Strategic Outlook 10

China as a Global Power

Christopher Weidacher Hsiung, Cecilia During, Oscar Almén, Ivar Ekman, Peter Stenumgaard and Annica Waleij (eds.)

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Foreword

This year's edition of FOI's Strategic Outlook is not only the 10th in the series but also commemorates its 15-year anniversary. The ambition is to leverage expertise from across the agency and focus on topics or areas of interest that currently or will potentially have a significant impact on Swedish security. To widen the scope, we have also invited other research entities to contribute with their expertise and viewpoints. This year is no exception, and I am happy to welcome contributions from RAND Corporation in the United States, the Norwegian Defence Research Establishment (FFI), and the Swedish National China Centre (NKK).

There are a number of reasons why we turn our attention to the People's Republic of China (PRC) in this edition. Once a poor agricultural collectivisation economy, the country has not only redefined itself to become the second-strongest economy in the world, but it is also employing every sort of political, industrial, military, and financial tool in its efforts to reshape the current international order. In that process, it also uses hybrid tactics, hard-line rhetoric, and disinformation. In the NATO 2022 Strategic Concept, the Alliance identifies a series of systemic challenges posed by the PRC. The same sentiment is echoed in the Joint Declaration on EU-NATO Cooperation, from January 2023.

Of course, the future remains uncertain, including China's evolving role in its relations with the international community. Whatever happens, I hope that this latest edition of Strategic Outlook will cast new light on what we can expect and help us prepare.

Stockholm 2024

Jens Mattsson
Director-General

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Introduction

The current Strategic Outlook aims to provide an overview of China's emergence as a global power and its implications for Sweden and the rest of the world. China is an authoritarian one-party state with a value system that is different from the West, and its rise has been one of the most consequential international developments of the last forty years. Spurred by decades of sustained, high economic growth, the country has transformed itself into a potential global superpower. China's growing power and influence are most keenly felt in the Indo-Pacific region, yet its impact extends worldwide, particularly economically, reaching all corners of the Earth. Furthermore, China's military is now second only to that of the United States, while making great strides in a number of leading areas of science and technology.

To be sure, one can ask whether China can maintain its impressive economic trajectory, a crucial precondition for becoming even more powerful internationally. There are indications that its current economic growth model is unsustainable and that the country is dealing with difficult internal challenges, such as environmental problems and a rapidly aging population. The increased centralisation of political power in the hands of China's leader, Xi Jinping, and the ongoing tendency to allow national security interests appear to take precedence over economic reform and openness to global markets is having a negative impact on China's business environment. As a result, foreign corporations and investors are taking note and exercising more caution.

That said, even if China's economy slows down, the country has already amassed such a high level of national capabilities across economic, political, military, and scientific domains that it will heavily shape regional and global politics and security for the foreseeable future. Xi Jinping and, more broadly, the Chinese Communist Party (CCP) elite remain strongly ambitious about China's future and its place in the world. For years, Xi has talked about realising "the China dream" and "the great rejuvenation of the Chinese nation" and how the world is witnessing "changes unseen in a century," implying that the West is in decline and the East (meaning China) is rising. Simply put, if deeds can meet ambition, China's ascent to world power has the potential to fundamentally reshape the current post-Cold War, US-led liberal international order, with effects felt across the entire globe.

The contributions in this anthology reflect FOI's past or ongoing research and focus areas with regard to China. They exemplify FOI's unique scientific and analytical competence in social science and the humanities, law, natural sciences, engineering, and technology. The articles focus on China's regional and international behaviour or its impacts on different functional domains. Although many of the articles directly or indirectly relate to domestic conditions and factors,

specific issues of domestic content are discussed to a lesser extent. Many, but not all, of the contributions more directly discuss the relevance or implications for Sweden (and Europe). Not all aspects or issues of China's development as an emerging global power could be covered, and it was necessary to select perspectives that could be included. The editors, however, have strived to capture the widest possible range of issues.

This publication consists of twenty contributions spanning a variety of topics and perspectives on how to conceptualise the rise of China, understand its foreign relations, and explore political, legal, and economic issues. It also covers military affairs, as well as a wide range of topics related to science and technology. The articles are organised into four broad thematic areas (some articles have a certain thematic overlap): geopolitics and foreign relations (Part One), economy and politics (Part Two), military issues (Part Three), and science and technology (Part Four). We are pleased to have received three external contributions, which provide their perspectives and viewpoints: from RAND Corporation, the Norwegian Defence Research Establishment (FFI), and the Swedish National China Centre (NKK). Every article ends with a short recommendation for further reading.

As the totality of the articles in the entire publication hopefully reveals, China's power and outreach are truly global and will undoubtedly have profound implications for international affairs and security in the foreseeable future. We note that in most of the articles, three overarching features have emerged, either directly or indirectly: (1) the presence of heightened geopolitical tensions between China and the United States; (2) a China increasingly under the strongman rule of Xi Jinping, who is fixated on maintaining the CCP's political and social control at home and expanding its global ambitions abroad; and (3) impressive advances in numerous contemporary and future strategic domains and key technologies, marked by growing integration between civilian and military research and development.

More broadly, while the articles convey a collective impression that the ramifications of China's continued rise will be massive, correctly predicting the way that the actual course of events and developments will unfold remains difficult. Considering these issues is extremely important, however, not only from the perspective of research and analysis, but also from a policy standpoint. How to analyse China and what conclusions can be drawn have direct policy implications for how to respond to China's growing power and international influence.

An essential point of departure is to fully appreciate that China's increased power and influence have the potential to reshape much of the contemporary international system and global governance; we must remain clear-eyed that this may result in additional global geopolitical tension and friction. In Europe, China's growing clout is mostly felt in the economic domain, manifested by the debate and concern over Chinese investments in sensitive European strategic sectors and supply-chain vulnerability. China's "tacit support" for Russia in its war against

Ukraine has shown that the Chinese leadership is willing to jeopardise important trade, investment, and technology links with Europe for the sake of maintaining and even further reinforcing its strategic partnership with Russia.

That said, it is at the same time crucial to tailor the appraisal of the China challenge appropriately. In essence, this means arriving at nuanced assessments of the ways and issue areas in which China constitutes a challenge or threat, as well as identifying areas where it is less or not at all imposing. Not only describing but also analysing the underlying drivers and motivations of China's behaviour is thus important. This also means that one should not, by default, dismiss efforts to identify areas and issues where there is potential for continued engagement, despite the increasingly politicised and tense climate between China and the West. This is not an easy task. It needs to be seriously considered, lest relations between China and the West, notably the United States, become so fraught with mutual suspicions, hostility, and tensions that the prospect of a great-power war may once again become a real possibility in the coming years, with tremendous human, economic, and political costs.

The Editors

Part One

Geopolitics and Foreign Relations

1. Theorising the China Challenge

Björn Ottosson

A decade ago, China's rise was predominantly depicted in a positive light and celebrated as a globalisation success story. However, the world has changed dramatically since then, and it is increasingly evident that strategic competition is emerging as the defining characteristic of international politics, with cooperation yielding to rivalry. To grasp the monumental implications of China's ascent and understand where we are headed, it is paramount to begin with a structural perspective. This perspective reveals that we are entering more perilous times than many perceive, marked by heightened international tensions and increased risks of misperceptions, miscalculations, and ultimately, wars.

The shift from cooperation to competition aligns with dramatic changes in the distribution of power in the international system. Following the Cold War, the US emerged as the sole superpower, resulting in a unipolar system. However, in recent decades, US power has waned relative to China's remarkable ascent. The question of whether we will end up in a multi- or bipolar world involving the US and China remains open. However, it is evident that a diffusion of power is reshaping the dynamics of the international system, and the potential transition towards bipolarity will likely occur through a phase of multipolarity.

This article advances a structural realist argument from the field of international relations theory, asserting that the escalation of strategic competition and shifts in global power distribution are interconnected rather than coincidental. It aims to clarify the term, *strategic competition*, delineate theoretical nuances to contextualise the challenge posed by China's rise, and pinpoint some potential pitfalls.

A STRUCTURAL UNDERSTANDING OF STRATEGIC COMPETITION

There is no universally accepted definition of strategic competition; it is often used interchangeably with great-power competition. However, it typically denotes states' desire to outcompete rivals, implying a pursuit of advantages beyond merely balancing power.

Some attribute the shift towards strategic competition to domestic factors such as the political system, state identity, or the perspectives of leaders within the competing states. However, from a structuralist perspective, understanding strategic competition cannot rely solely on internal state dynamics. A state's behaviour is shaped by its relative position within the international system, which

both constrains and enables its actions. By analysing the system's influence on constituent states, we can infer how they compete and adapt in their quest for survival and prosperity.

From a structural realist point of view, the anarchic nature of the international order elevates security as a primary concern for states. Anarchy implies that there is no higher authority capable of guaranteeing security for all states. Consequently, states operate within a self-help system, where failure to take proactive measures can leave them vulnerable. This environment fosters a constant preoccupation with survival, influencing state behaviour. States are compelled to maintain a balance of power through internal balancing, such as by bolstering military strength and production capacity, and external balancing, such as by forging alliances. As all states strive for security, it often becomes a scarce commodity, which in turn makes competition a feature of international politics. The necessity to balance power compels states to prioritise relative gains from cooperation over absolute gains, as it directly impacts their long-term security. As a result, they forego many opportunities for cooperation.

There are two variants of structural realism, defensive and offensive, which derive differing answers from the anarchical order, regarding why and how states engage in strategic competition. From a defensive realist perspective, anarchy compels states to value security over power, viewing power as a means to that end. Assuming that balancing is inherent in international politics, the pursuit of excessive power prompts other states to seek counterbalancing measures. Refraining from such pursuits thus increases security.

However, even with strictly defensive postures, security competition persists due to the security dilemma, a fundamental concept for defensive realists. Ensuring one's security involves inherent uncertainty, often prompting states to assume the worst about the intentions of others, as misinterpretations could eventually lead to an underbalanced situation and potentially disastrous consequences. Hence, when a state then tries to increase its security through military buildup, it is often perceived as threatening, which triggers reciprocal responses. This dynamic fuels arms races, fosters mistrust, and ultimately diminishes security for all involved parties.

The security dilemma elucidates how defensively motivated states can be driven into conflict by security competition. It is important to note that security competition is distinct from strategic competition; rather, the former serves as a motivator for strategic competition. The current strategic competition often stems from and is fuelled by security competition. For instance, escalating insecurity and mistrust define the wider strategic competition in the Indo-Pacific between a rising China and a declining US and its regional allies.

In contrast to defensive realism, offensive realism posits that anarchy and uncertainty drive states to maximise power. From this viewpoint, relying solely on a balance of power is considered insufficient. States can never be certain of the intentions of

other states, as today's friend can be tomorrow's enemy. They can also never be certain they have amassed enough power for security. Therefore, they view the relentless pursuit of power as indispensable for survival. Consequently, states prioritise the maximisation of power, viewing hegemony as the most advantageous position.

States also seek to maximise influence, as failing to seize every opportunity allows other states to do so instead. They also compete for status and prestige, as these factors affect their relative influence. From this perspective, competition for power extends across almost all aspects and occurs in every domain, ranging from technology, market shares, and international rules and norms to sports. According to offensive realists, strategic competition is thus an inevitable consequence of the continual pursuit of relative power advantages.

Beyond the exclusive realm of theories, it becomes apparent in the real world that strategic competition arises from *both* security *and* power competition. Recognising this is crucial, as understanding the origins of competition is essential for effectively managing its impacts and devising the appropriate policy responses.

POLARITY AND THE INTENSITY OF COMPETITION

Given that anarchy is a persistent feature, polarity is the most important variable for structural realists, which refers to the distribution of power across the international system. Shifts in polarity influence how states ensure their security by creating incentives and disincentives for certain behaviours. Variations in polarity lead to diverse balancing strategies, ultimately yielding distinct long-term outcomes. The current resurgence of strategic competition is, to a great extent, the result of the diffusion of power in the system and the end of unipolarity.

In a unipolar system, a leading state possesses the predominant power. By imposing and enforcing rules, the unipole establishes a degree of hierarchy among states, thereby making the system less anarchical. From a defensive realist perspective, this mitigates the effects of anarchy, moderates the security dilemma, and reduces the intensity of security competition. This, in turn, incentivises states to pursue more cooperation.

For offensive realists, unipolarity discourages power competition by deterring and disincentivising revisionist attempts to alter the power balance. The power disparity between the unipole and other states renders any direct challenge impractical, thus minimising rivalry for hegemony. However, states may attempt to counteract unilateral actions by the hegemon through non-military means, a strategy known as soft balancing. Additionally, unipolarity curtails competition for status and prestige, as other states recognise that the unipole might view their efforts to elevate their status as a challenge. Furthermore, the unipole moderates power competition by supplying global public goods, such as financial stability and freedom of the seas. This aspect of unipolarity sparked the development of the concept of benign hegemony.

In a bipolar system, such as the Cold War, the two dominant states are forced to rely on internal balancing, as neither can delegate their security responsibilities to others, leading to effective mutual balancing and strategic stability. This system often prompts the two poles to minimise economic interdependence. In multipolar systems, states rely on both internal and external balancing. However, they may be incentivised to pass the buck and shift responsibility onto others, resulting in underbalancing and potential conflict.

The post-Cold War unipolar system reflected US power predominance, with the US aiming to maintain stability by discouraging regional power competition. During this period, China adhered to its strategy of "hide your strength, bide your time," showing deference to US leadership while prioritising economic development over military expansion and integrating into the global system, refraining from revisionism or overt status seeking. This approach was designed to minimise strategic competition and preempt any US counterbalancing efforts. Concurrently, the era witnessed a surge in international cooperation, fostering concepts of global governance that were antithetical to the notion of strategic competition.

SYSTEM CHANGE AND STATE RESPONSES

US relative decline, the rise of China, and the diffusion of power herald a resurgence of anarchy, heightening insecurity and exacerbating the security dilemma. This power transition has intensified security competition among almost all major powers, particularly in US-China relations, and the self-help measures they are adopting, both internally and through alliances, are further amplifying mutual perceptions of insecurity. Hence, there are many signs suggesting that we are entering a multipolar phase.

China is rapidly expanding its military capability, including its nuclear arsenal and delivery systems, as well as its ability to project power farther from its mainland. In response to China's rising power, Japan is shifting its long-standing post-WW II posture by engaging in both internal and external balancing. This includes a massive military buildup and concerted efforts to deepen security ties with its allies and partners. Meanwhile, India's tradition of non-alignment is becoming diluted as it emerges as the world's largest arms importer. Acknowledging the power shifts and deteriorating security situation, the US is overhauling its entire nuclear arsenal, including new warheads and delivery systems, and bolstering security cooperation with allies and partners. Initiatives such as the Quadrilateral Security Dialogue (Quad) between Australia, India, Japan, and the US, along with the trilateral security partnership between Australia, the UK, and the US (AUKUS), highlight these efforts.

The diffusion of power is removing constraints on assertive pursuits of power, influence, and status. States are increasingly less disposed to deferring to a US in decline, opting for more aggressive power pursuits. Changing the current power

balance seems increasingly achievable and feasible, with the potential benefits outweighing the costs imposed by the unipole.

Under Xi Jinping's leadership, China has abandoned its strategy of maintaining a low profile and has become more assertive in pursuing power, influence, and status. Japan is also seeking a greater role in global affairs, as evident through its military buildup and leadership in the revival of the Trans-Pacific Partnership (TPP) following the US withdrawal. Similarly, India is asserting itself more prominently on the international stage, positioning itself as a voice for the Global South in direct competition with China. Russia has become increasingly aggressive in its pursuit of power and influence; this is demonstrated by its military buildup, annexation of Crimea, intervention in the Syrian civil war, and its full-scale invasion of Ukraine in 2022. The US has recognised the onset of a new era of great power competition, and strategic guidance is starting to prioritise security over economy, with increased state control across various domains, signalling the end of the globalisation era. Notably, China and the US are actively working to reduce their mutual interdependence.

Times may be more perilous than many perceive, as multipolarity amplifies strategic competition through its tendency to foster underbalancing. Compared to a unipolar or bipolar system, responsibilities and security perimeters are less defined in a multipolar system. This not only creates greater opportunities for power expansion, as revisionist states anticipate underbalancing and adjust their cost-benefit calculations accordingly, but also increases the likelihood of misperceptions, miscalculations, risky decisions, and, ultimately, wars. For instance, it is conceivable that President Vladimir Putin's decision to attempt a full-scale invasion of Ukraine was based on a miscalculation, underestimating the possibility that the US and major European states would unite behind Ukraine. Worse still, multipolarity heightens the potential for offensive alliances targeting status quo states, thereby exacerbating strategic competition.

NAVIGATING TREACHEROUS WATERS

The deteriorating security dilemma intensifies security competition, leading to arms races and deepened mistrust. It also heightens the risk of war, as competition may escalate uncontrollably when states perceive weakness as potentially emboldening aggressive responses. Concurrently, the resurgence of great-power competition undermines global stability, economic growth, and governance by reducing cooperation and emphasising relative gains. The "trade war" and economic decoupling between the US and China have global repercussions, potentially creating rifts between the US and the EU.

