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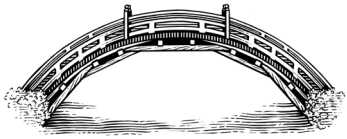
ROUNDTABLE

China's Military-Civil Fusion Strategy: Development, Procurement, and Secrecy



Richard A. Bitzinger

Yoram Evron

Zi Yang

Introduction

Zi Yang

Hailed by the Chinese government as a cornerstone of national rejuvenation, Military-Civil Fusion (MCF) has captured domestic and international headlines in recent years. While in China the focus of reports is on how MCF will benefit the defense industry, the People's Liberation Army (PLA), and national strategic goals, the principal concerns of Western analysts are how the strategy will strengthen PLA capabilities and the possible transfer of dual-use technologies to MCF participants.

To better understand questions surrounding MCF and assess the progress of the strategy, the S. Rajaratnam School of International Studies (RSIS) at Nanyang Technological University organized a workshop in February 2020 featuring scholars from a multitude of countries to examine MCF's structure, outcomes, challenges, and global implications. This roundtable features three papers and presentations from the workshop. Each author investigates a particular aspect of MCF, including lessons from China's past experience of civil-military integration, the effects on China's military procurement system, and the state secrecy system's influence on MCF developments.

Richard Bitzinger's essay provides an overview of how MCF arose and the potential future prospects for the initiative. From the early 1980s to 2017, the Chinese government made several attempts at civil-military integration to little effect. Despite moderate gains in some areas of cooperation, the development of dual-use technology remained limited, as were technological transfers from the commercial sector to the military. The main problem during these earlier ventures, according to Bitzinger, was the inability of the civilian and military authorities to formulate and implement a civil-military integration-specific development strategy. Therefore, it is no surprise that under Xi Jinping's administration China is trying to turn over a new leaf on civil-military integration by devising a comprehensive MCF strategy with the goal of bringing technological benefits to the PLA. However, MCF is a multiyear initiative covering wide swaths of China's defense sector, and results might not be clearly visible in

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ZI YANG is a PhD student in the S. Rajaratnam School of International Studies (RSIS) at Nanyang Technological University (Singapore). His research focuses on China's military. Mr. Yang's recent publications include a Center for Strategic and International Studies report with Jeff Benson titled "Party on the Bridge: Political Commissars in the Chinese Navy" (2020) and a Routledge Handbook chapter "Character Assassination and the Contemporary Anti-Corruption Campaign in the Chinese Military" (2019). He can be reached at <yang0622@e.ntu.edu.sg>.

the short run. Regardless, Xi's government seems fully committed to the strategy, and the long-term implications could pose a substantial challenge to the United States and its allies.

Yoram Evron's essay examines the influence of MCF on PLA procurement. Traditionally, the Chinese military procurement system has been constrained by a number of challenges, such as technological backwardness, poorly regulated client-supplier ties, and limited access to Western arms. Despite a series of reforms over the years, these impediments remain in place. A key aim of MCF is to improve the military procurement system. As such, civilian enterprises are expected to partake in the production, maintenance, support, and service of military equipment, as well as in obtaining and integrating foreign dual-use technologies. But out of all the procurement phases, MCF devotes most of its attention to military technology research and development. At present MCF has not significantly improved the procurement system. Legal, bureaucratic, and functional hurdles remain, and the government has not fostered the necessary conditions for large-scale civilian participation in military procurement. The most immediate effect of MCF on China's military buildup is introducing foreign, state-of-the-art know-how to advanced high-priority systems and subsystems, which could have palpable strategic impact in the long run.

Last but not least, my essay on MCF and China's state secrecy system argues that despite the allowance of limited defense industry transparency to attract private enterprise to MCF, the state's preference for secrecy, which has grown under Xi, will hamper development of the strategy. Since its early years, the Chinese Communist Party has prioritized secrecy. In fact, the maintenance of secrecy contributed to its success in taking over China. The party's founders regularly stressed the importance of keeping secrets, and the tradition lives on to this day. I illustrate this point for MCF by mapping the Chinese state secrecy system and how exactly it operates in scientific research universities, which are playing an increasingly vital role in the strategy. Yet, when economic and security interests collide, the state usually favors the latter, and the strictness of the secrecy system has certainly deterred potential MCF participants from the civilian sector.

MCF has global security and economic implications. The PLA is the leading beneficiary, whereas countries under pressure from China's assertive foreign policy, as well as corporations with dual-use technologies that could benefit PLA capabilities, will feel MCF's adverse influence. Therefore, policymakers, security specialists, and corporate executives in liberal democracies must take note of MCF and invest in understanding its diverse

and long-term implications. Moreover, policy experts on commerce, trade, and security should closely monitor developments of the strategy and design appropriate policy measures to preempt or counteract negative ramifications. Despite the challenges ahead for MCF, it has strong backing from the state and will continue to expand into new territories. Consequently, equal commitment is needed in tracking developments and devising appropriate policies and countermeasures. ◈

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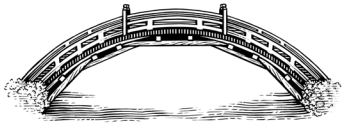
ROUNDTABLE ESSAY

China's Shift from Civil-Military Integration to Military-Civil Fusion

Richard A. Bitzinger



RICHARD A. BITZINGER *is a Visiting Senior Fellow with the Military Transformations Program at the S. Rajaratnam School of International Studies (RSIS) (Singapore). His work focuses on security and defense issues relating to the Asia-Pacific region, including military modernization and force transformation, regional defense industries and local armaments production, and weapons proliferation. Mr. Bitzinger has written several monographs and book chapters, and his articles have appeared in such journals as* International Security, Orbis, China Quarterly, *and* Survival. *He is the author of* Arming Asia: Technonationalism and Its Impact on Local Defense Industries *(2017) and editor of* Emerging Critical Technologies and Security in the Asia-Pacific *(2016). He can be reached at <isrbitzinger@ntu.edu.sg>.*

NOTE *This essay draws on several previously published works by the author: "Introduction" in* Emerging Critical Technologies and Security in the Asia-Pacific, *ed. Richard A. Bitzinger (London: Palgrave Macmillan, 2016); "Reforming China's Defense Industry,"* Journal of Strategic Studies *39, no. 5–6 (2016): 762–89; "Reforming China's Defense Industry: Progress in Spite of Itself?"* Korean Journal of Defense Analysis *19, no. 3 (2007): 99–118; "Dual-Use Technologies, Civil-Military Integration, and China's Defense Industry," in* Chinese Civil-Military Relations: The Transformation of the People's Liberation Army, *ed. Nan Li (Abingdon: Routledge, 2006), 178–88; and "Civil-Military Integration and Chinese Military Modernization," Jamestown Foundation, China Brief, November 24, 2004.*

KEYWORDS: CHINA; PEOPLE'S LIBERATION ARMY; MILITARY MODERNIZATION

EXECUTIVE SUMMARY

This essay examines how China has come to value Military-Civil Fusion (MCF) as a critical strategy for next-generation military-technological innovation and how the country is attempting to apply MCF to its weapons development process.

MAIN ARGUMENT

MCF is part of a long-term and broad-based strategic effort by Beijing to develop China into a technological superpower by pursuing both guns and butter and using them to mutually support each other. Chinese leaders, particularly Xi Jinping, are using MCF to position the country to compete militarily and economically in an emerging technological and strategic competition with the U.S. In this respect, current efforts are far more ambitious and far-reaching than previous initiatives, particularly in their determination to fuse China's defense and commercial economies. At the same time, China is only at the beginning of an arduous, multiyear process to leverage advanced commercial technologies for military modernization, and there is no certainty that MCF will work any better than earlier efforts. Nevertheless, it is unlikely that Xi, the Chinese Communist Party, or the People's Liberation Army will abandon MCF anytime soon.

POLICY IMPLICATIONS

- Despite the availability of advanced technologies in the commercial sector, MCF is a gamble, and it will require considerable effort and resources to adapt and apply these technologies to military innovation. Legal, regulatory, and cultural hurdles could impede the pace and intensity of MCF.
- Nevertheless, should China successfully implement MCF and achieve significant results, the resulting "world-class" military could pose a worrying challenge to the U.S. and its allies in the Indo-Pacific.

Military-Civil Fusion (MCF) is rapidly becoming a critical strategy for next-generation military-technological innovation and development. If fourth industrial revolution (4IR) technologies are the basis for future military capabilities and advantage, then MCF is a crucial course for militaries seeking to exploit these technologies. At the same time, however, MCF is not only an important military-technological innovation strategy but also increasingly part of many countries' strategic efforts to remain militarily competitive with likely adversaries and rivals. The essence of such competitive strategies, according to Thomas Mahnken, is all about "imposing costs upon a competitor in order to influence his decision-making calculus," and thus affect his strategic behavior.[1] This type of strategy has become increasingly prevalent in the Sino-U.S. strategic competition. China's growing military-technological capabilities in the areas of precision-strike weaponry and C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) have been sapping the United States' margin of superiority for years.[2] Such capabilities "increasingly favor a strategy of denial," undermining U.S. military power where it must travel long distances before it can project force.[3] These efforts have been dubbed anti-access/area denial (A2/AD). Capabilities for A2/AD include, but are not limited to, ballistic and cruise missile strikes (both land-attack and anti-ship), artillery and rocket barrages, submarine operations (anti-ship and antisubmarine), long-range air strikes, cyberattacks, and anti-satellite warfare.

In the case of China, therefore, MCF has become a core military-technological innovation strategy, particularly as the People's Liberation Army (PLA) shifts to "intelligentized warfare." Intelligentized warfare is defined as the "operationalization" of artificial intelligence (AI) and its enabling technologies, such as cloud computing, big data analytics, quantum computing, and autonomous systems, for military applications. As such, this approach differs markedly from earlier PLA concepts of "informationized warfare," which mainly emphasized the use of information systems (e.g., improved systems for intelligence, reconnaissance, and surveillance; advanced command, control, and communications infrastructures) as

1 Thomas G. Mahnken, "Frameworks for Examining Long-Term Strategic Competition between Major Powers," in *The Gathering Pacific Storm: Emerging U.S.-China Strategic Competition in Defense Technological and Industrial Development*, ed. Tai Ming Cheung and Thomas G. Mahnken (Amherst: Cambria Press, 2018), 3.

2 Ibid., 2.

3 Ibid., 7–8.

a force multiplier.[4] Chinese military modernization is now entwined with civilian technological innovation in a number of critical dual-use technology sectors, including aerospace, additive manufacturing, AI, and computing. As such, MCF has become an essential ingredient in Beijing's long-term effort to make China a technological superpower in both military and civilian respects.

The remainder of this essay is divided into the following sections:

- pp. 8–11 cover the impact of technology and the continued interest in harvesting emerging commercial technologies for their military potential.
- pp. 12–20 survey China's experiences with MCF as well as previous attempts at civil-military integration from the early 1980s to 2017.
- pp. 20–23 analyze recent MCF initiatives under Xi Jinping.
- pp. 23–24 offer a brief conclusion.

THE IMPACT OF TECHNOLOGY ON MILITARY EFFECTIVENESS AND ADVANTAGE[5]

Technology is widely regarded as a crucial element of military effectiveness and advantage. As Keith Krause once put, "the possession of modern weapons is a key element in determining the international hierarchy of power."[6] In theory (and often in practice), the possession of cutting-edge militarily relevant technologies equates to more effective weapons systems, which in turn results in greater military power and eventually greater geopolitical power. At the same time, the transnational diffusion of military-related technologies is an important factor affecting the distribution of power in international politics. Consequently, the global dissemination of advanced, militarily relevant technologies should be as great a security concern as the spread of weapons systems themselves.

Complicating this predicament of advanced conventional weapons proliferation, "militarily relevant technologies" are becoming harder to identify and classify. Technological advances, especially in military systems,

4 U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China* (Washington, D.C., September 2020), 161 ~ https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-dod-china-military-power-report-final.pdf.

5 This section draws on Richard A. Bitzinger, "Introduction," in *Emerging Critical Technologies and Security in the Asia-Pacific*, ed. Richard A. Bitzinger (London: Palgrave Macmillan, 2016); and Richard A. Bitzinger, "Civil-Military Integration and Chinese Military Modernization," Jamestown Foundation, China Brief, November 24, 2004 ~ https://jamestown.org/program/civil-military-integration-and-chinese-military-modernization.

6 Keith Krause, *Arms and the State: Patterns of Military Production and Trade* (Cambridge: Cambridge University Press, 1992), 19.

are a continuous, dynamic process; breakthroughs are always occurring, and their impact on military effectiveness and comparative advantage can be both significant and hard to predict in nascent stages. In particular, many advanced technologies—particularly those embedded in commercial rather than military industrial sectors—offer new and potentially significant opportunities for defense application and, in turn, for increasing one's military edge over potential rivals.

Emerging 4IR technologies such as AI and machine-learning, block-chains, new man-machine interfaces, automation and robotics, and quantum computing promise to create challenges in identifying new and significant military technologies and understanding how these capabilities could provide a military advantage, and therefore political leverage, in the decades to come. As Sarah Kirchberger observes:

> The 4IR is generating technologies that not only further strengthen the interconnections between [the surface, subsurface, and air domains], but will interlink them more strongly with the outer space and cyber domains. Space and cyber are key enablers of naval capabilities such as navigation, ISR, communication, and targeting, but immense computing power is necessary to interpret large amounts of sensor and other input data, with secure data links…needed to provide connectivity between disparate units to allow a shared situational awareness—ideally, in real-time or near-real-time.[7]

A succinct example of the potential impact of 4IR on the military sphere is made by Nah Liang Tuang:

> [T]he use of armed, autonomous…drones equipped with advanced sensors, and linked to wireless command and control networks where artificial intelligence–enabled decision-making only requires human intervention when lethal force needs to be used. Several of such drones could be remotely overseen by a single soldier using improved man-machine interfaces.[8]

Due to their complexity, advanced learning systems, autonomous weaponry, and quantum technology are all unlikely to be widely diffused across East Asia before 2030. The ability to develop and integrate these technologies could be limited to larger, more technologically advanced countries. Nevertheless, there are many discrete 4IR

[7] Sarah Kirchberger, "Maritime Power and Future of Conflict in the 21st Century: The Case of the Subsurface Domain" (paper presented to the conference "Defense Innovation and the 4th Industrial Revolution: Security Challenges, Technologies, and National Responses," Singapore, February 19–20, 2019), 1.

[8] Nah Liang Tuang, "The Fourth Industrial Revolution's Impact on Smaller Militaries: Boon or Bane?" S. Rajaratnam School of International Studies (RSIS), Working Paper, no. 318, November 22, 2018, 2.

technologies—such as autonomous systems and AI—that could be successfully plugged into the existing force structures in some small states. For example, systems such as unmanned aerial vehicles (UAVs) are increasingly being used to complement or replace manned reconnaissance platforms. Although more innovative use of unmanned systems remains limited in the region, the situation is dynamic and likely to change. In particular, even many smaller or less advanced militaries are developing indigenous UAVs, including swarming concepts.[9]

In addition, the world is undergoing a revolution in networking and connectivity via the internet and social media. Building on the huge, 4IR-related technological leaps in the commercial sector, many countries around the globe are actively exploring the militarization of cyber and information operations. In fact, the global military environment today is more suited than ever for cyber operations, and such technology has significant potential to be disruptive.[10]

For all these reasons, there is ongoing interest in harvesting emerging, critical commercial technologies for their military potential. This process, commonly known as civil-military integration (CMI), has considerable potential to revolutionize the way militaries develop and produce defense-critical systems and holds particular promise in adapting commercial 4IR technologies, especially information technology (IT), to military purposes. Consequently, the proliferation of militarily relevant technologies is no longer simply a matter of immediate end-use but also of potential future use.

