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China's Long March to Technological Supremacy  
The Roots of Xi Jinping's Ambition to "Catch Up and Surpass"  
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Until recently, American perceptions of Chinese technology tended to be either hopeful or dismissive. On the hopeful side, the information revolution was taken as a sure drive of [greater freedom](#) [1]. "Imagine if the Internet took hold in China," George W. Bush said in a presidential debate in 1999. "Imagine how freedom would spread." Some observers noted considerable theft and imitation of U.S. technology firms, but Chinese technology was generally thought to represent little or no competitive threat, with analysts explaining—as a 2014 *Harvard Business Review* headline put it—"why China can't innovate."

But China has quickly moved [up the value chain](#) [2], creating world-class industries in everything from 5G and artificial intelligence to biotechnology and quantum computing. Some experts now believe that China could unseat the United States as the world's leading technological force. And many U.S. policymakers view that prospect as an [existential threat](#) [3] to U.S. economic and military power. "Very dangerous," President Donald Trump said recently when talking about the Chinese telecommunications company Huawei; National Security Adviser John Bolton has warned of a "Manchurian chip."

Yet if China's rapid technological advance came as a shock to most observers in the United States, for Chinese leaders it reflects a drive that dates to the origins of the People's Republic. President Xi Jinping has described a formidable objective for Chinese tech: "catch up and surpass." But that ambition, abbreviated as *ganchao* in Chinese, has long been one of the Chinese Communist Party's defining goals; it remains the essential framework for understanding China's ambition to become a technological superpower today, bringing together the legacies of Marxism, Maoism, and the tortuous pursuit of modernization by the Chinese Communist Party (CCP). In the minds of China's leaders, from Mao Zedong to Xi Jinping, technological progress is not only a means to economic and military prowess but also an ideological end in itself—offering final proof of China's restoration as a great power after decades of struggle.

## “CATCH UP AND SURPASS”

Long before Donald Trump and Xi Jinping began their trade war, the CCP's historical fixation on advanced technology emerged from a combination of nostalgia for China's lost imperial glory and awe for Soviet modernization. Mao, like other Chinese revolutionaries and reformers, blamed the country's having fallen behind partly on its inability to keep up with international technological advancements. And he watched as leaders in Moscow carved their own path to technological progress.

Initially, Mao's China received extensive technological and technical [assistance](#) [4] from the Soviet "elder brother." In 1957, Soviet Premier Nikita Khrushchev declared that his goal was to "catch up and surpass the United States." Mao took the idea and made it his own, putting the Chinese variant of Khrushchev's goal—*ganchao*—at the heart of CCP ambitions. He envisioned the socialist world's "overwhelming superiority" in science and technology and came to see technological strength as central to economic, ideological, and geopolitical power—the view of catch up and surpass that CCP leaders continue to hold today.

The Chinese adaptation of catch up and surpass quickly turned fevered and utopian. Mao, [impatient](#) [5] to develop faster than the overbearing Soviet Union, announced in early 1958 that China would take a Great Leap Forward, in which "politics and technology must be unified." The Great Leap Forward—a massive campaign to rapidly industrialize and collectivize the country—ended in a catastrophic famine that killed tens of millions of people. Yet even then, the CCP did not abandon *ganchao*. Continued concerns about China's military

backwardness, as [Evan Feigenbaum](#) <sup>[6]</sup> has written, motivated repeated pushes for technological advancement. In 1975, Premier Zhou Enlai introduced the concept of the Four Modernizations: modernizing “agriculture, industry, national defense, and S & T . . . to the front ranks of the world” by the year 2000. And when Zhou and Mao died in 1976, their successors, Hua Guofeng and Deng Xiaoping, attempted “a [new leap forward](#) <sup>[7]</sup>,” aiming to help China “catch up” by importing more than \$15 billion worth of advanced technology from abroad.

When this new leap also foundered, due to soaring debts and sloppy decision-making, Deng took a new approach to *ganchao*, this time relying on market reform, industrial policy, and economic opening. The CCP rehabilitated those who had been purged during the Cultural Revolution, increased investment in S & T research and training, [sent delegations abroad](#) <sup>[8]</sup> to bring new ideas and technologies back to China, and encouraged foreign firms to set up shop in China and share sophisticated equipment and know-how. The rise of information technologies became a particular fixation of the Chinese leadership in the 1980s. In 1983, Premier Zhao Ziyang gave a speech on the “[global New Technological Revolution](#) <sup>[9]</sup>,” invoking the need to “catch up and surpass” and citing the writings of American futurist Alvin Toffler, whose *The Third Wave* predicted the rise of a new Information Age. Zhao and Deng sought “‘leap-frog’ development in key high-tech fields” such as information technology, automation, and bioengineering.

