



FOUNDATION FOR DEFENSE OF DEMOCRACIES

Defusing Military-Civil Fusion

The Need to Identify and Respond to Chinese Military Companies

Emily de La Bruyère and Nathan Picarsic

May 2021



Defusing Military-Civil Fusion

The Need to Identify and Respond to Chinese Military Companies

Emily de La Bruyère

Nathan Picarsic

May 2021



FDD PRESS

A division of the
FOUNDATION FOR DEFENSE OF DEMOCRACIES
Washington, DC

Table of Contents

INTRODUCTION 6

RESPONDING TO BEIJING’S STRATEGY OF MILITARY-CIVIL FUSION..... 7

IDENTIFIED COMPANIES..... 9

 Backbone Military-Industrial Groups 9

 International Infrastructure Players..... 13

REMAINING GAPS 19

 Centrally State-Owned Military-Industrial Companies 19

 Additional Infrastructure Players..... 21

 Additional Military-Academic Complex Entities 23

A NEW MODEL: A PRIORITIZATION FRAMEWORK 25

 Clear Definitions 25

 Expanded Scope 25

 Clear Prioritization..... 26

 Operationalizing the Documentation Effort 27

CONCLUSION 28

APPENDIX A: FY2021 NDAA Language Concerning
Reporting Requirements Pertaining to Chinese Military Companies 29

APPENDIX B: Chinese Entities Listed by the U.S. Department of Defense..... 31

Introduction

The People’s Republic of China, led by the Chinese Communist Party (CCP), has emerged as America’s primary strategic competitor. Both parties in Washington now recognize this reality. Leveraging growing economic, technological, and military means, the CCP is expanding China’s power and influence internationally – including by revising international norms and institutions.

Beijing’s strategy of military-civil fusion (MCF) (军民融合) plays a core role in this global campaign. MCF entails the fusion of military, civilian, and commercial investments, actors, and positioning to increase China’s comprehensive national power.¹ The strategy is tailored for the globalized commercial ecosystem: MCF leverages the international integration of Chinese military companies – both private and state-owned – in order to acquire resources and leverage.

Since 2020, the U.S. Department of Defense (DoD) has identified 44 Chinese companies that operate in the United States and have ties to the People’s Liberation Army (PLA). (See Appendix B for a full list.) They include traditional Chinese defense contractors as well as companies that specialize in information technology (IT), engage in commercial business, and operate in legacy industrial domains. Most are state-owned enterprises. All are state-supported. Every one of the 44 companies deploys internationally in accordance with Beijing’s global “Go Out”² offensive to acquire strategically important technology. They also develop

infrastructure and supply chains through which China projects coercive power.

The 44 companies identified by DoD include entities purchasing aerospace firms in Michigan and Alabama, developing real estate in California, selling subway cars to the Massachusetts Bay Transit Authority, and establishing research and development (R&D) centers in Silicon Valley.

The DoD list fulfills two-decades-old congressional tasking. Section 1237 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 1999, as amended, directed DoD to document “Communist Chinese military companies” that are “operating directly or indirectly in the United States or any of its territories and possessions.”³ The FY1999 statute required DoD to make its determinations by March 1, 2001.⁴ But, for two decades, there was no public progress. The FY1999 NDAA congressional mandate resurfaced in 2020 alongside increased attention in Washington on MCF and on China’s competitive threat more broadly.

At present, the DoD list of Chinese military-tied companies is just that: a list. It provides neither information about the identified companies nor the rationale for their inclusion. DoD has not disclosed its methodology. Nor does the list indicate the material consequences for identified entities or whether an entity’s subsidiaries or joint ventures are also implicated.

This report documents connections between the companies on DoD’s list and the Chinese military and military-industrial establishment. The report focuses on

1. Emily de La Bruyère and Nathan Picarsic, “Military-Civil Fusion: China’s Approach to R&D, Implications for Peacetime Competition, and Crafting a US Strategy,” *2019 Naval Postgraduate School Acquisition Research Symposium*, May 2019.

2. The People’s Republic of China launched the Go Out policy in 1999 to encourage Chinese companies to invest, partner, and otherwise engage internationally. The Go Out program continues to inform Beijing’s web of industrial plans. See: Elizabeth C. Economy, “The Game Changer: Coping with China’s Foreign Policy Revolution,” *Foreign Affairs*, November/December 2010. (<https://www.foreignaffairs.com/articles/china/2010-11-01/game-changer>)

3. The statute defines “Communist Chinese military company” according to two criteria. First, the entity must be “owned or controlled by, or affiliated with, the People’s Liberation Army or a ministry of the government of the People’s Republic of China or owned or controlled by an entity affiliated with the defense industrial base of the People’s Republic of China.” Second, the entity must be “engaged in providing commercial services, manufacturing, producing, or exporting.”

4. Larry Wortzel, “The Administration Must Name Chinese Defense Companies in the United States,” *The Heritage Foundation*, October 10, 2000. (<https://www.heritage.org/asia/report/the-administration-must-name-chinese-defense-companies-the-united-states>)

three key, overlapping groups: state-owned backbone military-industrial enterprises, companies building global infrastructure and standards, and elements of China’s military-academic complex. These entities reflect core components of China’s MCF program.

However, as this report demonstrates, the companies that DoD has listed thus far represent just the tip of the iceberg. This report points to additional Chinese military-linked companies that operate in the United States but have escaped scrutiny as examples of gaps in the DoD documentation effort. To an extent, such gaps reflect the need to continue expanding the DoD list – as well as to do so according to a broader scope and set of definitions. But gaps are also endemic to the exercise. There will always be more companies that meet qualifying criteria. Simply adding new companies to the existing DoD list will not solve the problem.

Rather than trying to identify every Chinese military-tied company, DoD should adopt a clear prioritization framework to target the companies that matter most. This report outlines a proposed framework that accounts for companies’ roles within the MCF system (for example, do they collect or apply technology?), their capital intensity, the degree of U.S. exposure or vulnerability to them (for example, do they control an industry chain on which the United States depends?), and the technologies or capabilities they develop (for example, do they operate in a domain critical for future U.S. power projection?).

“Rather than trying to identify every Chinese military-tied company, DoD should adopt a clear prioritization framework to target the companies that matter most.”

Finally, the report also argues that DoD’s documentation effort should be paired with an operationalization effort: Washington needs mechanisms to encourage government and private-sector action that both defends against and competes with Chinese military companies. Executive Order 13959 offers an example

of a mechanism that limits the ability of military-tied Chinese companies to operate in the global financial and commercial system. The United States also needs tools for proactive, offensive competition.

Since the adoption of the 2017 National Security Strategy, the U.S. government has sought to address the asymmetric and non-traditional threats posed by Beijing in an era of renewed great power competition. Documentation of Chinese military companies is a part of that effort. Now, refining the documentation and monitoring process, as well as operationalizing its results, offers an immediate, tractable opportunity to counter the CCP’s global offensive.

Responding to Beijing’s Strategy of Military-Civil Fusion

The FY1999 NDAA, as amended, directed DoD to document “Communist Chinese military companies” that are “operating directly or indirectly in the United States or any of its territories and possessions.” The original statute required DoD to make its determinations by March 1, 2001.⁵ But, for two decades, there was no public notice. DoD published its first tranche of identified companies in June 2020 and another four tranches thereafter. To date, DoD has identified 44 companies. (See Appendix B.)

The DoD lists were published without methodological explanation. There was no acknowledgement of the 20-year delay – or the sudden end of that delay. However, DoD likely issued the lists in response to bipartisan congressional pressure: In September 2019, Senator Tom Cotton (R-AR), then-Senate Minority Leader Chuck Schumer (D-NY), and Representatives Mike Gallagher (R-WI) and Ruben Gallego (D-AZ) cited Section 1237 of the FY1999 NDAA in a letter to then-Secretary of Defense Mark Esper. Urging DoD to combat China’s MCF

5. Ibid.

strategy, the bipartisan group of lawmakers pressed Esper to update and publicly release the list required by the FY1999 NDAA. “The Administration should reexamine all the statutory authorities at its disposal to confront the CCP’s strategy of Military-Civilian Fusion,” the group wrote, “including powers that have lain dormant for years.”⁶

MCF is a national-level Chinese strategy with a corresponding institutional apparatus, designed to fuse military and civilian actors, resources, and positioning for the sake of overarching national power. The term “military-civil fusion” emerged in the late 1990s under Hu Jintao, then-vice chairman of the CCP’s Central Military Commission. But it was by no means a new concept: Hu drew on longstanding CCP theory that dates back to Mao Zedong and the founding of the People’s Republic of China, then labeled “military-civil combination” (军民结合).⁷ At the end of 2007, the 17th Chinese People’s Congress formally called for developing a strategy of “military-civil fusion with Chinese characteristics” in order to “adapt to the technological revolution and military

change with Chinese characteristics.”⁸ In 2015, current CCP General Secretary Xi Jinping elevated MCF to national-level strategy.

MCF entails the two-way transfer of technology, resources, and information between military and civilian entities. The MCF strategy also uses international commercial and civilian, as well as military, positioning for coercive ends. At the broadest level, MCF is intended to strengthen all elements of China’s national power by fusing economic, military, and social governance.

MCF provides China with a diverse array of levers for influence and coercion. Dominance in certain supply chains might be used to compel a state or company to cave to Beijing’s geopolitical agenda.⁹ Investments in international media, social media, and cross-border data flows might allow Beijing to disseminate propaganda and control international narratives.¹⁰ Infrastructure construction abroad might allow China to influence production and transportation of, and therefore markets for, critical raw materials.¹¹ And construction of virtual networks and systems – such as space satellite, telecommunications, and logistics systems – might allow

6. Senator Tom Cotton, Minority Leader Charles E. Schumer, Representative Mike Gallagher, and Representative Ruben Gallego, *Letter to Secretary of Defense Mark Esper*, September 11, 2019. (https://www.cotton.senate.gov/imo/media/doc/Letter%20to%20Secretary%20Esper_1999%20NDAA.pdf); see also: Emily de La Bruyère and Nathan Picarsic, “Military-Civil Fusion: China’s Approach to R&D, Implications for Peacetime Competition, and Crafting a US Strategy,” *2019 Naval Postgraduate School Acquisition Research Symposium*, May 2019.

7. See: Ji Wenbo, “从‘军民结合’到‘军民融合’:改革开放以來中国国防科技工业领导管理体制的调整与完善 [From ‘Military-Civil Combination’ to ‘Military-Civil Fusion’: The Adjustment and Improvement of the Leadership and Management System of China’s Defense Technology Industry Since Reform and Opening Up],” *Party History Expo*, February 2018. For additional discussion, see: Emily de La Bruyère and Nathan Picarsic, “Military-Civil Fusion: China’s Approach to R&D, Implications for Peacetime Competition, and Crafting a US Strategy,” *2019 Naval Postgraduate School Acquisition Research Symposium*, May 2019. “军民结合” can also be – and often is – translated as “military-civil integration.” The authors opt for “military-civil combination” to distinguish the term from “military-civil fusion” (军民融合), which itself is often – and used to be predominately – translated as “military-civil integration.” See, for example: Tai Ming Cheung, “From Big to Powerful: China’s Quest for Security and Power in the Age of Innovation,” *East Asia Institute*, April 2019. (https://igcc.ucsd.edu/_files/great-powers/gp_reading_cheung.pdf)

8. National People’s Congress Finance and Economics Committee, *军民融合发展战略研究 [Military-Civil Fusion Development Strategy Research]* (Beijing: China Financial and Economic Publishing House, 2010).

9. See, for example: Keith Bradsher, “China is Said to Resume Shipping Rare Earth Minerals,” *The New York Times*, October 28, 2010. (<https://www.nytimes.com/2010/09/23/business/global/23rare.html>)

10. See, for example: Danielle Cave, Fergus Ryan, and Vicky Xiozhong Xu, “Mapping More of China’s Tech Giants: AI and Surveillance,” *Australian Strategic Policy Institute*, November 28, 2019. (<https://www.aspi.org.au/report/mapping-more-chinas-tech-giants>)

11. See, for example, the discussion of China’s mineral positioning in Africa in: Emily de La Bruyère and Nathan Picarsic, “Two Markets, Two Resources: Documenting China’s Engagement in Africa,” *U.S.-China Economic and Security Review Commission*, November 2020. (https://www.uscc.gov/sites/default/files/2020-11/Two_Markets_Two_Resources_Documenting_Chinas_Engagement_in_Africa.pdf)

Beijing to collect, influence, and direct global data.¹² In other words, Beijing does not simply share inputs to power between civilian and military entities. Beijing also fuses outputs. Beijing uses both military and civilian players and positioning to project a new kind of national power and shape the global order in the CCP's favor.