Navigating a multipolar future presents greater challenges compared to unipolarity or bipolarity, with its complexity heightening the risk of misperceptions and miscalculations. It demands nuanced approaches, particularly in addressing the strategic competition between the US and China. Leaders must strive to evade

a scenario where a rising power threatens an established hegemon, significantly escalating the risk of conflict, often referred to as the Thucydides Trap. They also need to sidestep the so-called Kindleberger Trap, which occurs when the leading power fails to supply sufficient global public goods, leading to a breakdown of the international order and economic decline.

There are domestic forces within the US that underestimate the extensive benefits the country derives from international stability. The perception that other nations are reluctant to share the burden fuels growing frustration, with Europe and China increasingly viewed as having benefited from the US-led order without contributing their fair share. This has instilled fear among US allies and partners of potential US disengagement from international commitments. As US power declines relatively, the extent to which other nations, including China, will contribute to global public goods remains uncertain. However, from a structural perspective, it is evident that the US will strive to maintain its position of power, avoiding disengagement but risking overstretch in the process. This could create opportunities for others to exploit, potentially leading to global instability.

Successfully navigating the challenge of power transitions will be crucial for international peace and security in the coming decades. Recognising that the motivations and features of strategic competition differ when they arise from security and power competition is a crucial first step in successfully managing the US-China relationship, as it opens up space for diplomacy and accommodation. However, structural forces indicate rough sailing ahead.

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2. Facing an Era of Great Power Rivalry: Beijing's Efforts to Build Coalitions and Strategic Relations with the Global South and Russia

Christopher Weidacher Hsiung and Johan Englund

China's growing assertiveness in the foreign and security policy domain has created a backlash from the US and its allies and partners. As a response, Beijing seeks to form new coalitions and strategic relations, notably with the "Global South" and Russia. In an era of growing great power rivalry with the US, the orientation of China's foreign policies and strategic interests have major implications for global security and the development of international relations in the years ahead.

A MORE COMBATATIVE CHINA UNDER XI

For decades, China pursued a relatively pragmatic and restrained foreign and security strategy. The main goal was to create a peaceful and stable external environment conducive to economic development and social modernisation, from which Beijing could subsequently build up its military power, advance greater international influence, and secure its core interests, including unification with Taiwan. Beijing achieved this by building cooperative relations with its regional neighbours and global players, such as the US and Europe, while also integrating into the international community. At the same time, China tried to shape the image of its rise as benevolent and posing no threat to the world. These efforts were, in many ways, successful. Although China's ascent raised eyebrows in many countries, Beijing seemed to have worked out a way to alleviate the most alarming concerns over its increased economic clout and military capabilities.

When Xi Jinping became general secretary of the Chinese Communist Party (CCP) in 2012, China's foreign and security strategy arguably entered a new era. Four broad elements have gradually stood out. First, China has assumed a more assertive approach towards its vital national interests. This is evidenced in growing militarised measures to push for its maritime territorial claims in the South and East China Seas, in the border conflict with India, and, unwaveringly, over Taiwan. Second, China's has accelerated its military buildup, including its nuclear forces, to become a "world-class" military power. Third, China has in recent years become more willing to directly use other coercive policies towards countries that it feels harm its interests. Coercion is not only seen in the economic tools it uses, for example, boycotts, embargos, or trade barriers, but also in deploying a more

generally combative diplomatic tone. Fourth, China is less worried about directly challenging the West and, most notably, what Beijing views as its rightful claim to regional hegemony in Asia and global major power status.

To be sure, debates remain over whether the core tenets of China's past strategy have changed. Beijing officially still proclaims that it adheres to the same guiding principles of past policies, not least being open to international collaboration on economic and trade issues. Moreover, there is also a debate over whether the changes to China's foreign-policy behaviour are largely due to the leadership nature of Xi Jinping or an effect of growing power and expanding capabilities that enable China to advance its interests more forcefully. Some see China's behaviour as the outcome of an "action-reaction" circle, where Beijing and Washington both react to what they perceive as the hostile intentions of the other side. Others point to domestic factors, such as rising nationalism, pushing the Chinese leadership to act more assertively. That said, in the view of most observers, China under Xi represents a more assertive foreign policy conduct.

FACING A HARSHER EXTERNAL SECURITY ENVIRONMENT

China's growing assertiveness has created a backlash from many countries, especially the US and its allies and partners. The US has sought to counter China's increased power in Asia for years, starting with Obama's "pivot to Asia" and continuing through the "trade wars" of the Trump years. In recent years, as Sino-American rivalry has intensified, Washington has begun to deter Chinese assertiveness and its potential for aggression, notably against Taiwan, more forcefully. Under the Biden administration, much focus has been given to building stronger bilateral ties with key Asian allies and partners such as Japan, Australia, and India, as well as creating new security coalitions, for example, AUKUS (Australia, the United Kingdom, and the US), or repurposing old strategic groupings, including the Quad (India, Japan, Australia, and the US). Even the EU, which has long sought to de-emphasise geopolitical dimensions with Beijing, has shifted its tone towards China. Designating China as "a partner for cooperation, an economic competitor, and a systemic rival," the EU has increasingly come to emphasise the last of the three labels. In the economic and technological realm, Western countries are seeking to decrease their dependence on, or integration with, China, a strategy the EU calls "de-risking" relations with Beijing. Given the high complexity of global production networks, it still remains to be seen how this approach will pan out. However, economic relations are increasingly being securitised, with for instance technological supply chains seen through the lens of national security interests.

Not all countries have joined the US in its efforts to counter China. Many ASEAN states, for instance, remain wary of getting sucked into the strategic rivalry between the US and China. They fear that a military confrontation between the two will wreak havoc on regional and global stability and prosperity. Nonetheless, the net effect is that China now faces a more dire external security environment than it has in years.

CHARTING A RESPONSE – COURTING THE "GLOBAL SOUTH" AND STRENGTHENING TIES WITH RUSSIA

Chinese elites have long perceived the US as bent on containing China's rise. But there has been a parallel assessment that the overall structural trend is on China's side, with Xi claiming that the "East is rising and the West is declining." Although Chinese leaders still appear to hold this view, the current outlook is somewhat bleaker. In October 2022, in the 20th party congress, Xi Jinping said that China needs to "overcome headwinds to China's continued rise." In March 2023, Xi stated that "Western countries, led by the United States, have implemented all-around containment and suppression of China, which has brought unprecedented severe challenges to the country's development." This statement was and is remarkable not only for its uncommon direct reference to the US, but also for its clear-eyed assessment of the strategic environment.

China has conducted a number of policy responses to counter this US-led strategic pressure. Its domestic initiatives include further strengthening its resilience by building a more self-sustaining national industry, spurring an innovative and high-tech industrial base, and continuing its military buildup. In the foreign policy domain, China is trying to prevent US-China relations from deteriorating further. It is also seeking to mend ties with Europe, hoping to prevent a reinforcing of transatlantic cooperation against it. Beyond this, China has crafted two policy responses that are likely to become major elements of Chinese foreign and security policy: courting the "Global South" and strengthening its partnership with Russia.

First, China has begun a more concentrated effort to court what has come to be described as the "Global South," a somewhat broad term that captures countries and regions outside the direct sphere of a US-led network of allies and partners, with a focus on South and Southeast Asia, Africa, and, to some extent, Latin America. By strengthening relations with countries in the Global South, China wants to build coalitions and partnerships that can help to undermine those of the US and what it perceives as a Western-dominated global order. Beijing's strategy has primarily consisted of offering investments and infrastructure gains, notably through its Belt and Road Initiative (BRI), rolled out more than a decade ago. However, China's multifaceted strategy in these parts of the world also involves expanded political exchanges and growing defence cooperation.

China presents itself to the Global South as an equal partner that, unlike Western powers, does not interfere in other countries' internal affairs. Beijing appeals to many developing countries in its outspoken striving for a multipolar order that increases the influence of countries in the Global South. China has recently pushed a global narrative that claims that it can offer the world a different set of governance norms and principles. These may include, for example, the role of the state in markets, internet governance, and the trumping of sovereignty over human rights. A new global governance system would be different from current

Western-based rules and institutions that, according to Beijing, privilege the industrialised, developed countries in the West and not the developing countries.

Three recent Chinese actions that capture this ambition have been formulated as the Global Development Initiative (GDI), the Global Security Initiative (GSI), and the Global Civilization Initiative (GCI). The three initiatives remain vague and are mostly framed as parts of a narrative, since Beijing has yet to fill them with much concrete substance. Nonetheless, they aim to conceptualise China's view of how international relations should be pursued to achieve development and a more secure world. Beijing is also increasingly seeking the adoption of the initiatives in both bilateral and multilateral settings. Much focus is placed on the principles of state sovereignty, territorial integrity, and each country's right to determine its own system of development and governance, overriding the West's emphasis on the protection of democratic and human rights across national borders. Because China views its approach as opposed to the US-led order, it claims that its three initiatives emphasise dialogue over confrontation and win-win cooperation rather than zero-sum games. But, at the same time, it recurrently stresses its "commitment to taking the legitimate security concerns of all countries," a statement that many find highly contradictory, especially in light of Beijing's stance on Russia's full-scale invasion of Ukraine. China's three initiatives aim to appeal to the Global South, thus laying the groundwork for coalitions against the alliances and partnerships the US is now actively building. In addition, China's active push to establish alternative international institutions, such as the BRICS (Brazil, Russia, India and China) and the Shanghai Cooperation Organization (SCO), bears witness to its efforts to create a less US-dominated global governance structure.

A second major response is to enhance its strategic partnership with Russia. In recent years, China-Russia ties have morphed into a truly comprehensive strategic partnership encompassing close political, economic, and growing military cooperation. Since Russia's invasion of Ukraine, Beijing has tacitly supported Moscow. While not providing it with direct military assistance, China has maintained bilateral trade with Russia, not least in the oil and natural gas sectors, providing it with a major economic cushion in the face of Western sanctions against Russia. China has furthermore provided Russia with dual-use items which have been essential in sustaining Moscow's war efforts. Since the outbreak of the war, Xi Jinping and Vladimir Putin have met four times in person and pledged to further strengthen bilateral relations. In the military sphere, the Chinese and Russian armed forces continue to conduct joint exercises and training.

The war in Ukraine has had major ramifications for the world economy, which is vital for the well-being of China's own development goals, and reputational cost in the West. Furthermore, Russia's military performance in the war has probably also surprised Chinese strategists, calling into question Russian military prowess. Despite this, China remains committed to further strengthening Sino-Russian ties. China still considers Russia its most suitable international partner to coun-

terbalance the US. While Russia is highly antagonised by the US and NATO in Europe, Beijing, in a similar vein, is deeply disgruntled by the presence of the US and its allies in the Indo-Pacific. This common aversion against the US constitutes a powerful foundation for the Sino-Russian strategic partnership, likely only to grow in importance in the years to come.

STAYING ON TARGET

China has become a major global power with substantial resources at its disposal. With significant global clout, Beijing will likely continue to strongly assert its interests in the world, although primarily in its own neighbourhood, where its core interests lie. At the same time, Beijing is facing significant domestic challenges in its economic and demographic structure, while the ousting of Foreign Minister Qin Gang and Defence Minister Li Shangfu in 2023 suggests that not everything in the Xi administration is running smoothly. Even more, souring relations with the US and its allies and partners further underscore the headwinds that China confronts. In Washington, there is strong bipartisan consensus that China constitutes the US "pacing threat," an assessment that will undoubtedly remain in the foreseeable future.

However, it is probable that these challenges will merely temper Beijing and impose a degree of tactical restraint. China remains committed to its long-term ambition of becoming a global great power and asserting regional hegemony. Much also suggests that Xi Jinping will remain China's preeminent leader in the coming decade, thus continuing to strongly shape China's dealings with the world. From Beijing's vantage point, there are few incentives to concede anything of significance in its international relations. China, on the contrary, is likely to continue to pursue its quest to recast the current US-based international order to better fit its own interests and preferences. A key feature of this task will be for China to build closer ties with countries in the Global South and Russia to function as counterweights against what it views as the US's intent to restrain its rise as a global superpower in the 21st century.

This will entail major implications for the world, including Europe. International affairs are bound to become increasingly characterised by Sino-American great power rivalry, in which strategic coalitions of various forms are taking shape. Countries around the world will sometimes have to choose between the two major powers, while on other occasions they will be able to play out their positions between them to maximise their own interests. As such, coalitions may occasionally be interchangeable, depending on the particular issue. Nonetheless, the growing prominence and impact of strategic coalitions will challenge Europe's future interests and policies. As Chinese-backed coalitions emerge, potentially countering the strategic interests of many European countries, the latter will need to position themselves within an evolving global landscape shaped by strategic considerations.

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3. The Expanding Security Dimension of China's Relations with Africa

Olivier Milland and Gabriella Körling

Known for its strong political and economic ties with Africa, China is also attempting to expand its role as a security actor on the continent. However, Beijing is competing with an already established Western security presence as well as new, emerging powers such as Brazil, Gulf states, India, Russia, and Turkey. The proliferation of external actors looking to offer African states solutions to their security problems highlights the continent's growing geopolitical relevance, and African states' ambition and ability to revisit historic dependencies and diversify their sources of support. This signals mounting challenges for Western powers, such as the EU, which has also sought to expand its role as a security actor in Africa in the past few years. This article addresses important aspects of China's expanding security role in the region and emphasizes that an understanding of this is paramount in a time of mounting geopolitical rivalry.

Africa's geopolitical relevance is growing. In 2024, seven of the world's ten fastest-growing economies are African. Rich in natural resources, including strategic minerals, Africa forms a critical part of the global green transition. As the size of its population is estimated to surpass China and India's combined by 2050, it also has the potential to become one of the world's largest markets in the coming decades. However, widespread security and development challenges are endangering Africa's potential trajectory.

Since the end of the Cold War, Western states have been the region's main external security actors. But African states increasingly perceive their support as paternalistic and constraining, partly because it is contingent upon a series of norms regarding governance and human rights – thereby leading to frustration and weariness among them. Over the past decade, emerging powers such as China but also Brazil, Gulf states, India, Russia, and Turkey have expanded their security engagement in the region. These new entrants are offering similar security solutions, but with fewer or different strings attached. And they are challenging Western dominance on various fronts, including in trade, investments, and security support.

CHINA'S EVOLVING SECURITY ROLE IN AFRICA

The 2022 launch of the Global Security Initiative (GSI) introduced a new concept for China's international security engagement. In many respects, this was a repackaging of past Chinese conceptual thinking and practices involving security.

The GSI nonetheless consolidates China's push to become a global security actor, providing an overarching normative framework and establishing the priorities for Beijing's increased international security activities. While China competes with the US in exerting economic and political influence globally, China lags behind when it comes to security provision. Beijing's expanding involvement in security issues overseas has created unease in the West, as it challenges the Western-led security order by promoting an alternative security governance as part of China's great power rivalry with the US.

China's increased security and military presence is also evident in Africa. While the continent has been a Chinese foreign policy priority for many years, security engagement in the region accelerated after China's president, Xi Jinping, took office in 2013. Chinese foreign ministers have chosen African countries as the first destination of their annual trips since 1990; President Xi has visited the continent 11 times. Since 2015, security cooperation has been part of the Forum on China-Africa Cooperation (FOCAC), a summit held every three years between China and 53 African states that will hold its eighth edition in 2024. China-Africa Peace and Security Forums have brought together high-ranking African and Chinese military officials since 2018. These forums are important for building personal networks and relationships, and showcasing Chinese military equipment.

China's security commitment in Africa includes multilateral and bilateral assistance, as well as weapons exports. The multilateral support focuses on funding for the African Union (AU) and the African Peace and Security Architecture (APSA) and funding and contributing troops to UN peace-support operations. Bilateral assistance includes various forms of military assistance and capacity-building. Chinese weapon sales to Africa have increased during the past two decades. Africa is also home to China's first overseas military base, which opened in Djibouti in 2017.

There are four intersecting interests and rationales that drive China's security engagement in Africa: economic, domestic, political, and military. From an economic perspective, China's increasing security role in Africa is linked to its expanding economic presence there. Security is important to protect investments in infrastructure and natural resource extraction and to secure maritime trade routes. From a domestic perspective, Beijing seeks to protect Chinese citizens living and working in Africa. China's security focus also serves political goals by positioning it as a "responsible power" on the global stage. It also boosts existing partnerships and contributes to deepening China-Africa ties by responding to African demands to diversify partnerships for security cooperation, training and capacity-building. Finally, the military rationale inherent in peacekeeping and anti-piracy exercises provides the People's Liberation Army (PLA) with operational experience. It also increases the PLA's visibility by displaying great-power military capabilities outside of China.

COMPONENTS OF CHINA'S SECURITY ROLE

China's bilateral security engagement in Africa rests on two main pillars: Security Force Assistance (SFA) and weapons sales.