In the marketizing economy, newly emergent private companies also served the national goal to “catch up and surpass.” [Liu Chuanzhi](#) <sup>[10]</sup>, an engineer at the state-run Chinese Academy of Sciences, started a side business that grew into Lenovo, one of the world’s largest makers of personal computers. Ren Zhengfei, formerly an official in the People Liberation Army’s engineering corps, began importing and [reverse-engineering](#) <sup>[11]</sup> foreign [network hardware and electronics](#) <sup>[12]</sup>, establishing [Huawei](#) <sup>[13]</sup> in 1987.

In the 1990s and 2000s, the pursuit of advanced technology involved several strategies of varying degrees of legality and publicity. Fostering the private sector remained a crucial part of the CCP’s strategy; Huawei especially won [high-profile endorsements](#) <sup>[13]</sup> from senior Chinese leaders and tens of billions in loans from state banks, becoming a national champion as it expanded overseas and partnered with foreign companies. Information technology firms boomed, but the CCP assiduously managed the perceived political and cultural risks that accompanied the rise of the Internet. While building up the Great Firewall, China’s rulers also took advantage of the more open networks in developed countries: aggressively recruiting overseas Chinese experts to return to the PRC, obtaining foreign intellectual property by mandating the transfer of technical know-how in joint ventures, and engaging in industrial espionage targeted at high-value technologies.

## SILICON MARXISM

In 2013, shortly after being appointed CCP general secretary, Xi laid out his vision for China’s future in a series of remarks centered around the goal of national rejuvenation—regaining wealth, power, and glory for China. Alongside the problems of corruption, pollution, debt, and military competition, he [worried openly](#) <sup>[14]</sup> about the lagging state of Chinese technology. Advanced technology had been key to the West’s “sway over the world in modern times”; Beijing would need an “asymmetrical strategy” to “catch up and surpass,” he said, explicitly invoking this decades-old CCP ambition.

That long-standing view, reflecting a single-minded focus on *ganchao*, explains the intensity and persistence of Chinese theft of trade secrets, involving both conventional spycraft and cybercrime—what former National Security Agency Director Keith Alexander called “[the greatest transfer of wealth](#) <sup>[15]</sup> in history.” It has been reinforced by a belief that China’s thefts were part of rectifying imperialist misdeeds by the Western countries as well as the linkage of technological advances to the ideology and identity of the CCP. It also reflects a paradox in the CCP’s relationship to technology: pursuing an ultimate state of self-reliance has relied above all on foreign technology and expertise.

By the time Trump came into office, China’s rulers could see that their focus on *ganchao* was bearing fruit. Barring a major crisis, China will become the world’s largest economy by gross domestic product well before the hundredth anniversary of the People’s Republic’s founding, in 2049. Its rulers, accordingly, are already shifting from “catching up” to “surpassing.”

Xi argues that indigenous technological innovation is necessary to surpass the West, even if copying has been mostly sufficient to catch up. He [calls innovation](#) <sup>[16]</sup> “the primary driving force of development,” giving a Silicon Valley-friendly gloss to the [Marxist idea](#) <sup>[17]</sup> of historical “driving forces.” Working closely with private companies and universities, the CCP has [positioned](#) fields such as [chipmaking](#) <sup>[18]</sup>, bioengineering, telecommunications, and artificial intelligence (AI) as test cases of whether China can “surpass” the United States. A state-supported flood of discounted capital, world-class researchers, “[civil-military fusion](#) <sup>[19]</sup>,” and less constraining norms give

Chinese labs an edge. In the race to develop next-generation wireless service, 5G, Huawei is leading the pack, with one of the biggest R&D budgets <sup>[12]</sup> of any tech company and revenues roughly equal to <sup>[20]</sup> telecom competitors Nokia and Ericsson combined. And when it comes to the data powering AI, according to a report from the think tank MacroPolo <sup>[21]</sup>, China may benefit from having fewer constraints on experimenting with new systems. (The Uighurs have experienced what this is leading to in the chilling techno-authoritarian model implemented in Xinjiang.) Because the CCP already engages in large-scale surveillance and limits personal freedoms, innovations in big-data systems for smart cities and social credit point in a startlingly dystopian direction.

To Xi, innovation is good for both maintaining social control and growing national power. His Made in China 2025 <sup>[22]</sup> demonstrates the breadth of Beijing's ambitions. Made in China 2025 aims to bolster Chinese firms and ensure that they control the domestic market in advanced technologies such as robotics, new-energy vehicles, medical devices, quantum computing, and AI. One Chinese official told The Wall Street Journal <sup>[23]</sup> that the plan has undergone cosmetic changes "because the Americans don't like it." But it endures in substance <sup>[24]</sup>, and other senior officials insist that the CCP "will never give an inch" on this scheme's broader goals.