“Beijing does not simply share inputs to power between civilian and military entities. Beijing also fuses outputs. Beijing uses both military and civilian players and positioning to project a new kind of national power and shape the global order in the CCP's favor.”

The 44 companies DoD identified reflect different modes and mechanisms of China's MCF strategy. The listed companies include the key state-owned enterprises supporting China's military industry; companies acquiring military-relevant technology from abroad; entities facilitating the transfer of technology between military and civilian; and companies developing virtual and physical infrastructure that can be used to project power internationally. These companies illustrate the MCF threats and actors against which the United States and its allies and partners must defend. However, these 44 companies are merely a starting point. Countless other Chinese entities support China's military and MCF system internationally. These entities operate through sweeping, often opaque, systems of subsidiaries and partnerships not currently covered by the DoD list or U.S. law.

Identified Companies

This section provides examples of ties between companies on the DoD list and the Chinese military, military-industrial, and MCF establishments. This section explores three avenues of connection: state-owned backbone military-industrial enterprises, companies building global infrastructure and standards, and elements of China's military-academic complex. These avenues reflect core elements of China's MCF program. They are neither mutually exclusive nor rigidly defined.

Backbone Military-Industrial Groups

The DoD list includes China's 10 state-owned military-industrial groups. These conglomerates oversee a sprawling network of connected subsidiaries and industrial partnerships.¹³ Owned by the State-owned Assets Supervision and Administration Commission of the State Council, these companies constitute the backbone of China's national defense industry.¹⁴ They are the obvious place to start in identifying companies working with the PLA. As major industrial conglomerates, all of these companies operate, to one degree or another, in the United States. They span the nuclear, aviation, aerospace, shipbuilding, weapons, and electronic information industries.

These 10 entities, as one MCF industry association puts it, represent “the backbone of national security, undertake national defense research and production tasks, and provide various weapons and equipment

12. See, for example: Emily de La Bruyère, “The New Metrics for Building Geopolitical Power in a New World,” *The National Interest*, April 12, 2020. (<https://nationalinterest.org/feature/new-metrics-building-geopolitical-power-new-world-143147?page=0%2C1>)

13. China State Shipbuilding Corporation and China Shipbuilding Industry Company are both on the list, though they merged in November 2019 into China State Shipbuilding Corporation Limited.

14. “中国军工行业基本分类及十一大军工集团产业介绍 [Basic Classification of China's Military Industry and Industry Introduction of Eleven Major Military Industry Groups],” *Guizhou University Institute for Advanced Technology*, May 11, 2020. (<http://iat.gzu.edu.cn/2020/0511/c8847a134914/page.htm>)

for the development of the national armed forces.”¹⁵ China North Industries Group’s products range from amphibious assault weapons to air and missile defense technology; China South Industries’ products range from light weapons to armored vehicles. China Aerospace Science and Technology Corporation (CASC) and China Aerospace Science and Industry Corporation cover space technology, strategic nuclear missiles, and conventional missile systems. Aviation Industry Corporation of China (AVIC) and Aero

Engine Corporation of China develop military aircraft, while China Shipbuilding Industry Corporation and China State Shipbuilding Corporation produce military vessels. China National Nuclear Corporation researches and develops nuclear weapons.¹⁶ China Electronics Technology Group Corporation (CETC) and China Electronics Corporation (CEC) research and develop reconnaissance and early warning, electronic jamming, intelligence analysis, and other military information technologies.¹⁷

China’s Backbone Military-Industrial Entities

English-Language Name	Primary Industry
China National Nuclear Corporation	Nuclear
Aviation Industry Corporation of China	Aviation
Aero Engine Corporation of China	Aviation
China Aerospace Science and Technology Corporation	Aerospace
China Aerospace Science and Industry Corporation	Aerospace
China State Shipbuilding Corporation Limited	Shipbuilding
China South Industries Group Corporation	Weapons
China North Industries Group Corporation	Weapons
China Electronics Technology Group Corporation	Electronic Information
China Electronics Corporation	Electronic Information

15. See: “中国军工行业基本分类及十一大军工集团产业介绍 [Basic Classification of China’s Military Industry and Industry Introduction of Eleven Major Military Industry Groups],” *Guizhou University Institute for Advanced Technology*, May 11, 2020. (<http://iat.gzu.edu.cn/2020/0511/c8847a134914/page.htm>); “中国军工行业基本分类及十一大军工集团产业介绍 [Basic Classification of China’s Military Industry and Industry Introduction of Eleven Major Military Industry Groups],” *Zhongguancun Blue Navy Military-Civil Fusion Industry Promotion Association*, March 21, 2019.

16. “中国军工行业基本分类及十一大军工集团产业介绍 [Basic Classification of China’s Military Industry and Industry Introduction of Eleven Major Military Industry Groups],” *Guizhou University Institute for Advanced Technology*, May 11, 2020. (<http://iat.gzu.edu.cn/2020/0511/c8847a134914/page.htm>)

17. These activities cover, as CEC’s deputy general manager put it in 2019, “underwater, surface, ground, and air.” He said this at the 2019 National Electronic Warfare Conference, co-sponsored by CEC and CETC as well as the National University of Defense Technology and the Hefei People’s Government. “2019全国电子战大会成功召开 [The 2019 National Electronic Warfare Conference Was Successfully Held],” *Chinese Institute of Electronics*, December 3, 2019.

These companies maintain and operate a host of subsidiaries. The DoD list explicitly designates three of those subsidiaries. The first, China Academy of Launch Vehicle Technology (CALT), is a subsidiary of CASC.¹⁸ CALT makes China’s Long March space-launch rockets and is responsible for the launch missions of major national space activities, including Beidou’s satellite network, manned space program, and lunar exploration projects. CALT’s website notes that all of its work maintains the spirit of “the in-depth development strategy of military-civil fusion.”¹⁹

The second subsidiary, China SpaceSat, is publicly listed on the Shanghai Stock Exchange and is also majority-owned by CASC.²⁰ China SpaceSat specializes in the development and application of small satellites. As the company puts it, “China SpaceSat has now developed

into a space-earth integrated design, development, integration, and operation company, focusing on the two main businesses of aerospace manufacturing and satellite applications.”²¹ U.S.-based investment funds, including the BlackRock ISF-iShares Emerging Markets Index Fund and Vanguard Investment Series PIC – Emerging Markets Stock Index, invest in China SpaceSat.²²

The third subsidiary of the backbone military-industrial companies identified on the DoD list is Hikvision. CETC is the controlling shareholder of Hikvision, a video surveillance equipment supplier.²³ 2020 media coverage found that Hikvision had received almost \$300 million in U.S. government contracts.²⁴ Reporting in 2019 documented the pervasive presence of Hikvision security cameras in U.S. government buildings.²⁵

Designated Subsidiaries of Backbone Military-Industrial Entities

Subsidiary Name	Controlling Entity	Industry
China Academy of Launch Technology (CALT)	CASC	Aerospace
China SpaceSat	CASC	Aerospace
Hikvision	CETC	Electronics and IT

18. See: “China Aerospace Science and Technology Corporation,” *China Defence Universities Tracker*, accessed May 4, 2021. (<https://unitracker.aspi.org.au/universities/china-aerospace-science-and-technology-corporation>)

19. “本院概况 [Institute Introduction],” *China Academy of Launch Vehicle Technology*, accessed May 4, 2021. (<http://calt.spacechina.com/n481/index.html>). CALT has three joint R&D institutions in Switzerland and one in the United Kingdom. It has launched satellites for at least 14 countries, including the United States. “海外合作 [Overseas Cooperation],” *China Academy of Launch Vehicle Technology*, accessed May 4, 2021. (<http://calt.spacechina.com/n485/n529/index.html>)

20. For more on the company’s background, see: Muyang Chen, “Made in China 2.0: State-Led Commercialization of China’s Space Industry,” *University of Washington East Asia Center*, April 7, 2016. (<https://jsis.washington.edu/eacenter/2016/04/07/made-china-2-0-state-led-commercialization-chinas-space-industry>)

21. “公司介绍 [Company Introduction],” *China SpaceSat*, accessed May 4, 2021. (<http://www.spacesat.com.cn/templates/content/index.aspx?nodeid=4>)

22. See: “China SpaceSat Co. Ltd.,” *The Wall Street Journal*, accessed May 4, 2021. (<https://www.wsj.com/market-data/quotes/CN/XSHG/600118/company-people>)

23. See: “Hikvision Global,” *Hangzhou Hikvision Digital Technology Co., Ltd.*, accessed May 4, 2021. (<https://us.hikvision.com/en/about/hikvision-global>)

24. Isobel Asher Hamilton, “Chinese Surveillance Giants Blacklisted by Trump’s Administration Are Set to Appear at a Major US Security Trade Show,” *Business Insider*, March 5, 2020. (<https://www.businessinsider.com/blacklisted-surveillance-hikvision-dahua-huawei-security-isc-2020-3>)

25. Jackie Northam, “Government Deadline Approaches to Ban Chinese-Made Surveillance Cameras,” *NPR*, August 8, 2019. (<https://www.npr.org/2019/08/08/749318323/government-deadline-approaches-to-ban-chinese-made-surveillance-cameras>)

China's 10 military-industrial groups serve as coordinators of China's MCF program domestically and internationally. They help facilitate the exchange of technology, capital, and infrastructure between China's military and civilian sectors. For example, nine of the 10 groups are investors in China's National Military-Civil Fusion Industry Investment Fund.²⁶

AVIC provides an example of the institutional support that China's military-industrial groups provide for MCF. One of China's two state-owned aviation military-industrial groups, AVIC develops and manufactures fighter planes, bombers, transport aircraft, reconnaissance planes, helicopters, and unmanned aerial vehicles (UAVs) as well as missiles and other airborne systems. Within China, AVIC also plays a central coordinating role in the MCF apparatus. Through industrial parks, dedicated investment funds, and direct individual investments, AVIC provides capital and infrastructure to other MCF businesses, often in partnership with other leading Chinese military, technology, and financial players.

Internationally, AVIC invests in foreign sources of technology and develops global infrastructure. As AVIC Chairman Lin Zuoming explained at the CCP's 18th National Congress in 2012, "AVIC has been

accelerating its pace of Going Global in recent years and has acquired a number of foreign companies."²⁷ Overseas deals that AVIC and its subsidiaries have executed over the past decade bear out that statement. In 2011, AVIC International acquired Alabama-based Continental Motors (now Continental Aerospace Technologies), an aircraft engine manufacturer, through AVIC's subsidiary Technify Motor.²⁸ Also in 2011, AVIC's automotive subsidiary AVIC Auto acquired a controlling share in Michigan-based Nexteer Automotive, a steering and drivetrain maker. At the time of acquisition, Nexteer ranked third in the world in sales of driveshaft components and fourth for steering systems.²⁹

That same year, AVIC subsidiary Chinese Aviation Industry General Aircraft bought Minnesota's Cirrus Aircraft.³⁰ This was the first time a Chinese company had purchased a U.S. aircraft maker. In 2013, AVIC's Continental Motors bought Southern Avionics, a small Texas-based company specializing in avionics services.³¹ In 2015, the same AVIC subsidiary acquired Florida-based United Turbine and UT Aeroparts,³² both focused on the aircraft turbine market. Also in 2015, AVIC International Holding acquired California-based aerospace parts maker Align Aerospace, and AVIC Auto joined with U.S.-Chinese investment firm BHR in purchasing Henniges, Michigan's leader in

26. "国家军民融合产业投资基金有限责任公司 [National Military-Civilian Fusion Industry Investment Fund Profile]," *PE Daily* (China), May 13, 2019.

27. Xue Zhiwei, "坚持合作共赢 大步迈向世界 [Adhere to Win-Win Cooperation; Stride to the World]," *Economic Daily* (China), November 14, 2020.