Security Force Assistance

For most external partners, including China, SFA is a key approach to providing military and security assistance to African armies. SFA encompasses several aspects of military capacity-building, such as training and equipment, often with the aim of improving the operational capability and effectiveness of the receiving counterpart. However, SFA is a crowded field. The US remains the dominant provider of SFA in Africa, both in terms of value and the number of partner states. The US has provided some form of SFA to all 54 countries in Africa. European countries also provide bilateral military assistance, but only to a few select countries. The EU has stepped up its delivery of SFA to support states in counter-terrorism and anti-piracy operations. Russia has official military-technical cooperation with at least 36 African states, including weapons trade and training. Russia has also been heavily involved in more unofficial involvements via private security companies, including in the Central African Republic, Libya, Mali, and Sudan.

Chinese support for African armed forces dates back to the Cold War, when it assisted independence movements with ideological similarities. Today, China seems to have a continent-wide strategy, as it provides some form of military assistance to almost all African countries. And while countries such as Angola, Algeria and Zimbabwe stand out as historical recipients of Chinese SFA, others have received larger quantities in recent years, often together with large Chinese infrastructure investments.

The value of Chinese security support is modest, however. According to a recent study, China spends significantly less than the US on SFA in Africa and is on par with the most important European providers, who concentrate their support on a limited number of countries. What makes Chinese military assistance stand out is its focus on training military officers and other security personnel. Unlike the US and the EU, which have invested more in training forces locally, most of the training offered by Beijing takes place in military academies in China. Most observers agree that the offer of training of military officers in China, in terms of number of places and scholarships, greatly surpasses the overseas training offered by other international partners. These training programmes are central to China's military diplomacy as they contribute to creating and nurturing personal connections and closer relationships, while building influence with future military leaders. This is similar to training programmes offered to journalists and other professionals in a bid to shape their perceptions of China.

Chinese weapons sales

China's weapons sales have increased exponentially over the past 20 years, making it one of the world's five largest weapons exporters. Historically, China's main buyers have been in Asia, but Africa's share has grown over the past 30 years. Accounting for no more than 4 percent in the early 1990s, Africa's share of Chinese weapon sales increased to more than 27 percent of its weapon exports between 2002 and 2006, but declined again to 7percent in the last five years (2018–2022). China's weapon sales in Africa seem to be driven primarily by the principle of willing buyer, willing seller. Nonetheless, arms sales demonstrate technological know-how; they may help build trust between supplier and recipient over time, therefore constituting a complementary soft-power tool. While many African countries do purchase Chinese weapons, two overlapping groups of countries stand out as their main clients. First, countries that are unable to access weapon systems from Western producers due to sanctions and, second, those that cannot afford Western weapon systems.

Although China has not supplanted other suppliers to Africa, its relevance becomes clearer when looking at individual states. Algeria was by far the largest buyer of Chinese weapons between 1992 and 2022, accounting for about 21percent of total Chinese sales during the period. The second-largest buyer was Egypt, followed by Sudan, Morocco, Nigeria, and Tanzania. Both Nigeria and Tanzania bought most of their weapons from China during the 30-year period, while China was Sudan's second-largest source of weapons.

Although China sells many weapons to a few clients, the number of clients has grown. While no more than eight African countries purchased Chinese weapons between 1992 and 1996, 27 African states did so between 2017 and 2022. Indeed, this follows a similar trend as China's SFAs, which are spread wide but thin.

IMPLICATIONS FOR EU-AFRICA RELATIONS

As China is likely to continue to expand its security engagement in Africa in the coming years, this poses both risks and opportunities to Western actors, such as the European Union.

In terms of risks, firstly, it challenges the West's historical dominance, thereby leading to a potential loss of influence. In the current global political climate, with Global South countries increasingly challenging the West's historical dominance, China's positioning as part of the Global South has a discursive and relational advantage over Western actors. Importantly, Beijing explicitly positions its security engagement as an alternative to the West's liberal interventionism. Additionally, China's emphasis on the principle of non-interference and respect for the sovereignty of individual states plays well with its African counterparts, who are increasingly weary of Western injunctions and conditionalities.

Secondly, the promotion of a Chinese world vision contrasts with the West's rules-based order and international norms, particularly with regard to African security problems. There are also indications that Beijing is already looking to reframe established norms on security and development to better fit its own principles and interests. Thirdly, China's emphasis on non-interference in domestic affairs may strengthen authoritarian and illiberal regimes, potentially undermining respect for human rights and international law. Fourth, the growing number of SFA providers may lead to a fragmentation of and competition within national armed forces, who have been equipped and trained by various foreign actors.

However, there are also opportunities. Firstly, China's strengthening of multilateral institutions in Africa, such as the AU and APSA, aligns with the EU's own efforts. Rather than being in competition, the diversified sources of funding may serve as a force multiplier and help the AU secure more durable funding, which has been a key challenge over the past 20 years. Secondly, China's contribution to UN peacekeeping operations, both in terms of funds and personnel, may improve burden-sharing and reduce the perception that such operations are Western-led or imposed by Western powers. For instance, France has been the penholder in the Security Council for the three largest peacekeeping operations in Africa in the past ten years, even though its troop contributions to those missions have been low. Thirdly, Beijing's focus on promoting stability in Africa is not incompatible with the EU's goals and could prove to be an avenue for cooperation.

Nevertheless, questions remain about the impact of Chinese security policy in Africa and the potential challenges it poses to Western engagement. One line of inquiry could be to analyse the extent to which China's security engagement in specific African countries aligns more with economic or political interests. There is also the question of how African actors' perceptions of Chinese security involvement will evolve over time. Given that it is anticipated to grow, its exposure to African public scrutiny will increase. For instance, it will be important to observe how China balances its peace and security commitment with its self-proclaimed position of "non-interference" and respect for national sovereignty, particularly as growing contestation in Africa against foreign security involvement increases.

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4. A US Perspective on the US-China Relationship

Mark Cozad, Kristen Gunness, Barry Pavel, and Anca Agachi
(RAND)

A substantial divide has developed between the United States and China since 2017, largely driven by both nations' fundamentally different, and perhaps irreconcilable, objectives and priorities. While conflict is possible, it is also unlikely, as leaders in both countries desperately want to avoid war. The more likely future for US-China relations is one involving heightened economic and technological competition, ongoing regional tension as China continues to coerce its neighbours, and increasing pessimism in both Washington and Beijing about their ability to deter and counter each other. In this environment, meaningful cooperation and improved relations will be improbable.

The US-China relationship is deteriorating; growing more volatile and confrontational despite efforts in Washington and Beijing to boost cooperation and a desire on both sides to avoid confrontation. The United States wants to maintain the current global system that it believes has enhanced peace and prosperity. China also sees benefits in preserving some elements of the system, but it wants to remake other parts of it to reflect its values and interests; it seeks greater leadership; and it desires roles commensurate with its great power status—something Beijing believes the United States wants to deny China by encircling and containing it militarily and economically. Both Washington and Beijing have stated that cooperation could help alleviate tensions, but mistrust still engulfs the relationship. These challenges will limit possibilities for meaningful cooperation, keeping it as an elusive and perhaps unrealistic goal despite both countries' efforts to maintain a stable relationship.

Xi Jinping, speaking after his November 2023 meeting with President Biden, reiterated that China is "ready to be a partner and friend of the United States" and will follow three principles in handling the "giant ship of China-US relations": mutual respect, peaceful coexistence, and win-win cooperation. However, Xi went on to ask his audience "Are we adversaries, or partners?" He argued that "misinformed policymaking, misguided actions, and unwanted results" emerge when one side sees the other "as a primary competitor, the most consequential challenge and a pacing threat." Xi clearly understands what the US-China relationship has become—a high-stakes, great-power competition. Unsurprisingly, Xi did not address how Beijing's policies contribute to these troubles.

The Biden-Xi summit came at one of the lowest points in US-China relations since the Tiananmen crisis. Both President Biden and Xi expressed their desire to improve the relationship and agreed to resume military-to-military exchanges, combat fentanyl distribution, and cooperate on climate initiatives. In light of how rapidly relations have deteriorated in recent years, these three agreements are perhaps the most positive outcome one could expect. Unfortunately, they are also emblematic of the limits of what is possible in the current US-China relationship, mired in competition across all major fronts: economics and technology, security, and diplomacy.

ECONOMICS AND TECHNOLOGIES DRIVING GEOPOLITICS

In 2021, Beijing hoped the incoming Biden administration would dismantle earlier Trump administration tariffs as part of its efforts to improve relations. Instead, with tariffs still intact, Washington in October 2022 announced export restrictions on microchips and related production technology intended to slow China's military advancement. New export controls expected later in 2024 will tighten the remaining loopholes. The Trump-era tariffs remain and will likely be in place for the remainder of the Biden presidency. Washington's attempts to refine its message on trade policy have not alleviated Beijing's concerns about "decoupling" as fears mount among China's leaders about the health and long-term viability of China's economy.

Technology has emerged as a foundational element of national power, alongside diplomacy, economics, and military strength, among others. As a result, geopolitical outcomes arising from the US-China rivalry will increasingly stem from vigorous and growing economic and technological competition. Whichever country dominates key sectors such as semiconductors, artificial intelligence (AI), and strategic minerals will accelerate not only its own future economic growth but also that of the rest of the world. Geopolitical influence and power will increasingly be tied to the critical digital and other infrastructure of countries across the globe.

Chinese interlocutors often say, "China just wants to do business." However, US government officials and businesses have highlighted that China subsidises its national technology champions in key sectors in ways that do not equate to a level commercial playing field vis-à-vis non-Chinese companies seeking market share. In addition, the United States has become increasingly concerned about Beijing's use of its business leverage to coerce countries that take policy positions on issues that do not conform with the ideological and other preferences of the Chinese Communist Party (CCP), such as on human rights and China's numerous territorial disputes.

Thus, the advanced democratic economies around the world who share values and interests are increasingly coming together in new ways to counter undue Chinese economic and technological predatory and coercive practices. From a US perspective, this is not an attempt to "keep China down," as CCP spokespeople often state, but to push back on China's unfair commercial practices and to protect supply chains and critical infrastructure from Chinese dominance and control.

AI, semiconductors, biotech, and autonomous capabilities are among the many key sectors that will drive geopolitics in the coming decade. By restricting Chinese investments and controlling exports in these sectors to limit China's access to critical technologies, the Biden Administration and its allies directly message Beijing about the West's intention to compete in those areas that will be key to defining geopolitical competition in the years to come.

PESSIMISM, COERCION AND, REGIONAL TENSIONS

Security and defence issues in the US-China competition have been fraught with potential crises and flashpoints. The deterioration in US-China military-to-military relations is a direct consequence of the perception on both sides of increased tensions. While buffers remain—such as Xi Jinping's imperative to maintain a stable environment for economic growth and national rejuvenation—Washington and Beijing are confronting an increased danger of escalation. Both countries' domestic politics have contributed to deteriorating relations. Public discussion in the United States about the possibility of a Chinese invasion of Taiwan in 2027 has spurred debate on defence investments, posture, and deterrence against China. At the same time, Xi has spoken to the Chinese public about mounting challenges at home and abroad, alluding to the ways in which the United States has "contained and suppressed us…which has brought unprecedented severe challenges to our development." This pessimism in both countries has heightened insecurity and raised the possibility of a military crisis or conflict in areas where significant tensions already exist.

The most obvious flashpoint for a US-China conflict remains Taiwan. William Lai's victory in Taiwan's January 2024 election kept the Democratic Progressive Party (DPP) in power, a result that suggests continuity in Taiwan's China policy. Lai's approach will likely include continued military investments to strengthen Taiwan's defence and efforts to build closer ties with the United States. Beijing's reaction to the election has been measured, but CCP spokespeople restated in fairly standard terms that the "Taiwan question is at the very core of China's core interests" and urged the United States to "honour its commitment of not supporting 'Taiwan independence,' stop arming Taiwan, and support China's peaceful unification."

As Washington and Beijing take steps to stabilise the relationship, three developments could create a crisis over Taiwan. First, US elections in November 2024 could change the calculus behind US support for Taiwan, as well as the trajectory of US-China relations. Second, China's own actions could contribute to tensions over Taiwan devolving into a crisis, particularly if Beijing seeks to coerce reunification. Third, if Taipei's policy were to shift towards independence, a crisis would almost certainly ensue.

China's attempts to coerce its neighbours in other parts of Asia also present potential flashpoints. The situation between China and the Philippines in the South China Sea has witnessed a noticeable uptick in China's coercive actions against the Philippines, as well as against other US allies and partners. Most recently, Chinese coercion focused on disputed maritime territory near the Second Thomas Shoal, where a Philippine garrison is stationed. Chinese Coast Guard ships have interfered with Philippine supply efforts, shot water cannons at ships, and conducted unsafe manoeuvres. The United States has expressed support for its Philippine allies, stating that an armed attack against Philippine forces would trigger the US-Philippine Mutual Defense Treaty.

These actions mirror other types of Chinese coercive actions in the East China Sea (around the Senkaku Islands) and in the Taiwan Strait, where paramilitary and PLA forces attempt to control the air and maritime environments and create a de facto presence that supports Beijing's territorial claims. As the United States supports its allies and partners, standing up to Chinese coercion and avoiding escalation remain ongoing challenges.

PEACE, SECURITY, AND INFLUENCE

Global strategic competition with China also manifests as a clash over global norms and influence, as China seeks to expand its global reach through new partnerships and stronger political-economic ties. In the United States, China's efforts to challenge norms and increase its reach have led to bipartisan initiatives to counter China's actions. US leaders argue that if successful, China's efforts to mould the international system to reflect its values, advance its goals, and present itself as an alternative to the West will open the door to greater Chinese coercion in the future.

Sino-Russian cooperation—the so-called "no limits" partnership—has become a significant source of friction between Washington and Beijing. Since Russia's invasion of Ukraine, the relationship has evolved into a utilitarian symbiosis: Russia gains a close relationship that mitigates the effects of isolation and sanctions. China gains a source of energy and a captive market that helps it balance against the West. The United States is frustrated by Beijing's unwillingness to distance itself from Russia's aggression in Ukraine and remains concerned about the coordinated threats that both countries pose to global security. Along with a stronger bilateral relationship, both countries' ties to North Korea and Iran raise additional concerns for US policymakers about proliferation, sanctions compliance, regional stability, and the possibility of opportunistic aggression. The deepening Sino-Russian friendship and the warm ties that Beijing and Moscow have with Iran and North Korea have, for many US allies, unquestionably linked security concerns between the Euro-Atlantic and Indo-Pacific theatres.

In spite of these connections, China aspires to be a global peacemaker capable of bringing stability to conflict-ridden areas. Beijing's involvement in the normali-

sation of relations between Iran and Saudi Arabia was treated with great fanfare, but its 2023 peace proposal for Ukraine was not taken seriously by either parties nor by others. Even though Kyiv soundly rejected the proposal, Ukraine's leaders understand China could play a critical role in post-war peace plans due to Beijing's sway over Moscow. In the Middle East, despite Beijing's statements about China's reliance on Red Sea shipping lanes for trade, it refuses to join the coalition against the Houthis and has declined to condemn their attacks. Beijing has also been unable to enlist Iran's support to convince its proxy to halt these attacks, raising questions in the United States about the depths of China's commitment to maintaining global stability. At a time when greater cooperation on peace and security is needed, China's strategic choices continue to sow mistrust with the United States and limit meaningful progress in the relationship.

US policymakers continue to carefully monitor China's footprint and intentions in other regions, including Europe and parts of the Global South. Russia's weaponisation of interdependence during its war in Ukraine has led several European nations to reassess their dependency on China, but there are limits to the steps most governments will take. China's influence in Europe may be in retreat—especially Eastern Europe as the 17+1 Framework atrophies—with several governments attempting to "de-risk" from Beijing; however, a radical decoupling is unlikely.

China's challenges in Europe have contributed to its doubling-down on efforts to gain influence in the Global South. Beijing's strategy of presenting itself as an alternative to the West—for example, through the Belt and Road Initiative (BRI) and by seeking to elevate the BRICS grouping—raises concerns in the United States that China seeks to advance its own agenda with little concern for Western values including human rights, democracy, and global peace and security.

THE FUTURE DIRECTION

The US-China relationship faces a number of challenges that will be difficult to overcome. Washington and Beijing want to maintain peace and stability but have significantly different ideas about how they can be achieved. Recent tensions have created concern that crisis and perhaps conflict are on the horizon, but both countries recognise the incredible costs that would accompany war. Accordingly, Washington and Beijing prioritise stable relations even if competing interests stoke tension and make stability more difficult to achieve. While conflict is possible, it is also unlikely, as leaders in both countries desperately want to avoid war. The more likely future for US-China relations is one involving extreme economic and technological competition, regional tension as China continues to coerce its neighbours, and increasing pessimism in both capitals about their ability to deter and counter each other. In this environment, meaningful cooperation and improved relations will be improbable.