The classic definition of CMI is the process of combining the defense and civilian industrial bases so that common technologies, manufacturing processes and equipment, personnel, and facilities can be used to meet both defense and commercial needs. According to the former U.S. Congressional Office of Technology Assessment, CMI includes "cooperation between government and commercial facilities in research and development (R&D), manufacturing, and/or maintenance operations; combined production of similar military and commercial items, including components and subsystems, side by side on a single production line or within a single firm or facility, and use of commercial off-the-shelf items directly within

9 Henrik Paulsson, "Military-Technological Innovation in East Asia: Operational Perspectives," report prepared for the Singapore Ministry of Defence by the Military Transformations Programme, RSIS, 2017, 4–5.

10 Ibid., 6.

military systems."[11] CMI can occur on three levels: facility, firm, and sector. Facilities can share personnel, equipment, and materials, and even simultaneously manufacture defense and civilian goods. Firm-level integration involves separate production lines but the joint military-civilian use of corporate resources, such as management, labor, and equipment. Finally, integrated industrial sectors, such as aerospace or shipbuilding, can draw from a common pool of research and development activities, technologies, and production processes. This last strategy is increasingly seen as the most rewarding line of attack when it comes to CMI.

CMI provides many potential benefits to military modernization efforts. Adapting available commercial technologies to military needs can save money, shorten development and production cycles, and reduce risks in weapons development. Many militaries' approaches to CMI have been particularly influenced by the power of modern IT sectors, seeing considerable potential for force multipliers in areas such as information warfare, digitization of the battlefield, and networked systems. CMI can also improve the quality of military equipment and contribute to more efficient production and acquisition of military systems. Above all, CMI permits arms industries and militaries to leverage critical technological advances in sectors where the civilian side has clearly taken the lead in innovation, such as communications, computing, and microelectronics. To this can also be added 4IR technologies like AI and machine-learning, man-machine interfaces, automation and robotics, quantum computing, and the Internet of Things.

China, like many countries, has long been keenly aware of the benefits of CMI for reducing the costs and risks of weapons development and production and accelerating military modernization. Additionally, China views CMI and MCF as advancing its long-term objective of achieving greater self-sufficiency in arms procurement by enabling the PLA "to source more of its critical and sensitive technologies domestically"[12] and subsequently reducing its dependency on foreign suppliers for its most advanced weapons. Therefore, CMI and MCF add a new wrinkle to China's classic techno-nationalist development strategy through the launching of a joint government-industry-military effort to acquire, nurture, indigenize, and diffuse critical dual-use technologies deemed essential to national security.

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[11] U.S. Congress, Office of Technology Assessment, *Other Approaches to Civil-Military Integration: The Chinese and Japanese Arms Industries* (Washington, D.C., March 1995), 3 ~ https://ota.fas.org/reports/9532.pdf.

[12] Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy* (New York: Cornell University Press, 2013), 201.

CHINA AND MCF: A NEW APPRECIATION

Few countries are more appreciative of the potential military impact of commercial 4IR technologies than China. China is keen to expand its CMI efforts as a means of driving military breakthroughs in these areas. MCF, particularly in areas such as AI, robotics, advanced microelectronics and computing, and quantum technologies, is especially critical to the PLA's "informationization" efforts. In 2007 at the 17th Party Congress, then general secretary Hu Jintao was reportedly the first to use the term "military-civil fusion." In 2015, President Xi Jinping made the "aligning of civil and defense technology development" a national priority, a strategy that was subsequently reaffirmed in China's 2015 white paper on military strategy and again at the 19th Party Congress in October 2017.[13] In 2017, Beijing established the Central Commission for Integrated Military and Civilian Development as the body responsible for overseeing MCF.[14] It is likely, therefore, that the Chinese leadership will maintain significantly high levels of defense spending in order to underwrite the PLA's overall modernization activities, including MCF.

Beijing's efforts to utilize dual-use technologies for military modernization have considerable implications for Sino-U.S. strategic competition. China is in the midst of an unprecedented military buildup and has long searched for ways to promote MCF, develop dual-use technology, and exploit commercial-to-military spin-on in support of the PLA's modernization efforts. The United States has an obvious interest in retarding this effort—hence, its continued opposition to lifting the Western ban on arms sales to China. Dual-use technology exports are much harder to control, however. Such transfers are overwhelmingly commercial and therefore are seen as benign and beneficial to both seller and buyer alike. In addition, many of these technologies are already widely diffused throughout the world, and it would be difficult and impractical to restrict their sales. Consequently, the United States may not be able to halt China's MCF and dual-use technology exploitation.[15]

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13 Lucie Béraud-Sudreau and Meia Nouwens, "Weighing Giants: Taking Stock of the Expansion of China's Defence Industry," *Defense and Peace Economics* (2019): 12.

14 U.S. Department of Defense, *Annual Report to Congress 2020*, 21, 96, 102.

15 Bitzinger, "Civil-Military Integration and Chinese Military Modernization."

China's Defense Industry and CMI, Early 1980s to the Mid-1990s: Defense Conversion[16]

The Chinese defense industry's first attempts at CMI ran from roughly the early 1980s to the mid-1990s and focused on rectifying acute economic, structural, and organizational problems through a concerted attempt to convert military factories over to manufacturing civilian products. In particular, commercial production was seen as a means of absorbing excess capacity in the arms-producing sector, providing defense enterprises with additional revenue to compensate for their underperforming military product lines, and encouraging directors and managers to bring their ventures more in line with market forces. This strategy was officially embodied in Deng Xiaoping's "sixteen character" slogan, which called for "combining the military and civil, combining peace and war, giving priority to military products, and making the civil support the military."[17]

With Beijing's enthusiastic blessing, the defense industry branched out in a broad array of civilian manufacturing during the 1980s and 1990s. China's aviation industry, for example, established a number of joint ventures with Western aircraft companies. McDonnell Douglas set up a production line in Shanghai to build MD-82 and MD-90 passenger jets. Boeing, the Airbus consortium, Sikorsky Aircraft, Pratt & Whitney, and Bombardier of Canada all established facilities at various Chinese factories to produce sub-assemblies and parts for Western civilian aircraft. Beginning in the 1980s, Chinese shipyards also successfully converted much of their production to more profitable civilian products, such as bulk carriers and general cargo ships. Meanwhile, China's missile industry entered the lucrative satellite-launching business with its series of Long March space-launch vehicles.

During the period, many defense enterprises became engaged in commercial ventures far outside their traditional economic activities. Ordnance factories assembled motorcycles, aircraft companies built mini-cars and buses, and missile facilities put together refrigerators, television sets, and even corrugated boxes. By the mid-1990s, 70% of all taxicabs, 20% of all cameras, and around 65% of all motorcycles produced in China came out of

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16 This section is adapted from Richard A Bitzinger, "Dual-Use Technologies, Civil-Military Integration, and China's Defense Industry," in *Chinese Civil-Military Relations: The Transformation of the People's Liberation Army*, ed. Nan Li (Abingdon: Routledge, 2006), 178–88; and Bitzinger, "Civil-Military Integration and Chinese Military Modernization."

17 Toby Warden, "A Revolutionary Evolution: Civil-Military Integration in China," Australian Institute of International Affairs, October 1, 2019 ~ http://www.internationalaffairs.org.au/australianoutlook/a-revolutionary-evolution-civil-military-integration-in-china.

former weapons factories. By the late 1990s, an estimated 80%–90% of the value of China's defense industry output was nonmilitary.

However, little of this early conversion effort actually aided the Chinese military-industrial complex. For one, defense conversion in China has been no guarantee of financial success, and many former weapons factories lost money in the transition to civilian production. In particular, many failed to create reliable, mainstay product lines or develop a more consumer-savvy attitude toward price, quality, or adding new features. More important, defense conversion did little to benefit China's defense industry in terms of acquiring and diffusing potentially useful commercial technologies to the military sector. The concern that conversion meant a process of "swords into plowshares and better swords" was largely unfounded. If anything, "spin-off"—the transfer of military technologies to civilian applications—was more important during this period than civilian-to-military "spin-on."

At the same time, opportunities for the direct spin-on of civilian technologies to military production remained limited. In the aviation industry, for example, while China acquired a number of advanced numerically controlled machine tools for use in commercial aircraft production, end-user restrictions kept these from being converted to military use. With regard to the shipbuilding industry, even as late as the mid-1990s, commercial programs had little impact on improving China's ability to produce modern warships or develop advanced naval technologies. The shipbuilding industry's low-technology base, while sufficient for building cargo ships, added little value to the design and construction of warships.

This is not to say that no dual-use technology development occurred. In fact, a critical science and technology development effort, the 863 Program, was launched in the mid-1980s. The program was a long-term initiative to expand and advance China's high-technology base in a number of areas, many of which had potential military applications, including aerospace, lasers, opto-electronics, semiconductors, and new materials. The 863 Program, however, was essentially a research activity and not set up (or funded) to promote and diffuse these technologies for practical or military use.

At best, CMI efforts during this period only indirectly aided Chinese weapons development and production, to the extent that the military-industrial complex benefited from overall economic growth. In some cases, defense conversion did help reduce overhead costs and generate sources of income to underwrite new arms production. In general, however, there were few linkages between military and civilian production and, in particular,

very few efforts to develop dual-use technologies or apply innovative civilian technologies to military use.

China's Defense Industry and CMI, Mid-1990s to 2017: Exploitation of Dual-Use Technologies[18]

China's approach to CMI began to change around the mid-1990s with a crucial shift in policy from conversion (i.e., switching military factories over to civilian use) to the promotion of integrated dual-use industrial systems capable of developing and manufacturing both defense and military goods. This new strategy was embodied and prioritized in the defense industry's five-year plan for 2001–5. It emphasized the dual importance of both the transfer of military technologies to commercial use and the transfer of commercial technologies to military use, calling on the Chinese arms industry to not only develop dual-use technologies but actively promote joint civil-military technology cooperation. Consequently, the spin-on of advanced commercial technologies both to the Chinese military-industrial complex and in support of the PLA's overall modernization was made an explicit policy.[19]

China began to seriously pursue the idea of leveraging advanced technologies and manufacturing processes found in the commercial sector in order to benefit defense R&D and production. According to many analysts, CMI was a central feature of defense industry reform from 1997 to 2017.[20] It was viewed as a fast (or at least faster) and ready means to shortcut the R&D process of advanced weapons systems, cherry-pick civilian manufacturing practices in high-tech sectors (e.g., computer-aided design and manufacturing and program management tools), exploit dual-use technologies (e.g., space systems for surveillance, communication, and navigation), and, in particular, take advantage of the latent capabilities found in commercially based IT. Such civil technologies could be either

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18 This section draws on Richard A. Bitzinger, "Reforming China's Defense Industry: Progress in Spite of Itself?" *Korean Journal of Defense Analysis* 19, no. 3 (2007): 99–118; and Richard A. Bitzinger, "Reforming China's Defense Industry," *Journal of Strategic Studies* 39, no. 5–6 (2016): 762–89.

19 Warden, "A Revolutionary Evolution."

20 Eric Hagt, "Emerging Grand Strategy for China's Defense Industry Reform," in *The PLA at Home and Abroad: Assessing the Operational Capabilities of China's Military*, ed. Roy Kamphausen, David Lai, and Andrew Scobell (Carlisle: Strategic Studies Institute, 2010), 481–84; Brian Lafferty, Aaron Shraberg, and Morgan Clemens, "China's Civil-Military Integration," Study of Innovation and Technology in China, January 2013, 58; and James Mulvenon and Rebecca Samm Tyroler-Cooper, "China's Defense Industry on the Path of Reform," prepared for the U.S.-China Economic and Security Review Commission, October 2009, 57–58.

domestically developed or obtained from foreign sources via joint ventures, technology transfer, or even espionage.[21]

This new strategy was embodied in the principle of *yujun yumin* (locate military potential in civilian capabilities), enunciated at the 16th Party Congress in 2002.[22] Yujun yumin has subsequently been made a priority in the last several five-year defense plans, as well as in the 2006–20 Medium- and Long-Term Science and Technology Development Plan (MLP) and the parallel 2006–20 Medium- and Long-Term Defense Science and Technology Development Plan (MLDP). The MLP defined indigenous innovation as the promotion of original innovation by reassembling existing technologies in different ways to produce new breakthroughs and absorbing and upgrading imported technologies. Meanwhile, the MLDP prioritized implementing policies and measures that supported the importation, absorption, and re-innovation of foreign technology. Taken together, these plans and strategies emphasized the importance of the transfer of commercial technologies to military use and called on the Chinese arms industry to not only develop dual-use technologies but also actively promote joint civil-military technology cooperation.

During this period, China focused on dual-use technology development and subsequent spin-on of microelectronics, space systems, new materials (such as composites and alloys), propulsion, missiles, computer-aided manufacturing, and IT. During 1997–2017, Beijing worked both to encourage further domestic development and growth in these key sectors and to expand linkages and collaboration between China's military-industrial complex and civilian high-tech sectors. Factories were also encouraged to invest in new manufacturing technologies, such as computer-aided design, computer numerically controlled multi-axis machine tools, computer-integrated manufacturing systems, and modular construction in shipbuilding. They were also urged to embrace Western management techniques. In 2002, for example, the Chinese government created a new industry enterprise group, the China Electronics Technology Group Corporation, to promote national technological and industrial developments in defense-related electronics. In addition, under the 10th Five-Year Plan (2001–5), many technology breakthroughs generated under the 863 Program were finally

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21 Hagt, "Emerging Grand Strategy for China's Defense Industry Reform," 514–18; Mulvenon and Tyroler-Cooper, "China's Defense Industry on the Path of Reform," 35–37, 38–43; and Tai Ming Cheung, "Dragon on the Horizon: China's Defense Industrial Renaissance," *Journal of Strategic Studies* 32, no. 1 (2009): 47.

22 Mulvenon and Tyroler-Cooper, "China's Defense Industry on the Path of Reform," 5.

slated for development and industrialization. Defense enterprises formed partnerships with Chinese universities and civilian research institutes to establish technology incubators and undertake cooperative R&D on dual-use technologies, while foreign high-tech firms wanting to invest in China were pressured to set up joint R&D centers and transfer their technology. In this regard, it is worth noting that during the 10th Five-Year Plan, four times as much funding (22 billion yuan) was allocated to the 863 Program than during the entire period from 1985 to 2000.[23]

Chinese CMI efforts during 1997–2017 appear to have paid some dividends. China's aggressive development of advanced commercial technologies and their subsequent spin-on into the defense sector have been successful in a number of areas, such as electronics and information technologies, shipbuilding, aviation, space-launch vehicles, satellites, and advanced manufacturing. In particular, China's military shipbuilding sector appears to have benefited.[24] Following an initial period of low-end commercial shipbuilding—such as the production of bulk carriers and container ships—since the mid-1990s China's shipyards have increasingly progressed toward more sophisticated ship design and modular construction. To this end, they modernized and expanded operations, built huge new dry-docks, acquired heavy-lift cranes and computerized cutting and welding tools, and more than doubled shipbuilding capacity. At the same time, Chinese shipbuilders entered into a number of technical cooperation agreements and joint ventures with shipbuilding firms in Japan, South Korea, Germany, and other countries, which gave them access to advanced ship designs and manufacturing technologies. As a result, Chinese military shipbuilding programs, which are usually collocated at shipyards engaged in mostly commercial activities, were able to leverage these considerable infrastructure and software improvements for design, development, and construction. One outcome of these efforts was the comparatively higher quality and capacity of warships being delivered to the PLA Navy.[25]

China's rapidly expanding aircraft and space industry also spurred the development and application of dual-use technologies that are basically commercial in nature but also serve military purposes. For example, to enter the large commercial aircraft market, in 2008, Beijing created the state-owned Commercial Aircraft Corporation of China (COMAC), which

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23 Warden, "A Revolutionary Evolution."

