it.

[i] E.g., "The IP Commission Report." The Commission on the Theft of American Intellectual Property (May 2013). Hannas, Mulvenon and Puglisi, *Chinese Industrial Espionage*. (Routledge, 2013) hereafter "*CIE*." Michael Brown and Pavneet Singh, "China's Technology Transfer Strategy" (DIUX, February 2017). Section 301 *Report into China's Acts, Policies, and Practices Related to Technology Transfer, Intellectual Property, and Innovation*. Office of the United States Trade Representative (27 March 2018). U.S.-China Economic and Security Review Commission, "2019 Annual Report to Congress" (November 2019).

[ii] William C. Hannas and Didi Kirsten Tatlow, *Beyond Espionage: China's Quest for Foreign Technology* (Routledge 1st edition, September 2020); Alex Joske, "Hunting the Phoenix," Australian Strategic Policy Institute, 2020, https://www.aspi.org.au/report/hunting-phoenix ; Receipts of local UFWD paying overseas scientists available at: "The distribution list of provincial-level projects for the introduction of foreign intelligence special funds at the provincial level in 2018" [2018 年省级引进国外智利专项经费直项目分配明细表], https://web.archive.org/web/20201112190122/http://webcache.googleusercontent.com/search?q=cache%3AKAaZ3LpEe4oJ%3Arst.hunan.gov.cn%2Frst%2Fxxgk%2Ftzgg%2F201802%2F9516964%2Ffiles%2Fe1c7ddd51dda49f6b70a6ad5ae9b0490.xls+&cd=3&hl=en&ct=clnk&gl=us

[iii] IBID

[iv] Roth, Kenneth "China's Global Threat to Human Rights", Global Report 2020

[v] Mann, James "The China Fantasy: How Our Leaders Explain away Chinese Repressions" Viking 2007; Pomfret, John "What America didn't anticipate about China" The Atlantic, 16 October 2019.

[vi] Hannas et al., "Chinese Industrial Espionage: Technology Acquisition and Military Modernization". Routledge, 2013

[vii] 在中国科学院第十九次院士大会、中国工程院第十四次院士大会上的讲话 （2018 年 5 月 28 日）(http://www.xinhuanet.com/politics/leaders/2018-05/28/c_1122901308.htm). Xi used a slightly different formulation of this line at a June 9, 2014 speech at CAS and CAE: 习近平：在中国科学院第十七次院士大会、中国工程院第十二次院士大会上的讲话 (2014 年 6 月 9 日) (http://cpc.people.com.cn/n/2014/0610/c64094-25125594.html); See also how Xinhua emphasized this particular line of the speech with the headline here: 习近平：把关键技术掌握在自己手里 (http://www.xinhuanet.com//politics/2014-06/09/c_1111056694.htm); 习近平：为建设世界科技强国而奋斗 (http://www.xinhuanet.com/politics/2016-05/31/c_1118965169.htm)

[viii] 国务院关于印发"十三五"国家战略性新兴产业发展规划的通知. State Council, 2016

[ix] 国家科技创新基地优化整合方案. MOST, MOF, National Development and Reform Commission, 2017

[x] "十三五" 科技军民融合发展专项规划. MOST, CMC, 2017.

[xi] Hannas and Tatlow, "China's Quest for Foreign Technology: Beyond Espionage" Routledge, 2020

[xii] Hannas and Tatlow, "China's Quest for Foreign Technology: Beyond Espionage" Routledge, 2020.

[xiii] Alex Rubin, Alan Omar Loera Martinez, Jake Dow, and Anna Puglisi "The Huawei Moment" (Center for Security and Emerging Technology, July 2021). https://doi.org/10.51593/20200079

[xiv] These policies include "two bases formula", "short-term visits" and "serve in place. See Hannas et al., Routledge 2013 more a more in depth treatment of these policies.

[xv] Simon and CAO, "China's Emerging Technological Edge: Assessing the Role of High-End Talent". Cambridge University Press, 2009; Cong CAO, Richard Suttmeier, and Denis Fred Simon. "China's 15-year Science and Technology Plan," Physics Today, December (2006), pp. 38-43; Hannas et al., "Chinese Industrial Espionage: Technology Acquisition and Military Modernization" Routledge, 2013.

[xvi] Translation of "The 13th Five-Year Special Plan for S&T Military-Civil Fusion Development" ["十三五"科技军民融合发展专项规划], Center for Security and Emerging Technology; "Opinions on the In-Depth Development of Military-Civil Fusion" [军民融合深度发展的意见], General Office of the State Council on Promoting the National Defense Technology Industry [国务院办公厅关于推动国防科技工业], December 2017, https://perma.cc/4M58-X4C2; "'Military-to-civilian' and 'civilian-to-military' pace accelerates, the development of MCF continues to release new momentum" ["军转民""民参军"步伐加快军民融合发展持续释放新动能], China Financial News Network [中国金融新闻网], August 1, 2018, https://perma.cc/B4FH-H2SK.

[xvii] Original CSET Data Visualization, "Chinese Talent Program Tracker," Center for Security and Emerging Technology, November 2020. https://doi.org/10.51593/20200066

[xviii] "十三五" 生物技术创新专项规划 (*13th Five-year Plan for Biotechnology Innovation*). MOST, 2017; 国家集成电路产业发展推进纲要 (National Integrated Circuit Industry Development Plan). State Council, 2014; 新一代人工智能发展规划. (Next-Generation Artificial Intelligence Development Plan). State Council, 2017; "Why is Xi Jinping's 'First Resource' so important?" ["习近平眼里的"第一资源"为何如此重要"], *People* [人民网], July 18, 2018, http://politics.people.com.cn/n1/2018/0718/c1001-30155931.html.; 国家技术转移体系建设方案. State Council, 2017; 制造业人才发展规划指南. MOE, MHRSS, MIIT, 2016.

[xix] "十三五" 科技军民融合发展专项规划. MOST, CMC, 2017.

[xx] Hannas and Tatlow, "China's Quest for Foreign Technology: Beyond Espionage" Routledge, 2020.

[xxi] "十三五" 科技军民融合发展专项规划. MOST, CMC, 2017; "十三五" 生物技术创新专项规划 (*13th Five-year Plan for Biotechnology Innovation*). MOST, 2017; 国家集成电路产业发展推进纲要 (National Integrated Circuit Industry Development Plan). State Council, 2014; 新一代人工智能发展规划. (Next-Generation Artificial Intelligence Development Plan). State Council, 2017.

[xxii] Notice on Issuing "Made in China 2025" (State Council, Guo Fa 2015 No. 28, issued 8 May 2015; Decision on accelerating the Cultivation and Development of Strategic Emerging Industries (Guo Fa (2010) No. 32, issued 10 Oct 2010;

[xxiii] "The Saga of the Chinese spies and the stolen corn seeds, will it discourage economic espionage" LA Times, 31 October 16; Farm Journal Ag Web, "Mo Hailong Pleads Guity to Seed Theft Conspiracy", 28 Jan 16;

[xxiv] Gibson, Rosemary " China RX: Exposing the Risks of America's Dependence on China for Medicine". Prometheus Books, 2018.
[xxv] "MD Anderson Researchers Ousted as NIH and FBI Target Diversion of Intellectual Property", The Cancer Letter, 26 April 2019.
[xxvi] Ryan Fedasiuk, Emily Weinstein, and Anna Puglisi, "China's Foreign Technology Wish List" (Center for Security and Emerging Technology, May 2021). https://doi.org/10.51593/20210009