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Part Two

Economy and Politics

5. From the World's Factory to the Middle Kingdom: China's Changing Geopolitical and Geoeconomic Role

Michał Budryk

In the space of a few decades since roughly 1980, China underwent a significant transformation. What used to be a closed and isolated economy, underwhelming on a global scale, became first a major recipient of foreign direct investments and the "world's factory", and now a global player with both worldwide political and economic ambitions and the agency to realise them. How did China break out of the global economic system that seemed to be rigged against it to become what it is today, an actor participating in shaping this system and aiming at redefining it?

THE GLOBAL FACTORY AND CHINA'S "GOOD-ENOUGH" MARKET

Since the opening of the Chinese economy in the 1980s, the country has become a magnet for foreign direct investment (FDI). Vast numbers of readily available low-cost labour made China an attractive offshoring target for primarily North American and West European firms looking to cut their manufacturing costs, while also holding the promise of future growth. With time, a global economic system known as "the global factory" emerged: economic activities became globally divided between those of higher-value (such as design, research and development, or marketing) typically located in the wealthy and knowledge-intensive economies of the West, and those of low-value (manufacturing), which tended to become offshored or outsourced to what was called emerging markets, often China.

Although attractive earlier due to its low labour costs, China was certainly not lauded for the quality of its products. Chinese companies trailed far behind the technological leaders of the West. The Chinese economy as a whole lacked the advanced knowledge base required for developing higher-end and reliable products of top quality that would meet the expectations of customers in the wealthy markets of Europe and America, even despite their low prices. Then again, perhaps they didn't have to.

Western firms have long overlooked the domestic Chinese market, which differs in several important aspects from the West's. Perhaps most importantly, consumer purchasing power remains significantly lower, making the market relatively unattractive for Western firms. The country also features a relatively underdevel-

oped infrastructure and institutional environment, a set of circumstances under which Western companies are not accustomed to operating, given their experience in markets in the West.

This is not to say that the Chinese market lacks growth opportunities. In fact, since global firms have long underserved China's market, it offers a niche for its domestic companies. These companies can address the specific needs of local customers, which they know better than anyone else can, focusing on low-cost solutions to common local problems in a process known as "frugal innovation".

China's economic growth and rapid urbanisation following in part globalisation and Western investments gives rise to a considerable middle class with enough disposable income to support the growth of domestic firms addressing its needs. The focus is not necessarily on advanced features, cutting-edge technology, or high-end branding, but rather on functionality, simplicity, and affordability. For this reason, this segment is sometimes called China's "good-enough" market: the products only need to be good-enough rather than top-notch. Furthermore, this kind of offering allows for expanding into other markets with similar characteristics, and even into the more price-sensitive segments of Western economies.

CHINA'S STRATEGIC INTENT

Although the good-enough market allows for sizeable growth, there is no reason to believe that it satisfies China's economic ambitions.

Firstly, Chinese companies have developed enough financial muscle to invest abroad. There are two major reasons why they may want to do that: either to find new customers (that is, market-seeking investment), or to acquire resources unavailable on the home market at an agreeable price (asset-seeking investment). This last approach is known as the strategic intent perspective: their objective in seeking resources abroad is not primarily for the sake of international expansion but rather to strengthen their position vis-à-vis domestic competitors.

Among the resources that Chinese firms appear to find most interesting is knowledge, which is typically lacking in developing countries. In following their strategic intent, they often target financially struggling Western companies that have a well-developed knowledge base, as was the case when, for example, Zheijang Geely acquired Volvo Cars or Lenovo acquired IBM's PC division. What may ensue is that the firm in question does eventually venture into international markets at a later stage and then aims at their higher-end segments with the use of the technology and knowledge acquired abroad.

This Chinese "strategic intent" is clearly visible in Sweden. In a series of studies, FOI researchers show that Chinese investments in Sweden are rather limited in number, as they only make up 1 percent of all foreign-owned companies registered in the country. These investments, though, are highly concentrated in a

few selected industries important for the *Made in China 2025* strategy (a policy to strengthen China's high-tech manufacturing industry), notably automotive, transport, IT, and telecom. Almost all the major ones are indeed acquisitions rather than greenfield investments (i.e., establishing an entirely new subsidiary in the target market, as opposed to brownfield, or acquiring an existing firm).

However, companies can also learn organically from their operations abroad. Some researchers suggest that although greenfield investments do not yield equally generous learning opportunities as mergers and acquisitions do, they nonetheless allow for gaining knowledge from the market and spreading it within the company. One emblematic case in point is Huawei, which established one of its R&D centres almost literally next door to Ericsson in Stockholm, Sweden.

Furthermore, there are learning opportunities that Chinese firms can exploit in the home market. The establishment of Western companies in China allow for a wide range of access to knowledge, from technological spillovers and partnerships to illicit activities such as industrial espionage and intellectual property theft. More recently, China has developed its own strong research centres, both academic and industrial, while it is among the top ranks globally in terms of patent count.

CHINA'S GEOECONOMIC POLICY

Apart from the activities of Chinese firms, the Chinese government also remains an active player in the economy. Using the subordination of economic measures to advance political goals, as is sometimes the case in China's foreign policy, is known as geoeconomics.

The Chinese government supports foreign investment by Chinese firms by, for example, providing advantageous funding opportunities. These funds play a role in directing Chinese investments abroad towards areas that the state finds particularly interesting. One geographical example is Africa, where such investments have been used to secure access to natural resources of importance to the Chinese economy, in some cases crowding out investments from Western countries, notably the United States. Another example is a list of industries that the Chinese government sees as strategically important, where it supports investments in both Europe and the United States.

The use of advantageous loans as a support for foreign investments also leads to increased use of the yuan on global financial markets. This is in line with China's ambition, with some support from other BRICS countries (i.e., Brazil, Russia, India, and South Africa) to strengthen the yuan's role as the reserve currency, both globally at the expense of the US dollar and euro and regionally at the expense of the Japanese yen.

However, the Chinese government's involvement in the economy goes far beyond providing loans or designing national geoeconomic strategies, such as the aforementioned *Made in China 2025* strategy or the earlier established Belt and Road Initiative (infrastructural investments enhancing trade connections from China to Europe). The state also owns a range of companies and directly influences their business decisions, including on foreign investment. However, the links between the government and the business elites, as well as the government's deep control over all aspects of society, provide grounds for suspicion among observers in Europe and America about the motives of the Chinese investors, even when there is no direct and overt governmental involvement.

The concentration of Chinese investments abroad in selected industries, in alignment with governmental strategies, poses certain risks for host countries, at least in some countries. Specifically, there is a risk that these countries will become more vulnerable to Chinese geoeconomic measures than a simple statistic on the number of investments might suggest. This will be particularly true when these targeted industries also become strategically important for their host countries, and the authorities in Beijing are aware of the power of this tool. As FOI researchers have shown, Sweden and other Nordic countries have several times fallen prey to Beijing's punitive actions when the Chinese government exerted its economic influence to pursue its political goals. The fact that Sweden outsources much of its welfare system to private actors can also make it vulnerable to such antagonistic measures, although China has not so far been a noteworthy actor in these sectors.

The case of Chinese FDI policies highlights the importance of long-term strategies in achieving national goals. Through a range of measures, China transformed its economy and underwent an evolution from an isolated, somewhat peripheral country to a regional superpower with ambitions of shaping global economic and political systems. In this role, it appears to be growing on the world stage. Unsurprisingly, the world's now second-most populous country and its, for now, second-largest economy is also gaining political influence. The move from the global political periphery that China occupied during much of the 20th century towards being a new "Middle Kingdom" may not be complete just yet, but it is well underway.

It is important to note that China is a unique case in accessing this possibility for two major reasons. Firstly, the sheer size of its population affords it opportunities that are unavailable to any other country on Earth, save India. It is the source of many of China's strengths, providing a vast labour force and thereby an enormous domestic market. Secondly, China remains a country with profound state control over all aspects of its society. This allows it to craft and execute strategies in a way and on a scale perhaps impossible to emulate in democracies and free-market economies.

Some of the sources of China's development appear to be at a limit, with population growth coming to a halt (or even a decline) and economic growth, although still high by Western standards, slowing down. Nonetheless, China as a global player is here to stay, with ongoing ambitions to influence the global economic and political system through the active use of the geoeconomic tools at its disposal as strong as ever.

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6. China's Semiconductor Ambitions Amid Geoeconomic Rivalry

Tobias Junerfält

China's semiconductor industry is receiving increased emphasis in US-China great power competition. This is due, not least, to the dual-use nature of the industry and its products. Semiconductor technology has become an integral part of geopolitics. China's attempts to develop its own semiconductor industry and, by extension, its defence industry have implications for the US-China military balance. To further enhance both its offensive and defensive military capabilities and keep up with the US and its allies, China needs to make steady progress in advanced semiconductor manufacturing. Moreover, the extent of China's access to a wide variety of chips has implications for sustaining not only its overall military capabilities, but also its broader tech industry.

AGE-OLD AMBITIONS FOR THE SEMICONDUCTOR INDUSTRY

China has long sought to develop a leading and self-sufficient semiconductor industry. Since the era of Mao Zedong, China has regarded the semiconductor industry as a strategically important sector and promoted its development with state support. However, whereas China's neighbours in East Asia, that is, Japan, South Korea and Taiwan, all established internationally competitive semiconductor industries during the 20th century, China's success was more limited.

In the 21st century, China's ambitions for its semiconductor industry have continued and accelerated. A notable development was the founding of the Semiconductor Manufacturing International Corporation (SMIC) in 2000. From the outset, the goal of SMIC was to mimic the business model of Taiwan Semiconductor Manufacturing Company (TSMC), partly by recruiting semiconductor expertise from Taiwan and the US. SMIC did achieve some success during the early 2000s, marked by partial bridging of the technological gap to its competitors abroad, and contracts to manufacture chips for major semiconductor actors, such as Texas Instruments, in the US. SMIC is now among the top foundries internationally, but it has yet to achieve a combination of technological prowess and efficient large-scale manufacturing up to par with competitors such as TSMC and Samsung.

CURRENT POSITION IN THE SEMICONDUCTOR SUPPLY CHAIN

China still lags behind in many parts of the semiconductor supply chain, notably in advanced front-end manufacturing, chip design, and important inputs, in terms of chip-design tools, manufacturing equipment, and certain materials.

However, China also has noteworthy strengths that make other countries, including those with significant semiconductor industries, dependent on it. One of China's major roles is in back-end manufacturing, the part of the semiconductor production process where semiconductor wafers manufactured upstream are separated into individual chips, tested, and packaged for assembly into end-user electronics. In 2019, China represented around two-fifths of global back-end manufacturing capacity.

Another supply chain segment in which China plays a dominant role is in critical raw materials. China is a leading global extractor and/or refiner of various metals and minerals used in semiconductor manufacturing, such as gallium, germanium, silicon, tungsten, arsenic, and rare-earth elements. China's share of global supplies for these and other critical raw materials varies, as does other countries' direct import dependence on China. However, a notable example of China's supply dominance is found in rare-earth elements.

China is also a huge market for semiconductors. The semiconductor industry's prosperity hinges on customer demand, mostly for civilian goods. In 2019, approximately a third of global chip sales went to China. Chinese manufacturers of consumer electronics, such as Huawei and Lenovo, use various microelectronics in their internationally competitive products. Lastly, even though China lags behind in advanced front-end manufacturing, it represents a substantial share (16 percent) of global front-end manufacturing capacity. China's market share in less-advanced front-end manufacturing is growing, with implications for the global economy. Advanced semiconductor technology is used in AI applications, for example, but other applications, such as automobiles and defence systems, heavily depend on less-advanced chips. China's successes in developing domestic production capacity for less-advanced chips could, for instance, be used to flood the market and damage the industries of its geopolitical opponents.

OUTCOMES OF MODERN INDUSTRIAL POLICY

China's semiconductor ambitions in the first decades of the 21st century have been characterised by various industrial policy programmes, the latest of which is the multisectoral strategy, *Made in China 2025* (MIC2025), launched in 2015. MIC2025 stipulates specific policy targets related to technological self-sufficiency to be reached before 2025. The ultimate goal is for China to dominate various tech industries by the centenary of the People's Republic in 2049. The semiconductor industry is at the core of these tech ambitions, both because of its role in underpinning technological development in other strategic industries, such as electric vehicles, energy, and telecom, and due to the industry's dual-use nature. As a means to promote its continued military modernisation, China actively encourages synergies between civilian and defence industries, which puts further emphasis on the semiconductor industry and its products.

To further its MIC2025 goals for the semiconductor industry, China has set up multifarious mechanisms for state support to encourage domestic and overseas investments along the semiconductor value chain. The level of active Chinese state support for its semiconductor industry is exceptional. A key institution in this regard is the National Integrated Circuit Industry Investment Fund (National IC Fund), created in 2014. During the past decade, the fund has actively encouraged semiconductor investments through generous funding, targeting different parts of the supply chain for advancement. Far from all investments have borne fruit; the average return on investment rate is likely unimpressive. At an aggregate level, MIC2025 policy targets for the semiconductor industry have fallen short. In 2020, China had a semiconductor self-sufficiency rate of approximately 16 percent, rather than the targeted 40 percent. The policy target for 2025, of a 70 percent self-sufficiency rate, is also a far cry.

The lion's share of China's industrial policy-related efforts occur domestically, but the acquisition of foreign semiconductor companies has been part of China's goals to fill technology gaps and increase self-sufficiency. Other means include talent poaching and intellectual property theft. There are many examples of investments beyond China's borders, including in Europe. Partially or wholly state-owned Chinese entities, such as the National IC Fund and SMIC, have been involved in several acquisitions in Europe during the past decade. Through these and other investments, China may have gained access to previously inaccessible know-how and technologies, some of which may have significant dual-use potential, in various product segments and parts of the semiconductor value chain. This includes manufacturing inputs, for example, equipment and silicon wafers, and products in segments such as optoelectronics, microelectromechanical systems, radio-frequency power applications, and printed-circuit boards. China has also heavily invested, domestically and abroad, in various semiconductor-dependent tech industries. Synergy effects from such investments contribute to China's semiconductor ambitions.

US-LED GEOECONOMICS – A SPANNER IN THE WORKS

In recent years, the US and its allies in the EU, Japan, Taiwan, and South Korea, have increasingly regarded the semiconductor industry and China's ambitions as matters of national security, particularly for advanced chip manufacturing. To manage the perceived threat, there have been new or renewed semiconductor industrial policy efforts throughout the West. Moreover, investment screening has become stricter, while China's semiconductor and broader tech industries have become prominent targets of US-led export controls. Huawei and SMIC are just a few examples of targeted entities.

US efforts to impede China's technological development started during the Trump presidency, but have continued under the Biden administration. In addition to limiting its own exports, the US has put pressure on state actors and companies in the EU and East Asia to refrain from supplying China with advanced

chips or inputs to advanced manufacturing. To achieve this, the US uses both its diplomatic influence and leverage as a leading provider of various tools and machines that constitute crucial inputs to chip design and manufacturing. The US-led export control regime has had some success, notably in limiting China's access to manufacturing equipment, including advanced lithography machines from the Dutch-owned company ASML. However, the control regime has also been porous, for instance due to the possibilities to circumvent export controls on advanced chips through transhipments. Furthermore, export controls on manufacturing equipment also have their limits. This was illustrated in September 2023, when Huawei showcased a new smartphone. The device's advanced processor was manufactured by SMIC, but using less-advanced equipment produced by ASML.

US attempts to plug export control gaps through revisions can only serve as a partial solution, as perfect enforcement is beyond the US's reach. The US is dependent on international cooperation to prevent China from gaining access to foreign chips and manufacturing inputs. To a large extent, not only the government of the US but also the governments of each of its allies share concerns over China's technological ambitions and the need to minimise security-related risks connected to investments and trade. Notwithstanding that, there remains disagreement regarding the proper means and scope, as the countries within the US camp to varying degrees maintain important dependencies on China. These dependencies are also related to each country's private sector interests, which might not always align with national security goals.

THE ROAD AHEAD FOR CHINA

Despite extensive semiconductor investments, China is still heavily dependent on international supply chains. The future prospects of China's semiconductor ambitions of self-sufficiency and technological advancement would seem to hinge upon its ability to reduce the impact of hostile geoeconomics that target its vulnerabilities. China will need to leverage its national supply chain strengths to remain relevant in the semiconductor supply chain and discourage others from restricting their semiconductor-related exports to China. During 2023, China showed its willingness to exploit its supply dominance in critical raw materials by implementing export controls on gallium, germanium, and rare-earth element processing technology. Needless to say, a mutual exchange of geoeconomic measures between China and the West has global economic repercussions.

China's ambitions would also seem to depend on disruptive industrial developments, considering its weak position in many supply chain segments. China is actively seeking such developments to allow it to leapfrog the semiconductor industries of its geopolitical rivals. Semiconductor supply chains are complex, and the barriers to entry are not equally high for all segments. China is thus likely to succeed in some of its ambitions. If China could achieve a competitive edge in certain supply-chain or product segments, the potential implications include increased international dependence on its semiconductor industry and its im-

proved resilience to foreign geoeconomics, as well as enhanced capabilities for its military. Exploitation of semiconductor materials other than the mainstream material, silicon, is one of China's possible paths forward. If it were to gain a commercial lead in front-end manufacturing using compound semiconductors, such as silicon carbide or gallium nitride, potentially enhanced by its supply dominance in critical raw materials, this advance could open up new trajectories for its semiconductor industry. The same applies to its potential to succeed in breaking free from Western-dominated chip-design architectures.