24 Bitzinger, "Civil-Military Integration and Chinese Military Modernization."

25 Evan S. Medeiros et al., *A New Direction for China's Defense Industry* (Santa Monica: RAND Corporation, 2005), 140–52.

openly views its mission as equally important as the nation's development of nuclear weapons or the launch of its first satellite. China currently has two passenger jets in and near commercial production, respectively: the ARJ21 regional jet and the C919 narrow-body jet. Other passenger jets are also envisioned, and COMAC has begun to plan for the production of two wide-body airliners: the 300-seat CR929 and the 400-seat C939.[26] These projects are expected to have spin-on effects for China's defense sector, particularly for the design and production of large military aircraft such as bombers and transport aircraft. Likewise, CMI has advanced China's space-launch business and its emerging capacities for the development and manufacture of various spacecraft, including telecommunications satellites, the BeiDou navigation satellite system, and the Yaogan and Ziyuan earth observation satellites. In addition, many of the technologies being developed for commercial reconnaissance satellites, such as charge-coupled device cameras, multispectral scanners, and synthetic aperture radar imagers, have obvious spin-on potential for military systems.

During this same period, the PLA benefited from the development and growth of China's commercial information and communications technology (ICT) industry. As James Mulvenon and Rebecca Samm Tyroler-Cooper have pointed out, the Chinese military electronics, communications, and information systems have always been a special case when it comes to R&D and production, benefiting from a "digital triangle" comprising the PLA (as a sponsor of commercial-to-military spin-on), China's increasingly sophisticated commercial ICT industry, and state laboratories, research institutes, and R&D funding institutions. In particular, the PLA has been aided by the "growing use of COTS [commercial off-the-shelf technologies]," which permit it to "directly benefit from the globally competitive output of China's commercial IT companies."[27]

Problems with Earlier CMI Efforts[28]

Despite these achievements, China's CMI efforts—particularly in commercial-to-military spin-on—remained limited. There has been so far little evidence of any significant CMI in other sectors of the Chinese defense industry, even in the aviation industry, where one might expect it to be a naturally occurring phenomenon. Commercial and military aircraft

26 The CR929 is a collaborative project with Russia's United Aircraft Corporation.

27 Mulvenon and Tyroler-Cooper, "China's Defense Industry on the Path of Reform," 35–37.

28 This section draws on Bitzinger, "Civil-Military Integration and Chinese Military Modernization."

manufacturing is still carried out not only on separate production lines but also in separate facilities and enterprises, with little apparent communication or crossover between these compartmentalized operations. Moreover, with the exception of helicopters (and possibly transport aircraft), the technological overlap between civil aviation and military aircraft is small and not conducive to CMI. As such, there are few opportunities to share personnel, production processes, and materials, and perhaps even fewer prospects for joint R&D or collocated production.

Likewise, China's overall record of indigenous high-tech development and innovation has been mixed, further limiting opportunities for CMI. Gaps and weaknesses still exist in China's science and technology base, and little indigenous design and manufacturing actually take place in many of China's high-technology sectors. Rather, high-tech production is still oriented toward the fabrication of relatively mature consumer or commodity goods, such as DVD players or semiconductors, built according to original equipment manufacturer specifications. For the most part, from the early 1980s to the 2000s, China still lacked sufficient numbers of skilled designers, engineers, scientists, and technicians in crucial high-tech sectors, and so most high-end items, such as microprocessor chips, had to be imported. Finally, many of the country's high-tech incubators are still in their nascent stage, and China continues to spend relatively little on high technology compared to the United States and the rest of the West.

At the same time, much of China's high-tech R&D and industrial base was still heavily foreign-controlled, particularly during the early part of this period. Foreigners owned virtually all of China's high-tech intellectual property and most of its manufacturing capacity (e.g., semiconductor plants). As such 85% of China's high-tech exports came from foreign-owned companies or joint-venture operations. In addition, many foreign-established R&D centers were actually geared more toward training and education than joint science and technology development.[29] In general, therefore, China's CMI remained limited in scope and operation, and both civilian and military authorities were unable to formulate or implement a specific strategy for effectively exploiting CMI. As one consequence, the development, as well as importation, of defense-specific technologies continued to be crucial in the modernization of the country's military-industrial complex and the development of next-generation weapons systems.

[29] Kathleen A. Walsh, written testimony for the Hearing before the U.S.-China Security Review Commission, January 17, 2002.

Overall, in both of these earlier periods, China's CMI efforts turned out to be much less successful than expected. Central authorities struggled to entice commercial enterprises to transition to defense work or partner with defense firms on joint projects that would entail diffusing technologies and innovations to the military. Consequently, according to Tai Ming Cheung, less than 1% of China's commercial high-tech firms were ever engaged in defense work, and as a result, CMI "barely scratched the surface of the Chinese economy."[30] There still existed many impediments to deepening and broadening engagement, including weak institutions, mechanisms, and guidelines to promote and support CMI; high barriers between civilian enterprises and the defense market; corporate parochialism on both sides (commercial firms were too often overly protective of their intellectual property, while military secrecy made technology-sharing problematic); insufficient resource-sharing; and underdeveloped industries dedicated to CMI.[31] Overall, until well into the second decade of the 21st century, civilian firms were still only tangentially engaged in armaments production.

MILITARY-CIVIL FUSION UNDER XI JINPING: TURNING A NEW PAGE?

Although the term "military-civil fusion" was used by then general secretary Hu Jintao as far back as the 17th Party Congress in 2007, MCF is mostly associated with Xi Jinping.[32] As previously mentioned, in 2015 he announced the "aligning of civil and defense technology development" as a national priority.[33] In addition, China's 2015 white paper on military strategy called for an "all-element, multi-domain, and cost-efficient pattern of CMI." Nevertheless, it was not until the 19th Party Congress in October 2017 that Xi fully realized his MCF vision. As Lucie Béraud-Sudreau and Meia Nouwens state:

> The deepening of the CMI policy can be interpreted both as a way to tackle the lack of competitiveness and the lack of innovation. This has become an integral part of Xi's strategy to complete the modernization of China's armed forces by 2035 and turn them into a world-class army by midcentury. Xi reiterated

30 Tai Ming Cheung, "The Chinese Defense Economy's Long March from Imitation to Innovation," *Journal of Strategic Studies* 34, no. 3 (2011): 343–44.

31 Lafferty, Shraberg, and Clemens, "China's Civil-Military Integration," 58–60.

32 Warden, "A Revolutionary Evolution."

33 U.S. Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China* (Washington, D.C., 2019), 21.

> the importance of CMI for China and for the PLA by declaring at the 19th Party Congress that "we will...deepen reform of defense-related science, technology, and industry, achieve greater military-civilian integration, and build integrated national strategies and strategic capabilities."[34]

In 2017, Beijing created the Central Commission for Integrated Military and Civilian Development, a new and powerful body for overseeing MCF strategy and implementation. The same year, China issued the 13th Five-Year Special Plan for Science and Technology MCF Development, which "detailed the establishment of an integrated system to conduct basic cutting-edge R&D in AI, bio-tech, advanced electronics, quantum, advanced energy, advanced manufacturing, future networks, [and] new materials," in order "to capture commanding heights of international competition."[35]

After 2017, MCF appears to differ from earlier efforts at CMI in several critical ways. First, it seeks to fully integrate the civilian industrial base into the PLA's supply chain. For the first time, nondefense companies are being encouraged to sell directly to the military.[36] Second, MCF is being explicitly used to help China's military access critical 4IR technologies, particularly AI. MCF entails the militarization of AI, which the PLA sees as critical for such tasks as command and control, intelligence processing, targeting, and navigation.[37]

Third, given the demand for cutting-edge commercial technologies, MCF inevitably necessitates the redirection of foreign technologies to support the modernization of the PLA. This is because much of China's high-tech industrial base is still highly dependent on imported technologies, designs, and manufacturing equipment and processes. In many instances, the Chinese government is encouraging private firms to acquire foreign technology for the PLA.[38] This, in turn, risks making foreign companies

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34 Béraud-Sudreau and Nouwens, "Weighing Giants," 12.

35 Tai Ming Cheung, "From Big to Powerful: China's Quest for Security and Power in the Age of Innovation," East Asia Institute, Working Paper, April 4, 2019, 12.

36 Chriss Street, "Chinese Army Employs Military-Civil Fusion to Weaponize Industrial Base," *Epoch Times*, September 30, 2019 ~ https://www.theepochtimes.com/chinese-army-employs-military-civil-fusion-to-weaponize-industrial-base_3101117.html.

37 Kathrin Hille and Richard Waters, "Washington Unnerved by China's 'Military-Civil Fusion,'" *Financial Times*, November 7, 2018 ~ https://www.ft.com/content/8dcb534c-dbaf-11e8-9f04-38d397e6661c.

38 Kate O'Keefe and Jeremy Page, "China Taps Private Sector to Boost Its Military, Raising Alarms," *Wall Street Journal*, September 25, 2019 ~ https://www.wsj.com/articles/china-taps-its-private-sector-to-boost-its-military-raising-alarms-11569403806.

de facto suppliers to the PLA.[39] Consequently, the U.S. government is increasingly concerned that normally benign technology transfers and commercial joint ventures between U.S. and Chinese private companies could inadvertently help the PLA become a more technologically advanced adversarial force. There is particular concern that algorithms used for AI and machine-learning—some of the most complex software and therefore the hardest to copy—would be particularly vulnerable to theft. Nevertheless, as Christopher Ford, then U.S. assistant secretary for international security and nonproliferation in the U.S. Department of State, noted, MCF means that "it is very difficult and in many cases impossible to engage with China's high-tech sector in a way that does not entangle a foreign entity in supporting ongoing Chinese efforts to develop or otherwise acquire cutting-edge technological capacities for China's armed forces."[40]

Finally, and perhaps most importantly, MCF is part of a long-term and broad-based strategic effort by Beijing to position China as a technological superpower by pursuing both guns and butter and having them mutually support each other. According to Greg Levesque, Chinese leaders are using MCF to position the country "to compete militarily and economically in an emerging technological revolution."[41] In this respect, Chinese MCF is much more ambitious and far-reaching than any present U.S. efforts at CMI, particularly in terms of China's determination "to fuse defense and commercial economies."[42] According to Lorand Laskai, "since Xi Jinping ascended to power in 2012, civil-military fusion has been part of nearly every major strategic initiative, including Made in China 2025 and Next Generation Artificial Intelligence Plan."[43]

It should therefore come as no surprise to see that MCF has intertwined military modernization with civilian innovation in a number of critical dual-use technology sectors, including aerospace, advanced equipment manufacturing, AI, and alternative sources of energy. At the

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39 Derek Scissors and Daniel Blumenthal, "China Is a Dangerous Rival, and America Should Treat It Like One," *New York Times*, January 14, 2019 ~ https://www.nytimes.com/2019/01/14/opinion/us-china-trade.html.

40 Christopher Ashley Ford, "Huawei and Its Siblings, the Chinese Tech Giants: National Security and Foreign Policy Implications," U.S. Department of State, September 11, 2019 ~ https://www.state.gov/huawei-and-its-siblings-the-chinese-tech-giants-national-security-and-foreign-policy-implications.

41 Greg Levesque, "Military-Civil Fusion: Beijing's 'Guns AND Butter' Strategy to Become a Technological Superpower," Jamestown Foundation, China Brief, October 8, 2019.

42 Lorand Laskai, "Civil-Military Fusion: The Missing Link between China's Technological and Military Rise," Council on Foreign Relations, January 29, 2018 ~ https://www.cfr.org/blog/civil-military-fusion-missing-link-between-chinas-technological-and-military-rise.

43 Ibid.

same time, MCF also "involves greater integration of military and civilian administration at all levels of government: in national defense mobilization, airspace management and civil air defense, reserve and militia forces, and border and coastal defense."[44] As Laskai notes, the PLA Strategic Support Force, which was established in 2015 and is responsible for space, cyber, and electronic warfare, has "energetically built ties outside the military, signing cooperation agreements with research universities and even stationing officers within an unnamed software development company."[45] Moreover, it is important to recognize that Xi's "personal legitimacy" is increasingly tied to the success or failure of MCF. According to Toby Warden, MCF is categorically entwined with "long-term party planning" and "party consensus," and any move to scale back this strategy would come at a great cost to Xi's authority.[46]

CONCLUSION

China is only at the beginning of an arduous, multiyear (or even multidecade) effort to leverage advanced commercial technologies for the advancement and modernization of the PLA. There is no certainty that Xi Jinping's MCF initiatives will work better than earlier efforts at CMI. According to Béraud-Sudreau and Nouwens, many obstacles remain, including "the private sector's lack of access to large-scale and high-tech facilities and experimental instruments" and the question of whether private-sector companies will get permission and clearances to work on larger and more sensitive projects or "simply be used to supply less sensitive components."[47] Nevertheless, it is unlikely that Xi, the Chinese Communist Party, or the PLA will walk away from MCF anytime soon, even if the program does experience setbacks. As Warden states, "the Party-state's long-term ambitions [for MCF] should not be underestimated," and China's "doctrine" of MCF will continue to serve as a "guiding principle" for its long-term strategy of parallel economic development and military modernization.[48]

Moreover, should China successfully implement MCF and achieve significant results in terms of military-technological advances, the results

44 Levesque, "Military-Civil Fusion."

45 Laskai, "Civil-Military Fusion."

46 Warden, "A Revolutionary Evolution."

47 Béraud-Sudreau and Nouwens, "Weighing Giants," 12.

48 Warden, "A Revolutionary Evolution."

could pose a worrying challenge to the United States and its allies in the Indo-Pacific. Altogether, the PLA is proceeding apace to develop robust A2/AD capacity within the first island chain, eventually expanding farther into the Pacific Ocean. As China shifts toward intelligentized warfare,[49] MCF will be a key component of the PLA's overall strategy to achieve "complete military modernization" by 2035 and become a "world-class" military by 2049. ◈

[49] U.S. Department of Defense, *Annual Report to Congress 2020*, 161–62.

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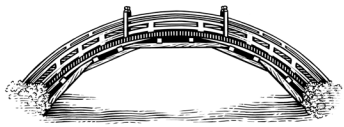
ROUNDTABLE ESSAY

China's Military-Civil Fusion and Military Procurement

Yoram Evron



YORAM EVRON *is a Senior Lecturer in Chinese studies in the Department of Asian Studies at the University of Haifa (Israel). His current research focuses on civil-military relations, military procurement, and China's military modernization, as well as China–Middle East relations and East-West relations in Asia. Dr. Evron is the author of* China's Military Procurement in the Reform Era: The Setting of New Directions *(2016). His recent articles have been featured in* Pacific Review, China Quarterly, *and the* Journal of Contemporary China. *He can be reached at <yevron@research.haifa.ac.il>.*

KEYWORDS: CHINA; PEOPLE'S LIBERATION ARMY; MILITARY MODERNIZATION

EXECUTIVE SUMMARY

This essay examines the impact of China's Military-Civil Fusion (MCF) strategy on the country's military procurement and argues that its main contribution lies in increasing China's access to advanced military-related foreign know-how and technologies.

MAIN ARGUMENT

Adopted in 2015, the MCF strategy is the last phase of a prolonged national effort to overcome the embedded hindrances of China's military procurement system by harnessing the civilian sector to that end. The strategy is designed to inject new technologies and R&D into China's military-industrial complex, increase its efficiency, and improve the bargaining position of the People's Liberation Army (PLA) vis-à-vis its suppliers throughout the various phases of procurement. A close examination of the expressed objectives of the MCF, its policy tools, and implementation reveals that (1) the strategy concentrates more on R&D than all other procurement phases, (2) efforts to reduce bureaucratic and functional barriers between the defense and civilian industry sectors face many obstacles, and (3) MCF's greatest achievements lie in transferring advanced military-related expertise from foreign sources to China's military establishment.

POLICY IMPLICATIONS

- Although the MCF strategy narrows China's military-technology gap with other leading world powers, it does not address the embedded inefficiencies of the country's military procurement system. Hence, its overall effect on the PLA's readiness and warfighting capability is limited.
- China's MCF has drawn negative attention from other countries—particularly the U.S.—for the tight relations between the military, civilian industry, and academia. Such criticism affects China's political, technological, and economic relationships with these countries and may have detrimental consequences for relevant Chinese sectors.
- MCF's record may provide another demonstration of China's difficulty in injecting market forces into its state-owned sector as well as in addressing problems of inefficiency through measures other than economic liberalization.