28. Jeff Amy, "AVIC International Completes Purchase of Continental Motors from Teledyne," *Alabama.com*, April 20, 2011. (https://www.al.com/press-register-business/2011/04/avic_international_completes_p.html)

29. Chad J.R. Ohlandt, Lyle J. Morris, Julia A. Thompson, Arthur Chan, and Andrew Scobell, "Chinese Investment in U.S. Aviation," *RAND Corporation*, 2017, page 48. (https://www.rand.org/content/dam/rand/pubs/research_reports/RR1700/RR1755/RAND_RR1755.pdf)

30. Han Tianyang, "State-owned AVIC buys US-based Nexteer," *China Daily* (China), April 11, 2011. (http://www.chinadaily.com.cn/bizchina/2011-04/11/content_12306100.htm)

31. Chad J.R. Ohlandt, Lyle J. Morris, Julia A. Thompson, Arthur Chan, and Andrew Scobell, "Chinese Investment in U.S. Aviation," *RAND Corporation*, 2017, page 51. (https://www.rand.org/content/dam/rand/pubs/research_reports/RR1700/RR1755/RAND_RR1755.pdf)

32. "Continental Motors Services Acquires United Turbine and UT Aeroparts Corporations," *AviationPros*, February 2, 2015. (<https://www.aviationpros.com/engines-components/aircraft-engines/piston-engine-maintenance/press-release/12040796/continental-motors-group-continental-motors-services-acquires-united-turbine-and-ut-aeroparts-corporations>)

anti-vibration technology.³³ AVIC also operates real estate projects in the United States, including a string of hotels in California, Georgia, and Michigan.³⁴ Some of AVIC's subsidiaries even received Paycheck Protection Program funding from U.S. COVID-19 relief efforts in 2020.³⁵

At a more structural level, AVIC has proposed the concept of an "Air Silk Road." The project is an aviation industry-specific offshoot of China's One Belt One Road (OBOR) initiative, focusing on "the three major areas of aviation infrastructure construction, aviation network construction, and aviation project trade." The Air Silk Road's goal is to shape the aviation industry and systems within and among target countries as well as to propel the "going out" of China's aviation supply chains.³⁶

International Infrastructure Players

Beijing's global project hinges on developing international infrastructure and standards through which to project power. The DoD list covers many major infrastructure companies, state-owned and private, spanning both traditional industries (such as

rail, construction, and energy) and emerging ones (such as cloud computing, telecommunications, and space). In some cases, the infrastructure these companies build is for direct military use. In others, it serves integrated military and civilian ends. And in still other cases, the infrastructure is purely civilian but establishes positions that encourage dependence on China and enhance Chinese influence or geopolitical leverage, in accordance with the MCF strategy.

Military Infrastructure

China Communications Construction Co. (CCCC) is a state-owned engineering and construction company identified by DoD in August 2020 as linked to China's military. According to its website, CCCC is the world's largest dredging company, port machinery manufacturer, marine equipment design company, and offshore oil rig design company.³⁷ CCCC developed the advanced dredgers for, and carried out the construction of, artificial islands in the South China Sea.³⁸ In March 2019, CCCC signed a strategic cooperation framework with China's Eastern Theater Navy in the field of military facility construction. They agreed to cooperate on engineering technology, construction management,

33. Chad J.R. Ohlandt, Lyle J. Morris, Julia A. Thompson, Arthur Chan, and Andrew Scobell, "Chinese Investment in U.S. Aviation," *RAND Corporation*, 2017, page 51. (https://www.rand.org/content/dam/rand/pubs/research_reports/RR1700/RR1755/RAND_RR1755.pdf). These cases do not include non-U.S. international acquisitions, such as the acquisition of Germany's diesel aircraft engine manufacturer Thielert in 2013, the United Kingdom's aircraft cabin manufacturer AIM Altitude in 2015, and Spain's automatic assembly systems manufacturer Aritex in 2016. For Chinese-language discussion of AVIC's overseas acquisitions, see: "海外并购：中国航空业新动力 [Overseas M&A: A New Engine of China's Aviation Industry]," *National Finance Weekly* (China), July 7, 2017.

34. Wang Jun, "Hotels Aside, AVIC Needs to Grow its Service Arm," *China Daily* (China), October 4, 2013. (http://usa.chinadaily.com.cn/epaper/2013-10/04/content_17009586.htm)

35. See: Emily de La Bruyère and Nathan Picarsic, "China's Protection Racket: Analysis of PRC-owned or -invested Entities Receiving PPP Loans," *Horizon Advisory*, August 2020. (<https://www.horizonadvisory.org/paycheckprotection>)

36. China Development Bank Financial Leasing, "航空工业租赁的'空中丝路'探索与建议 [Exploration and Suggestions on 'Air Silk Road' for Aviation Industry Lease]," *Sohu News* (China), January 4, 2020.

37. "公司概况 [Company Overview]," *China Communications Construction*, accessed May 4, 2021. (https://www.ccccltd.cn/aboutus/gsgk_558)

38. See, for example: "中国逆天装备曝光 在南海造岛只是小试牛刀 [China's Anti-Sky Equipment Exposed, Building an Island in the South China Sea Is Just a Small Test]," *Sina Military* (China), November 1, 2017; "中国造岛巨兽天鲲号，几天就能造出一个岛，还能实现无人操控挖煤 [China's Island-Building Giant Tiankun Can Build an Island in a Few Days, and It Can Also Realize Unmanned Coal Mining]," *New Country Strategy* (China), August 20, 2020; "China's CCCC to Build Artificial Islands for Duterte-Backed Scheme in Philippines," *Global Construction Review* (UK), October 27, 2016. (<https://www.globalconstructionreview.com/news/chinas-cccc-build-artificial-islands-duterte>)

and personnel training for “mutual benefit to advance the war zone.”³⁹

CCCC’s business spans more than 150 countries.⁴⁰ Its Singapore-based subsidiary, CCGC Overseas Real Estate, is currently developing the Grand Plaza (also known as The Grand) in Los Angeles, a \$1 billion mixed-use real estate development project that began construction in 2019.⁴¹ The project is a public-private partnership with the Los Angeles Grand Avenue Authority, among others.⁴² Representatives from the Los Angeles municipal government and the Chinese Consulate in Los Angeles attended the project’s signing ceremony.⁴³

Commercial Infrastructure

State-owned CRRC is the world’s largest manufacturer (by revenue) of rolling stock, or railway products and services. CRRC exports to more than 105 countries and maintains R&D centers globally, including in the United States.⁴⁴ CRRC is a dedicated MCF player and

ranks among the most heavily subsidized companies in China.⁴⁵ The company’s 2018 annual report vows to “implement the military-civil fusion development strategy and expand the application of technology and products.”⁴⁶ CRRC documents also profess commitments to OBOR, Made in China 2025, and “Go Out.”⁴⁷ In May 2017, CRRC joined with CASC – one of the 10 core state-owned military-industrial companies – and other government and state-owned entities to launch an investment fund dedicated to MCF technologies ranging from high-speed rail to power grid equipment to aerospace.⁴⁸

What role does a rolling stock company play in MCF? Much rail technology is dual-use. It also supports national – including military – logistical capacity. One of MCF’s priorities is leveraging civilian infrastructure, construction, and logistics for military purposes. According to this logic, rail infrastructure, whether located in China or abroad, should support the PLA’s requirements.⁴⁹

39. China State Construction Engineering Corporation, China Railway Engineering Corporation, China Railway Construction Corporation, China Power Construction Corporation, and China Energy Construction Cooperation all signed parallel agreements. “东部战区海军与多家央企签订战略合作框架协议 [The Eastern Theater Navy signs Strategic Cooperation Framework Agreements with a Number of Central Enterprises],” *Sohu News* (China), March 2019.

40. “公司业务 [Business],” *China Communications Construction*, accessed May 4, 2021. (<https://www.ccccltd.cn>). CCCC was also involved in the Hambantota Port project in Sri Lanka and the deep-water port in Kyaukpyu, Myanmar. Shannon Tiezzi, “With Latest Sanctions, US Casts a Shadow Over China’s Belt and Road,” *The Diplomat*, August 27, 2020. (<https://thediplomat.com/2020/08/with-latest-sanctions-us-casts-a-shadow-over-chinas-belt-and-road>)

41. “Construction Begins For \$1B The Grand Mixed-Use Project In Downtown Los Angeles,” *BisNow*, February 12, 2019. (<https://www.bisnow.com/los-angeles/news/mixed-use/construction-begins-for-much-anticipated-1b-the-grand-mixed-use-project-in-downtown-los-angeles-97463>)

42. Kim Slowey, “Related Scores \$630M Loan for AECOM-Led Los Angeles Mixed Use Project,” *Construction Dive*, November 9, 2018. (<https://www.constructiondive.com/news/related-scores-630m-loan-for-aecom-led-los-angeles-mixed-use-project/541676>)

43. Zhen Shaohua, “Vice General Manager of China Communications Construction Attended the Signing Ceremony of Grand Plaza Project in Los Angeles,” *China Communications Construction Group*, accessed May 4, 2021. (http://en.cccgreg.com/index.php?m=default_wmDetails&catid=&cid=266)

44. “About,” *CRRC Overseas Research Center*, accessed May 4, 2021. (<https://crrc.engr.illinois.edu/about>)

45. “中国中车：公司获得政府补助共计约11.27亿元 [CRRC: The Company Received Government Subsidies Totaling Approximately 1.127 Billion Yuan],” *Daily Economic News* (China), February 8, 2021.

46. “中国中车股份有限公司 2018年年度报告 [China CRRC Co., Ltd 2018 Annual Report],” *CRRC*, March 29, 2019. (<https://www.crcgc.cc/g4951.aspx>)

47. See, for example: “中国中车2017年社会责任报告 [China CRRC 2017 Social Responsibility Report],” *CRRC*, March 29, 2018. (<https://www.crcgc.cc/zj/g1571/s35748/t300429.aspx>)

48. “中国中车：拟合资设立规模1139亿基金 投资军民融合等产业 [China CRRC: Capital to Set up a Scale of 113.9 Billion Funds, Investing in Military and Civilian Integration and other Industries],” *China Fund News* (China), July 3, 2017.

49. See: National People’s Congress Finance and Economics Committee, 军民融合发展战略研究 [*Military-Civil Fusion Development Strategy Research*] (Beijing: China Financial and Economic Publishing House, 2010).

Moreover, CRRC's international rail projects could allow China to acquire coercive leverage through commercial positioning. For example, Boston has sourced rail cars for its Red Line and Orange Line subways from CRRC.⁵⁰ Boston's transportation system could become dependent on CRRC for parts, servicing, equipment, and technology.⁵¹ Such dependence is particularly concerning, as Beijing frames transportation networks as components of national security.⁵² Transportation networks also provide indirect leverage via influence over the goods transported. For example, in Africa, China develops transportation networks alongside its investments in strategic mineral reserves and their processing. These transportation networks help shore up vertically integrated control over resource extraction, production, and trade.⁵³

Expansion of China's rail and other heavy-industry players also provides industrial capacity that bolsters China's commercial and military prospects. Technology and support from, as well as sales to, the military allow China's large construction and manufacturing companies to develop their products and lower costs, thereby out-muscling their international competitors. Think of this as not only technological transfer from military to civilian but also capacity transfer: Military procurement of CRRC's rail products or China State Shipbuilding Corporation's ships permits those entities to operate at greater capacity. Greater capacity allows the companies to lower costs and increase production

scale. As a result, the companies can both underprice competitors and, during times of increasing demand or decreasing supply, fill market gaps to capture market share. China's relatively insulated domestic markets, along with state support for core domestic actors such as CRRC, allow the Chinese economic system to underwrite the acquisition and development of dual-use and military-relevant technology.

Fused Military and Civilian Infrastructure

At the 2018 National Informatization Work Conference, Xi declared, "[C]yber-information military-civil fusion is the key field and frontier field of military-civil fusion, and it is also the most dynamic and high-potential field of military-civil fusion."⁵⁴ Accordingly, the DoD list covers some of China's key players in international IT systems, which Beijing uses to serve integrated military and civilian ends.