Advanced memory chip manufacturing and advanced packaging (part of back-end manufacturing) represent areas of other potential disruptive developments for China. These could provide China with an alternative way to produce advanced chips, circumventing US-led export controls that target its front-end manufacturing capabilities. An extreme example of another disruptive development is the scenario of a Chinese annexation of Taiwan, with its considerable semiconductor industrial capacity. This would have dramatic implications for China's position in the semiconductor supply chain. It would also open up a vast scope of new sanctions against China, as the US and its allies would likely want to prevent it from successfully exploiting Taiwanese leading-edge chip manufacturing. To conclude, another longshot prospect for China's semiconductor industry is a comparative failure of on-going semiconductor industrial-policy measures by the US and its allies, due to the possibility of unsuccessful cooperation. China's state-led efforts might not be in vain if they are more successful than state-led efforts elsewhere.

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7. The Communist Party's Influence over Business

Oscar Almén

Under Xi Jinping's leadership, the Chinese Communist Party has increased its influence over business. Companies in China, state-owned as well as private, are meant to play an important part in Xi's vision of the "great rejuvenation of the Chinese nation." The Party's increasing control over business has implications not only for domestic politics and the economy but also internationally. As Chinese companies expand their presence abroad, the extent to which these companies are doing the bidding of the Party has become an increasingly salient question in the affected countries. Western governments have responded to the perceived threat by enacting policies that aim to protect the most sensitive sectors from Chinese influence. This article examines the Party's increasing control over business in China and discusses how this affects Chinese companies abroad.

THE COMMUNIST PARTY AND CAPITALISTS

The Chinese Communist Party (CCP) has always had a complicated relationship with private business. While the Party is inherently suspicious of the existence of organisations outside its control, getting too closely involved with private business was long considered ideologically incorrect. However, as the private sector expanded in the 2000s, being absent from the private sector became increasingly risky for the Party. In 2002, the CCP endorsed General Secretary Jiang Zemin's policy to allow private entrepreneurs to join it, which opened up a new chapter in Party-business relations.

From the 2000s, private companies flourished, and it became clear that the private sector was the driver of economic growth, employment, and innovation, especially in high-technology sectors. Realising the value of private business, the "Party-state" generally maintained some distance in order not to hurt the business environment. With the strong support of protectionist policies, private firms such as Huawei and IT companies Alibaba and Tencent grew to become global giants.

When Xi Jinping came to power in 2012, many saw him as a possible economic reformer. However, it soon became clear that Xi's idea of reform had nothing to do with liberalising the Chinese economy. Xi was convinced that what China needed was a stronger Party and state presence rather than less. This is consistent with his conviction that CCP control in all sectors of society is the key to China's successful development.

Once in power, Xi embarked on a power struggle, under the guise of an anti-corruption campaign, to get rid of political opponents within the Party and concentrate power in himself. In addition to securing power in the Party, Xi wanted to strengthen the Party's presence in society. The already severely limited political freedoms in China were further reduced. In the media, civil society, academia, and business, loyalty to the Party and Xi Jinping as its leader was to be ensured. In a 2018 speech to the CCP Central Committee, Xi said that "we must adhere to the Party's leadership in the Party, government, military and civilian affairs; east, west, south, north, and central, the Party leads everything. The Party is the highest force for political leadership, the leadership of the Party is our greatest institutional advantage."

To Xi, the importance of CCP political control and national security (to him, essentially inseparable factors) trumps economic growth. While he recognises the important contributions of private companies to economic growth and innovation, these are mainly means by which the Party-state can realise his goal, the great rejuvenation of the Chinese nation, i.e., the vision that China shall become a world power led by the CCP.

STATE-OWNED COMPANIES AND MIXED OWNERSHIP

State-owned enterprises play an important role in China's Party-state capitalist model. Reform of the governance structures of state-owned companies has enabled greater political steering and ensured that they are aligned with the central government's strategic interests. In addition, such companies can also be utilised to indirectly influence private companies. Since 2013, the government has encouraged mutual investment between types of companies: state-owned companies invest in private companies, and vice versa, through the "mixed ownership" policy. The aim of private companies investing in state owned companies is to improve profitability and corporate governance in the state sector by bringing in competence from the more dynamic private sector.

The additional purpose of state-owned companies investing in private companies, called reverse mixed ownership, increases CCP control over private business. This mostly involves minority posts, but, in some cases, the state has become the majority owner. Research conducted in 2019 found that among China's 1000 largest private companies, 65 percent had direct equity ties with state owners. Also, small minority posts can sometimes allow the state to gain board representation or veto rights over corporate decisions. In certain sectors that operate news and information products, state ownership is a requirement. In 2021, Beijing ByteDance Technology, the main Chinese entity of TikTok's owner, ByteDance, sold a 1 percent stake to a company fully owned by the Chinese government. The purchase also gave the Chinese government the right to appoint a CCP official, Wu Shugang, as one of three board directors at Beijing ByteDance Technology. Wu was given the authority to control the content on ByteDance's Chinese media

platforms. Other examples of the Chinese government acquiring what are often termed "golden shares" include subsidiaries of Tencent, Alibaba, and Weibo. The purpose of acquiring golden shares in key high-tech and media companies is for the Party-state to maintain direct supervision of the companies' activities.

THE PARTY PRESENCE IN PRIVATE COMPANIES

The Party constitution tasks the Party's "cells" with promoting the Party line, helping companies abide by the law, and maintaining harmony in companies with Party members. The 1993 company law had already stated that private companies should form Party cells if they have more than three Party members, though in the early years it was not strictly implemented. This has changed, especially during Xi Jinping's term. In 2012, the CCP Central Organization Department issued a document that was a signal to step-up Party building in private companies. The share of private companies that had established a Party organ increased from 6 percent in 2003 to 73 percent in 2017. In 2020, the CCP published yet another important document, *Opinion on Strengthening the United Front Work of the Private Economy in the New Era*. It indicates that, in the future, Party cells in private companies might be given a role more similar to the role they play in state-owned companies, including control over human-resource decisions and monitoring internal behaviour.

CRACK-DOWN ON PRIVATE COMPANIES

A series of events in 2020–21 marked a new level of political control over private business. This clearly showed that the CCP under Xi Jinping will not hesitate to use tough measures to discipline private business even if they have negative effects on the national economy. This signalled that no individuals or organisations would be allowed to challenge the authority of Xi Jinping or the Party in any way. In the fall of 2020, Alibaba founder Jack Ma's company, Ant Finance, announced what would have been the largest initial public offering (IPO) in history. However, authorities suddenly suspended the offering, and Jack Ma disappeared from public view for several months. A couple of weeks previously, Jack Ma had held a speech criticising the financial regulator's policies, which evidently upset the CCP. Later, Ant Finance was forced to undergo a restructuring of its business and pay a fine of USD 2.78 billion.

In 2021, China experienced what was termed as "the regulatory storm," during which the government initiated a regulatory crackdown on private companies in sectors such as financial technology and education. The new regulations spooked investors, who fled the tech companies. It is estimated that by 2023, China's tech giants had lost more than USD 1 trillion in value. As a response, the government had to reverse some of its policies, in a move that could possibly be seen as a rebuke of Xi Jinping's economic policy. In fact, as of early 2024, the Chinese economy is struggling with many problems, many of which are structural and there-

fore difficult to adjust. A steep fall in foreign investments further exacerbates the problem, and the government has issued several statements to placate investors that China remains investor-friendly.

CHINESE COMPANIES ABROAD

The heightened political control over business in China has had profound implications for the overseas activities of some of the successful private companies in the country. In addition to the Party regulations mentioned above, a number of recently enacted laws have been at the centre of discussion regarding the risks resulting from Party and state influence over Chinese private companies.

Perhaps most notorious is the 2017 National Intelligence Law, which stipulates that Chinese individuals and organisations have to provide information to the national security authorities. While no law has ever been necessary for the Party to take what it wants from Chinese citizens if it is considered important enough, a law might have the additional effect of making the citizens more proactive in informing authorities of sensitive information to avoid breaking the law.

Also, foreign-owned companies in China are increasingly affected by legal changes as well as stricter implementation of existing laws. Foreign companies' entities in China are subject to the same laws and regulations directed at private companies, such as establishing Party cells. For example, in 2013, Mercedez-Benz established a Party cell in its Chinese joint venture. The revision of the anti-espionage law, which came into effect on 1 July 2023, gives the Chinese authorities expanded discretionary power to investigate and prosecute foreign firms in China. The broad and vague language of the law has created fears that anything could be considered a threat to national security and thus an excuse for inspections of electronic devices or the facilities of foreign businesses. Ongoing research indicate that some Swedish companies have also expressed concern about the changing and increasingly unpredictable political environment in China. However, the concern seems to stem more from national regulatory policies than from CCP presence, such as Party cells, in the companies.

HUAWEI AND THE PARTY

The extent to which the CCP or the state controls private companies in China is a crucial issue for these companies' international activities. A major argument for the security risks related to Chinese foreign direct investments is the concern that the investing company can be forced to hand over sensitive information to the Chinese security authorities or that the company is acting in the strategic interests of the Chinese Party-state. Citing national security grounds, new regulations, such as investment screening mechanisms, have been enacted in many countries. Sweden's Foreign Direct Investment Screening Act entered into force on 1 December 2023.

Other regulations target Chinese companies' participation or equipment in the critical infrastructure of other countries. This debate has been particularly intense in connection with the Chinese telecom giant, Huawei, and its participation in the rollout of 5G. The debate centres on whether Huawei is a private company or controlled by the Chinese Party-state. While Huawei's ownership structure is very complex, there is no evidence that the Party-state has any ownership in Huawei, but that does not mean that Huawei is free from CCP influence. Huawei's path to becoming a successful company in China and globally was only possible through close contact and collaboration with the Party-state. Thus, the Party-state has enabled Huawei's development and expects it to be loyal to China and the CCP.

As stated above, private companies are increasingly subject to Party influence; there are several cases where the Party-state has taken strong measures against large and important private companies, such as Alibaba and Tencent. As one of China's "national champions," Huawei is of special strategic importance to the Chinese state. If the CCP or Chinese security authorities demand that Huawei gives them information, it cannot refuse. Whether or not the CCP would actually use this power is another question.

From 2018, in a series of decisions, several countries, including the US, Japan, Australia, and India banned Chinese companies from participating in 5G development. In October 2020, the Swedish Post and Telecom Authority (PTS) announced a similar decision. The decision was taken after consultation with Swedish security authorities, citing national security grounds. After an appeal by Huawei, the Administrative Court of Appeal made a final verdict in June 2022 to uphold the PTS's decision. Huawei then proceeded to sue the Swedish state at the International Centre for Settlement of Investment Disputes (ICSID), an international arbitration institution financed by the World Bank. Huawei claimed that Sweden had breached the investment agreement between Sweden and China. As of early 2024, the case is not yet settled.

Party control over business in China is a crucial issue both for its domestic development and for Chinese companies' activities abroad, at least in the West. While close collaboration between the CCP and business is not necessarily negative for business development in China, it clashes with security interests in the West. This has already affected Chinese businesses abroad, not least in Sweden, as shown by the case of Huawei. There are no signs that this development will subside. However, outside the democratic West, China's economic influence (and, as a consequence, geopolitical influence) keeps growing and it is likely here that much of the global power struggle will play out in the future.

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8. The Chinese Diaspora, the United Front, and Hybrid Warfare as an Integral Part of Chinese Statecraft

Oscar Almén and Ivar Ekman

In recent years, much has been made in international debates about how China is working to challenge the very nature of the international system. How this is being done in practical terms, as well as the ideological and organisational underpinnings of this endeavour, have received less notice. This article aims to show how a particularly Chinese type of statecraft – diaspora politics, as a part of the so-called "United Front principle" – by its nature is both integral to the worldview of the Chinese Communist Party and a fundamental challenge to what we know as the liberal rules-based international order.

In January 2022, Canadian intelligence officials warned their Prime Minister, Justin Trudeau, that China was behind a large influence operation that included interfering in Canada's 2019 parliamentary elections. According to the officials, the Chinese consulate in Toronto organised and financed a network of campaign workers, consisting of members of the Chinese diaspora, and was accused of actively supporting pro-Beijing candidates. One elected parliamentarian for the Liberal Party, Han Dong, was actively but perhaps unknowingly supported by individuals of the Chinese diaspora with close connections to the consulate. A public inquiry is currently looking into the case of Chinese election influence in Canada, and it will report by the end of 2024.

In 2015, Swedish citizen Gui Minhai was abducted by Chinese security forces from his vacation home in Thailand and brought to China. In 2016, he reappeared on Chinese state TV confessing to a lethal traffic crime in what was clearly a staged and forced confession. Gui Minhai remained in jail with only limited contact with Swedish diplomats. The real reason for his incarceration was that, as the owner of a publishing house in Hong Kong, he authored and published books with sensational and intimate details of the leaders of the Chinese Communist Party (CCP), including Xi Jinping. In 2020, Gui was sentenced to 10 years in prison for "illegally supplying intelligence for entities outside the territory of China." The Chinese authorities also announced that Gui had applied for a restoration of his Chinese citizenship and thus should no longer be considered a Swedish citizen. Representatives of the Swedish government have not been allowed access to him since 2018.

These are two examples of how the Chinese Communist Party uses and abuses the Chinese diaspora as a way to extend its influence outside China. Members of the diaspora sympathetic to Beijing are sometimes mobilised, for example organising counterprotests against Beijing-critical demonstrations to strengthen support for pro-Beijing policies, in their countries of residence. Members of the diaspora who are critical of the Communist Party, such as Gui Minhai, or members of the exiled, persecuted Uighur minority, are treated as enemies of the state.

EXTRATERRITORIAL AUTHORITARIAN RULE

Typically for authoritarian states, China is not unique in its efforts to control its diaspora. These states relate to their diasporas in a way similar to how they treat their domestic populations, as subjects who must be controlled and mobilised rather than as citizens with rights. This has been termed *extraterritorial authoritarian rule*. However, a number of factors make China stand out in comparison to other authoritarian states.

First, China does not recognise dual citizenship. This means that, according to the Chinese state, the Chinese diaspora has two main categories: those who have kept their Chinese citizenship but are residing abroad (*huaqiao*) and those with foreign citizenship but of Chinese origin (*huaren*). The latter category includes people who have lived abroad for generations and oftentimes do not even speak Chinese. To the CCP, they are nonetheless to be regarded as a part of the Chinese diaspora and essentially Chinese. The Chinese regime tends to put much emphasis on physical aspects such as hair and skin colour, as well as ethnic components such as culture and language, when defining Chinese nationality. This perspective clashes with the civic definition of nationality, which is based on citizenship. In a speech to representatives of overseas Chinese organisations in Beijing, in June 2014, Xi Jinping proclaimed:

"There are tens of millions of overseas Chinese in the world, and everyone is a member of the Chinese family. For a long time, generation after generation of overseas Chinese have upheld the great traditions of the Chinese nation and have not forgotten the motherland, their ancestral hometown, or the blood of the Chinese nation flowing in their bodies wherever our compatriots live; they have a distinctive Chinese culture in them. Chinese culture is the common spiritual gene of Chinese children."

Second, the number of people who the Chinese regime considers to be a part of the Chinese diaspora is around 60 million, which would amount to one of the largest diasporas in the world. Considering China's growing global power in combination with a huge population to be targeted by Beijing's extraterritorial rule, the diaspora becomes a potent force of influence abroad.

Third, the CCP has built up a well-organised and extensive apparatus for dealing with the Chinese diaspora. The term, *overseas Chinese affairs work*, refers to or-

ganising and influencing the diaspora, involving actors and institutions throughout the state and party at the central and local levels, as well as embassies and organisations abroad. This work is led by the Overseas Chinese Affairs Office (OCAO). It is part of a larger grand strategy for promoting Beijing's interests far beyond China's borders. During Xi Jinping's reign (since 2012), China's ambitions for great power status and global influence have become more apparent than previously. In 2018, he reorganised the government and put OCAO under the purview of the United Front Work Department (UFWD), a department of the Central Committee of the CCP. This move signified the increasing political importance of diaspora work. The UFWD is the Party's branch responsible for China's soft power and influence operations. In order to understand how Beijing's diaspora policy fits into the greater strategy of the Chinese Communist Party, one must also understand the role of the United Front.