Distinguishing between civilian and military technologies has become increasingly difficult in the 21st century. Advanced technologies flow back and forth between these sectors, thereby promoting their mutual development. Moreover, civilian organizations and professionals possess advanced knowledge, equipment, and skills that the military industrial complex (MIC) occasionally lacks, as well as access to advanced (often dual-use) foreign know-how that their military equivalents do not have. These qualities are clearly evident in China, where civilian organizations are more efficient than their military peers and more attentive to the demands and requests of the People's Liberation Army (PLA) due to their relatively weak bargaining position.

For decades, China's military strategists have been aware of this situation. Various programs have been promoted to exploit it and interlink China's economic development and military modernization.[1] Nevertheless, these programs have had unsatisfactory results. In 2015, China promoted this issue to the level of national strategy and took further measures to expedite its resolution. Among other things, the government changed the strategy's previous title from Military-Civil Integration (*junmin jiehe*) to Military-Civil Fusion (MCF, *junmin ronghe*), underscoring the tight connection it seeks to achieve between the sectors. At the 19th Party Congress that convened in 2017, MCF was included in the seven national strategies for the country's development, conveying the personal attention of China's top leader Xi Jinping.[2]

These measures have initiated various activities aimed at breaking down the bureaucratic and functional barriers between different sectors and organizations in China's technology and industry establishments. New policies and bodies were created to coordinate and advance MCF, new rules and regulations were issued to enable inter-sectorial cooperation, and financial incentives were offered to encourage on-the-ground collaborations.

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1 Richard A. Bitzinger, "Dual-Use Technologies, Civil-Military Integration, and China's Defense Industry," in *Chinese Civil-Military Relations: The Transformation of the People's Liberation Army*, ed. Nan Li (New York: Routledge, 2006), 178–88; and Tai Ming Cheung, *Fortifying China: The Struggle to Build a Modern Defense Economy* (Ithaca: Cornell University Press, 2009).

2 Audrey Fritz, "China's Evolving Conception of Civil-Military Collaboration," Center for Strategic and International Studies, August 2, 2019 ~ http://www.csis-cips.org/blog/2019/8/2/chinas-evolving-conception.

However, MCF's impact on China's military procurement is thus far unclear.[3] The goal of this essay is to begin filling this void.

To undertake this endeavor, two conceptual aspects should be considered. First, MCF is not necessarily relevant to all aspects of military procurement. Military procurement is a long, costly, and multi-phased process, which includes defining requirements and the development (or, alternatively, the import), manufacture, deployment, and through-life support of weapon systems and other military equipment.[4] Given that certain procurement projects require major financial investments and confidential know-how and information, they may exclude civilian participation at least partially. Accordingly, when investigating MCF's impact on military procurement, one should focus on the procurement phases and areas where civilian involvement is actually expected. Second, attempts to analyze MCF's impact on China's military procurement must set the criteria for successful procurement. Much of the literature on the PLA's material basis concentrates on its ability to bridge the technological gap with the world's leading armed forces. However, this focus may overlook deficiencies in other phases or aspects of procurement. Examples of such deficiencies include an overemphasis on weapons R&D at the expense of arms production or maintenance, or the overweight of nonmilitary considerations, such as techno-nationalism, in China's procurement decisions.

To address these possible lacunae, this essay focuses on the operational dimensions of procurement and measures its success through the ability to promote China's military readiness, as dictated by the country's strategic objectives and military doctrine. In other words, MCF is assessed based on its contribution to the procurement process that provides the armed forces with weapons and equipment of sufficient quality and quantity to accomplish

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3 For reports and analysis outside China on MCF, see David Yang, "Civil-Military Integration Efforts in China," Study of Innovation and Technology in China (SITC), Policy Brief, September 2011; Brian Lafferty, Aaron Shraberg, and Morgan Clemens, "China's Civil-Military Integration," SITC, Research Brief, January 2013; Marcel Angliviel de la Beaumelle, Benjamin Spevack, and Devin Thorne, "Open Arms: Evaluating Global Exposure to China's Defense-Industrial Base," Center for Advanced Defense Studies, October 18, 2019; Li Huaqiu, "Zhonggong junmin ronghe fazhan zhanlüe chutan" [A Probe into the CPC's Strategy of Civil-Military Fusion], National Policy Research Foundation, January 28, 2019 ~ https://www.npf.org.tw/1/20157; Lorand Laskai, "Civil-Military Fusion and the PLA's Pursuit of Dominance in Emerging Technologies," Jamestown Foundation, China Brief, April 9, 2018 ~ https://jamestown.org/program/civil-military-fusion-and-the-plas-pursuit-of-dominance-in-emerging-technologies; and Toby Warden, "A Revolutionary Evolution: Civil-Military Integration in China," Australian Institute of International Affairs, October 1, 2019 ~ http://www.internationalaffairs.org.au/australianoutlook/a-revolutionary-evolution-civil-military-integration-in-china.

4 Stefan Markowski and Peter Hall, "Challenges of Defence Procurement," *Defence and Peace Economics* 9, no. 1–2 (1998): 25–26.

their missions, does so within a given time frame and budget, and allows maintenance of the weapons for as long as they are in service.[5]

The remainder of this essay is organized as follows:

- pp. 29–31 examine China's military procurement process and the difficulties therein that even after reform hamper the efficiency of the MIC.
- pp. 31–35 describe the MCF objectives in the procurement process.
- pp. 36–39 address the conduct of the MCF policy and platforms for fusion between the two sectors to occur.
- pp. 39–43 assess areas of success and challenge in MCF so far and argue that impediments to the strategy still hamper the effectiveness of the procurement process.
- pp. 43–44 conclude by noting that MCF's main contribution to China's military buildup appears to lie mostly in R&D and that policy has less impact in improving military procurement's efficiency.

IMPEDIMENTS TO CHINA'S MILITARY PROCUREMENT SYSTEM

To supply the PLA with the advanced weapons and equipment it needs to accomplish its missions within a given budgetary framework, China's military procurement system needs access to the required technologies and hardware from either domestic or foreign sources. Procurement should also allow the PLA to play a dominant role both in the design and development of the acquired weapons and in the quality assurance of their manufacture and maintenance. Finally, it should include the means to keep the procurement process efficient. Arguably, such an outcome can be achieved only by injecting free market forces into the military procurement process, importing (in various ways) advanced foreign technologies, and pouring abundant financial resources into weapon design, R&D, and production. The significant progress of China's weaponry in the 21st century notwithstanding, the country's military procurement system has yet to create such conditions.

[5] Yoram Evron, *China's Military Procurement in the Reform Era: The Setting of New Directions* (London: Routledge, 2016), 174–75.

China's military procurement system has traditionally suffered from several chronic problems.[6] It relies on an inefficient and technologically backward MIC. There is a monopolistic and poorly regulated client-supplier relationship between the PLA and the large defense industry conglomerates, which reduces the former's bargaining power with the latter. There is limited access to Western arms markets due to the formal and informal U.S.-led arms embargo. Finally, China has a culturally embedded desire for self-reliance, which has pushed its defense technology complex to overstretch its resources and impose compromises on arms manufacturing.

To overcome these problems, the military procurement system has undergone significant reforms over the years. The most significant one was probably the 1998 transfer of the military acquisition function from the Commission for Science, Technology and Industry for National Defense to the PLA through the newly established General Armament Department. This change was supposed to ease the inherent conflict of interests in the earlier structure that was rooted in the commission's dual responsibility for both the MIC and arms acquisition. Another aspect of these reforms was fostering competition within the MIC by splitting each of the five major defense industry groups (aerospace, aviation, shipbuilding, armament, and nuclear) into two corporations that would compete with each other. In addition, in 2005 the State Council issued an order to introduce civilian enterprises into military acquisitions, especially in the field of spare parts and components. In this framework, acquisition contracts and payment transfers between the PLA branches and defense industries, heretofore conducted by the military's financial units, were now handled directly between the branches and their suppliers, who would be chosen by tender. Thus, the PLA branch unit that placed the order would have much greater control over the type and quality of the product received as well as the conditions of supply.[7] Efficacious steps also were taken in management and technology, such as increasing the financial and administrative supervision of factories and developing new capabilities in project management and systems integration. Last, new channels were created to recruit funds for the MIC through the capital market. Accordingly, defense industry enterprises and research institutes were sold, closed down,

6 On the progress and setbacks in China's MIC, see Tai Ming Cheung, "Keeping Up with the Jundui: Reforming the Chinese Defense Acquisition, Technology, and Industrial System," in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip Saunders et al. (Washington, D.C.: National Defense University Press, 2019), 585–625; and Lucie Béraud-Sudreau and Meia Nouwens, "Weighing Giants: Taking Stock of the Expansion of China's Defence Industry," *Defense and Peace Economics* (2019).

7 Evron, *China's Military Procurement in the Reform Era*, 57–58.

or merged in order to reduce the large losses accumulated by the MIC over the years.[8]

Nevertheless, these measures did not address the fundamental problems of China's military procurement, and in 2015 China led another round of reforms that were part of the PLA's largest restructuring since the 1950s. As part of this process, some defense industry corporations that were previously split—aviation and nuclear—were merged.[9] Concurrently, the General Armament Department, which was largely preoccupied with the modernization of the ground forces, was replaced with a newly created body in the Central Military Commission (CMC): the Equipment Development Department (EDD). Centralizing arms development and military procurement as a CMC body, the EDD is intended to oversee weapons development for the entire PLA and institute reforms to R&D and procurement systems. Being part of the formal CMC bureaucracy, the EDD arguably can oversee the procurement process and ensure that it is compatible with the PLA's buildup plans more easily than its predecessor.[10]

Nevertheless, these reforms did not alter the main impediments in China's military procurement. The system is still dominated by mammoth, inefficient state-owned enterprises that are not subject to market forces, have no embedded incentive to increase efficiency, and suffer from limited innovative capacity. Consequently, the PLA has limited impact as a customer on the design and high costs of weapons and equipment. In addition, it is likely that the supply of weapons and equipment is irregular, that their specification and performance do not meet the original requirements, and that the maintenance of the equipment is insufficient.

MCF'S OBJECTIVES

MCF is supposed to help repair some of these problems. However, civilian firms and professionals are not expected to be involved equally in all phases of procurement or necessarily intended to improve the entire arsenal

8 On the financial achievements of the reforms, see Cheung, "Keeping Up with the Jundui," 586.

9 As of 2020, these groups include China Aviation Industry Corporation, China South Industries Group, China North Industries Group, China Aerospace Science and Industry Corporation, China Aerospace Science and Technology Corporation, China Shipbuilding Industry Corporation, China State Shipbuilding Corporation, China National Nuclear Corporation, China Nuclear Engineering and Construction Group Corporation, and China Electronics Technology Group Corporation.

10 Joel Wuthnow and Phillip C. Saunders, *Chinese Military Reforms in the Age of Xi Jinping: Drivers, Challenges, and Implications* (Washington, D.C.: National Defense University, 2017), 35–37.

of the PLA. The purpose of this section is to indicate the areas and phases of China's military procurement in which MCF is supposed to make an impact.

MCF is mostly focused on military R&D. Its goal is to help the MIC overcome the shortage of well-trained professionals, inefficiency and overstretch, lack of innovation, and strong dependence on imported know-how. Thus, the 2017 "Opinion of the General Office of the State Council on Promoting the Deep Development of Military-Civil Fusion of National Defense Science, Technology and Industry"—one of the defining documents of the post-2015 MCF, hereinafter referred to as Document no. 91—devotes its longest section (Section 3) to innovation, while no specific sections are given over to manufacturing or maintenance.[11] According to this and other documents, MCF is supposed to accomplish its goals by including civilian firms, universities, and research institutes in China's defense R&D process, leveraging the knowledge of high-level professionals for R&D efforts in weapons, and acquiring access to sensitive foreign expertise.[12] By adding these assets to the MIC's capabilities and experience, MCF is intended to produce a broad variety of advanced technologies that will improve China's entire arsenal and raise it to a world-class level.

However, as government documents and semiofficial analyses indicate, this list of technologies is limited. In fact, it emphasizes emerging technologies (e.g., the Internet of Things, autonomous vehicles, artificial intelligence, and big data analysis) and other advanced technologies, which are in compliance with China's civilian science and technology (S&T) national plans (e.g., the 2006–20 Medium- and Long-Term Science and Technology Development Plan and Made in China 2025), as well as with its vision of mechanized,

11 State Council Information Office of the People's Republic of China (PRC), "Guowuyuan bangongting guanyu tuidong guofang keji gongye junmin ronghe shendu fazhan de yijian, guobanfa (2017) 91 hao" [Opinions of the General Office of the State Council on Promoting the Deep Development of Military and Civil Fusion of National Defense Science Technology and Industry], government document, no. 91, December 4, 2017 ~ http://www.scio.gov.cn/xwfbh/xwbfbh/wqfbh/39595/40930/xgzc40936/Document/1658974/1658974.htm. On the central place of R&D in MCF, see State Council Information Office (PRC), "Guofang ke gong ju jiedu tuidong guofang keji gongye junmin ronghe de yijian—gaige pojie nanti chuangxin zengqiang huoli" [State Administration for Science, Technology, and Industry for National Defense's Interpretation of Promoting Defense Science, Technology, and Industry of Military-Civil Fusion—Bring New Ideas to Solve Problems and Increase Vigor Innovatively], December 7, 2017 ~ http://www.gov.cn/zhengce/2017-12/07/content_5244986.htm.

12 See also "Xinshidai xia tongyong hangkong chanye junmin ronghe shi fazhan zhanlue yanjiu" [Studying the Development Strategy of Military and Civil Fusion in Aviation Production under Xinshidai Group], China Civil Aviation Network, April 16, 2018 ~ http://www.caacnews.com.cn/zk/zj/zhangliang/201804/t20180416_1245535.html.

informationized armed forces.[13] More specifically, MCF is supposed to provide China's military with advanced capabilities in the following areas: information and electronics, aerospace, aviation, and shipbuilding.[14] The main items in this list include the following:

- *Information and electronics.* The objectives in this area are to develop a network information system that connects the military and civilian sectors and is protected from foreign cyberattacks; improve the Chinese military's detection capabilities; improve the design and construction of military electronic information test sites, identification, and precision-guidance capabilities; and develop and improve existing core devices such as computer servers, high-end chips, semiconductors, and computer processors to reduce dependence on imported devices. Other related areas include developing measurement and control equipment, integrated circuit design and manufacturing, intelligent transportation-related technologies, and a new generation of broadband communication.
- *Aerospace.* This focus area includes improving satellite design and R&D, parts manufacturing, communication and ground applications, remote sensing, and navigation; designing aerospace infrastructure; and developing heavy-lift launch vehicles, nuclear power plants for use in space, and aerospace measurement and control systems.
- *Aviation.* The objective in this area is to make progress in the entire range of technologies related to the aviation industry, including metallurgy, materials development, electronics, avionics, and jet engines and propulsion systems, as well as the manufacture of high-end equipment.
- *Shipbuilding.* This area promotes constructing deep-sea test sites; developing oceanic underwater detection technologies and sensing

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13 On MCF's emphasis on emerging technologies, see State Council Information Office (PRC), "Guofang ke gong ju jiedu tuidong guofang keji gongye junmin ronghe de yijian"; and "Xingcheng xinxing lingyu junmin ronghe fazhan geju" [Forming New Patterns of MCF Development Forms], ScienceNet, February 21, 2019 ~ http://www.news.sciencenet.cn/htmlnews/2019/2/423100.shtm.