Take, for example, China's space infrastructure – particularly Beidou, China's satellite navigation system and alternative to GPS. Beidou serves the spectrum of military and civilian purposes, including military aircraft, smart-city construction, carshare systems, deep-space activities, and commercial aerospace.⁵⁵ The Beidou system's development and operation appear to be covertly directed by China's military apparatus.⁵⁶

Chinese sources frequently frame Beidou as an archetype of MCF. In 2012, the vice chairman of the

50. "CRRC MA Achievements in Massachusetts," *CRRC*, accessed May 4, 2021. (<https://www.crrcgc.cc/ma/g10053.aspx>)

51. Elizabeth Brotherton-Bunch, "Problems Mount for Boston Rail Cars Built by Chinese State-Owned Company CRRC," *Alliance for American Manufacturing*, March 4, 2020. (<https://www.americanmanufacturing.org/blog/problems-mount-for-boston-rail-cars-built-by-chinese-state-owned-company-crrc>)

52. See, for example: State Council and the Central Military Commission of the People's Republic of China, "国防交通条例 [National Defense Traffic Regulations]," February 24, 1995; Chen Baoguo, "新一轮信息技术革命浪潮对我国的影响 [The Impact of the New Wave of Information Technology Revolution on My Country]," *Scientific Decision*, Volume 11, 2010, pages 1–25.

53. See: Emily de La Bruyère and Nathan Picarsic, "Two Markets, Two Resources: Documenting China's Engagement in Africa," *U.S.-China Economic and Security Review Commission*, November 2020. (https://www.uscc.gov/sites/default/files/2020-11/Two_Markets_Two_Resources_Documenting_Chinas_Engagement_in_Africa.pdf)

54. "习近平：自主创新推进网络强国建设-新华网 [Xi Jinping: Independent Innovation Promotes the Building of a Network Power]," *Xinhua News Agency* (China), April 21, 2018.

55. Guo Meng, "正在蓬勃成长的军民融合典范 [A Booming Military-Civil Fusion Model]," *China National Defense News* (China), September 27, 2017.

56. John Dotson, "The Beidou Satellite Network and the 'Space Silk Road' in Eurasia," *The Jamestown Foundation*, July 15, 2020. (<https://jamestown.org/program/the-beidou-satellite-network-and-the-space-silk-road-in-eurasia>)

Central Military Commission, China's top military body, described Beidou as a "milestone" for the military and the nation.⁵⁷ *China National Defense News* calls Beidou a "model of military-civil fusion." In September 2017, Gao Weiguang, assistant director of the China Satellite Navigation Engineering Center, said, "Beidou serves the construction of national defense as well as economic and social development... China deeply integrates the Beidou system into the Belt and Road strategy, military-civil fusion, and information development."⁵⁸

CASC, one of China's 10 state-owned military-industrial groups, played a critical role in the construction and development of the Beidou system, including through CASC's China SpaceSat and CALT subsidiaries.⁵⁹ As CASC's website puts it, the company "is responsible for the development of the launch vehicles and most of the satellites for China's Beidou Navigation Program."⁶⁰ CETC also supports Beidou's technological and industrial development, primarily through its 54th Research Institute – described at the 2020 China Satellite Navigation Conference as "engaged in technology research and development, manufacturing, and system integration in cutting-edge fields such as military communications, satellite navigation and positioning, aerospace measurement and

control, intelligence reconnaissance and command, communications and information countermeasures, and integrated applications of aerospace electronic information systems."⁶¹ In November 2020, CETC won the "Beidou Satellite Navigation Application Promotion Contribution Award," issued by the China Satellite Navigation Management Office and the China Satellite Navigation Conference Organizing Committee.⁶²

Beidou's relationships extend well beyond China's state-owned military-industrial companies. Take Semiconductor Manufacturing International Corporation (SMIC), also named on the DoD list and the largest semiconductor foundry company in China. Headquartered in Shanghai and incorporated in the Cayman Islands, SMIC is partially state-owned and publicly listed on the Shanghai and Hong Kong stock exchanges. SMIC appears to be a Beidou supplier, building domestic capabilities that add value to the Beidou ecosystem.⁶³

Other IT infrastructures and champions also play key roles in China's global MCF ambitions.⁶⁴ China Telecommunications Corporation (China Telecom) describes MCF as one of its primary applications. China Telecom is a state-owned telecommunications company on the DoD list alongside China United Network Communications Group Co., Ltd. and

57. Bree Feng, "A Step Forward for Beidou, China's Satellite Navigation System," *Sinosphere Blog*, December 4, 2014. (<https://sinosphere.blogs.nytimes.com/2014/12/04/a-step-forward-for-beidou-chinas-satellite-navigation-system>)

58. Guo Meng, "正在蓬勃成长的军民融合典范 [A Booming Military-Civil Fusion Model]," *China National Defense News* (China), September 27, 2017.

59. See, for example: Mark Stokes, Gabriel Alvarado, Emily Weinstein, and Ian Easton, "China's Space and Counterspace Capabilities and Activities," *U.S.-China Economic and Security Review Commission*, March 30, 2020. (<https://www.uscc.gov/research/chinas-space-and-counterspace-activities>)

60. "Beidou Navigation Program," *China Aerospace Science and Technology Corporation*, accessed May 4, 2021. (<http://english.spacechina.com/n16421/n17215/n17269/n2389165/c2389393/content.html>)

61. "中国电子科技集团公司第五十四研究所 [The 54th Research Institute of China Electronics Technology Group Corporation]," *China Satellite Navigation Conference*, accessed May 4, 2021. (<http://china-satellite.org/exhibition/showman/127.html>)

62. "中电科睿威公司喜获'北斗卫星导航应用推进贡献奖' [CETC Corporation Won the 'Beidou Satellite Navigation Application Promotion Contribution Award']," *China Electronics Technology Group*, November 28, 2020.

63. See, for example: "SMIC Active IP Listing," *Design & Reuse*, accessed May 4, 2021. (<https://www.design-reuse.com>)

64. For a discussion of the roles of IT and telecommunications as core domains of MCF and China's security strategy, see: Rush Doshi, Emily de La Bruyère, Nathan Picarsic, and John Ferguson, "Seizing the Information Revolution: Beijing's Two Voices in Telecommunications," *Brookings Institution*, April 2021. (<https://www.brookings.edu/research/china-as-a-cyber-great-power-beijings-two-voices-in-telecommunications>)

China Mobile Communications Group, also state-owned, and Huawei.⁶⁵ China Telecom’s government-enterprise operation is divided into 11 divisions, including an MCF industry division.⁶⁶ In a concrete manifestation of its military ties, China Telecom signed a strategic cooperation agreement with China’s Eastern Theater Command in 2017 for the construction of battlefield information infrastructure, military emergency communications, application and transformation of new-generation IT, and the training of informatization professionals.⁶⁷

Military-Academic Complex

Technologies developed by information infrastructure champions on the DoD list often appear on China’s national- and provincial-level MCF public-service platforms. These platforms are hubs designed to encourage sharing of technology and other resources among military and civilian entities.⁶⁸

This points to another way entities can support China’s military and MCF programs: the provision of research, development, and engineering. Discussions of MCF in China emphasize the value of dual-use technologies and the efficiencies derived from breaking down barriers between military and civilian technology development as well as technological

applications.⁶⁹ Several companies on the DoD list participate in this process, transferring technology from the commercial space to China’s military and security apparatus.⁷⁰

In June 2020, the DoD identified Inspur, a Chinese company focused on cloud computing and big data, as tied to the PLA. Inspur has a strategic cooperation agreement with the 36th Institute of CETC, one of China’s 10 core military-industrial groups, “to jointly build a new dream in the field of national defense and informatization” through technology partnerships in control, intelligent equipment, and other data-related areas. A press release notes that “through cooperation in comprehensive research, technology demonstration, product development, [and] manufacturing ... the two parties will achieve complementary advantages.”⁷¹ Inspur operates a U.S.-based subsidiary, Inspur Systems, based in Milpitas, California. The subsidiary has an R&D center in Fremont, California, and facilities in Seattle, Washington, and Newark, California.⁷²

Sugon, a leading Chinese computing company, offers a similar example. In 2016, Sugon signed a strategic cooperation agreement with the Chinese Institute of Command and Control to promote “the application

65. “中国电信集团/总部AI中心/DICT中心/集成公司总部2021校园招聘 [China Telecom Group/Headquarters AI Center/DICT Center/Integrated Company Headquarters 2021 Campus Recruitment],” *Student Career Center of Peking University*, October 9, 2020.

66. “中国电信政企事业部任命应急、交通、军民融合等11个行业总裁 [China Telecom’s Government-Enterprise Division Appoints 11 Industry Presidents Including Emergency Response, Transportation, Military-Civil Fusion],” *Sobu News (China)*, September 29, 2020.

67. Zhang Xiaofei, Cheng Yongliang, and Rui Tianyang, “东部战区与中国电信战略合作，涉军地应急通信联合保障等领域 [Strategic Cooperation Between the Eastern Theater Command and China Telecom, Joint Support of Military-to-Ground Emergency Communications, Etc.],” *China News (China)*, April 22, 2017.

68. “华为存储服务器 [Huawei Storage Server],” *Hunan Provincial Military-Civil Fusion Public Service Platform*, December 4, 2019.

69. See: National People’s Congress Finance and Economics Committee, *军民融合发展战略研究 [Military-Civil Fusion Development Strategy Research]* (Beijing: China Financial and Economic Publishing House, 2010).

70. Again, the forms of support for China’s military and MCF system identified in this report are not mutually exclusive. Backbone military-industrial companies develop international infrastructure; companies developing international infrastructure share R&D with the Chinese system.

71. “三十六所与浪潮集团开展战略合作，携手服务国防与国家信息化建设 [Thirty-Six Institute and Inspur Group Carry Out Strategic Cooperation to Jointly Serve National Defense and National Information Construction],” *Jiaxing Junsheng Electronic Technology Co.*, June 3, 2017.

72. “Contact Us,” *Inspur Systems*, accessed May 10, 2021. (<https://www.inspursystems.com/contact-us>)

of command and control technology in national defense construction and national security.⁷³ *Xinhua* observed that “Sugon cloud computing technology helps the PLA joint combat command system.”⁷⁴ Currently listed on the Shanghai Stock Exchange, Sugon was established through support from the Chinese Academy of Sciences,⁷⁵ which remains Sugon’s largest shareholder.⁷⁶ Sugon’s 2019 annual report lists 19 subsidiaries. They include Sugon U.S. Systems, Inc., a California-based subsidiary that appears to have been dissolved. The subsidiary list also includes Zhongke Ruiguang Software Technology Company, a joint venture with California-based VMW focused on cloud computing, big data, and other fields.⁷⁷

In a broader example of technology sharing between China’s military and civilian systems, since 2015, the year Beijing elevated MCF to national-level strategy, the Chinese Institute of Command and Control has held an annual “Military-Civil Fusion Technology and Equipment Expo” in Beijing.⁷⁸ The event is attended by tens of thousands of representatives from the government, military, armed police, public security, transportation, civil air defense, aerospace, aviation, weapons, ships, and electrical technology fields.⁷⁹ Huawei, Inspur, and Sugon⁸⁰ – to name a few companies – are regular participants.⁸¹ So are core state-owned military-industrial companies and their subsidiaries (such as Hikvision).⁸²

73. “中国指挥与控制学会联手中科曙光 专家指有望助推国防建设 [The Chinese Institute of Command and Control Teamed up with Sugon Experts to Point out That It Is Expected to Boost National Defense],” *China News* (China), January 16, 2016. The Chinese Institute of Command and Control falls under the Chinese Association for Science and Technology, which itself responds to the CCP. Ben Murphy, “China Association for Science and Technology 2019 Budget,” *Georgetown Center for Security and Emerging Technology*, August 27, 2020. (<https://cset.georgetown.edu/research/china-association-for-science-and-technology-2019-budget>)

74. “曙光云计算技术助力解放军联合作战指挥体制 [Sugon Cloud Computing Technology Helps the PLA Joint Combat Command System],” *Xinhua News Agency* (China), January 16, 2016.

75. “Company Overview,” *Sugon*, accessed May 10, 2021. (<https://www.sugon.com>)

76. “Dawning Information Industry Co., Ltd.,” *Business Insider*, accessed May 7, 2021. (https://markets.businessinsider.com/stocks/dawning_information_industry-stock); “中科曙光 (603019) : 背靠中科院强劲科研实力，国产超级计算机龙头 [Sugong (603019): Backed by the Strong Scientific Research Strength of the Chinese Academy of Sciences, the Domestic Computing Leader],” *East Money* (China), September 9, 2019. A significant portion of Sugon’s net profit – over 31 percent in 2018 – derives from government subsidies.