THE UNITED FRONT AND CHINESE STATECRAFT

The principle of a "united front" goes back to the earliest days of organised Communism. According to the principle formulated by the fourth congress of the Soviet-led Communist International (Comintern), in 1922, a united front is "an initiative whereby the Communists propose to join with all workers belonging to other parties and groups and all unaligned workers in a common struggle to defend the immediate, basic interests of the working class against the bourgeoisie." In other words, and in a broader sense, it is the idea of working together with and co-opting other societal forces to promote the revolution and the interests of the Party (interests that, in the ideology of a Communist party such as the CCP, are identical to the interests of the state and the people). In the subsequent years, this idea developed and mutated in many different ways, depending on the country and the circumstances. However, it has had the greatest impact in China, under the CCP. In 1939, Mao Zedong dubbed the United Front one of the Chinese Revolution's "Three Magic Weapons," alongside armed struggle and Party building. The year after, in 1940, this "magic weapon" took on a very concrete institutional form when the UFWD came into being.

The carrying out of the United Front principle is usually broadly described as "United Front work," while the larger system of organisations and institutions is termed the "United Front system." The roles and influence of the United Front principle and the UFWD have varied in the Chinese context. As has already been noted, its role has expanded under the reign of Xi Jinping (whose father spent many years as a CCP leader focused on United Front work). Today, the UFWD has within its purview groups covered by a modern interpretation of a united front, which means it handles overseas-Chinese relations, relations with China's many ethnic groups, the country's approved religious organisations, private entrepreneurs, and matters relating to Xinjiang, Hong Kong, Tibet, and Taiwan, to name some of the most important. Among its achievements is the role it played in the pacification of the Hong Kong protest movement in 2019–2020.

However, what has changed in the past two decades is that China's international relations have taken on a much bigger role in the work of the UFWD and the United Front at large. It is increasingly an important tool for the CCP to manage both perceived foreign threats, such as in the case of the Swedish bookseller, Gui Minhai, or to influence the politics of other countries, such as with the Canadian elections. In areas closer to China, such as Taiwan, this work is even more prevalent and evident, with efforts to influence elections and cultivate pro-Beijing civil society organisations.

The United Front principle is thus being expanded to encompass countries and jurisdictions other than China. A political idea, an ideological construct as well as concrete institutions and policies, with its roots in the purportedly "scientific" nature of Communism is thereby coming into much more intense direct contact with not only liberal-democratic systems, but also the rules-based international order in place since the end of the Second World War. This means that the challenge of China's United Front principle is deeper and more complex than a straightforward competition for resources and interests, as is the case in, for example, the military domain. In practical terms, and as is made clear by the above examples of China's diaspora relations, United Front work abroad implies a blurring of the lines between legitimate inter-state activities, such as diplomacy, cultural outreach, and soft power, and illegitimate and grey-zone activities, such as spying, corruption, and influence operations. Thus, the United Front principle, by its very nature, circumvents and undermines a number of core tenets of the current international order, including citizenship (as seen in the example of the Chinese diaspora described in detail above), international jurisdiction, and sovereignty.

In this sense, and from a Western perspective, United Front work should be viewed as an important tool for the CCP to achieve its international goals, below the threshold of open conflict and short of military action. That is, it is now an important tool of "political warfare," to use the older term for this type of statecraft, or "hybrid warfare," to use the phrase most commonly applied today. The challenge is that the United Front's work is rarely understood as such, at least not in its broader sense. Since the institutions in the West are built on a completely different understanding of how conflicting interests in society should be handled, what is usually discovered and dealt with is what falls under our criminal laws – kidnappings, bribes, or spying – and thus the purview of legal authorities. However, as much of the United Front work is carried out within the limits of our laws, there is a tendency not to view it as the structured, long-term undermining of both political cohesion and the international system that it actually is. Only when the true nature of the United Front principle is more widely realised can the challenge it poses be successfully handled.

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9. China's Position on Developing New International Law on Lethal Autonomous Weapon Systems

Anna Andersson and Pontus Winther

China argues in favour of a new international legally binding instrument prohibiting certain lethal autonomous weapon systems (LAWS). At the same time, it is investing heavily in developing LAWS technology, raising doubts as to whether it is genuinely committed to new international law. To assess the validity of China's support for a ban on LAWS, we must better understand how China defines it. This essay examines China's statements in international forums on the legal development regarding LAWS and provides a legal perspective on China's views on which types of LAWS should be prohibited.

WHAT ARE LAWS AND WHY IS CHINA'S POSITION IMPORTANT?

Lethal autonomous weapon systems (LAWS) can be described as weapon systems that, once activated, can identify, select, and apply force to targets without further human involvement. The prospect of future development of LAWS has led to discussions about whether and how international law applicable to such weapon systems should be developed.

In these discussions, China has, somewhat surprisingly, voiced support for a ban on LAWS. At the same time, China is one of the world's leading developers and suppliers of LAWS technology. Since China is a major actor in this field and an important power within the community of states, it is beneficial for Sweden and the EU, as strong voices in favour of the rules-based international order, to understand China's position on new international regulation for LAWS.

This essay contributes to this understanding with a legal analysis of how China's position relates to other states and proposals. It enquires into how its support for a legally binding instrument prohibiting LAWS is dependent on its particular understanding of which types it deems "unacceptable."

HOW ARE LAWS CURRENTLY REGULATED IN INTERNATIONAL LAW?

At present, there is no LAWS-specific prohibition or restriction in international law. However, international humanitarian law (IHL) and applicable international human rights law (IHRL) govern the use of LAWS in armed conflict. For example, the use of LAWS must comply with rules based on IHL's principles of

distinction, proportionality, and precaution. Briefly, the principle of distinction dictates that attacks must be strictly limited to military objectives, that is, combatants and property that make an effective contribution to the opponent's military action and that the attacker has a direct military advantage in attacking. The principle of proportionality prohibits attacks against military objectives that would cause incidental harm or death to civilians and/or damage to civilian property that would be excessive in relation to the anticipated military advantage of the attack. Lastly, the principle of precautions in attack calls for constant care to be taken during all aspects of military operations in order to spare civilians and civilian objects. Moreover, the use of LAWS must comply with applicable IHRL, which may include the right to life, the prohibition of torture, and the right to private life. Thus, any use of LAWS must comply with these and other already existing principles and rules.

The international discussions on LAWS revolve around the question of whether existing international law is sufficient, or whether additional regulation is needed.

WHAT IS THE STATUS OF THE DISCUSSION ON NEW INTERNATIONAL LAW FOR LAWS?

Interstate discussions on LAWS have been ongoing for approximately a decade and in several forums. The two main ones are the Convention on Certain Conventional Weapons (CCW), with its group of governmental experts (GGE LAWS), which was established in 2013, and, as of 2023, the United Nations General Assembly (UNGA).

Despite a decade of talks, the concrete outcomes from the GGE are limited to a set of guiding principles adopted in 2019 and a short part on substance in its 2023 final report. It states that LAWS must not be used if they are incapable of being used in compliance with IHL: control is needed to uphold compliance; states must ensure compliance throughout the lifecycle of LAWS; and, when necessary, should limit the targets, duration, geographical scope, and scale of their operation. One of the reasons for the GGE's limited results is that the CCW works through consensus. Since all involved states must agree to the GGE's outcomes, a single state may have a significant impact on the process.

The limited results of the CCW have led to criticism from states that approach the LAWS issue with a sense of urgency; some states have started to consider other avenues. In 2023, Austria proposed a draft resolution on LAWS to the First Committee of the UNGA. 164 states voted for the draft resolution, five against, and eight states, including China, abstained. UNGA then adopted the draft as Resolution 78/241 (2023). Through the resolution, UNGA requests the UN Secretary-General to examine states and other actors' positions on possible ways of addressing concerns related to LAWS. This opens up the question of initiating a new type of process for developing new international regulations for LAWS, in parallel to the CCW. This could be initiated through the UNGA (as for the

Treaty on the Prohibition of Nuclear Weapons), or modelled on the "Oslo process," which resulted in the Anti-Personnel Mine Ban Convention. A risk associated with such processes, which are not based on consensus and are typically advanced by states that favour far-reaching bans, is that major military powers may not ratify the resulting instruments.

Following the events in the First Committee, the CCW state parties also agreed on a new mandate for the GGE to, until the end of 2025, consider and formulate a set of elements of an instrument. Notably, however, the question of the status of such an instrument was left for the future. This is because one of the main dividing lines in the discussions on LAWS currently goes between those states that favour and those that oppose a legally binding instrument. Another division regards the preferred level of human involvement in LAWS. Current proposals can be categorised into three clusters that comprise:

i. Confirmation that international law, in particular IHL, applies to LAWS, and, possibly, explanations of how central rules such as the fundamental principles of IHL summarised above should be understood in relation to LAWS;
ii. A description or a prohibition on LAWS that cannot be used in line with existing IHL and new rules, such as on human involvement, legal reviews, and measures to counter unintended bias, which ensure that other LAWS are developed and used in compliance with existing IHL; and
iii. New rules that emphasise ethical considerations and go beyond existing IHL; such as a prohibition of certain LAWS, possibly of LAWS that can attack humans, including those who are not protected from direct attack under existing IHL; and new more far-reaching requirements of human control and geographical, temporal, and other restrictions of non-prohibited LAWS.

While these three clusters capture most states' proposals, China's position is not as easily categorised and therefore merits a closer analysis.

WHAT IS CHINA'S POSITION IN INTERNATIONAL DISCUSSIONS?

China participates in all major international forums that discuss new international regulation of LAWS. China's participation should be seen in light of its policy on regulation of military artificial intelligence (AI), presented in 2021:

> *"Countries need to ensure that new weapons and their methods or means of warfare comply with [IHL] and other applicable international laws. . . Relevant weapon systems must be under human control and efforts must be made to ensure human suspension at any time."*

From this, it is clear that China recognises that existing international law, in particular IHL, applies to new LAWS that incorporate AI and place emphasis on human

control of such weapons. Its position does not, however, clarify whether China considers that there is a need for specific international legal regulation on LAWS.

In a working paper presented to the GGE in 2022, China underlined that the group's mandate is to discuss only *lethal* autonomous weapons systems. It expressed that a clear definition of this concept is key to further negotiations. China encouraged states to distinguish between "unacceptable" and "acceptable" LAWS, and to consider an international prohibition of the former. With the latter, China stands out from other major military powers, such as the US and Russia, who oppose a prohibition.

China also proposed a definition of "unacceptable" LAWS, which included five cumulative, non-exhaustive elements:

> *"Firstly, lethality, meaning sufficient lethal payload (charge) and means. Secondly, autonomy, meaning absence of human intervention and control during the entire process of executing a task. Thirdly, impossibility for termination, meaning that once started, there is no way to terminate the operation. Fourthly, indiscriminate killing, meaning that the device will execute the mission of killing and maiming regardless of conditions, scenarios and targets. Fifthly, evolution, meaning that through interaction with the environment, the device can learn autonomously, expand its functions and capabilities in a degree exceeding human expectations."*

These elements set a high threshold for which LAWS China considers "unacceptable." They do not reflect the currently applicable IHL. For example, the formulation of the fourth element does not catch the full extent of the principle of distinction. Other aspects that relate to a system's (in)capability to act in compliance with IHL are not dealt with at all. Thus, China's definition of "unacceptable" LAWS does not draw the line between LAWS that cannot be used in line with existing IHL and those that can be used in compliance with IHL, a division that several other states have made.

China's definition of "unacceptable" LAWS leaves broad scope for what could be considered as "acceptable," including LAWS with questionable capacity to distinguish between military objectives and protected persons or objects. This indicates that what China considers should be prohibited is not that far-reaching. This again makes China stand out from other states that argue for a ban, as they typically support a more broadly encompassing definition.

The close connection between China's definition of "unacceptable" LAWS and its support of a ban became clear in its statement in the UNGA First Committee. China maintained that it would support negotiations for a legally binding instrument aimed at prohibiting LAWS "if and when conditions are ripe, and when all parties have reached consensus on issues such as definition and characterisation." This indicates that China's support for a prohibition is dependent on a narrow definition of which systems would be banned. Further, while China has voiced concern over challenges associated with LAWS, it has not been as actively

engaged as some other states raising similar concerns. Taken together, this indicates that China does not share the sense of urgency expressed by other states that argue for a ban. It also indicates that China prefers the CCW, where, given the consensus requirement, it has greater potential to influence the outcome than in other types of processes for treaty-making.

Nor does China present a definition of what it considers "acceptable" LAWS in its working paper but mentions that these "are always under human control." It thus appears that the scope of "acceptable" LAWS is wide, and despite the reference to human control, China opposes any new international legal requirements (for example on human control) or restrictions for the development and use of "acceptable" LAWS. Instead, China suggests that the international community should develop ethical norms for "acceptable" LAWS, and furthermore encourages states to regulate the development of such LAWS *domestically*. Here, too, China stands out from other states that support a ban, as these states also support international requirements for meaningful human control and restrictions on the use of the types of LAWS that would not be banned.

HOW CAN WE UNDERSTAND CHINA'S POSITION?

While it is precarious to say anything with certainty, one explanation for China's position could be that it is reluctant to commit to any effective international legal regulation of LAWS. Another explanation could be that China is trying to balance its ambition to be world-leading in LAWS technology with what may be a genuine concern about the prospect of fully autonomous weapon systems. A third explanation could simply be a general tendency to approach any new international law cautiously.

At any rate, the likely short-term effect of China's position is that China will seek to keep the discussion within the CCW's consensus-based process. This ensures that China's decisive influence over the formulation of potential new international regulations on LAWS is retained. As indicated by its abstention from voting in the UNGA, it is doubtful whether it has any interest in participating in other potential processes, such as one initiated by the UNGA. There is no indication that China will likely change this position in the near future. While China may continue to contribute to active discussions on LAWS within the CCW, it is unlikely to take a leading role in developing international law for LAWS.

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Part Three

Military Issues

10. China's Military Modernisation

Per Olsson

During the past two decades, the Chinese People's Liberation Army (PLA) has undergone rapid and comprehensive modernisation. Fuelled by drastically increased spending, the PLA army, navy, air force, and rocket force have received increasingly advanced equipment. China still lags behind the West, particularly the US, in several key areas. Moreover, much of China's true military capability remains unknown, due to a lack of transparency and warfighting experience. However, China has narrowed the capability gap to the West and is likely to continue doing so in the coming decade. To further understand these developments, this article explores how far China's military modernisation has come and discusses what challenges remain.

PURPOSE OF MODERNISATION

Since 2000, China's People's Liberation Army (PLA) has undergone a comprehensive military modernisation, enabled by a rapid and sustained increase in expenditure. Recently, China's growing military power has become the focal point of much international attention, not least from the US, which sees China as its main geostrategic rival. The Chinese Communist Party (CCP) has set a goal for the PLA to be completely modernised by 2035 and become a world class force by 2049. The CCP leadership also aims to build an "informationised" military, one that has maximised its use of information technology, in order to win local wars. This would entail shaping the PLA into a force that is able to deter or challenge any military intervention in support of Taiwan, primarily by the US, in the event of a Chinese invasion or blockade.

MILITARY SPENDING

In 2022, China's military expenditure amounted to USD 292 billion in current prices, according to SIPRI (2023). This was second only to the US, which spent USD 877 billion in the same year. Between 2000 and 2022, China increased its military spending more than sixfold in fixed prices, as shown in Figure 1. Meanwhile, China's military expenditure as a share of gross domestic product (GDP) has remained quite stable during the past two decades, amounting to 1.6 percent in 2022.

It is unclear how much of China's military expenditure is allocated towards the PLA's modernisation. According to China's own reporting to the UN in 2020, 37.2 percent was allocated to equipment, 29.6 percent to personnel, and 33.2 percent to operations and maintenance. However, equipment spending may not be identical to spending on new materiel. Whatever the exact share devoted to

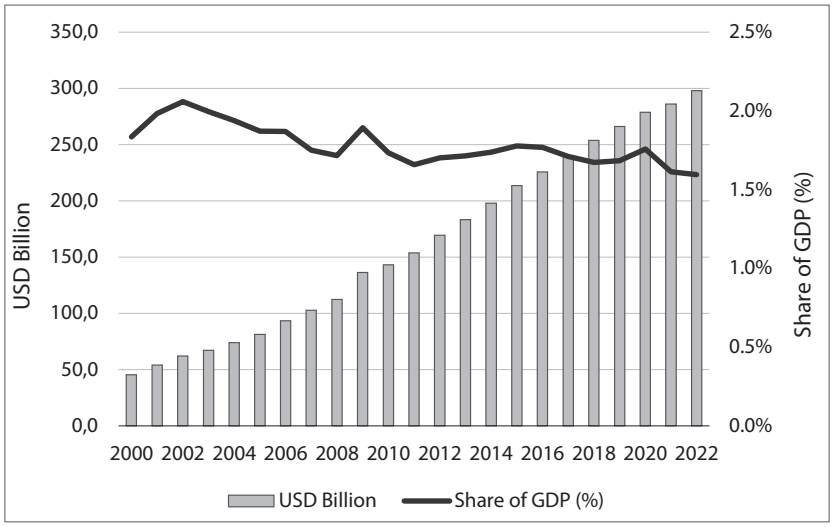

Figure 1. China's Military Expenditure 2000–2022, 2021 fixed prices.
Source: SIPRI (2023) .

modernisation, the change over the past two decades is unmistakable, with a rapid transformation of the equipment in active service within the PLA's ground force, navy, air force, and rocket force.