14 The following analysis relies on the People's Government of Hebei Province, "Guanyu shenbao 2013 nian sheng ji junmin jiehe chanye fazhan zhuanxiang zijin xiangmu di tongzhi" [Notice on Application for Provincial Military-Civilian Fusion Industry Development Funds in 2013], July 18, 2013 ~ http://info.hebei.gov.cn/eportal/ui?pageId=6778557&articleKey=3747206&columnId=330890; Luan Dalong, "Junmin ronghe zouxiang xin shidai" [Military-Civil Fusion Heads for a New Era], Center for China and Globalization, March 8, 2018 ~ http://www.ccg.org.cn/Research/view.aspx?Id=8579; Cyberspace Administration of China and Office of the Central Cyberspace Affairs Commission (PRC), "Wangluo xinxi tixi junmin ronghe zhanlüe de sikao" [Thinking of the Military-Civil Fusion Strategy of Network Information System], November 12, 2018 ~ http://www.cac.gov.cn/2018-11/12/c_1123701001.htm; "Woguo junmin ronghe chanye fazhan qingkuang" [General Situation of China's Military-Civil Fusion's Industry Development], China High-Tech Industry Herald, April 15, 2019 ~ http://www.chinahightech.com/html/paper/2019/0415/521151.html; and U.S. Department of Defense, *Annual Report to Congress: Military and Security Development Involving the People's Republic of China 2019* (Washington, D.C., 2019), 21.

abilities; building nuclear-powered offshore floating platforms; and constructing high-grade icebreakers and various polar vessels such as polar semi-submarine transport vessels, polar rescue vessels, and polar core supporting equipment.

As for the nuclear and armament industries, unlike in other sectors, where technology spin-on appears to be dominating MCF, in these sectors technology spin-off is more evident.[15] In the case of the nuclear sector, this is due to the marginal role of civilian bodies in the industry and limited connections with foreign industries (except for basic research undertaken in civilian universities). The armament industry, on the other hand, can surely benefit from the spin-on process in various technologies. However, due to the declining priority of the ground forces in China's military modernization, a smaller effort is being made.

Similar to military R&D, the incorporation of MCF in military production is expected to be selective. A report published in *Zhongguo gaoxin jishu chanye daobao* (China High-Tech Industry Herald) finds that the participation of civil companies and research institutions in different phases of military manufacturing is based on the size of the financial investments and the level of confidentiality involved in each phase. Dividing arms production into four stages—major systems integration, systems production, parts production, and materials—the report states that civilian bodies are mostly involved in the last two phases.[16]

According to the report, the systems integration stage is the most complicated, costly, and confidential, and therefore is basically carried out by China's main defense industry enterprise groups.

The systems production stage includes the development and production of systems such as avionics and engines, as well as their subsystems. These are the main components integrated at the systems integration stage, and their production is complicated and confidential. Consequently, this stage is also dominated by companies and research institutes that are part of the main defense industry groups.

The production of the components and parts of the weapon systems and subsystems, however, is less sensitive and simple enough to allow the

15 The term "spin-off" refers to the spillover of military technology to the civilian sector and the development of respective civilian products (e.g., the microwave and CD player). Technology spillover from the civilian to the military sector (e.g., drones and autonomous vehicles) is known as "spin-on." The assessment of the spin-on/spin-off balance in the various sectors relies on "Woguo junmin ronghe chanye fazhan qingkuang."

16 "Woguo junmin ronghe chanye fazhan qingkuang."

involvement of civilian companies. Moreover, this stage involves know-how and hardware that are not necessarily military-related. Consequently, the involvement of civilian firms in this stage is welcome. In addition, this stage involves the production and integration of core devices, such as high-end integrated circuits, semiconductors, and processors, which at least partly are beyond the current production capability of China's MIC. Civilian companies can bridge this gap more easily for several reasons. First, some of the relevant know-how is civilian by nature and is already available in this sector.[17] Second, civilian companies and other bodies have better access than their military peers to foreign sensitive, dual-use technologies. The importing of such products by civilian companies may help overcome export restrictions in the country of origin while allowing China to hide the MIC's weaknesses and its military intentions. Indeed, in 2010 an official document stated bluntly that military-civilian integration, as it was called then, should promote the introduction of advanced foreign technologies into China.[18]

The greatest participation of civilian companies in arms production is expected at the stage of producing and processing materials. To be sure, some of the products included at this stage, such as certain alloys and composite materials, are sensitive and sophisticated and should therefore be handled by companies with the appropriate level of security clearance. On the other hand, the civilian classification of many products included in this category allows the utilization of imported know-how, to which civilian bodies have greater access.

Finally, civilian companies are expected to play a role in the maintenance, support, and service of military equipment. Surely, many of these activities are carried out routinely by military units. Nevertheless, Document no. 91 clarifies that MCF should improve the maintenance of high-tech weapons and military equipment during training and wartime alike.[19] Unfortunately, this reference to servicing products is unique among available MCF documents. Furthermore, unlike with other procurement phases, the implementation and challenges of combining civilian bodies in support activities are not discussed. Hence, it is reasonable to assume that the involvement of civilian bodies as maintenance and service providers is relatively minor in China's overall MCF effort.

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17 State Council Information Office (PRC), "Guowuyuan bangongting," item 18.

18 Central Military Commission (PRC), "Guanyu jianwei he wanshan junmin jiehe yu jun yu min wuqi zhuangbei keyan shengchan tixi de ruogan yijian" [Several Views on the Establishment and Improvement of MCI's Weapons Research and Production System], October 24, 2010 ~ http://info.hebei.gov.cn/eportal/ui?pageId=6778557&articleKey=6462929&columnId=330890.

19 State Council Information Office (PRC), "Guowuyuan bangongting," item 27.

MCF MEASURES

MCF's potential impact on military R&D lies in the incorporation of civilian enterprises, research institutes, and individual experts in the arms development process. The value that these organizations and individuals bring consists first and foremost in the advanced know-how that they possess, largely through their access to military-related and other types of foreign expertise.[20] However, this is insufficient by itself to promote civilian participation in military R&D. Such an outcome depends on the existence of various conditions, which the MCF strategy intends to provide.

A preliminary condition for the participation of civilian enterprises in military R&D projects is sharing the availability of such opportunities. To that end, several platforms were established during the 2010s. One prominent platform is the online military procurement system (*quanjun wuqi zhuangbei caigou xinxi wang*) that was launched in 2015 by the PLA's procurement department, the EDD. It provides information on requested military systems and equipment and allows civilian organizations to submit proposals. Examples of military systems and projects that this platform presents include telecommunication systems, software testing tools, and funding for military-related research.[21]

Other important platforms for information sharing are the "Civilian Participation in Military Technology and Products Catalogue" (*min canjun jishu yu chanpin tuijian mulu*) (hereinafter, the Catalogue) and the National Military-Civilian Integration Public Service Platform (*guojia junmin ronghe gonggong fuwu pingtai*). Jointly established by the Ministry of Industry and Information Technology (MIIT) and the State Administration for Science, Technology and Industry for National Defense (SASTIND), the Catalogue has been published annually since 2009.[22] It presents dozens of military projects annually, inviting civilian S&T organizations to take part through various R&D activities, financial investment, and the like. The National Military-Civilian Integration Public Service Platform was established in 2017, also by the MIIT and SASTIND. It lists advanced dual-use R&D and manufacturing means and

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20 "China Encourages Private Sector Participation in Weapons Development," Xinhua, February 25, 2017 ~ http://www.xinhuanet.com//english/2017-02/25/c_136083431.htm.

21 The platform is available at http://www.weain.mil.cn.

22 "Liang bumen lianhe fabu 2018 niandu 'junyong jishu zhuan minyong tuiguang mulu' he 'min can jun jishu yu chanpin tuijian mulu'" [Two Departments Jointly Released the 2018 "Catalogue of Military Technology Transfer to Civilian Use" and the "Catalogue of Civilian Participation in Military Technology and Products"], Sina, December 4, 2018 ~ https://news.sina.com.cn/o/2018-12-04/doc-ihmutuec6000646.shtml.

services and allows registered users—civilian and military alike—to connect directly to each other.[23]

In addition to the procurement website and the Catalogue, other means have been initiated since the mid-2010s to promote expertise sharing and increase civil-military cooperation in military R&D. One such measure has been exhibitions of military-related technologies and products, which have taken place annually since the mid-2010s and present technologies and products developed by civilian firms and institutions (solely or jointly with defense industry enterprises). The exhibitions' aims include sharing information about specific needs in technology development and innovation, engaging more organizations in MCF activities, and enhancing the industrialization of dual-use technologies.[24] Through such methods, these information-sharing tools can potentially make a double contribution to China's military procurement: incorporating advanced proficiency and other capabilities into military R&D and increasing competition among the PLA's suppliers.[25]

Exposing civilian organizations to military R&D opportunities is not enough, however, to prompt their participation; it is also necessary to provide them with incentives and collaboration frameworks. An important tool in this respect is MCF's industrial demonstration bases (*junmin ronghe chanye jidi*), which provide favorable conditions for civilian companies and research institutes that engage in military-related development and civil-military partnerships of this type. Established in 2009, by mid-2019, 32 bases were operating in provinces and cities across China.[26] Intending to encourage MCF activity (and following the central leadership's orders), regions and local authorities set up demonstration bases, offering various incentives to enterprises that met their conditions. For instance, Hebei Province demanded that companies and research institutes operating in the industrial base engage in R&D projects with convertible civil-military capability and technology relevant to military R&D. Such projects should also be innovative yet proven to some degree and have a clear commercial potential. Enterprises that meet

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23 The platform is available at http://www.zgcjm.org.

24 On such exhibitions, see, for example, People's Government of Hebei Province, "Guanyu juban di er jie 'Zhongguo-Hebei junmin ronghe guofang gongye xietong chuangxin chengguo zhanshi qiatan hui' de tongzhi" [Notice on the 2nd "China Hebei Exhibition of the Innovation and Industrial Achievements of Military-Civil Fusion in the Area of National Defense"], December 28, 2015 ~ http://info.hebei.gov.cn/eportal/ui?pageId=6778557&articleKey=6503674&columnId=330890; and "Junmin ronghe gongshi Qingdao shiqi!" [Military-Civilian Fusion Offensive, Qingdao Rise!], Phoenix Network Qingdao, February 25, 2019 ~ https://qd.ifeng.com/a/20190225/7236134_0.shtml.

25 Luan, "Junmin ronghe zouxiang xin shidai."

26 "Woguo junmin ronghe chanye fazhan qingkuang."

these conditions are prioritized in the allocation of MCF's funds, participation in military R&D projects, and the support of other funds.[27] Similarly, the government of Sichuan announced that it would award local enterprises that develop MCF-related products 2% of their R&D investment, up to ten million renminbi.[28] Special contests and research funds provide additional incentives to increase enterprises' participation in MCF projects. For instance, an annual contest of dual-use projects, which has been held since 2016 by MIIT, SASTIND, EDD, and other organizations, brings together over one hundred high-tech dual-use projects—most of them innovative—and grants the winners funds worth one to three million renminbi.[29]

Nevertheless, providing opportunities and incentives is still not adequate to increase civilian entities' participation in military R&D projects; obstacles must be removed that prevent civilian sector involvement. Examples of these obstacles include the high degree of compartmentalization between and inside the military and civilian establishments, insufficient technology standardization between the two sectors, and inadequate legal protection of civilian entities' intellectual property.[30] So far, military and civilian products and R&D processes have been subject to different technological standards, making it difficult to transfer technology and carry out R&D collaborations between the sectors. To address this problem, ongoing efforts at the national level have been undertaken to introduce new technology standards that apply to both sectors.[31] A similar effort has taken place in the area of intellectual property legislation. Realizing that civilian enterprises avoid sharing know-how with their military counterparts out of concern that their intellectual property is legally unprotected, MCF's

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27 People's Government of Hebei Province, "Guanyu yinfa 'Hebei sheng junmin ronghe chan xueyan yong shifan jidi rending guanli banfa' de tongzhi" [Notice on Distributing the "Administrative Measures for the Selection of Industries for the Military-Civilian Fusion Study and Research Demonstration Base in Hebei Province"], August 15, 2018 ~ http://info.hebei.gov.cn/eportal/ui?pageId=6778557&articleKey=6802900&columnId=330890.

28 Central People's Government (PRC), "Sichuan duo cuo bingju cujin guofang keji gongye junmin ronghe fazhan" [Sichuan Takes Multiple Measures to Promote the Development of Military-Civil Fusion in National Defense Science, Technology, and Industry], October 25, 2018 ~ http://www.gov.cn/xinwen/2018-10/25/content_5334324.htm.

29 "120 ge xiangmu juezhu Zhongguo junmin liang yong jishu chuangxin yingyong dasai juesai" [120 Projects Compete for the Finals of China's Military-Civil Dual-Use Technology Innovation Contest], Xinhua, November 26, 2018 ~ http://www.xinhuanet.com/politics/2018-11/26/c_1123769935.htm.

30 "Baogao: Junmin ronghe zongti fazhan taishi xiang hao dan tizhi jizhi gaige xiangdui zhihou" [Report: Overall Development of Military-Civil Fusion Is Better, but Reform of Institutional Mechanisms Is Relatively Lagging], *21 caijing sousuo*, January 21, 2019 ~ http://news.21so.com/2019/qqb21news_0121/4679246.html; and "Junmin ronghe gongshi Qingdao shiqi!"

31 "Junmin ronghe gongshi Qingdao shiqi!"; and "Xinshidai xia tongyong hangkong chanye junmin ronghe shi fazhan zhanlue yanjiu."

leading bodies—at the national and subnational levels—have taken measures to strengthen intellectual property laws.[32]

In addition to R&D, MCF's tools can also enhance China's military procurement in other ways. They can strengthen the PLA's bargaining position vis-à-vis its suppliers, allow better management of acquisition contracts, and ultimately use China's military procurement budget more efficiently to better equip PLA units. For instance, the online military procurement system allows civilian suppliers to bid for a large variety of non-weapon items requested by the PLA's arms and services. The request includes a target price and other conditions, with the proposal being sent directly to the military department that will utilize the respective item.[33] This can potentially weaken the MIC's monopoly over the PLA's supplies, and it ensures compatibility between the PLA's actual needs and budget, the selected proposal, and the product that is ultimately supplied. Similarly, MCF tools allow the PLA's procurement bodies relatively tight control over their acquisition contracts and expenses. Unlike the defense industry groups, which enjoy strong political and economic power, civilian entities taking part in military projects are subject to strict contract conditions and have little bargaining power vis-à-vis the procurement bodies. Furthermore, incentives, funds, and other financial benefits that are included in the MCF policy are subject to regular and random audits, which cannot be applied to the MIC's enterprises.[34]

MCF'S INTERIM RECORD

Given the endemic problems of China's MIC the involvement of civilian enterprises, S&T organizations, and individual professionals in military R&D, manufacturing, and support services can potentially improve military procurement. However, to date, the involvement of these groups has been insufficient to substantially change China's military procurement structure.

Despite the top-down efforts made since 2017, the bureaucratic, legal, and functional barriers between the defense and civilian sectors are still high. For example, it takes up to half a year—and probably much longer—for

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32 "Xinshidai xia tongyong hangkong chanye junmin ronghe shi fazhan zhanlue yanjiu."

33 See http://www.weain.mil.cn.

34 See, for example, People's Government of Hebei Province, "Guanyu dui shengji junmin jiehe chanye fazhan zhuanxiang zijin zhichi xiangmu chou shenji de tongzhi" [Notice Regarding Random Audit of Special Funds to Support Province-Level Projects of Military-Civil Integration's Industry Development], September 18, 2015 ~ http://info.hebei.gov.cn/eportal/ui?pageId=6778557&articleKey=6493986&columnId=330890.

civilian companies to acquire a defense sector–supplier license.[35] In addition, legislative and regulatory measures that have been taken to protect civilian organizations' intellectual property are weak, leading civilian enterprises to avoid sharing their technologies with defense industry enterprises.[36] Worse, at least some of these impediments are intentional. A *Fazhi ribao* analysis in 2019 argues that the involved parties have intentionally blocked the legislation required for the introduction of the market economy into the defense sector and the implementation of MCF. Attempting to protect narrow organizational interests, they either use MCF-related legislation to expand their authority or block it altogether. In other cases, the vague division of legislative authority between the military, provincial, and other related bodies and the failure to consider the financial costs involved in the new laws further complicate the situation.[37] As a result, China has so far failed to create the necessary conditions for the large-scale participation of civilian enterprises in military-related activity, and consequently the scale of their participation in military R&D and production remains small. As of early 2019, around two thousand civilian enterprises were licensed as suppliers for the defense system—a small number considering the size of China's military forces, MIC, and civilian sector.[38]

Under such conditions, MCF can hardly change the basic structure of China's military procurement—that is, the lack of a market economy and the PLA's weakness amid the MIC. Hence the strategy is not expected to remedy the MIC's inefficiency or limited innovation capacity. Instead, MCF's contribution seemingly lies in its ability to improve military R&D through the introduction of cutting-edge know-how. Assessing the advancement of MCF in various dimensions, an official report in 2017 found that the greatest progress to date had been in the fusion of technologies, while fusion in manufacturing (industrial fusion) lagged behind.[39] Given MCF's obstacles and the basic relations between China's military and civilian sectors, the reasons for this are quite clear. First, the relatively easy access of China's civilian organizations and professionals to advanced dual-use foreign expertise

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35 "Zenme zuo, keji minqi cai neng zou hao 'canjunlu'" [How to Make Science and Technology Civilian Companies Do Well in "Joining the Military Road"], *Science and Technology Daily*, March 12, 2019 ~ http://www.stdaily.com/zhuanti01/2019nlianghui/2019-03/12/content_754852.shtml.