77. “曙光信息产业股份有限公司: 2019 年年度报告摘要 [Sugon Information Industry Co., Ltd.: Summary of 2019 Annual Report],” *Sugon*, June 2020. (https://www.sugon.com/investor/get_affiche?url=%7Cuploads%7Cfile%7C323032302e30342e3038%7Ce40333b673892a55a7b2d4a5b607d5a7.pdf)

78. “2019第五届中国 (北京) 军民融合技术装备博览会 [2019 Fifth China (Beijing) Military-Civil Fusion Technology and Equipment Expo],” *China Industry Exhibition Network*, accessed May 10, 2021. (<http://www.31expo.com/show/pdetail--5392--160603.html>)

79. *Ibid.*

80. A *Global Times* article reports that Sugon’s participation in the 2016 event indicates that the company is “actively deploying the military-civil fusion strategy”: “Under the guidance of the central MCF strategy, major private enterprises have also deployed a national strategy for MCF. Sugon and StarNet Ruijie will bring China’s independent and controllable advanced technologies and solutions to their debut [at the expo].” “中科曙光和星网锐捷等积极布局军民融合战略 [Sugon and StarNet Ruijie Actively Deploy Military-Civil Integration Strategies],” *Global Times* (China), May 25, 2016.

81. “2019第五届中国 (北京) 军民融合技术装备博览会 [2019 Fifth China (Beijing) Military-Civil Fusion Technology and Equipment Expo],” *China Industry Exhibition Network*, accessed May 10, 2021. (<http://www.31expo.com/show/pdetail--5392--160603.html>); “2016第二届中国军民融合技术装备博览会 [2016 2nd China Military-Civil Fusion Technology and Equipment Expo],” *China Aviation News* (China), December 15, 2016.

82. “2019第五届中国 (北京) 军民融合技术装备博览会 [2019 Fifth China (Beijing) Military-Civil Fusion Technology and Equipment Expo],” *China Industry Exhibition Network*, accessed May 10, 2021. (<http://www.31expo.com/show/pdetail--5392--160603.html>); “2016第二届中国军民融合技术装备博览会 [2016 2nd China Military-Civil Fusion Technology and Equipment Expo],” *Chinese Institute of Command and Control*, accessed May 10, 2021.

Remaining Gaps

The FY1999 NDAA tasking directs DoD to identify Chinese military companies that operate in the United States. These companies do not only support the PLA industrially and technologically. They also conduct business in the United States and, in some cases, leverage that business to obtain dual-use and other military-relevant resources. Some build infrastructure in the United States, as in the cases of CRRC and the Boston subway, CCCC and the Los Angeles Grand Plaza, and AVIC and its real estate operations nationwide. Some have headquarters or operate R&D centers in the United States, such as Huawei in Santa Clara⁸³ and Inspur and China Mobile in Milpitas, California.⁸⁴ Many occupy positions in U.S. supply chains and connect to U.S. information systems.

“The DoD list is a critical resource. It begins to reveal the opaque nature of Chinese entities doing business globally – and the national security risks they present. However, this list should not be considered exhaustive. The 44 companies identified are by no means the only PLA-tied Chinese companies operating in the United States.”

The DoD list is a critical resource. It begins to reveal the opaque nature of Chinese entities doing business globally – and the national security risks they present. However, this list should not be considered exhaustive. The 44 companies identified are by no means the only PLA-tied Chinese companies operating in the

United States. Many centrally state-owned military-industrial companies, builders of global infrastructure for Chinese power projection, and pillars of Beijing’s military-academic complex are not on the list. Those 44 companies also operate through subsidiaries, joint ventures, and investment vehicles that are difficult to identify and may evade the scrutiny sparked by the DoD list.

This section details additional companies not on the list that meet qualifying conditions. These companies are presented as examples of gaps, not remedies for them. It would be insufficient simply to expand the existing DoD list to include these companies. Rather, the current documentation effort should be updated to account for the reality that there will always be more companies that meet qualifying criteria, especially as Beijing is adept at repackaging old players. Rather than trying to collect them all, the DoD effort should adopt a clear prioritization framework to focus on the military-tied companies that matter most, based on their role within the MCF system, the technologies or capabilities they develop, and their ties to U.S. resources or vulnerabilities.

Centrally State-Owned Military-Industrial Companies

The DoD list identifies the 10 primary centrally state-owned military-industrial companies. Those are not the only military-industrial players among China’s centrally state-owned enterprises. For example, China Poly Group Corporation (CPGC) is involved in art and antique auctioning, textile manufacturing, international trade, fishing, and real estate. It also works in defense and explosive manufacturing.⁸⁵ The company owns

83. Huawei announced in December 2019 that it would move that center to Canada. The move appears not yet to have taken place.

“Huawei Jobs in Santa Clara,” *LinkedIn*, accessed May 4, 2021. (<https://www.linkedin.com/jobs/huawei-jobs-santa-clara-ca>)

84. “US Headquarters,” *Inspur*, accessed May 10, 2021. (<https://www.inspursystems.com>). “China Mobile USA Research Center,” *Yellow Pages*, accessed May 4, 2021. (<https://www.yellowpages.com/milpitas-ca/mip/china-mobile-usa-research-center-465239266>)

85. “业务领域 [Service Areas],” *China Poly Group Corporation*, accessed May 10, 2021. (<https://www.poly.com.cn/l/1098-4299-3.html>).

Sometimes, those subsidiaries can overlap – or be deceiving. For example, CPGC subsidiary China National Crafts Group is a leading importer of precious metals and platinum. “保利集团五大合作项目集中签约 推动转型升级 [Five Major Cooperation Projects of Poly Group are Signed to Promote Transformation and Upgrading],” *China Proposed Projects Network*, November 8, 2011.

the world's third-largest art auction house.⁸⁶ CPGC also exports arms internationally, with past customers including Myanmar and Zimbabwe, reportedly in exchange for Chinese access to raw materials.⁸⁷

Most of CPGC's arms sales take place through its subsidiary Poly Technologies. Poly Technologies is a leading exporter of missile equipment, military-related electronic equipment, police and anti-riot equipment, military logistics supplies, and firearms.⁸⁸ Its products include a laser defense system to counter UAVs;⁸⁹ UAVs that can perform reconnaissance and missile strike missions;⁹⁰ and armored vehicles.⁹¹ The U.S. Department of State sanctioned Poly Technologies in

2013 for its violation of the Iran, North Korea, and Syria Nonproliferation Act.⁹²

CPGC is also an institutional supporter of China's domestic MCF apparatus. It operates several MCF research centers and investment funds.⁹³ Its real estate-related subsidiaries construct buildings and infrastructure in MCF industrial bases and zones across China.⁹⁴ CPGC's website advertises that the company is "combining national policies and [CPGC's] own advantages to promote military-civil fusion and innovative development."⁹⁵ CPGC also coordinates with PLA-affiliated institutions, including China's National Defense University⁹⁶ and the China Academy of Engineering Physics, which leads China's research on

86. Kaylee Randall, "Top 5 Auction Houses in the World," *The Collector*, August 8, 2019. (<https://www.thecollector.com/top-5-auction-houses-in-the-world>)

87. Cain Nunns, "China's Poly Group: The Most Important Company You've Never Heard Of," *PRI GlobalPost*, February 25, 2013. (<https://www.pri.org/stories/2013-02-25/chinas-poly-group-most-important-company-youve-never-heard>); "Does the People's Liberation Army Have Eyes on Sydney Property?" *Crikey* (Australia), November 11, 2019. (<https://www.crikey.com.au/2019/11/11/poly-group-corporation-sydney-property>)

88. "保利科技有限公司2019年校园招聘 [Poly Technology Co., Ltd. Campus Recruitment in 2019]," *Beihang Employment*, October 30, 2018. In addition, China Huaxin Post Telecom Technology Co., Ltd., another CPGC subsidiary, develops technologies for smart cities. "科技智绘美好未来 [New Technology Better Future]," *China Huaxin Post and Telecom Technologies Co., Ltd.*, accessed May 10, 2021. (<http://www.sinohx.com/#page1>); Poly Jiulian Holding Group Co., Ltd. develops explosives. "China Poly Group Corporation Limited," *China Poly Group Corporation*, accessed May 10, 2021. (<https://www.poly.com.cn>)

89. Yang Tianmu, "无人机与其'克星'演绎矛与盾故事 [UAV and its 'Nemesis' Interpret the Separ and Shield Story]," *People's Liberation Army Daily* (China), April 15, 2018.

90. Zhao Yan and Zhang Qichang, "轻型武器走红拉美防务市场 [Light Weapons Become Popular in the Latin American Defense Market]," *People's Liberation Army Daily* (China), April 6, 2017.

91. "镜头里的阿布扎比国际防务展 [Abu Dhabi International Defense Exhibition in the Lens]," *People's Liberation Army Daily* (China), February 25, 2015.

92. "China Poly Group Corporation," *Nuclear Threat Initiative*, August 22, 2009. (<https://www.nti.org/learn/facilities/52>); U.S. Department of State, Office of the Spokesperson, Media Note, "Imposition of Nonproliferation Sanctions Against Foreign Entities and Individuals," February 11, 2013. (<https://2009-2017.state.gov/r/pa/prs/ps/2013/02/204013.htm>)

93. "结合国家政策和自身优势 推进军民融合创新发展 [Combining National Policies and the Company's Own Advantages to Promote Military-Civil Fusion and Innovative Development]," *China Poly Group Corporation*, August 15, 2017. (<https://www.poly.com.cn/poly/s/1077-3817-16872.html>)

94. "结合国家政策和自身优势 推进军民融合创新发展 [Combining National Policies and the Company's Own Advantages to Promote Military-Civil Fusion and Innovative Development]," *China Poly Group Corporation*, August 15, 2017. (<https://www.poly.com.cn/poly/s/1077-3817-16872.html>); "朱铭新拜访雄安新区管委会副主任吴海军 [Zhu Mingxin visited Wu Haijun, Deputy Director of the Xiongan New District Management Committee]," *China Poly Group Corporation*, May 3, 2018. (<https://www.poly.com.cn/s/1077-3818-17825.html>)

95. "结合国家政策和自身优势 推进军民融合创新发展 [Combining National Policies and the Company's Own Advantages to Promote Military-Civil Fusion and Innovative Development]," *China Poly Group Corporation*, August 15, 2017. (<https://www.poly.com.cn/poly/s/1077-3817-16872.html>)

96. "王兴晔会见国防大学防务学院外军见学团 [Wang Xingye Meets with the Outside Military Delegation from the School of Defense of the National Defense University]," *China Poly Group Corporation*, June 30, 2017. (<https://www.poly.com.cn/l/1090-3819-39.html>)

nuclear directed-energy weapons and has been subject to U.S. export controls since 1997.⁹⁷

CPGC operates and invests around the world as well. In the United States, CPGC operates real estate projects in Los Angeles and San Francisco, has hosted cultural events with U.S. theaters in California, and reports having run partnerships with Yale, Columbia, the Lincoln Center, and the Met.⁹⁸ CPGC's mining subsidiary has signed procurement agreements with JP Morgan Chase.⁹⁹ In the 1990s, the U.S. Department of Justice investigated CPGC for allegedly smuggling small arms into the United States, including automatic weapons.¹⁰⁰

Additional Infrastructure Players

While the DoD list identifies key companies that support the Beidou system, these are only the tip of the iceberg. Beijing BDStar, the company responsible for developing Beidou's 22nm chip technology, stands out.¹⁰¹ Established in 2000, Beijing BDStar was the first public company in China's satellite navigation industry. As the company's website puts it, "Beijing BDStar was born as a result of Beidou and was registered and established on the eve of the launch of China's first Beidou satellite. For 20 years, BDStar has grown with Beidou and has promoted and

witnessed the development of China's satellite navigation and related industries."¹⁰²

With industrial priorities in satellite navigation, microwave ceramic devices, and automotive engineering services, BDStar describes its R&D system as, among other things, a "military-civil fusion research and development platform."¹⁰³ BDStar has at least 11 subsidiaries, including Unicore Communications, a satellite positioning company with offices in Beijing, Shanghai, and Silicon Valley;¹⁰⁴ Chongqing-headquartered BDStar Intelligent & Connected Vehicle, which has an R&D center in Silicon Valley;¹⁰⁵ and In-tech GmbH, a Germany-based automotive and smart mobility company with offices in the United States, Mexico, the Czech Republic, the United Kingdom, and Romania.¹⁰⁶

BDStar is just one of many additional companies that support the Beidou ecosystem. Haige Communications offers another example. Listed on the Shenzhen Stock Exchange – but with the Guangzhou State-owned Assets Supervision and Administration Commission as its controlling shareholder – the company supports Beidou's military navigation services.¹⁰⁷ It provides wireless communications and navigation technologies, equipment, and services for the Chinese military

97. "Chinese Academy of Engineering Physics," *Australian Strategic Policy Institute's China Defence Universities Tracker*, accessed May 10, 2021. (<https://unitracker.aspi.org.au/universities/chinese-academy-of-engineering-physics>); U.S. Department of Commerce, Bureau of Industry and Security, "Supplement No. 4 to Part 744 - Entity List," September 22, 2020. (<https://www.bis.doc.gov/index.php/documents/regulation-docs/691-supplement-no-4-to-part-744-entity-list/file>)

98. Zheng Xin, "Poly Group Plans US Expansion," *China Daily* (China), November 9, 2017; Zheng Xin, "Poly Group Set to Boost Ties with Global Partners," *China Daily* (China), September 21, 2018.