PLA GROUND FORCE

The PLA Ground Force (PLAGF) has become increasingly modern since 2000. In 2000, most of China's 7000 tanks were derivatives of 1950s Soviet designs, while the nearly 3 million man strong force had few infantry fighting vehicles (IFVs) or armoured personnel carriers (APCs). Artillery was numerous, but mostly consisted of truck-towed pieces. In 2023, the PLAGF had been reduced to 965,000 men. The same year, three-fourths of the PLAGF's main battle tanks (MBTs) were modern third generation, while four-fifths of the IFVs and more than half of all the APCs were of recent design. The number of artillery pieces has been reduced, shifting from towed to self-propelled, while four-fifths of the multiple launch rocket systems (MLRSs) were also of modern designs, as shown in Table 1.

The way of fighting has also changed, with the PLAGF having been reorganised from Soviet-style divisions and regiments into Western-style brigades and battalions. However, from time to time, questions have arisen about how well trained the PLAGF is on its new equipment and how well it can conduct joint operations.

Table 1. PLA Ground-Force Equipment. Source: IISS (2000, 2023)

	Number of vehicles 2000	Number of vehicles 2023	Vehicles of modern 3rd generation or equivalent in 2023, share (%)
MBTs	7060	4800	77.1
IFVs	Some	6000	79.2
APCs	4800	8050	56.5
Self-propelled Artillery	300	3480	87.1
Towed Artillery	15,500	900	33.3
MLRSs	2500	1320	84.8

PLA NAVY

The expansion and modernisation of the PLA Navy (PLAN) have been priorities for China. In 2000, the PLAN was largely a littoral force, relying heavily on Soviet designs of frigates and conventional submarines (SSK). By 2023, the PLAN had been completely transformed, with two aircraft carriers in active service and a third underway, an expanding destroyer fleet, and a modernised frigate fleet. A large number of corvettes had also been introduced, freeing up frigates and destroyers for blue-water operations. The number of nuclear-propelled and -armed strategic submarines (SSBN) and nuclear-powered attack submarines (SSN) has expanded, while the conventional submarine fleet has been modernised.

Table 2. PLA Navy Equipment. Source: IISS (2000, 2023).

	Number of vessels 2000	Number of vessels 2023	New vessels in 2023, commissioned after 2000, share (%)
Aircraft Carriers	0	2	100.0
Amphibious Assault Ships	0	3	100.0
Destroyers	20	49	87.8
Frigates	43	41	80.5
Corvettes	0	50	100.0
SSBN	2	6	100.0
SSN	5	6	100.0
SSK	59	46	87.0

Since 2000, the PLAN has grown to become the world's largest in terms of naval vessels, with a vast majority of these having been commissioned after that year. In terms of tonnage, however, the PLAN remains only a third of the US, reflecting an overall difference in size between Chinese and American ships. While the PLAN had three aircraft carriers, of which only the not yet commissioned *Fujian* could possibly qualify as a super carrier, the US Navy operated 11 super carriers in 2023. The PLAN's most advanced destroyers are approaching the capabilities of Western navies, at least on paper. However, while China has 32 advanced Type 052D and larger Type 055 destroyers in 2023, the US operated 70 Arleigh Burke destroyers. While the PLAN has commissioned a large number of modern ships,

it still needs to build experience, not least in operating carrier groups. Its SSN force is growing, but is still not close to the US; instead, the PLAN still relies on conventional submarines with a more limited operational range.

PLA AIR FORCE

In 2000, the PLA Air Force (PLAAF) mostly consisted of second- and third-generation fighters of Soviet design together with imported and copied Russian Su-27 fourth-generation fighters. Since then, things have changed drastically. In 2005, China introduced its first indigenous fourth-generation fighter, the single engine J-10 and, in 2017, it became the second country in the world to field an active fifth-generation combat aircraft, the advanced and low-observable J-20.

Table 3. PLA Air Force Equipment. Source: IISS (2000, 2023)

	Number of aircraft 2000	Number of aircraft 2023	Fighters of modern 4th or 5th generation in 2023 (%)
Fighter Aircraft	3263	2081	71.5

In 2023, a majority of PLAAF combat aircraft could be considered modern. Of the 1,350 fourth-generation fighters, 760 belonged to the Sukhoi-27 family, including 250 of the advanced Chinese derivative, the J-16, and nearly 560 of various J-10 versions. The PLAAF also fielded 140 fifth-generation J-20s, with that number growing steadily. However, about 30 percent of the PLAAF still consists of older aircraft, mainly in the attack role, with several used for training. It is unknown how each generation of Chinese fighters actually measures up to their Western counterparts, but the general assessment is that the US still has a comfortable technological lead in aircraft design and operations.

PLA ROCKET FORCE AND STRATEGIC SUPPORT FORCES

The PLA Rocket Force is responsible for China's missile arsenals, including its nuclear stockpile. In overall number, China's nuclear arsenal still lags far behind the over 5,200 of the US or nearly 5,900 of Russia. However, China has expanded and modernised its nuclear capability for some time, from about 200 warheads a decade ago to over 500 in 2023, according to the US Department of Defence. China has a large fleet of missile-carrying vehicles and an increasing number of strategic submarines, and has been building silos capable of storing intercontinental ballistic missiles. Nuclear missiles have also become more advanced, with a growing share being Multiple Independently Targetable Re-entry Vehicle- (MIRV) capable.

The PLA Strategic Support Forces was established as a branch in connection to the wider 2015 military reform. However, the support forces were unexpectedly dismantled in spring 2024, with its three functional components, the Military Aerospace Force, the Cyberspace Force and the Information Support Force

placed directly under the central authority. The space force has a number of training bases with satellite capabilities, while the cyberspace and information support forces include a number of bureaus and research institutes.

FUTURE TRENDS

Although the modernisation of the PLA is still ongoing and China lags behind the West, particularly the US, in many key aspects, the PLA is expected to narrow the military capability gap in the next decade.

The PLAGF will likely continue to gradually replace older equipment with new MBTs, IFVs, and artillery pieces up until 2030. The PLAN will continue to expand, although at a slower pace than before as the larger and more advanced fleet will require more resources for maintenance. Nevertheless, it is likely that the aircraft-carrier fleet could grow to four or five in 2030, together with more of the advanced Type 055 destroyers, new Type 054B frigates, and new classes of nuclear submarines. The PLA Air Force will keep introducing its J-20, likely complemented by the smaller fifth-generation J-35, capable of carrier operations. The US estimates that if the PLA Rocket Force continues its nuclear expansion, China could have up to 1500 nuclear warheads by 2035, provided that current production trends remain.

However, the future is not set in stone, and China faces a number of challenges that could potentially delay or even derail its military modernisation.

CHALLENGES

One major challenge is corruption, a long-running problem within China, with neither the PLA nor the defence industry being exemptions. Recently, high-ranking officers, including the defence minister have either been fired or disappeared from public view. President Xi Jinping has admitted that corruption is a major, complex problem. That corruption is detrimental to China's military capability should be beyond dispute, since it leads to misallocation of resources. But it is difficult to assess how detrimental it is. Despite likely extensive corruption, the defence industry has been able to deliver large quantities of military equipment. Whether or not those are delivered on time and with the required quality is something outside observers cannot easily verify.

The actual combat capabilities of the PLA, which has not been involved in armed conflict since 1979, have also been questioned. In order to mitigate some of the shortcomings, the CCP leadership has emphasised more realistic training exercises. A related problem is the lack of experience in joint operations. The 2015 reform transformed previous military regions into Military Theatre Commands, placing segments of all branches under a common geographical command. Training increased the emphasis on realism and opposing force exercises that are less scripted, focusing more on learning and adding devolution of initiative. However,

it is unclear how well the PLA has adapted to this new doctrine or to what extent higher officers are actually willing to delegate command.

Another long-term challenge is the slowing growth rates of the Chinese economy, which has gone from double digits a decade ago to about 4–5 percent in the 2020s. Related to long-term economic growth, China's demographic outlook is also worsening, with an aging population putting a heavier burden on fewer youths who will need to contribute ever more to the economy. This, together with increasingly strained relationships with the West, puts further downward pressure on the Chinese economy.

CONCLUDING REMARKS

China's military modernisation is very much an ongoing process. The US is still leading, not least in terms of stealth fighter aircraft, aircraft carriers, and nuclear submarines. Questions also remain concerning the exact performance of Chinese equipment, as well as softer factors, such as corruption, outdated training practices, and lack of real combat experience.

However, the important takeaway is not where China is now, but the overall trend. So far, China's military modernisation has been rapid and comprehensive. While several hurdles remain, and some present the risk of becoming even more daunting, the overall trajectory is upwards. The CCP leadership aims to have a world-class military by 2049, so the long-term ambition remains unchanged. In recent years, military expenditure has been growing faster than China's overall economy, giving an indication of the increased priority of the country's armed forces.

China's military modernisation is important to understand, even in Sweden, on the other side of the globe. First of all, China's growing military power is a central concern for the US, NATO's most powerful member. Second, it affects the Indo-Pacific region, which is central to the world economy; any crisis there would impact Sweden's trade-dependent economy greatly. Third, there could also be a potential future spillover to Russia if the historical defence industrial dynamics between China and Russia shift. Finally, China's drive to modernise its military could impact Sweden's high-tech industry, forcing it to safeguard against industrial espionage or the unintended transfer of advanced dual-use technologies.

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11. Chinese Nuclear Weapons Buildup: A Change in Strategic Direction?

Ian Anthony and Christopher Weidacher Hsiung

China is expanding its nuclear arsenal at an accelerating rate, acquiring weapons with different characteristics from the past. Beijing has not declared the objectives behind this observed change in behaviour. It hesitates to engage in the strategic dialogue that the United States has called for in order to improve mutual understanding. The absence of transparency promotes different theories about Chinese objectives, causing a debate in the United States about the appropriate response.

HOW IS CHINA EXPANDING ITS NUCLEAR FORCES?

In recent reports, the US Department of Defence (US DOD) has emphasised the rapid growth and change in China's nuclear forces. The key message is that China will continue to rapidly modernise, diversify, and expand its nuclear forces over the next decade. This expansion will dwarf previous Chinese attempts at nuclear modernisation efforts in both scale and complexity.

As of 2023, China's estimated stockpile consisted of more than 500 nuclear warheads, almost triple in size compared to ten years ago. The size of China's nuclear force is expected to grow further, with the US DOD estimating that it will reach around 1000 nuclear warheads by 2030, and 1500 by 2035, if current trends continue.

As it grows, China's nuclear force is also becoming more diverse. As recently as the 2000s, China fielded only inaccurate, ground-based missiles at low levels of readiness. Now, China is moving towards a viable "triad" of increasingly accurate land, sea, and air-based weapons. New intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs) of intercontinental range, and a strategic bomber force armed with air-launched ballistic missiles (ALBMs) are all being acquired. China has built an arsenal of short- and intermediate-range ballistic missiles, and an unknown number of these are believed to be nuclear-capable. China has constructed three large silo fields that will contain at least 300 silos, which according to the US DOD could be filled with more advanced ICBMs. These will be able to launch missiles more quickly than their predecessors. China is also building mobile launchers for ICBMs that will be harder to find and track.

China is also developing fast and manoeuvrable delivery systems to evade missile defences. These hypersonic glide vehicles (HGV) could become nuclear-armed.

An early-warning system based on satellites and long-range radars is being built alongside the new nuclear forces. It will provide an alert status, enabling launch at short notice. China is also developing advanced conventional capabilities such as anti-satellite weapons (ASAT), electronic warfare, and cyber capabilities as part of its increasing multi-domain deterrence posture. This raises the cost of a nuclear attack against its territory. China is also undergoing operational changes where it has increased the PLA Rocket Force's readiness. This potentially moves China away from its long-held position of holding warheads separate from launchers, enabling a future "launch-on-warning" posture.

WHY IS CHINA INVESTING SO HEAVILY IN NUCLEAR FORCES?

The investments that China is making are part of a wider ambition to create fully modernised armed forces by 2035 and a "world class" military by 2049. However, what this means for nuclear policy and strategy remains unclear in official Chinese documents. China officially retains a no-first-use policy (NFU policy) adopted in the 1960s. China pledges to use its nuclear forces only in retaliation after it is attacked with nuclear weapons. China has also given a negative security assurance to states that are not nuclear-armed, promising never to use nuclear weapons against them.

China claims that its nuclear arsenal remains tied to mutual vulnerability based on a credible second-strike capability. China holds that nuclear weapons are for defensive purposes, to deter a nuclear attack or prevent coercive threats against itself. This is in line with the strategy put in place under Mao Zedong and maintained by subsequent leaders but updated to modern conditions.

However, the combination of decades-old official nuclear policies and a rapid nuclear build-up has created an intense academic and policy debate. The issue involves the long-term intentions behind China's nuclear weapons modernisation, and whether its nuclear strategy is undergoing changes. Expert analyses have sorted possible alternative explanations into several categories. Although not mutually exclusive or sorted into a hierarchy, these explanations include:

1. *Maintaining a secure second-strike capability*: China feels that planned US nuclear and conventional projects, if combined in the future with an expanded US ballistic-missile defence system, could undermine the past second-strike capability. China's nuclear buildup is to ensure that, even if threats grow in the future, it will have a credible deterrence capability.
2. *Preventing the United States from achieving escalation dominance in a regional war*: the way China is revising its nuclear forces might facilitate the use of accurate, low-yield nuclear weapons in a regional war, while retaining retaliatory forces if the US decided to respond in kind.
3. *Attaining recognition as a global great power*: China's goal might be to force the United States to put aside its aim of maintaining military power "second to none," and accept China as its equal.

4. *Coercing other countries in the Indo-Pacific*: a more modern and powerful nuclear arsenal might enable China to intimidate US allies into staying out of a conflict, or being part of a strategy, to extract concessions in territorial disputes, most likely over Taiwan.
5. *Responding to bureaucratic pressure from different parts of the Chinese decision-making establishment*: the PLA Rocket Force, responsible for China's missile arsenal, both conventional and nuclear, might be promoting nuclear weapon programmes to advance its specific institutional interests.
6. *Achieving nuclear superiority over "second-tier" nuclear-armed states and, ultimately, the US*: a "race to parity" in nuclear forces might be the interim stage in a "race to superiority." If China continues to develop a diverse arsenal of nuclear weapons with global and regional reach, alongside supporting capabilities, such as advanced intelligence, surveillance, and reconnaissance (ISR) and ballistic missile defence (BMD), it could indicate substantial modifications to China's NFU policy.
7. *Assuring regime stability in anticipation of Western pressure*: President Xi Jinping has highlighted nuclear weapons as a safeguard against structural change in China during the expected political and economic confrontation with the United States.

Changes in China's nuclear arsenal may have multiple causes, and the above categories could combine in various ways. For example, general support from an authoritarian supreme leader may have eliminated checks and balances, making it easier for vested interests to defeat alternative policies. Measures taken to assure a second-strike capability might create nuclear forces flexible enough for planners to consider other ways of using them. At the same time, moving to a launch-on-warning posture would be incompatible with the declaratory NFU policy.

WHAT IS THE US CONSIDERING TO DO IN RESPONSE?

In the China-expert community, the prevailing view is that there is insufficient evidence to confirm a fundamental shift in Chinese objectives. A hasty response to new capabilities could carry risks of its own, such as triggering a competitive nuclear arms race dynamic. Nonetheless, China's nuclear buildup is causing a debate in the US on the proper response. Two prominent features are evident: strategic stability talks and nuclear forces modernisation.

Strategic Stability Talks. China has made the regulation of nuclear weapons conditional on significant prior cuts to the US arsenal and its willingness to address Chinese concerns about advanced conventional weapons and missile defence. The US National Security Adviser has asserted that the US is ready for discussions with China, without preconditions, to manage nuclear risks and develop an arms-control framework. As an important input to its own policies, the US seeks greater clarity about why China is expanding its nuclear arsenal.

In 2013, President Xi proposed to President Obama that the two countries establish a "new type of great power relations": the US would accept China's rise and they could cooperate to address global problems, putting aside differences on political and economic issues to reduce the risk of war. The US met the concept with suspicion, but the Chinese have recently floated similar notions again. In November 2021, Presidents Joe Biden and Xi Jinping agreed to begin exploratory talks on strategic stability; an expert-level discussion took place in November 2023. The US apparently emphasised the importance of increased transparency from China on nuclear matters. However, scepticism in official US circles remains high; whether the 2023 meeting was the first in a series was unclear.

Nuclear forces modernisation. The US is committed to modernising all three legs of its own nuclear triad and the nuclear weapons complex that supports them. The goal is to field the most modern nuclear forces, but on the same scale as the existing arsenal. The Biden administration is conducting a broad review to assess whether the nuclear forces currently envisaged are tailored to the conditions expected in the 2030s or, if not, what changes are needed.