36 "Baogao: Junmin ronghe zongti fazhan taishi xiang hao dan tizhi jizhi gaige xiangdui zhihou."

37 "Zhiyue junmin ronghe lifa zhi wenti fenxi" [An Analysis of the Problems Restricting Military-Civilian Fusion's Legislation], *Fazhi ribao*, February 27, 2019 ~ http://www.legaldaily.com.cn/army/content/2019-02/27/content_7782179.htm.

38 "Zenme zuo, keji minqi cai neng zou hao 'canjunlu.'"

39 "Baogao: Junmin ronghe zongti fazhan taishi xiang hao dan tizhi jizhi gaige xiangdui zhihou."

provides them a certain advantage over their military peers. According to the 2017 report, of all MCF's aspects, foreign capabilities made the greatest progress.[40] This is less the case, however, in the industrial (manufacturing) realm, where China's defense industry has reportedly greater technological capacity than in the civilian realm.[41]

Second, organizational barriers between China's civilian and military S&T sectors have never been as high as those between the defense and civilian industries. For instance, China's universities and scientists have occasionally been involved in military projects, and mid- and long-term national S&T programs have often combined military and civilian aspects (e.g., the 1956 Twelve Year-Plan and the 863 Program).[42] Involvement of civilian enterprises in military production, however, remains highly limited. According to official sources, in 2016 less than 3.5% of the relevant civilian enterprises in China participated in military development and production. This is a very small percentage compared to civil-military collaboration in the United States, where over 90% of military technology is dual-use (according to the same source) and leading arms manufacturers have well-reputed civilian products and services.[43]

Given such conditions, the question is how MCF is affecting China's military procurement in practice. Starting with military R&D, the strategy's main contribution is probably the exposure of the MIC to advanced scientific and technological expertise, particularly wholly or partially imported dual-use know-how, and the access that such knowledge provides to new R&D equipment and methods. Yet even this activity faces challenges. Increasingly aware of China's MCF strategy, foreign governments have increased their scrutiny of Chinese activity in their territory, trying to limit the transfer of sensitive information to China. For instance, in 2019 the U.S. Department of Defense included the MCF concept in its annual report on China's military development for the first time and pointed to it as one of the country's means for modernizing its military.[44] As a countermeasure, the United States tries to identify Chinese companies with relations with the

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40 "Baogao: Junmin ronghe zongti fazhan taishi xiang hao dan tizhi jizhi gaige xiangdui zhihou."

41 State Council Information Office (PRC), "Guofang ke gong ju jiedu tuidong guofang keji gongye junmin ronghe de yijian."

42 Cheung, "Keeping Up with the Jundui," 595–602.

43 "Baogao: Junmin ronghe zongti fazhan taishi xiang hao dan tizhi jizhi gaige xiangdui zhihou"; and "Woguo junmin ronghe chanye fazhan qingkuang."

44 U.S. Department of Defense, *Annual Report to Congress*, 21. See also Richard P. Appelbaum et al., *Innovation in China: Challenging the Global Science and Technology System* (Cambridge: Polity, 2018), 58.

PLA, block their access to sensitive U.S. technologies, and make sure that they do not infiltrate the supply chains of U.S. defense system suppliers.[45] Thus, the MCF strategy not only undermines its own objectives but also intensifies the suspicions of technology-exporting countries—mostly the United States and its allies in Western Europe—and jeopardizes political and economic relations with them.

Including civilian enterprises in China's military R&D has another advantage. Contrary to R&D projects undertaken by defense industry groups, MCF projects are more likely to comply with military plans, requirements, and budgets. Overstretched R&D efforts have been an endemic problem in China's MIC and have negatively affected both the quality of its R&D and other phases of procurement. China's intention since the late 1990s to build world-class military capabilities, coupled with its failure to introduce a market economy into its defense industry, have exacerbated this problem.[46] While the MCF strategy lacks the means to alter the underlying conditions, the insistence that MCF projects have a commercial basis prevents them from making the problem even worse. Moreover, to some degree MCF follows the general direction that military R&D should take. Thus, as early as 2015, China reduced the number of MCF R&D projects by over 60% to avoid waste of efforts and budget overstretching.[47]

On the other hand, the small participation of the civilian sector in China's R&D shows the strategy's limited impact on procurement. Thus, given that the PLA's buyer-supplier relationship with the MIC remains unbalanced in favor of the latter, it is quite plausible that bridging the technological gap with the West has a limited effect on other phases of R&D. For instance, R&D resources remain overstretched, and spending is frequently wasteful.

Similarly, MCF seems to have had limited impact on military manufacturing and the maintenance and servicing of products. The involvement of civilian enterprises in these fields of procurement is most likely limited to the lower phases of the supply chain, so they can hardly compete with the defense industry groups as the PLA's main suppliers. Therefore, MCF fails to substantially affect either the arms manufacturing process or the buyer-supplier relationship between the PLA and the MIC.

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45 Kate O'Keeffe and Jeremy Page, "China Taps Its Private Sector to Boost Its Military, Raising Alarms," *Wall Street Journal*, September 25, 2019; and Demetri Sevastopulo, "U.S. Targets Companies with Chinese Military Ties," *Financial Times*, September 11, 2019.

46 Yoram Evron, "China's Military Procurement Approach in the Early 21st Century and Its Operational Implications," *Journal of Strategic Studies* 35, no. 1 (2012): 74–85.

47 Luan, "Junmin ronghe zouxiang xin shidai."

This failure leaves most of the endemic problems plaguing China's military procurement unchanged. A striking example of this situation is the fact that, as of early 2019, military products were still being sold to the PLA on a cost plus 5% profit basis.[48] Such a pricing model discourages the MIC's enterprises from increasing efficiency and shifts the burden to the military budget. Thus, we can conclude that MCF most likely allows China's MIC to narrow the technological gap with the West and develop increasingly advanced weapons. However, given that other aspects of military procurement still lag behind, this achievement has only a limited impact on the PLA's armament. It does not improve the PLA's ability to dictate the technical specifications and operational requirements of its weapons, validate the quality of new products, improve supply conditions, or keep its weapons and equipment well maintained throughout their deployment. As sophisticated as China's new weapons systems are, these latter aspects will ultimately decide the PLA's level of readiness.

CONCLUSION

The contribution of MCF to China's military procurement, and hence China's military buildup, lies mostly in its ability to identify and incorporate new technologies and R&D expertise—either partially or completely imported—into China's arms development system. In so doing, the strategy can help the MIC overcome existing weaknesses, narrow specific gaps, shorten the arms development process, and ultimately acquire capabilities that allow China to create world-class indigenous weapons. Yet, it also thereby heightens tension between China and Western states and puts at risk the future flow of information and experience from those states.

In addition, MCF does not change the underlying structure of China's military procurement. The large state-owned defense industry groups still monopolize the country's defense market, and as long as the state-owned enterprise sector and the MIC maintain their dominant positions, this situation is not expected to change. Thus, saving procurement budgets or allowing the PLA greater control than before over acquisitions is not where the policy's contribution rests.

What then is MCF's contribution to China's military buildup? Given that the strategy's immediate effect is limited to advanced R&D projects, it is most

[48] "Zhiyue junmin ronghe lifa zhi wenti fenxi." It is noteworthy that the figure mentioned in the source is profit plus 50%, but this is likely an error. See Cheung, "Keeping Up with the Jundui," 614.

plausible that the direct impact will be on advanced high-priority systems or critical subsystems that enjoy large budgets and attract the leadership's attention. Examples of such projects include aircraft carriers, jet engines, aerospace systems, and command and control systems. Certainly, such systems can have a strong strategic impact, even if they are deployed in small numbers. On the other hand, these systems are complex and require careful maintenance. Moreover, their impact on the military readiness of most PLA units might be limited because these units are generally equipped with less sophisticated weapons. For these services—mostly land forces but also parts of the navy and the air force—the PLA will remain dependent on China's existing processes of military procurement. ◈

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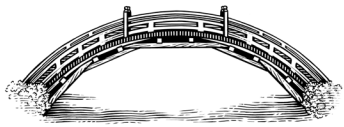
ROUNDTABLE ESSAY

Opening Up While Closing Up: Balancing China's State Secrecy Needs and Military-Civil Fusion

Zi Yang



ZI YANG *is a PhD student in the S. Rajaratnam School of International Studies (RSIS) at Nanyang Technological University (Singapore). His research focuses on China's military. Mr. Yang's recent publications include a Center for Strategic and International Studies report with Jeff Benson titled "Party on the Bridge: Political Commissars in the Chinese Navy" (2020) and a Routledge Handbook chapter "Character Assassination and the Contemporary Anti-Corruption Campaign in the Chinese Military" (2019). He can be reached at <yang0622@e.ntu.edu.sg>.*

KEYWORDS: CHINA; PEOPLE'S LIBERATION ARMY; MILITARY MODERNIZATION

EXECUTIVE SUMMARY

This essay analyzes China's state secrecy system and assesses its influence on the Military-Civil Fusion (MCF) strategy that aims to strengthen the defense industry.

MAIN ARGUMENT

MCF seeks to reinvigorate China's state-owned defense sector with nonstate inputs and integrate the defense economy with the nation's overall economic development. As a result, greater transparency and sharing of information between state and nonstate MCF participants has occurred. As defense sector openness increases, a major concern for the Chinese government is the safekeeping of state secrets. The state secrecy system led by the Chinese Communist Party has jurisdiction over the whole of MCF, and stringent rules regulating nearly every level of the initiative have been instituted. Yet the rigidity of this system could hamper progress and impede the realization of MCF goals.

POLICY IMPLICATIONS

- China maintains an elaborate bureaucracy to safeguard state secrets. As the country's security environment tightens, the secrecy system is positioned to gain additional influence over MCF.
- MCF has further opened up the state-dominated defense industry to nonstate actors, prompting greater transparency regarding the inner workings of China's defense industry. This development could lead to a clearer understanding of emerging MCF industry leaders as well as Chinese defense enterprises' interactions with nonstate partners that serve as the intermediaries of foreign engagement.
- State secrecy requirements add uncertainty to MCF's future. As market forces demand additional information sharing, the state secrecy bureaucracy will likely oppose such needs. Ultimately, the Chinese government must decide whether to give precedence to market forces or security priorities.

One of the major strategic plans of the Xi Jinping administration, besides the Belt and Road Initiative and Made in China 2025, is *junmin ronghe* or Military-Civil Fusion (MCF). First announced during Xi's meeting with representatives of the People's Liberation Army (PLA) in March 2013, MCF was elevated to the level of a national strategy in 2015 with Xi's personal backing.[1] His main motive in supporting MCF is the initiative's potential to reinvigorate China's defense industry through expanded cooperation with the private sector. MCF is drawing worldwide attention because of the global implications of China's growing military power and increasingly assertive foreign policy stance. Questions abound on the initiative's progress, challenges, and details. Moreover, concerns are rising over the export of dual-use technology to civilian MCF participants that could eventually end up in PLA hands.[2]

Although a growing pool of literature is helping us better understand MCF, there is still much that is unknown regarding this broad initiative that encompasses matters ranging from weapons production to scientific research. This essay focuses on the subject of secrecy and MCF. Namely, how will China balance the need for secrecy while it opens up its state-owned defense sector to nonstate partners? Moreover, how will secrecy considerations influence the initiative's progress?

To address these questions, this essay consults recently released Chinese sources, including monographs, journal articles, and legal documents. Given that MCF is a project open to Chinese capital only, most official documents relating to the initiative are in Chinese, especially when secrecy matters are concerned. The state secrecy apparatus, which serves as the gatekeeper, is embedded in all areas of MCF, with an expanding presence as the initiative grows. This tight control is necessary due to concerns over the leaking of state secrets. Nonstate entities seeking to participate in MCF must obtain a secrecy qualification certificate, which requires organizational restructuring according to state secrecy rules. During their participation in MCF, private companies and research institutions must abide by secrecy requirements at all times and allow inspections by the government.

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1 "Xi Jinping tan junmin ronghe: Shi guojia zhanlue guanhu guojia anquan he fazhan quanju" [Xi Jinping on Military-Civil Fusion: A National Strategy Concerning National Security and Overall Development], Chinese Communist Party News Online, January 23, 2017 ~ http://cpc.people.com.cn/xuexi/n1/2017/0123/c385474-29043923.html.

2 Marcel Angliviel de la Beaumelle, Benjamin Spevack, and Devin Thorne, "Open Arms: Evaluating Global Exposure to China's Defense-Industrial Base," Center for Advanced Defense Studies, October 18, 2019, 69.

In recent years, the Chinese press has reported a number of cases involving leaks of state secrets, giving further impetus to strengthening the secrecy apparatus.[3] The latest change to the system involves Xi signing the Military Secrecy Regulations into law.[4] This development has clear implications for MCF. While a strengthened secrecy system could be more effective in preventing leaks of state secrets, the system's strictness is turning away companies that could potentially contribute to MCF.

This essay is organized into the following sections:

- pp. 48–52 examine what MCF is, how it is leading to information openness, and how this trend of openness comes into conflict with a secretive state.
- pp. 52–54 look at the origins of the Chinese state's secretive nature.
- pp. 54–58 address the role secrecy plays in MCF and describe the state secrecy bureaucracy, the process of obtaining secrecy clearance, and how state secrecy agencies balance the contradictions between openness and a habit for opaqueness.
- pp. 58–62 analyze how this system plays out in a case study of scientific research universities.
- pp. 63–64 conclude by discussing the secrecy process's overall implications for MCF.

THE INFLUENCE OF MCF ON TRANSPARENCY

Although MCF as a national strategy started after Xi Jinping came to power, its origins can be traced back to the 1960s. The Third Front Movement, the first large-scale state-led initiative to fuse defense industry development with national economic growth, began in 1964 in an increasingly hostile international environment. By this time, China's relations with both the United States and the Soviet Union were at their nadir. Already engaged in a number of proxy wars with the United States in Southeast Asia, China risked war with the Soviet Union as well. Given such concerns, the Chinese government initiated a massive project to relocate defense-related heavy

3 "Shui chumai le guojia mimi?! Jiandie cefan huodong huamian shouci baoguang" [Who Betrayed State Secrets?! Intelligence Operations Exposed for the First Time], Xinhua, January 13, 2020 ~ http://news.xhby.net/index/202001/t20200113_6473448.shtml.

4 Unfortunately, the full text of the new Military Secrecy Regulations, which has a section governing secrecy and MCF, is not publicly available. For the official press release, see "Zhongyang junwei zhuxi Xi Jinping qianshu mingling fabu jundui baomi tiaoli" [Central Military Commission Chairman Xi Jinping Signs Military Secrecy Regulations into Law], *People's Liberation Army Daily*, February 19, 2020 ~ http://www.81.cn/jfjbmap/content/2020-02/19/content_254407.htm.

industries to the so-called third front (i.e., China's northwest and southwest interior), away from the first and second fronts (i.e., regions and cities that could be easily targeted during wartime).[5]

The Third Front Movement was the largest industrial relocation plan in modern Chinese history and created inland defense industrial centers. Eventually, it relocated nearly 50% of China's defense industrial production to Third Front cities.[6] However, today the movement is widely considered a failure that wasted resources and held back national development.[7] A significant percentage of Third Front enterprises did not survive the Mao Zedong era, mainly due to improper planning on the state's part.