Top-down, CCP-led technological innovation brings its share of challenges. Many observers correctly cite the risks of misguided government-steered investment <sup>[25]</sup>, which has led to waste and massive oversupply, or the challenges of supporting small entrepreneurs and researchers without heavy-handed interference. But the record of the past several decades shows that CCP leaders will, in their pursuit of technological advancement, display persistence and ingenuity in responding to those obstacles. China's leadership has certainly been prone to exaggerating its achievements throughout a long history marked by leaps, rushes, and "asymmetric steps"—but they also have a record of doing whatever it takes to make the hype real.

## A RACE AGAINST TIME

The goal of surpassing other countries technologically does not mean that China's rulers seek global military supremacy. But even in best-case scenarios, China's transition from catching up to surpassing will be destabilizing, as other countries confront Chinese ambitions for greater prosperity and security and feel their relative power decrease. And for China, building 5G networks for other countries and making AI breakthroughs clearly advance CCP aims far beyond narrowly construed self-reliance <sup>[26]</sup>. Even if firms such as Huawei and ZTE are not incontrovertibly compromised <sup>[27]</sup> by the state, their work clearly serves CCP interests.

Technology will remain at the heart of U.S.-Chinese tensions <sup>[28]</sup> well beyond the end of the current trade war. Technology, to the CCP, is power in practice—it is historical change in material form. The roots of "catch up and surpass" demonstrates that the CCP's approach to technology is far more deeply entrenched than many analysts realize. If China's rulers feel their technological rise is under threat, they are likely to react more forcefully and uncompromisingly than policymakers may expect—as the Chinese response to Washington's effort to block Huawei's global 5G dominance has demonstrated.

An all-out rivalry between the world's two technology leaders would be immensely costly, disruptive, and destructive. Instead, policymakers should focus on establishing and enforcing new rules for the race already underway, so that competition can occur fairly and be at least somewhat bounded. Within the United States, that will require scrutinizing Chinese investments and acquisitions of U.S. firms, well beyond the traditional purview of the Committee on Foreign Investment in the United States, as well as the footprint of both Chinese firms in the United States (such as Baidu's AI lab in Silicon Valley <sup>[29]</sup>) and U.S. firms in China (such as Google's AI lab in Beijing <sup>[30]</sup>). In addition, Washington should seek to begin negotiations with China as soon as possible to explore common rules for emerging technologies. Such agreements were possible with the Soviet Union during the Cold War. Today, they can be effective again if they are based on deep understanding of the technologies under discussion and the importance of tech to both countries' conceptions of national power. For the U.S. government, that may require creating or improve policymaking institutions, such as upgrading the Office of Science and Technology Policy (which currently runs the National Science and Technology Council) into a new National Emerging Technology Council. The National Emerging Technology Council would serve as a consistent, high-level body, overlapping the National Security Council and the National Economic Council, to coordinate more effectively across the whole of government and bring empowered expertise to bear on both domestic policymaking and international negotiations.

The U.S. government's response should not be premised on the notion, evidently in vogue in both Washington and Beijing, that all scientific and technological activity is a zero-sum competition between states. The history of *ganchao* suggests that so-called technological decoupling between China and the United States will continue in areas where it is most difficult to distinguish between commercial and military applications. But unwinding interdependence carries significant costs, and so U.S. policymakers should attempt to draw distinctions between sectors in China that feature strong private-sector leadership and those dominated by the state—not all “Chinese” technology is the same. Research institutions and private companies will also need much more help evaluating potential research cooperation with Chinese counterparts, to guard against problematic partnerships while preserving the great value of international exchange to the progress of scientific research.

Above all, Washington must not view countering China's technological advancement as a substitute for investing in a major effort at home [31]. The Trump administration's repeated attempts to cut budgets [32] for the National Science Foundation and other government S & T funding are profoundly self-defeating at a time of intensified U.S.-Chinese tech competition. China's technological advancement will challenge not only U.S. power but also the United States' sense of itself as a global leader and innovator. This demands significant U.S. domestic investment [31] in S & T—in government research labs and private research institutions for certain, and perhaps in private companies directly. It will also require mobilizing the American people behind making significant improvements to the education, infrastructure, and immigration systems, which are sources of the country's enduring strength. If there is one thing that U.S. policymakers can learn from the history of *ganchao*, it is that the world still wants what the United States has.

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