99. "保利集团五大合作项目集中签约 推动转型升级 [Five Major Cooperation Projects of Poly Group are Signed to Promote Transformation and Upgrading]," *China Proposed Projects Network*, November 8, 2011.

100. Jim Mann and Ronald Ostrow, "U.S. Seizes Assault Arms as Smuggling by China is Probed," *Los Angeles Times*, September 7, 2020. (<https://www.latimes.com/archives/la-xpm-1996-05-23-mn-7422-story.html>)

101. "发布新一代22nm北斗高精度定位芯片，北斗星通股价走强！ [With the Release of a New Generation of 22nm Beidou High-Precision Positioning Chip, the Share Price of Beidou Xingtong Strengthens!]," *Forbes China*, November 24, 2020. (<http://www.forbeschina.com/billionaires/52491>)

102. "共同的北斗，共同的梦想 [Common Beidou, Common Dream]," *BDStar Navigation*, accessed May 10, 2021. (<https://www.bdstar.com/about.aspx>)

103. "研发体系[R&D System]," *BDStar Navigation*, accessed May 10, 2021. (<https://www.bdstar.com/innovate.aspx>)

104. "About Us," *Unicore Communications*, accessed May 10, 2021. (<https://en.unicorecomm.com/about>)

105. "About Us," *BDStar Intelligent & Connected Vehicle Technology*, accessed May 10, 2021. (<https://www.bicv.com/en/about-us>)

106. "About Us," *In-tech*, accessed May 10, 2021. (<https://www.in-tech.com/en/company/about-us>)

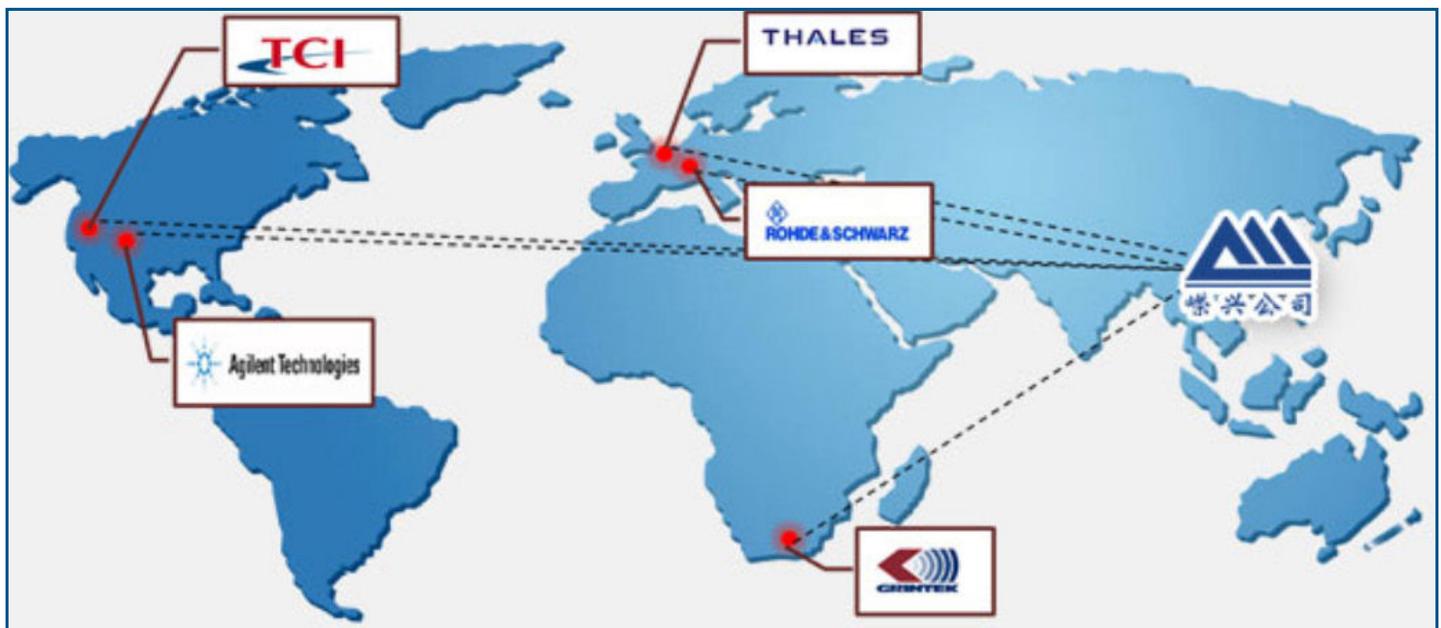
107. As do a number of listed companies. See: "13家北斗上市公司究竟都是做什么的？ [What Exactly Do the 13 Beidou Listed Companies Do?]," *Beidou Today* (China), July 18, 2015.

and armed police.¹⁰⁸ The U.S. Department of Commerce added Haige to its Entity List in August 2020 for supporting Beijing’s island construction and militarization in the South China Sea.¹⁰⁹

Haige’s annual report lists 25 subsidiaries, including Shenzhen Rongxing Industrial Development Co.¹¹⁰ Shenzhen Rongxing focuses on radio software development and system integration. According to the company’s website, it aims to be “a trusted and respected MCF developer in the field of electromagnetic spectrum.”¹¹¹

Shenzhen Rongxing has contributed technical support to Sino-Russian joint military exercises as well as to the G-20 summit in Hangzhou in 2016.¹¹² The company advertised itself in 2013 as “the only enterprise in the industry that can realize the integration and networking of the underlying systems for companies such as Germany’s R&S, France’s Thales, and America’s TCI.”¹¹³ Shenzhen Rongxing’s website boasts of Shenzhen Rongxing’s “good cooperative relations” with TCI, Agilent, and NARDA in the United States, as well as with France’s Thales, Japan’s AOR, and Germany’s R&S and GEW.¹¹⁴

Shenzhen Rongxing’s Integration System Footprint¹¹⁵



108. See, for example: Tang Shihua, “Haige Communications Takes USD118 Million in Military Orders in Two Months,” *Yicai Global* (China), January 2, 2018.

109. U.S. Department of Commerce, Bureau of Industry and Security, Press Release, “Commerce Department Adds 24 Companies to the Entity List,” August 26, 2020. (<https://www.commerce.gov/news/press-releases/2020/08/commerce-department-adds-24-chinese-companies-entity-list-helping-build>)

110. “广州海格通信集团股份有限公司 2019 年年度报告 [Guangzhou Haige Communication Group Co., Ltd. 2019 Annual Report],” *Guangzhou Haige Communication Group Co., Ltd.*, March 2020.

111. “公司简介 [Company Profile],” *Shenzhen Rongxing Industrial Development Co.*, accessed May 10, 2021. (http://www.rxing.com/AboutUs_Html/aboutus_introduction.html)

112. “发展历程 [Development Path],” *Shenzhen Rongxing Industrial Development Co.*, accessed May 10, 2021. (http://www.rxing.com/AboutUs_Html/aboutus_progressment.html)

113. “深圳嵘兴2019校园宣讲会 [Shenzhen Rongxing 2019 Campus Presentation],” *Kanzhun*, November 7, 2013. (<https://www.kanzhun.com/gsa/836924.html>)

114. “集成服务 [Integration Services],” *Shenzhen Rongxing Industrial Development Co.*, accessed May 10, 2021. (http://www.rxing.com/Product_Html/ProductService.html)

115. *Ibid.*

The range of Haige’s operations underlines the scope of the Beidou network and the applications developed by the MCF players supporting it. Another Haige subsidiary is Guangdong South Coast Technology Service Co., Ltd. (South Coast), which uses satellite positioning technology and terminal development to build and support integrated maritime information services. It provides ship positioning supervision systems for China’s customs, inspection and quarantine, border inspection, maritime affairs, border and coastal defense (for example, Guangdong Frontier Defense Corps), and port office entities as well as for foreign shipping companies.¹¹⁶ South Coast also supports China’s development of a cross-border e-commerce platform.¹¹⁷

These are only two companies in the larger Beidou network. And Beidou itself is just one infrastructure system. Similar gaps exist in documentation of actors in other critical MCF infrastructure sectors, such as nuclear energy and “new infrastructure.”¹¹⁸

Additional Military-Academic Complex Entities

MCF is institutionalized. Organizing nodes and coordinating mechanisms shape the activities of countless companies in China, the United States, and internationally. This is particularly obvious when it comes to the military-academic complex.

China’s R&D system is relatively centralized. Much of China’s cutting-edge research takes place under the auspices of, or in partnership with, state-led academic institutions that themselves have domestic and international partnerships across the academic and commercial landscape. As organizing forces for the development and sharing of military-relevant technology, these institutions should be included in DoD’s documentation of China’s military and MCF apparatus as well as its offshoots in the United States. Targeting these organizing nodes would allow the United States to move from hunting hydra heads to mounting a systemic defense.

Some of these state academic institutions are already known bad actors. The China Academy of Engineering Physics (CAEP), subordinate to the Ministry of Industry and Information Technology, is the dominant research institution behind China’s nuclear weapons program and also researches directed-energy weapons.¹¹⁹ This is no secret: CAEP is on the U.S. Entity List.¹²⁰ The DoD list does include Panda Electronics Group, a state-owned electronics group that as the Australian Strategic Policy Institute has documented, reports an address in CAEP’s Institute of Applied Physics and Computational Mathematics, indicating a possible link.¹²¹ However, the DoD list does not include CAEP itself.

CAEP is not a company, but it does operate corporate arms and invest capital. For example, CAEP owns

116. “发展历程 [Development Path],” *Guangdong South Coast Technology Service Co., Ltd.*, accessed May 10, 2021. (<http://www.gdnfha.com/aboutus/single/58.html>); “企业简介 [Company Profile],” *Guangdong South Coast Technology Service Co., Ltd.*, accessed May 10, 2021. (<http://www.gdnfha.com/aboutus/single/54.html>)

117. “业务方案 [Business Plan],” *Guangdong South Coast Technology Service Co., Ltd.*, accessed May 10, 2021. (<http://www.gdnfha.com/business/single/77.html>)

118. The term “new infrastructure” refers broadly to the physical systems underlying the Internet of Things, including telecommunications base stations, ultra-high-voltage transmission, high-speed rail and urban rail, new-energy vehicle charging centers, Industrial Internet systems, and data centers. In 2018, China’s Central Economic Work Conference introduced a government focus on “new infrastructure.”