As the reform era approached, Third Front corporations either moved to coastal China, closed shop, or restructured themselves to capture the civilian market.[8] State-owned defense enterprises converted to producing civilian goods. Departing from Mao's overemphasis on building up the defense industry, economic conversion became the theme of Deng Xiaoping's civil-military integration. Besides adapting production lines for civilian goods, the PLA and defense corporations transferred assets to civilian partners. In the two decades after "reform and opening up" was first announced in 1978, the PLA allowed 101 airports, 29 ports, 300 railway lines, 90 communication lines, and 1,000 storage facilities for civilian use, and 3 million square meters of land were transferred to civilian counterparts.[9] Military technology was employed in over 1,000 civilian economic projects, and some 10,000 patents were transferred to the civilian sector. Furthermore, over one million technical staff were trained and transferred to civilian positions, 900 cases of technical assistance were performed for civilian corporations, and the PLA supported some 150 critical civilian projects.[10]

Since coming to power, Xi has made significant changes to the PLA. With the anticorruption campaign and armed forces reform, he has by and large reshaped the PLA to be a force that is better disciplined and loyal to the Chinese Communist Party (CCP), as well as possessing a higher degree of war readiness. Such changes mean that the defense industry must keep

5 Barry Naughton, "The Third Front: Defence Industrialization in the Chinese Interior," *China Quarterly*, no. 115 (1988): 354.

6 Sun Li and Wang Ying, *Xinshidai junmin ronghe fazhan zhanlue yanjiu* [Strategic Study of Military-Civil Fusion Development in the New Era] (Beijing: Renmin Chubanshe, 2019), 25.

7 Covell F. Meyskens, *Mao's Third Front: The Militarization of Cold War China* (Cambridge: Cambridge University Press, 2020), 203–4.

8 Ibid., 233.

9 Sun and Wang, *Xinshidai junmin ronghe fazhan zhanlue yanjiu*, 28–29.

10 Ibid., 29.

up with the PLA's demand in research, innovation, and arms production. The primary goal of MCF, like its name suggests, is to increase connectivity between state-owned defense corporations and the nonstate sector through a two-way process called *junzhuanmin* and *mincanjun*. Junzhuanmin is the Chinese term for economic conversion, or the conversion of the military and defense corporations' products, personnel, and technology for civilian use. An example would be the transfer of declassified patents by defense corporations for use in the civilian sector. Mincanjun literally means "civilian joining the military" and can be loosely translated as civilian contracting, or allowing nonstate entities to enter the defense market once available exclusively to state-owned enterprises. While economic conversion was the focus for most of the reform and opening-up period, MCF's current incarnation gives more weight to civilian contracting with the hope of absorbing nonstate capital, talent, experience, and technology.

There are three main reasons that the state has decided to pursue MCF at this time. The first and foremost reason is to reinvigorate the state-owned defense sector with inputs from nonstate partners, including commercial entities and scientific research institutions. By expanding cooperation with nonstate partners, state-owned defense corporations can increase efficiency and lessen the state's budgetary burden.[11] In return, the nonstate sector can also benefit from the spillover effect of such exchanges. Moreover, private companies could assist in importing critical dual-use technology that state corporations find troublesome to acquire.[12] Second, by giving the private sector a greater share of the stable and lucrative defense market, the state hopes to avoid the arms race that brought down the Soviet Union. According to Chinese strategists, the Soviet Union fell for the ploy of engaging in an arms race with the United States and eventually overspent on defense that led to its economic and political collapse.[13] MCF is China's answer to the riddle. By giving the private sector a share of the task, the state hopes to maintain a healthy balance in defense expenditure. Finally, MCF is an ideological brainchild of Xi, who often speaks of the initiative's importance. In every major speech related to military matters, Xi has promoted MCF, linking it to his "China dream, powerful military dream" (*zhongguomeng*,

11 Elsa B. Kania, "In Military-Civil Fusion, China Is Learning Lessons from the United States and Starting to Innovate," RealClearDefense, August 27, 2019 ~ https://www.realcleardefense.com/articles/2019/08/27/in_military-civil_fusion_china_is_learning_lessons_from_the_united_states_and_starting_to_innovate_114699.html.

12 U.S.-China Economic and Security Review Commission, "2019 Annual Report to Congress," November 2019, 212 ~ https://www.uscc.gov/annual-report/2019-annual-report-congress.

13 Kania, "In Military-Civil Fusion."

qiangjunmeng) concept.[14] In fact, the official press has referred to MCF as the "bedrock of the rejuvenation" of the Chinese civilization.[15] By throwing his own personal weight behind the initiative, Xi has ensured that it will be a permanent fixture for years to come.

China's 13th Five-Year Plan (2016–20) describes the 2020 goal for MCF as follows: "form a basic military-civilian science and technology collaborative innovation system, and promote the formation of comprehensive, multi-domain, and high-efficiency military-civilian technology fusion."[16] To ensure the completion of this objective, the plan also outlined seven specific goals:

1. Strengthen macro-coordination of science, technology, military, and civilian integration. Improve the scientific and technological MCF system and mechanism. Promote coordination and integration of plans.
2. Strengthen the capacity of science and technology (S&T) collaborative innovation between the military and civilian sectors. Coordinate basic research and layout of cutting-edge technology research. Implement key S&T MCF projects. Implement major national S&T projects.
3. Promote planning and sharing of S&T innovation resources. Strengthen the joint construction and sharing of scientific research platforms. Promote the sharing of military and civilian S&T resources.
4. Promote the two-way transformation of military and civilian S&T achievements. Promote transformation of the system overseeing the conversion of military and civilian S&T achievements. Promote the implementation of an intellectual property rights protection strategy.
5. Carry out pilot demonstrations. Focus on building a military-civilian S&T collaborative innovation platform. Encourage the construction of a new type of MCF scientific research institution. Explore an MCF financial service model.

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14 "Xi Jinping: Zhazha shishi tuijin junmin ronghe shendu fazhan, wei shixian Zhongguomeng qiangjunmeng tigong qiangda dongli he zhanlue zhicheng" [Solidly Promote the In-depth Development of Military-Civil Fusion to Provide Strong Motivation and Strategic Support for the Realization of the Chinese Dream], Chinese Communist Party News Online, March 13, 2018 ~ http://cpc.people.com.cn/n1/2018/0313/c64094-29863762.html.

15 Li Ruixing and Xu Guizhong, "Maijin junmin ronghe shendu fazhan xinshidai" [March into a New Era of In-depth Military-Civil Fusion], Chinese Communist Party News Online, November 20, 2017 ~ http://theory.people.com.cn/n1/2017/1120/c40531-29656270.html.

16 Ministry of Science and Technology of the People's Republic of China (PRC), "Kejibu zhongyang junwei kexue jishu weiyuanhui guanyu yinfa 'shisanwu keji junmin ronghe fazhan zhuanxiang guihua' de tongzhi" [Ministry of Science and Technology and the Central Military Commission Science and Technology Commission's Notice Regarding the Publication of "The Thirteenth Five Year Plan's Special Plan for Military-Civil Fusion"], 2017 ~ http://www.safea.gov.cn/xxgk/xinxifenlei/fdzdgknr/qtwj/qtwj2017/201708/t20170824_134588.html.

6. Strengthen the cultivation of innovative personnel. Improve the training and utilization mechanism of military and civilian innovative talents and build a new type of think tank for S&T MCF.
7. Improve the policy system. Strengthen the construction of an MCF system for S&T. Improve the policy environment for S&T MCF.[17]

The terms "openness" and "sharing" together appear more than twenty times in the document, indicating a new emphasis on transparency that MCF is bringing to China's defense industry. In fact, the founding document of MCF—"Opinions on Fusing the Development of Economic Construction and National Defense," issued jointly by the CCP Central Committee, State Council, and Central Military Commission (CMC)—specifically highlights the need to share information and establish channels for information exchange between state and nonstate MCF participants.[18]

The implementation of those commands has led to a number of national and provincial MCF information-sharing platforms.[19] Publicly available on these platforms are information on MCF policies and regulations, procurement information, buyers and suppliers of technology, buyers and suppliers of products, resource sharing, and financing options. Compared to the pre-MCF days, business in the defense sector has become much more transparent. This trend is inevitable due to market demand, given that timely information is a necessity for business operations. However, openness in MCF-related sectors has not had a domino effect elsewhere in Chinese society. Despite some gestures toward transparency, the Chinese state remains highly secretive and obsessed over information control.

A SECRETIVE STATE

Maintaining secrecy was the key to the CCP's success in taking over China. In its early days, the party suffered a major setback in 1931 when

17 "Shisanwu keji junmin ronghe fazhan zhuanxiang guihua jinri yinfa" [The Thirteenth Five Year Plan's Special Plan for Military-Civil Fusion Published], Xinhua, August 23, 2017 ~ http://www.xinhuanet.com/mil/2017-08/23/c_1121531750.htm.

18 "Zhonggong Zhongyang, Guowuyuan, Zhongyang Junwei yinfa 'Guanyu jingji jianshe he guofang jianshe ronghe fazhan de yijian'" [Chinese Communist Party Central Committee, State Council, and Central Military Commission Release Document "Opinions on Fusing the Development of Economic Construction and National Defense"], Xinhua, July 21, 2016 ~ http://www.gov.cn/xinwen/2016-07/21/content_5093488.htm.

19 The national MCF information-sharing platform is the National Military-Civil Fusion Public Service Platform, available at http://jmjh.miit.gov.cn.

its chief of security service Gu Shunzhang was captured after failing to follow secrecy protocols.[20] The event almost brought down the entire party and was a lesson never to be forgotten. In the years following, the CCP not only emphasized covert operations but also placed equal importance on maintaining secrecy, which was recognized as a defensive mechanism against intelligence penetration.

Many of the CCP's senior leaders, including Zhou Enlai, Liu Shaoqi, and Deng Xiaoping, spent considerable time early on in their careers conducting covert operations. Mao Zedong, although primarily a military leader, made a number of directives regarding secrecy. "One must be extra cautious in keeping secrets" is one of his sayings that remains the motto of China's secrecy agencies.[21] Specifically, Mao recommended secrecy in various areas of work ranging from military operations security to what medium one should use when communicating sensitive information. The relationship between secrecy and openness is a simple one. In Mao's view, information beneficial to the party should be open, while information that could potentially harm the party should be kept secret.[22]

Zhou Enlai, the founder of the CCP's first intelligence agency, the Central Special Section (*zhongyang teke*), led covert operations for years. However, Zhou wrote and said very little about his personal philosophy of secrecy. Nonetheless, he led the drafting of a number of CCP Central Committee documents on the issue, such as CCP Central Committee Regulations on Secrecy Work and Decision on Strengthening the Protection of Party and State Secrets.[23]

By contrast with Zhou, Liu Shaoqi wrote one of the defining essays on CCP secrecy work in 1939 titled "On Overt and Covert Operations."[24] In essence, he believed that secrecy is critical to winning the struggle against an enemy. Overt operations must be employed along with covert ones to maximize damage. The more one understands an opponent, the better. At the same time, friendly forces must properly conceal themselves to minimize the effects of the enemy's intelligence operations.

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20 Peter Mattis and Matthew Brazil, *Chinese Communist Espionage: An Intelligence Primer* (Annapolis: Naval Institute Press, 2019), 68–70.

21 Zhang Qun, *Zhongguo baomi fazhishi yanjiu* [Government Secrecy in Chinese Legal History] (Shanghai: Renmin Chubanshe, 2017), 245–46.

22 Ibid., 247–49.

23 Ibid., 252–53.

24 Ibid., 253.

Deng Xiaoping, known mostly for his role in opening up China, also spent years conducting underground work. His views on secrecy are mostly relevant to state-building. During his time as the head of the CCP Central Committee Southwestern Bureau, Deng identified the need for a state secrets law. He championed the expansion of the definition of state secrets, limits on the number of personnel involved in covert work, and enhanced vetting of secrecy apparatus candidates.[25] In the reform and opening-up years, Deng criticized the lax attitude regarding state secrets and called for a law to address this problem, which was enacted in 1988 as the State Secrets Law.

After rising to power in 1949, the CCP took a whole-of-society approach to secrecy due to the constant fear of foreign intelligence infiltration. There were high-profile cases where secrecy rules were violated and alleged perpetrators severely punished.[26] The tightly controlled environment of the Mao era relaxed during the period of reform and opening up. Nevertheless, the secrecy architecture remained in place and was reinforced by the 1988 State Secrets Law.

In recent years, numerous laws have been adopted to revive the whole-of-society approach to secrecy. The National Intelligence Law, Cybersecurity Law, and Counterespionage Law all complemented the amended State Secrets Law, making cooperation with Chinese secrecy and intelligence bodies a duty of Chinese citizens and organizations. Annual awareness campaigns occur every April with the aim of reminding the citizenry of the need to combat foreign espionage and maintain secrets.[27] As the next section will show, the nature of the state, which always has viewed secrecy as an integral part of statecraft, has become even more secretive in the era of MCF-driven openness.

RECONCILING THE DIFFERENCES: THE SECRECY SYSTEM AND MCF

The State Secrecy Bureaucracy

Conflict between greater openness induced by MCF and the state's demand for secrecy means a mechanism is needed to mitigate the differences. The bureaucratic agencies responsible for work in this area include the

25 Zhang, *Zhongguo baomi fazhishi yanjiu*, 254–56.

26 One of the first high-profile cases is that of Zhang Dongsun, a Tsinghua University professor accused of leaking secrets to American agents in 1951.

27 April is the month of national security education.

Office of the Central Secrecy Commission (OCSC), the CMC Equipment Development Department, and the State Administration for Science, Technology, and Industry for National Defense (SASTIND).

The OCSC is China's lead agency in secrecy work. It reports to both the CCP Central Committee General Office and Central Secrecy Commission, simultaneously headed by Ding Xuexiang, a confidant of party general secretary Xi Jinping.[28] Being a party organ, the OCSC follows the CCP tradition of "one organization with two signboards"—its party designation being the OCSC, while its state designation is the National Administration of State Secrets Protection (NASSP). Such tradition exists mainly to integrate party organs into state administration and to conceal party organizations to the public and foreigners. The OCSC/NASSP's mission is to perform secrecy administrative functions in accordance with the law. A curious phenomenon thus emerges. Whereas in most countries state institutions handle secrecy work, in China an organ of the ruling party masquerading as a state agency controls everything related to state secrets—a principle referred to as "the party administers the secrets" (*dang guan baomi*).[29] This principle has been repeatedly emphasized in articles and speeches by secrecy chiefs. The expansion of CCP control of state institutions in recent years has strengthened the party's leading role in administering secrets. With that said, through the OCSC/NASSP, the party exerts leadership in secrecy work at all levels, such as policy formulation, supervision, guidance, inspection, technology development, classification, declassification, and publishing. OCSC/NASSP branches are present from provincial levels down to city districts and counties. However, everyday secrecy operations in work units are conducted autonomously with little interference from state secrecy organs, whose main task is overall policy leadership and guidance.

SASTIND is another organization that plays a key role in MCF-related secrecy work. Besides designing secrecy regulations for defense industry entities, SASTIND also ensures that defense companies adhere to these rules. The CMC Equipment Development Department is involved in approving top-secret secrecy qualification certification.

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28 National Administration of State Secrets Protection (PRC), "Ding Xuexiang zai quanguo baomi gongzuo huiyi shang qiangdiao, bawo xingshi renwu, jujiao mubiao yaoqiu, tuijin guojia mimi zhili tixi he zhili nengli xiandaihua" [Ding Xuexiang Highlights the Following at the National Secrecy Work Conference: Grasp the Situation and Tasks, Focus on Targets and Requirements, Promote the Modernization of the State Secrecy Governance System and Governance Capabilities], 2020 ~ http://www.gjbmj.gov.cn/n1/2020/0218/c409082-31592349.html.