119. “Chinese Academy of Engineering Physics,” *Australian Strategic Policy Institute’s China Defence Universities Tracker*, accessed May 10, 2021. (<https://unitracker.aspi.org.au/universities/chinese-academy-of-engineering-physics>)

120. “Addition of Certain Persons to the Entity List; Removal of Person From the Entity List Based on Removal Request; and Implementation of Entity List Annual Review Changes,” U.S. Department of Commerce, Bureau of Industry and Security, 77 Federal Register 58006, September 19, 2012. (<https://www.federalregister.gov/documents/2012/09/19/2012-22952/addition-of-certain-persons-to-the-entity-list-removal-of-person-from-the-entity-list-based-on>)

121. “Chinese Academy of Engineering Physics,” *Australian Strategic Policy Institute’s China Defence Universities Tracker*, accessed May 10, 2021. (<https://unitracker.aspi.org.au/universities/chinese-academy-of-engineering-physics>)

Sichuan Jiuyuan Investment Holding Group Co., Ltd.,¹²² which itself owns or holds a stake in dozens of other entities. Those entities include Lier Chemical, which exports to the United States and reports partnerships with Dow Chemical;¹²³ Sichuan Jiuyuan Yin Hai Software Co., Ltd., which invests alongside Tianjin Global Magnetic Card, a licensed Mastercard manufacturer;¹²⁴ and Beijing Xin'an Fortune Venture Capital, which has invested in U.S. and Chinese technology companies. The DoD documentation effort should prioritize companies engaged in partnerships with, receiving capital from, or allocating capital alongside, CAEP.

The Chinese Academy of Sciences (CAS) is larger and wider-ranging than CAEP. CAS is China's national academy for the natural sciences. It focuses on chemistry, IT, earth sciences, life and medical sciences, mathematics and physics, and technological sciences. CAS conducts and organizes national R&D projects, collaborates with other domestic and international players, and invests in commercial actors. It also fully espouses MCF. CAS' technological achievements regularly appear at the Chinese Institute of Command and Control's Military-Civil Fusion Technology and Equipment Expo.¹²⁵

In March 2018, CAS held a meeting for the "Chinese Academy of Sciences' in-depth advancement of the development of military-civil fusion project." As a report from the meeting noted, its purpose was "to build a research platform for the Chinese Academy of Sciences' military-civil fusion development strategy,

unite multiple forces, exchange and learn, and form a long-term mechanism for military-civil fusion development strategy research." CAS also operates dedicated MCF institutions, including an MCF big data research center¹²⁶ and an MCF development center at its university.¹²⁷ CAS' model rests on foreign cooperation, including with U.S. researchers, on topics ranging from high-energy physics to materials science.¹²⁸

As with CAEP, CAS is not a company. But it does operate corporate and investment arms. Those arms include CAS Holdings, which owns more than 30 holding companies.¹²⁹ And, as previously noted, CAS is the largest shareholder of Sugon, a company on the DoD list.

Enormous and diverse, CAS sits at the center of China's R&D ecosystem, with operations in civilian as well as military and dual-use domains. As with CAEP, the DoD documentation effort could focus on CAS in prioritizing and structuring documentation of military-civil technology transfer in the Chinese system. Doing so would allow DoD efforts to focus on organizing forces, such as CAS, rather than on their offshoots, such as Sugon.

CAS and CAEP are just two examples. There are other analogues, such as universities that house military or dual-use research benefitting the PLA, as well as government-led research projects with explicit military or MCF mandates.

122. "四川久远投资控股集团有限公司 [Organizational Structure]," *Sichuan Jiuyuan Investment*, accessed May 10, 2021. (<http://www.caep-forever.com.cn/about.aspx?mid=19>)

123. "About Lier," *Lier Chemical*, accessed May 10, 2021. (<http://www.lierchem.com/index.php?module=content&control=index&action=lists&catid=1>)

124. Home page, *China Tianjin Global Magnetic Card Co., Ltd.*, accessed May 10, 2021. (www.gmcc.com.cn)

125. See, for example: Gan Xiao, "中国科学院众多成果亮相第三届军民融合展 [Many Achievements of the Chinese Academy of Sciences Appeared at the 3rd Military-Civil Fusion Exhibition]," *Science Net* (China), September 18, 2017.

126. "军民融合大数据研究中心 [Military-Civil Fusion Big Data Research Center]," *Chinese Academy of Sciences Institute of Computing Technology*, accessed May 10, 2021.

127. "中国科学院大学军民融合发展研究中心 [Military-Civil Fusion Development Center]," *University of the Chinese Academy of Sciences*, accessed May 10, 2021.

128. "Introduction: Chinese Academy of Sciences," *Chinese Academy of Sciences*, accessed May 10, 2021. (<https://english.cas.cn>); The White House, Fact Sheet, "US-China Science and Technology Cooperation," accessed May 20, 2021. (<https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/st-fact-sheet.pdf>)

129. "Company Profile," *CAS Holdings*, accessed May 10, 2021. (<http://english.holdings.cas.cn/cp>)

A New Model: A Prioritization Framework

If U.S. efforts are to match the scope of Beijing’s MCF strategy, they will need updated tasking. Key elements of that updated tasking should include:

- Providing a clear definition of a Chinese military or MCF company. Language in the FY2021 NDAA offers a foundation for such a definition, but more is needed.
- Expanding the scope of documentation efforts to capture entities that may not operate on U.S. territory but nevertheless impact the United States or U.S. actors.
- Incorporating a prioritization framework into the DoD documentation program to allocate resources and attention strategically.

Clear Definitions

The FY1999 NDAA tasking was prescient. It was also crafted at a time when China was less influential, less integrated into the U.S. and global systems, and operating at a smaller scale. A U.S. response to China’s weaponization of cooperation demands a clear definition of Chinese military and MCF entities that focuses on the organizing elements of Beijing’s military and MCF systems. This definition should also offer guidelines for following MCF resource allocations, platforms, vehicles, and partnerships operating in the United States and globally.¹³⁰

The FY2021 NDAA offered the start of such a framework. Section 1260H calls for “[p]ublic reporting of Chinese military companies operating in the United States” and lays out an annual reporting process for the secretary of defense.¹³¹ The NDAA language defines Chinese military companies as those owned by the “People’s Liberation Army or any other organization

subordinate to the Central Military Commission of the Chinese Communist Party” and/or serving as a “military-civil fusion contributor.” The NDAA language provides detailed indicators for defining a “military-civil fusion contributor,” including connections to:

- Military-relevant streams of Chinese government funding;
- Institutional relationships commonly associated with MCF (such as connections to the Ministry of Industry and Information Technology); and
- Operational features of the MCF system in China (for example, operations located within an enterprise zone whose mandate and funding focus on MCF).

However, the FY2021 NDAA language still has gaps. Additional indicators are needed for identifying military and MCF companies. For example, the FY2021 NDAA guidance does not account for all non-government funding and investment streams linked to China’s military and MCF program. Private investment funds approved by Chinese central or provincial asset administration authorities to invest with an MCF mandate or thesis do not meet the NDAA criteria. Nor do the holding companies or investment vehicles backed by CAEP or CAS. Yet the portfolio companies into which those companies and vehicles invest, both in China and abroad, meet the spirit of the law’s intent. The FY2021 NDAA guidance also overlooks spin-off MCF actors, which generate revenue for the MCF apparatus by commercializing technology transferred from the military to private actors.¹³²

Expanded Scope

The FY1999 NDAA limits the scope of DoD’s documentation effort to companies “operating directly or indirectly in the United States.” This limitation should be expanded – or reconceived. A company without a presence in the United States might still control a critical node in a value chain on which the

¹³⁰. Based in Beijing’s system and institutions, this framework should be sensitive to emerging elements of China’s military and MCF program, including elements that may currently be underappreciated in U.S. analysis.

¹³¹. See Appendix A for the full text of this section.

¹³². Licensing of Chinese military-derived patents and intellectual property may be a useful indicator to monitor in this direction.

United States depends. A company without physical operations in the United States might still provide technology services or capital to the United States, acquiring influence and information in exchange. Moreover, a company without operations in the United States might still acquire U.S. technology and data (for example, through joint ventures or research cooperation). And a company without operations in the United States might also receive U.S. capital, not only benefiting directly from that capital but also acquiring influence over U.S. economic interests. For example, if a U.S. pension fund were invested in an index fund that invests in Sugon, U.S. pensions would depend on the performance of a Chinese military company.

Software and data are critical components of national prosperity, security, and power. Cross-border capital and supply chains have created complex systems of interdependence and become levers of strategic influence. Conceptions of what it means to operate in or with the United States should reflect this reality.

Clear Prioritization

Even as it expands DoD’s documentation effort, Washington should understand that gaps are inevitable. There will always be companies overlooked. There are simply too many companies tied to China’s military program. There will always be more. Moreover, attempting to list every last company could hinder the concrete action that must follow the documentation process.

The current documentation effort should be expanded, but with a clear prioritization framework in place to target the entities that matter most, based both on U.S. priorities and on each entity’s role within the Chinese system. Congress or DoD should offer a rubric to help the department prioritize between different technologies, sectors, and types of actors.

That rubric should factor in, first, every entity’s role within the MCF system and contribution to China’s offensive capabilities. Some MCF actors primarily collect technologies or resources. Others apply those technologies or resources to operational ends. A Chinese company or investor partnering with a U.S. player in satellite technology would be an example of the former. Companies operationalizing the Beidou ecosystem, such as Beijing BDSat, are examples of the latter. Both types are critical components of the MCF system. If the United States had unlimited time and resources or were further ahead in the competition with China, both would be worthy targets. But the applicators provide the highest value-added and most directly threaten U.S. interests. DoD’s effort should prioritize them.

Second, this rubric should prioritize areas in which the United States must compete to secure its future power and prosperity. Satellite and sensing systems and global logistics networks offer prime examples. These systems gather commercial and military-relevant information. They increasingly shape global movement. Both battlefield operations and commercial exchange depend on them. Beijing competes for these global information systems, their international technical standards, and their industry chains.¹³³ If the United States is to maintain informational advantages – and the ability to project power globally – it will have to prioritize these as a competitive domain.

Third, this rubric should account for the degree of U.S. vulnerability to a given Chinese entity, taking into account entire value chains. For instance, the rubric should consider the degree to which China’s MCF players enhance Chinese control over markets or industry chains in a way that threatens the autonomy of U.S. or allied value chains. To take a concrete case as an example, DoD should prioritize Chinese actors involved in refining and smelting critical rare earth

133. See: Emily de La Bruyère and Nathan Picarsic, “Beijing’s Bid for a Maritime ‘God View’: Military-Civil Fusion Power Projection and Threats to Supply Chain Integrity,” *Real Clear Defense*, October 13, 2020. (https://www.realcleardefense.com/articles/2020/10/13/beijings_bid_for_a_maritime_god_view_military-civil_fusion_power_projection_and_threats_to_supply_chain_integrity_580515.html)

elements and related magnet production that support U.S. weapons systems.¹³⁴

To its credit, DoD has designated entities engaged in semiconductor technology and production (such as SMIC, Gowin Semiconductor Corporation, and Advanced Micro-Fabrication Equipment, Inc.). Beijing prioritizes the semiconductor industry. China’s control over nodes in the value chain threatens U.S. economic and national security. DoD’s semiconductor-related designations therefore represent an encouraging first stab at addressing U.S. vulnerabilities. But this first stab is inadequate. DoD action ought to address the broader value chain, including silicon processing, chip design, and production. Moreover, DoD documentation efforts should apply the same lens to other areas of Chinese priority and leverage, such as rare earth elements, machine tools, and UAVs.

Operationalizing the Documentation Effort

No matter how refined the documentation process might be, it means little without operationalization. The DoD list has no teeth on its own. It provides information the government and private sector can use to take action. The expanded DoD documentation effort should be paired with interagency action that encourages government and private-sector players to act on DoD’s findings. For example, companies should review their partnerships and supply chains for possible connections to the Chinese military.

Such action should be both defensive and offensive. In 2020, the Trump administration issued Executive Order 13959, prohibiting investment in identified Chinese military companies. While a valuable step in

operationalizing DoD’s findings, that order was also purely defensive. The United States will not be able to combat MCF simply by blocking Chinese military companies.¹³⁵ The United States must also incentivize positive alternatives to Chinese MCF players and efforts. For example, where China has secured control over core nodes in industry value chains, Washington should encourage investment in and development of alternatives.