29 National Administration of State Secrets Protection Policy and Regulations Department (PRC), "Quanmian tuijin baomi falv zhidu tixi jianshe" [Comprehensively Promote the Construction of a Secrecy Legal System], 2018 ~ http://www.gjbmj.gov.cn/n1/2018/1226/c423239-30489734.html.

The Process of Secrecy Certification

Nonstate companies hoping to participate in MCF and gain access to the defense market must obtain three certifications: the Weapons and Equipment Research and Production Unit Secrecy Qualification Certification, the Weapons and Equipment Research and Production Certificate, and the Equipment Manufacturing Unit Qualification. The secrecy qualification certification must be obtained first. It is the most difficult certification to procure, is the most expensive to apply for, and requires extensive restructuring of the applying organization according to regulations. Basic prerequisites for the applicant include the following:

1. The applying legal person must be established in the People's Republic of China for three years and must have no criminal record.
2. The legal person seeks to engage in projects and products involving state secrets.
3. The legal person must not have foreign (including Hong Kong, Macao, and Taiwan) shareholders or direct investment. The proportion of capital contribution by foreign investors investing through indirect means and affiliates acting in concert must not ultimately exceed 20%.
4. The entity's legal representatives, main person-in-charge, de facto controller, members of the board of directors and supervisors, senior management personnel, and personnel planning to undertake research and production of weapons and equipment involving state secrets must be citizens of the People's Republic of China and have no foreign permanent residence or long-term residency permit, and no marriage relationship with overseas persons (including Hong Kong, Macao, and Taiwan).
5. The entity has permanent research and production facilities and offices, with the ability to undertake research and production tasks for weapons and equipment involving state secrets.
6. The entity has a well-constructed secrecy system with specialized agencies and personnel responsible for secrecy work. Facilities and equipment meet national security regulations and standards.
7. The entity has no leaks of secrets within one year.
8. The entity complies with laws, administrative regulations, and other conditions stipulated by the state secrecy agencies.
9. The entity has not been subjected to administrative penalties by securities regulatory agencies in the past three years.
10. The entity has a well-constructed internal control and information disclosure system.

11. The entity's actual controller guarantees to maintain his or her actual controller status during the application period and the valid secrecy qualification period.[30]

The applicant must submit the application with all required information to the local Weapons and Equipment Research and Production Secrecy Certification Commission, composed of specialists from the local OCSC/NASSP and SASTIND branches. In the application, the institution must indicate clearly which secrecy level it would like to apply for—i.e., secret (*mimi*), highly secret (*jimi*), or top-secret (*juemi*). An application for the top-secret level must be approved by the national-level commission, made up of personnel from not only the OCSC/NASSP and SASTIND but also the CMC Equipment Development Department. Secret and highly secret certifications can be approved locally. The applicant must provide detailed information on the institution and the measures it took to ensure readiness for projects involving state secrets. Secrecy protection education and training is required for the institution's personnel, and a secrecy commission or secrecy leading group must be formed in the organization to manage all affairs related to handling state secrets. Similarly, the institution's secrecy regulations must be enacted. Work completed in the past year relating to secrets classification, secrecy personnel management, carrier of classified information, management of classified products, critical secrets protection, information security infrastructure, external communications, secure conference systems, external facility management, external relations, secrecy inspection, rewards and penalties, file management, and secrecy work–related funds must be recorded in detail and submitted.[31] This means that an entity not already involved in state secrecy work must go through a comprehensive reorganization to comply with regulations.

After the local Weapons and Equipment Research and Production Secrecy Certification Commission receives the application, it will conduct a desk review and respond within five days on whether the application is accepted. Once an application passes this initial review, a team will be assembled for site inspection within 30 days. If the institution does not pass site inspection, then it can only reapply after six months. Once site

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30 State Secrecy Administration Policy and Regulations Department (PRC), "Wuqi zhuangbei keyan shengchan danwei baomi zige shenqing tiaojian" [Weapons and Equipment Research and Production Unit Secrecy Qualification Certification Application Conditions], June 2, 2017 ~ http://www.gjbmj.gov.cn/n1/2017/0602/c409113-29314727.html.

31 Ministry of Industry and Information Technology (PRC), "Wuqi zhuangbei keyan shengchan danwei baomi zige" [Weapons and Equipment Research and Production Unit Secrecy Qualification], 2016 ~ http://jmjh.miit.gov.cn/ueditor/jsp/upload/20160510/58681462860300211.doc.

inspection is successfully completed, the institution will receive a secrecy certificate. To ensure that institutions are maintaining secrecy standards, further site inspections will be conducted while the institution holds a secrecy qualification certification.

Besides state institutions, the secrecy system's ability to function also depends on the efforts of individual work units. The following section examines the issue of how these units conduct everyday secrecy work through a case study of scientific research universities.

SECRECY WORK AT SCIENTIFIC RESEARCH UNIVERSITIES

Scientific research is the driving force of China's defense industry. Without strong scientific research capacity, it would be difficult for the defense sector to innovate and manufacture competitive products. Universities now play an increasingly important role as scientific research hubs. As MCF takes off, universities beyond the seven defense industry–linked scientific research universities, known as the "seven sons of national defense" (*jungong qizi*), are seeking greater engagement. While the state welcomes university participation in MCF, there have been concerns about whether these institutions have the infrastructure in place to protect state secrets. One article published in *Secrecy Work*, the official journal of the OCSC/NASSP, argues that universities face three major problems when it comes to protecting secrets. First of all, there is the problem of incomplete institutions. Even after obtaining a secrecy certification, some universities have not properly set up effective secrecy institutions and long-term policies. Also, the focus of secrecy work is often on specific issues rather than overall governance. Second, university personnel generally lack secrecy awareness. Given the liberal environment prevalent at most universities, employees are more open to sharing information. Moreover, university employees change jobs easily and some will leave China to study or work in foreign countries. Finally, due to the lack of experience in secrecy work, universities generally do not have the basic requirements and technical means to conduct such research. For example, most universities in China do not have secured communication systems that meet government standards.[32] To live up to state secrecy standards, universities have sought to reorganize themselves and improve personnel management.

[32] Xi Caiyun, "Zuohao junmin ronghe beijing xia de gaoxiao baomi gongzuo" [Conduct Satisfactory Secrecy Work in Colleges and Universities under the Context of Military-Civil Fusion], *Baomi Gongzuo* 12 (2017): 43.

Basic Secrecy Organizations

Universities seeking MCF participation need to reorganize themselves according to OCSC/NASSP requirements and submit to repeated secrecy inspections. A secrecy commission subordinate to the university party committee must be established to coordinate overall secrecy work in the whole of the university. An administration office, under the secrecy commission's command, is in charge of implementing decisions. The university secrecy commission has nine areas of responsibility:

1. Implement the Party Central Committee's guidelines and policies on secrecy work.
2. Organize the implementation of the university party committee's decision on secrecy work and make recommendations to resolve major secrecy work issues.
3. Organize reviews of the university's secrecy rules and regulations.
4. Research and arrange university secrecy work.
5. Review and approve important matters of university secrecy work.
6. Organize the review of university secrecy work development.
7. Organize investigation of leaks.
8. Recognize and reward advanced units and individuals in conducting secrecy work, investigate violations of rules and disciplines, and strengthen accountability mechanisms.
9. Implement other tasks assigned by higher authorities and university leaders.[33]

The university party secretary or president will chair the secrecy commission as director, and the deputy university party secretary or vice president will be the permanent deputy secrecy commission director. The university vice presidents in charge of scientific research, human resources, or information will serve as the deputy secrecy commission directors.[34] Compared to the permanent deputy secrecy commission director, who manages secrecy work of the whole university based on instructions from the director, the deputy secrecy commission directors oversee secrecy matters in their own jurisdiction of scientific research, human resources, and information. Members of the secrecy commission consist of the director of the university party office, the director of the secrecy office, the technology division director,

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[33] Cui Shuni, ed., *Gaodeng xuexiao keyan baomi guanli tixi jianshe* [Construction of Scientific Research Secrecy Administration System in Colleges and Universities] (Beijing: Tsinghua University Press, 2019), 17–18.

[34] Chinese universities usually have several vice presidents.

the national defense school dean, the human resource division director, the information office director, the security department chief, and leaders of all classified schools and departments.[35] Secrecy commission meetings are held every semester to determine work targets in all areas of secrecy work, from policymaking to reorganizing institutions. The commission's chain of command penetrates from the university level to schools, departments, and specific project groups.[36] Every one of these work units must assign someone to be in charge of secrecy work, and all such personnel are bound by contracts.

Secrecy work in universities is divided into areas such as policymaking, classification of secrets, classified personnel management, classified carrier and items management, scientific research facilities secrecy management, information systems, equipment and data storage device secrecy management, scientific research activities and results management, secrecy-related rewards and punishments, and secrecy support systems management. At the core of university secrecy work is the management of classified personnel, because without the proper management of people nothing else will work correctly.

Management of Classified Personnel

The management of people is at the heart of secrecy work. Secrecy propaganda and education are the most basic elements of personnel management and are deemed long-term tasks. Targets are those who will soon receive a security clearance and enter into a classified position, classified personnel, those serving out their declassification period, classified personnel preparing to go abroad, and specific classified personnel to be trained on a superior's demand. The university's secrecy administration office, under the secrecy commission's command, will formulate the training plans. Schools and departments will further tailor the plan for their personnel. A training work plan will last for both spring and autumn semesters and cover a range of topics targeting specific audiences. There are six general areas of focus:

1. Secrecy work policy education.
2. Propaganda and education of laws, regulations, and university secrecy management rules.
3. The overall situation of secrecy work.

35 Cui, *Gaodeng xuexiao keyan baomi guanli tixi jianshe*, 18–19.

36 Ibid., 19, 24–25.

4. Education in proper secrecy work conduct and demonstration of typical cases of leaks.
5. Education in secrecy knowledge, skills, and secrecy technology.
6. Other secrecy propaganda and education content required by higher authorities.

Training sessions utilize mixed methods to maximize results. Seminars, competitions, roundtables, exhibitions, social media campaigns, and online studies are all part of the curriculum.[37] Classified scientific research personnel are grouped into a number of categories: classified project managers, classified graduate students, public participants in classified projects, national defense experts, external contractors, and service staff at classified facilities. The management of classified scientific research personnel involves administering personal information, registering changes regarding classified personnel with the Ministry of Public Security's Bureau of Exit and Entry Administration, managing travel documentation for classified personnel seeking to leave China on personal trips, organizing secrecy training and education, distributing classified personnel benefits, and organizing annual examinations.

The process of management focuses on several areas. First, positions in an organization must be classified to determine the importance of each position in the secrecy hierarchy. This helps in assigning the personnel with the appropriate security clearance to the right job. Classified positions can be divided into three types—core (*hexin*), important (*zhongyao*), and ordinary (*yiban*)—which correspond to the security clearance levels of top-secret, highly secret, and secret.

Second, another critical component of classified personnel management is vetting those people seeking to take on a classified position in eight categories:

1. People's Republic of China citizenship, no permanent or long-term foreign residency permits, or marriage with foreigners (including Hong Kong, Macao, and Taiwan).
2. Strong sense of patriotism and support of the CCP.
3. No criminal record.
4. Good personal conduct without bad habits.
5. Loyal, reliable, and has clear relations with family and friends residing in foreign countries.
6. Strong sense of duty and professional dedication.

[37] Cui, *Gaodeng xuexiao keyan baomi guanli tixi jianshe*, 94.

7. Capabilities that meet the position's requirements.
8. No tendencies that could harm national security.[38]

In addition, a candidate will be barred from a classified position if one of the following seven flaws is identified:

1. A criminal record or previous confinement in a correctional facility.
2. Record of intentionally leaking state secrets or having been warned or punished for unintentionally leaking state secrets.
3. Failed annual secrecy examination.
4. Relatives or spouse working for foreign entities.
5. Intentions to emigrate or live long-term overseas.
6. A temporary hire.
7. Deemed inappropriate by another secrecy administration office.[39]

Third, tight controls are imposed regarding classified travel, distribution of financial benefits, annual examinations that include a background check on classified personnel, and background re-examinations that occur depending on the classified personnel's position. Individuals serving at the core position must be re-examined every year; those at important positions, every three years; and those at ordinary positions, every five years.[40]

Finally, management of the declassification period is equally important. Personnel leaving classified positions must serve out a declassification period that again depends on a position's classification. This institution is in place to ensure that no leaks occur subsequent to the termination of one's contract with a classified job. During this time, strict controls are imposed on trips abroad and the ability to engage with foreign entities. For personnel exiting from a core level position, the declassification period is not less than three years; important level position, not less than two years; and ordinary position, not less than one year. For individuals who worked on ballistic missiles, nuclear weapons, military nuclear energy, or nuclear submarines, the declassification period is at least five years.[41]

38 Cui, *Gaodeng xuexiao keyan baomi guanli tixi jianshe*, 99.

39 Ibid.

40 Ibid., 105–6.

41 Ibid., 107.

CONCLUSION

MCF has been gradually expanding in recent years. The 13th Five-Year Plan's goal to set up a basic institutional framework for MCF by 2020 is within reach. Growing numbers of nonstate enterprises are joining the initiative. By 2016, only three years after MCF's initiation, some two-thirds of companies that had obtained the Weapons and Equipment Research and Production Unit Secrecy Qualification Certification were nonstate entities.[42] Decent results have been achieved in the economic conversion realm as well. By 2017, over two thousand defense technology patents had been transferred to the civilian sector.[43] Utilizing MCF as a springboard, nonstate institutions have participated in projects of national importance, such as the BeiDou satellite navigation system, aircraft carrier construction, and space missions. Nonetheless, even as the fusion of the state and nonstate sectors has taken off in recent years, the degree of fusion remains low. Out of an estimated 500,000 Chinese companies that could contribute to the defense industry, less than 1% are MCF participants.[44]

MCF cannot be properly assessed without understanding the secrecy system's crucial role as a gatekeeper. The upside of the secrecy system is that it eliminates unreliable MCF partners. But the system also has its downsides in keeping potential participants at bay. Some potential participants, in particular small and medium-sized enterprises, find joining MCF undesirable due to rigid secrecy regulations that could lead to commercial loss. In addition, the PLA distrusts private companies because it believes they are "incapable of maintaining confidentiality."[45] In consequence, PLA and state-owned defense enterprises have abused the secrecy system—for instance, by demanding secrecy qualification from nonstate bidders for unclassified defense products.[46] Moreover, the qualification system itself remains complicated. One secrecy certification cannot cover all situations. For example, those companies with a Weapons and Equipment Research and Production Unit Secrecy Qualification Certification cannot conduct work in information systems integration, which requires a separate certification.

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42 Sun and Wang, *Xinshidai junmin ronghe fazhan zhanlue yanji*u, 162.

43 Ibid., 163.

44 Ibid., 185.

45 Alex Stone and Peter Wood, *China's Military-Civil Fusion Strategy: A View from Chinese Strategists* (Montgomery: China Aerospace Studies Institute, 2020), 66.

46 Peng Hao, "Guanche junmin ronghe fazhan zhanlv baomi zizhi (ge) zenme fahui zuoyong" [Implement Military-Civil Fusion Development Strategy, How to Maximize the Role of Secrecy Qualification], *Baomi Gongzuo* 7 (2018): 15.

Institutions often find it difficult to comply with the strict secrecy system, especially nonstate entities with little experience in secrecy work and a fluid body of employees, which is the norm in the private sector.[47]

Chinese secrecy specialists have proposed reforms to make the system more efficient, but so far the results are unclear because very little information exists in the public domain. In the future, the secrecy system will exert strong influence over the trajectory of MCF, particularly in shaping the types of participating nonstate institutions. Judging by current trends, entities with tenuous foreign links but the desire and means to restructure and abide by secrecy regulations will account for most future MCF participants. Conversely, institutions with opposing characteristics will be excluded. State secrecy is highly valued in China and will generally take precedence over openness, even if it means sacrificing defense industry gains. ◈

[47] Peng, "Guanche junmin ronghe fazhan zhanlv baomi zizhi (ge) zenme fahui zuoyong," 16.