- DoD, with support from the rest of the federal government, should establish a robust analytical program to monitor the scope and functions of MCF and deliver regular updates, both in classified fora and publicly. These updates would inform U.S. and allied private-sector actors of the risks of doing business with Chinese military-tied companies. These updates would also serve as a foundation to support strategic action by U.S. government authorities. Strategic messaging around this information should frequently and explicitly recall the authorities of the International Emergency Economic Powers Act (IEEPA) associated with the original FY1999 NDAA tasking for the DoD list. IEEPA authorities could empower more proactive operationalization of U.S. government restriction and seizure of Chinese assets linked to MCF ambitions.
- The task of monitoring Chinese military companies should be prioritized on par with investment-screening and export-control functions managed by the interagency Committee on Foreign Investment in the United States and the Commerce Department’s Bureau of Industry and Security, respectively. Monitoring should also be coordinated with those efforts, either through existing interagency mechanisms, such as the National Security Council, or through a novel bureaucratic construct focused

¹³⁴. For a discussion of China’s rare-earths strategy, see: Emily de La Bruyère and Nathan Picarsic, “Absolute Competitive Advantage: Rare Earth Elements in China’s Strategic Planning,” *Horizon Advisory*, June 2020. (Available at: https://issuu.com/horizonadvisory/docs/horizon_advisory_-_absolute_competitive_advantage_); Timothy Puko, “U.S. Is Vulnerable to China’s Dominance in Rare Earths, Report Finds,” *The Wall Street Journal*, June 29, 2020. (<https://www.wsj.com/articles/u-s-is-vulnerable-to-chinas-dominance-in-rare-earths-report-finds-11593423003>)

¹³⁵. Nowhere is this more evident than in the value chains China controls. China dominates global commercial UAV production. As a result, the United States is hard-pressed to place restrictions on Chinese UAV players, no matter their ties to the Chinese military. Those UAV players will continue to have free rein and benefit from U.S. and global dependence until the United States and its allies and partners invest in non-Chinese alternatives.

on the techno-economic competition with China. Each of those entities will have gaps in defending against and disrupting Beijing's MCF apparatus. Coordination would help close those gaps.

- Executive Order 13959 should be implemented in that spirit. U.S. regulators and capital market actors should enforce the order's prohibitions. Given the scope of integration that Chinese military companies enjoy in global capital markets, those prohibitions should also be expanded to prevent all types of U.S. capital and persons from supporting Chinese military companies, including via private market equity and debt. Clear and consistent U.S. messaging, including from DoD and Congress, should underscore the reputational and operational risks of collaborating with the Chinese military. U.S. investors – institutional and individual – should be well-informed about actors that may propel the CCP's military capabilities and ambitions or authoritarian control. And U.S. federal funding programs should, from the point of design and commitment of funds, vet against risks of indirectly supporting Chinese military companies and perpetuating the control of supply chains by MCF actors.
- Finally, these defensive measures – restricting the capitalization and freedom of maneuver of Chinese military companies – should be paired with the prioritization, promotion, and protection of alternative ecosystems. DoD's Trusted Capital program offers an example of how the U.S. government can help create a marketplace for public-private interactions that support the U.S. industrial base. And funding mechanisms for non-traditional innovation-base participants, such as the mechanisms offered by the

Defense Innovation Unit and the U.S. Air Force's AF Ventures and AFWERX, show that U.S. federal funding can be both competitively framed and reach the best and brightest in dual-use technology. As the U.S. government and private sector look to invest in the wake of COVID-19, those investments should be framed in a competitive context and aim to activate multilateral interest in trusted supply lines throughout the defense industrial base.

Conclusion

In the FY1999 NDAA, legislators provided a vital tool for defense against what was then a little-recognized threat. However, that tool sat untapped for two decades. During that time, Beijing integrated globally. It established positions of asymmetric dependence and, with them, coercive influence. The CCP developed its MCF program and elevated it to a national-level strategy. The threat environment evolved to make the 1999 tool simultaneously more valuable and antiquated.

America has recognized the CCP threat. After two decades, DoD has acted on the FY1999 NDAA tasking to deliver a list of 44 Chinese military-tied companies operating in the United States. This list creates momentum. However, the effort requires updated guidance. The FY2021 NDAA offered the beginnings of an updated framework. That framework must now be expanded and complemented with a prioritization logic. It must also be paired with implementation steps that spark meaningful action on the part of the federal government and the private sector.

Appendix A: FY2021 NDAA Language Concerning Reporting Requirements Pertaining to Chinese Military Companies¹³⁶

SEC. 1260H. PUBLIC REPORTING OF CHINESE MILITARY COMPANIES OPERATING IN THE UNITED STATES.

(a) Determination.--The Secretary of Defense shall identify each entity the Secretary determines, based on the most recent information available, is operating directly or indirectly in the United States or any of its territories and possessions, that is a Chinese military company.

(b) Reporting and Publication.--

(1) Annual report.--Not later than April 15, 2021, and annually thereafter until December 31, 2030, the Secretary shall submit to the Committees on Armed Services of the Senate and the House of Representatives a list of each entity identified pursuant to subsection (a) to be a Chinese military company, in classified and unclassified forms, and shall include in such submission, as applicable, an explanation of any entities deleted from such list with respect to a prior list.

(2) Concurrent publication.--Concurrent with the submission of each list described in paragraph (1), the Secretary shall publish the unclassified portion of such list in the Federal Register.

(3) Ongoing revisions.--The Secretary shall make additions or deletions to the most recent list submitted under paragraph (1) on an ongoing basis based on the latest information available.

(c) Consultation.--The Secretary may consult with the head of any appropriate Federal department or agency in making the determinations described in subsection (a) and shall transmit a copy of each list submitted under subsection (b)(1) to the heads of each appropriate Federal department and agency.

(d) Definitions.--In this section:

(1) Chinese military company.--The term “Chinese military Company”--

(A) does not include natural persons; and

(B) means an entity that is--

(i)(I) directly or indirectly owned, controlled, or beneficially owned by, or in an official or unofficial

136. William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Pub. L. 116-283, *116th Congress* (2019–2020). (<https://www.congress.gov/116/bills/hr6395/BILLS-116hr6395enr.pdf>)

capacity acting as an agent of or on behalf of, the People’s Liberation Army or any other organization subordinate to the Central Military Commission of the Chinese Communist Party; or

(II) identified as a military-civil fusion contributor to the Chinese defense industrial base; and (ii) engaged in providing commercial services, manufacturing, producing, or exporting.

(2) Military-civil fusion contributor.--The term “military-civil fusion contributor” includes any of the following:

(A) Entities knowingly receiving assistance from the Government of China or the Chinese Communist Party through science and technology efforts initiated under the Chinese military industrial planning apparatus.

(B) Entities affiliated with the Chinese Ministry of Industry and Information Technology, including research partnerships and projects.

(C) Entities receiving assistance, operational direction or policy guidance from the State Administration for Science, Technology and Industry for National Defense.

(D) Any entities or subsidiaries defined as a “defense Enterprise” by the State Council of the People’s Republic of China. (E) Entities residing in or affiliated with a military-civil fusion enterprise zone or receiving assistance from the Government of China through such enterprise zone.

(F) Entities awarded with receipt of military production licenses by the Government of China, such as a Weapons and Equipment Research and Production Unit Classified Qualification Permit, Weapons and Equipment Research and Production Certificate, Weapons and Equipment Quality Management System Certificate, or Equipment Manufacturing Unit Qualification.

(G) Entities that advertise on national, provincial, and non-governmental military equipment procurement platforms in the People’s Republic of China.

(H) Any other entities the Secretary determines is appropriate.

(3) People’s liberation army.--The term “People’s Liberation Army” means the land, naval, and air military services, the People’s Armed Police, the Strategic Support Force, the Rocket Force, and any other related security element within the Government of China or the Chinese Communist Party that the Secretary determines is appropriate.

Appendix B: Chinese Entities Listed by the U.S. Department of Defense¹³⁷

English Name	Tranche
Aviation Industry Corporation of China	Tranche 1
China Aerospace Science and Technology Corporation	Tranche 1
China Aerospace Science and Industry Corporation	Tranche 1
China Electronics Technology Group Corporation	Tranche 1
China South Industries Group Corporation	Tranche 1
China Shipbuilding Industry Corporation	Tranche 1
China State Shipbuilding Corporation	Tranche 1
China North Industries Group Corporation	Tranche 1
Hangzhou Hikvision Digital Technology Co., Ltd.	Tranche 1
Huawei Technologies Co., Ltd.	Tranche 1
Inspur Group	Tranche 1
Aero Engine Corporation of China	Tranche 1
China Railway Construction Corporation	Tranche 1
CRRC Corporation	Tranche 1
Panda Electronics Group	Tranche 1
Dawning Information Industry (Sugon)	Tranche 1
China Mobile Communications Group	Tranche 1
China General Nuclear Power Corporation	Tranche 1
China National Nuclear Corporation	Tranche 1
China Telecommunications Corporation	Tranche 1

¹³⁷ U.S. Department of Defense, Press Release, “DOD Releases List of Additional Companies, In Accordance with Section 1237 of FY99 NDAA,” January 14, 2021. (<https://www.defense.gov/Newsroom/Releases/Release/Article/2472464/dod-releases-list-of-additional-companies-in-accordance-with-section-1237-of-fy>)

English Name	Tranche
China Communications Construction Company	Tranches 2-3
China Academy of Launch Vehicle Technology	Tranches 2-3
China Spacesat	Tranches 2-3
China United Network Communications Group Co., Ltd.	Tranches 2-3
China Electronics Corporation	Tranches 2-3
China National Chemical Engineering Group Co., Ltd.	Tranches 2-3
China National Chemical Corporation	Tranches 2-3
Sinochem Group Co., Ltd.	Tranches 2-3
China State Construction Group Co., Ltd.	Tranches 2-3
China Three Gorges Corporation Limited	Tranches 2-3
China Nuclear Engineering & Construction Corporation	Tranches 2-3
China Construction Technology Co., Ltd.	Tranche 4
China International Engineering Consulting Corporation	Tranche 4
China National Offshore Oil Corporation	Tranche 4
Semiconductor Manufacturing International Corporation	Tranche 4
Advanced Micro-Fabrication Equipment Inc.	Tranche 5
Luokung Technology Corporation	Tranche 5
Xiaomi Corporation	Tranche 5
Beijing Zhongguancun Development Investment Center	Tranche 5
GOWIN Semiconductor Corporation	Tranche 5
Grand China Air Co., Ltd.	Tranche 5
Global Tone Communication Technology Co., Ltd.	Tranche 5
China National Aviation Holding	Tranche 5
Commercial Aircraft Corporation of China, Ltd,	Tranche 5

Acknowledgments

The authors wish to thank the Foundation for Defense of Democracies and its Center on Military and Political Power, Center on Economic and Financial Power, and Center on Cyber and Technology Innovation for publishing this analysis, as well as Larry Wortzel, Mark Montgomery, and Eric Lorber for their peer reviews. All errors and omissions are the fault of the authors alone.

About the Authors

Emily de La Bruyère is a senior fellow focusing on China policy at FDD, where she has pioneered data tools tailored to Beijing's strategic and institutional structures. Her work focuses on China's standardization ambitions and military-civil fusion strategy and their implications for U.S. economic and national security. She uses primary-source, Chinese-language materials to provide decision makers with insight on geopolitical, technological, and economic change. In addition to her work at FDD, she is a co-founder of Horizon Advisory, a consulting firm focused on the implications of China's competitive approach to geopolitics.



Nathan Picarsic is a senior fellow at FDD with a focus on China policy. He has closely monitored trends in Chinese impact across key economic and military balance areas for over a decade and is a leading expert on competitive strategies and approaches to long-term peacetime competition. His work has contributed to broader recognition of the Chinese Communist Party's focus on military-civil fusion and technical standards as critical factors in U.S.-China competition. He is a co-founder of Horizon Advisory, a consulting firm focused on the implications of China's competitive approach to geopolitics.



About the Foundation for Defense of Democracies

The Foundation for Defense of Democracies (FDD) is a Washington, DC-based, nonpartisan policy institute focusing on foreign policy and national security. For more information, please visit www.fdd.org.

FDD values diversity of opinions and the independent views of scholars, fellows, and board members. The views of the authors do not necessarily reflect the views of FDD, its staff, or advisors.



P.O. Box 33249
Washington, DC 20033-3249
(202) 207-0190
www.fdd.org