In line with the US-Russia New START Treaty, the US deploys around 1700 strategic nuclear warheads, but also maintains a "hedge" stockpile of roughly 2000 warheads that could be returned to operational status if circumstances require. Its comprehensive modernisation of strategic nuclear weapons includes retiring old systems to stay within treaty limits. When New START expires (which will also release Russia from all legal restraints) in February 2026, the US could activate warheads from its hedge stockpile. However, at the time of writing, no decision has been taken to increase the number of deployed strategic nuclear weapons beyond current treaty limits. Today, US strategic nuclear forces are the primary instrument of extended deterrence for its Asian allies. Although the US currently has an estimated 200 B-61 nuclear gravity bombs available for delivery by combat aircraft, none of them are stored in Asia, and there are no plans to locate them there.

Implementing existing plans to modernise the US nuclear arsenal and its infrastructure is a great challenge. There nevertheless appears to be bipartisan political support for increasing its size and diversity, although the scale of the necessary changes is under active discussion.

WHAT IS THE IMPACT ON EUROPE?

At a time when major powers are at an inflection point, the trajectory of China's nuclear weapons policy and plans has become an important factor that will partly shape the global security environment for several decades. Europe has been slow to assess changes in Chinese nuclear plans and how they are influencing US defence strategy and plans.

For example, extended deterrence, the so-called “nuclear umbrella” that US allies in Europe depend on, relies heavily on the same weapons that would be needed in Asia during a crisis there. They may not be available if Russia saw the crisis as an opportunity to take military action in Europe. Although reassuring for Europeans, the aircraft that have been prominent in Bomber Task Force missions in Europe and the submarines that have raised the profile of their patrols in its waters are not "earmarked" to fall under NATO nuclear command and control. In a conflict with China, these same assets would be in high demand in Asia.

Russia is assisting China with the development of an early warning system, and if US-China relations continue to deteriorate, then the Sino-Russian military-technical relationship may deepen further. Even if Sino-Russian relations stop short of a formal alliance, their increased cooperation could make it more difficult for European states to maintain a sufficient defence.

France and the United Kingdom have recently expressed a wish for dialogue with China over strategic stability. However, the conditions, format, and agenda for their possible engagement with China on nuclear matters is unclear. The two European states, both nuclear-armed and, with China, the US and Russia, among the five permanent members of the United Nations Security Council (P5), have been part of the P5 dialogue on nuclear matters that began roughly 15 years ago. The talks, however, do not appear to have developed to a point where in-depth assessments could promote the prospects for nuclear-arms control. As a result, European insights into Chinese developments are likely to depend on the information that the United States is willing to share.

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12. China's Strategic Missile Capability

Staffan Lundin and Magnus Evestedt

China is one of the world's five recognised nuclear-weapon states, the third-largest by number of nuclear warheads. Nuclear weapons, and consequently nuclear deterrence, play a vital role in China's foreign, defence, and security policies. For nuclear weapons to play such a role, in the undesirable event that a conflict escalates to an exchange of such weapons, there must be credible ways to deliver them to their targets. For this purpose, China depends to a large extent on an arsenal of ballistic missiles. This arsenal provides it with the ability to strike significant parts of the world, with nuclear as well as conventionally armed missiles.

No more than a year after initiating its nuclear weapons programme in 1955, China set up a missile research organisation with the intent to develop ballistic missiles that could reach the United States. At first, missiles and technical support were acquired from the Soviet Union, but with time, domestic know-how prospered, and today all Chinese missiles are indigenously developed and constructed. The proliferation of Chinese missile technology to various states and non-governmental actors is a major concern to many Western governments.

The development of the first Chinese ballistic missile began in 1957 with the transfer of the Soviet R-2 missile to China. China reverse-engineered and indigenously developed the missile further, naming it 1059, and successfully conducted flight tests at the end of 1960. Five years later, it was renamed Dongfeng-1 ("East Wind," or DF-1). In the fifteen years that followed, the development of strategic missiles focused on larger payloads and longer ranges with the purpose of being able to target Japan (DF-2), the Philippines (DF-3), Guam (DF-4), and the continental United States (DF-5).

China applies what is known as a no-first-use nuclear policy (NFU policy). The Chinese government has declared that China will not be the first country to use nuclear weapons in a war and that China will not threaten to use its nuclear weapons against a country that does not itself possess nuclear weapons. Recent increases in the Chinese nuclear stockpile, i.e., the number of nuclear warheads, in combination with modernisation of the ballistic missile arsenal, have prompted some Western analysts to suspect that China may be preparing to revise its nuclear policy.

Strategic missiles are designed to strike targets far beyond the battlefield. Early strategic missiles almost exclusively carried nuclear warheads due to the low accuracy of delivering warheads at the long ranges required. With improved accuracy, it became feasible to hit close enough to a specific target for a conventional

warhead to be effective, even at great distances. The People's Liberation Army Rocket Force (PLARF) fields a variety of land-based nuclear, conventional, and dual-capable ballistic missiles, with ranges from a few hundred kilometres to well over ten thousand kilometres. This enables China to project a nuclear threat and hold at risk not only the United States in the intercontinental range, but also prospective adversaries such as Japan or India much closer to home. Furthermore, in a conflict, China could launch its conventionally armed ballistic missiles without violating the no-first-use policy.

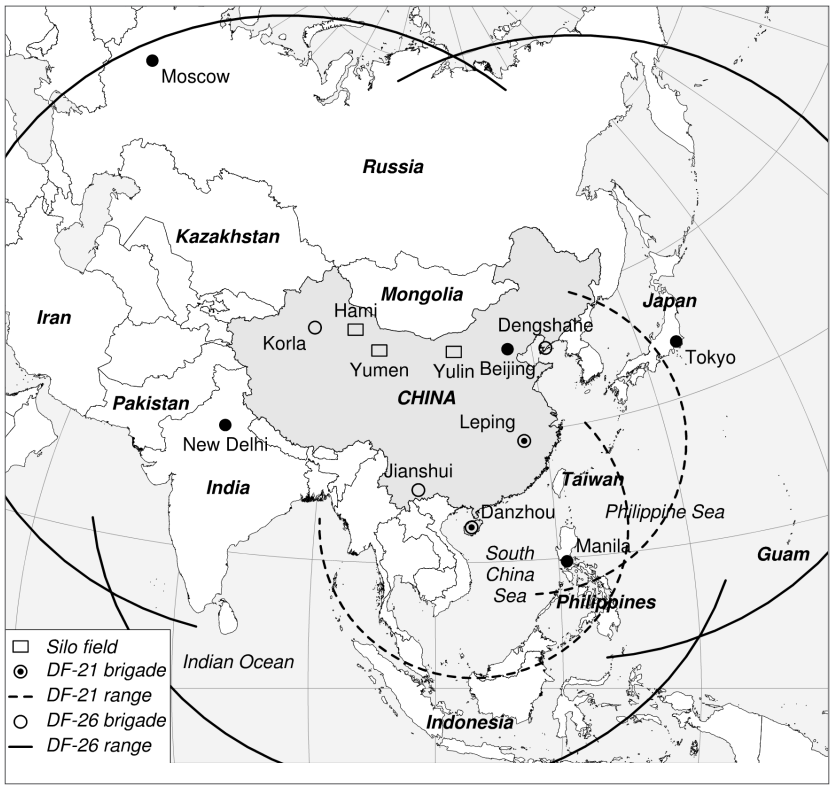
BALLISTIC MISSILES AND MISSILE DEFENCE

The first ballistic missile, commonly known as the V-2, was developed in Germany and used extensively in combat towards the end of the Second World War. Early ballistic missiles were powered by liquid-propellant rocket engines, but for modern missiles, solid-propellant rocket motors are often preferred. Typically, liquid propellants generate greater propulsive thrust than solid propellants, and the engine can be throttled or shut down. Missiles propelled by solid-fuel rocket motors, on the other hand, require less logistical support and are easier and quicker to prepare for launch than their liquid-propellant counterparts, making them more survivable. The engine (or motor) accelerates a ballistic missile in its initial stages of flight, and once the engine burns out, the missile, or at least its warhead, continues on a ballistic trajectory towards the target. The larger the rocket, the more fuel it contains; the more fuel, the higher the burnout speed and altitude that can be achieved, consequently extending the missile's range. Modern ballistic missiles frequently have the ability to manoeuvre somewhat in the final phase of their trajectories in order to increase accuracy and avoid missile defences.

To counter the threat from long-range ballistic missiles, some countries – notably, the United States and the Soviet Union, today Russia – have developed ballistic missile defences of several kinds and with differing capabilities. Ballistic missile defence is costly, which means that even global superpowers are limited as to the threats they can defend against. Consequently, Russian missile defences are concentrated around Moscow, and the United States has explicitly designed its missile defences to protect only against a limited ballistic missile threat from, say, North Korea or Iran.

INTERCONTINENTAL MISSILE FORCES

China's nuclear deterrent capability encompasses both nuclear weapons and delivery vehicles. The DF-5 is the oldest Chinese liquid-propellant ballistic missile still in operation. First deployed in the early 1980s, it has undergone several upgrades since then. Current variants are the DF-5A, carrying a single nuclear warhead, and the DF-5B, capable of delivering several smaller warheads. Both missiles are silo-based, and with ranges up to 13,000 km, they can be used to strike targets across the continental United States.



Map 1. Examples of location and range of selected Chinese missile assets (authors' own compilation).

The survivability of silo-based ballistic missiles depends on how well the silos can be hardened, camouflaged, and concealed. In an effort to increase missile survivability, launch sites were constructed as underground facilities, interconnected by tunnels with rails so that the missiles could be moved around randomly.

China is expanding its silo-based ballistic missile force. For decades, around 20 silos have been in operation, loaded with DF-5 intercontinental ballistic missiles. New missile-silo fields constructed at Hami, Yumen, and Yulin, however, have the potential to increase the silo-based ballistic-missile force capacity more than tenfold. Furthermore, the silo fields at Hami and Yumen are located deep inside China, making them unreachable to United States conventional cruise missiles fired from the Western Pacific. The question of whether all silos are loaded with intercontinental ballistic missiles, or if only a limited number of missiles are deployed to arm some of the silos while leaving others empty to confuse a potential adversary, remains a matter of contention.

China also possesses road-mobile solid-fuelled intercontinental ballistic missiles (ICBM) such as the DF-31 and the DF-41. The DF-31 is capable of delivering a single nuclear warhead to targets more than 11,000 km away, and the DF-41

can be used to launch up to three nuclear warheads as far as 13,000 km. There have been reports of plans for launch modes such as rail-mobile or silo-based.

China is probably also developing intercontinental-range hypersonic glide vehicles (HGV), partly due to concerns about the United States's missile defence capabilities, partly due to national prestige. Hypersonic glide vehicles are typically launched by rockets and then glide through the atmosphere at speeds surpassing five times the speed of sound. They are slower than ballistic missiles; they do not fly along ballistic trajectories; and they can manoeuvre, making them harder to detect, track, and engage. In July 2021, a fractional orbital bombardment system (FOBS) consisting of an intercontinental-range rocket and a hypersonic glide vehicle was tested, demonstrating China's ability to launch missiles with ranges exceeding 40,000 km. That would, in theory, make it possible for China to launch missiles on trajectories across the South Pole, challenging the US's missile defence systems, which are designed to defend against attacks coming from a northern direction.

REGIONAL MISSILE FORCES

While the original purpose of China's ballistic missile programme was to target the United States, China today also fields missiles with ranges that enable it to project power regionally, as described below.

The DF-21 is a family of nuclear-capable ballistic missiles. The DF-21A is a solid-fuel missile that can carry a nuclear warhead up to approximately 2,000 km. A DF-21A brigade based at Leping, in eastern China, could target a number of US bases in the southern part of Japan, reaching almost as far as Tokyo. Its range covers all of the Korean peninsula, and to the south it could reach Manila and US bases in the northern Philippines. A brigade based at Danzhou, on Hainan island, China's southernmost territory, is equipped with the conventionally-armed anti-ship version, DF-21D, claimed to be the world's first anti-ship ballistic missile. From its base, the missile's range covers essentially all of the South China Sea, and most of the Philippines. Furthermore, all of Taiwan and a significant part of the western Philippine Sea are within reach. It is obvious that the DF-21D would play a significant role in attempting to deter US aircraft carriers from entering the South China Sea. Even if the missile were in fact only capable of hitting stationary targets, US naval bases in the Philippines could be held at risk.

The DF-26 is believed to be a dual-capable ballistic missile. One DF-26 armed brigade is based at Korla, in western China. From this position, the missile's stated range of 4,000 km covers Iran, Pakistan, Afghanistan, and most of India. To the north, Kazakhstan, Mongolia, and much of Russia are covered, possibly even Moscow. Other DF-26 brigades are based in southern China, for instance, at Jianshui. From there, all of South and Southeast Asia could be targeted, including all of India, the Philippines, and Taiwan. Guam and Japan are within reach of DF-26 brigades, such as one based at Dengshahe, in the eastern and north-eastern parts of the country. In all, with its arsenal of DF-26 missiles, China can

hold most of the Middle East, all of South and Southeast Asia, and significant parts of Russia at risk. Notably, this area includes the de facto nuclear states of India, Pakistan, and North Korea, and, in addition, several US allies. In particular, American bases in Guam, Japan and South Korea are within reach.

The DF-21 and DF-26 missiles are all launched from road-mobile vehicles. In principle, the missiles can be moved anywhere within China before they are fired. Due to the vast size of the country, however, it is reasonable to assume that the missile brigades will go into action essentially in the area of their peacetime deployment.

China's missile force is currently being modernised by older systems being decommissioned and new systems being developed and deployed. One system that recently entered service is the DF-17 medium-range ballistic missile, armed with a hypersonic glide vehicle. The DF-17 is being deployed in eastern China, with its approximate range of 1,800 km allowing it to target foreign military bases in Taiwan and in the Republic of Korea. The missile has been presented as conventionally armed.

SUBMARINE-BASED BALLISTIC MISSILE FORCES

There are two main benefits to deploying ballistic-missile submarines. One is that the missiles may be launched closer to the target, thus reducing the warning time and the need for missile range. The other is that submarines afford a second-strike capability: if the enemy destroyed all land-based Chinese nuclear missiles in a first strike, China could still retaliate using its sea-launched missiles. Note that any benefit from submarine basing presupposes that the submarines can avoid detection and engagement. Furthermore, a credible second-strike capability, with deterrence patrols, requires not only submarines and weapons, but also functioning logistics and command and control.

China has a number of Jin-class nuclear-powered ballistic-missile submarines equipped with submarine-launched ballistic missiles such as Julang-2 ("Giant Wave," or JL-2) and Julang-3 (JL-3). The JL-2 is a solid-fuel ballistic missile with an intercontinental range of 8,000–9,000 km capable of delivering several nuclear warheads. Deployment of the JL-3 has recently commenced, with an increased range of more than 10,000 km. These missiles could reach most of the Pacific Ocean and the western United States if launched off the Chinese coast and, if the submarine travels far enough east, all of the United States could be targeted.

CONCLUSION

China possesses a diverse and capable arsenal of ballistic missiles, some of which are capable of delivering nuclear weapons. The ongoing modernisation of the arsenal has led to an evolution from a relatively small missile force based on fairly basic silo-based single-warhead missiles to one comprising advanced road-mobile missiles capable of carrying multiple warheads. China is also modernising its fleet of nuclear ballistic-missile submarines and the associated submarine-launched

ballistic missiles. It is difficult to accurately assess the quality and extent of the modernisation programme from the outside, and mere possession of weapons does not necessarily imply political will or intention. Nevertheless, its ballistic-missile arsenal does afford China the ability to threaten nuclear as well as conventional strikes both regionally and globally, making it a significant component of the Chinese strategic policy toolbox.

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13. Chinese Unmanned Aerial Vehicles and Future Autonomous Warfare

Tomas Melin, Martin Hagström, and Michael Tulldahl

China's industry leads the world in several technologies of the future, such as artificial intelligence (AI) and drones. Drones have proven to be a vital tool in military applications. The level of China's technological and industrial capacity will contribute to its future military capabilities. With its drone market of over USD 15 billion, it is big business.

THE RISE OF A HIGH-TECHNOLOGY INDUSTRIAL NATION

During the last three decades, China has transformed itself from a nation with good but basic industrial capabilities and an educational system producing excellent students who went to the West for doctoral studies, to a nation whose Master and PhD programs are comparable to those in the US, for example, in size and quality. Today, China's prominent scholars return home from top positions at the best universities in the US to be part of new academic excellence.

At the 16th National Party Congress in 2002, China introduced a new strategy for industrialisation, integrating knowledge and digitalisation, striving for global market participation, and seizing technological leadership. The subsequent congresses have underlined that strategy, while the long-term effort has clearly achieved effect. China now draws comparisons with the US, as its public R&D funding is either equivalent to or exceeds comparable U.S. federal funding. With an industry focused on producing high quality products and technological leadership, China's industry now leads the world in several high-tech areas, teeming with skilled engineers produced by a strong educational system.

China's 2017 AI strategy and its post-Covid investment in the rapid introduction of 5G networks have not only enhanced the industrial base, but created an industry that constitutes the foundation of surveillance technologies. With high-speed communication networks and AI surveillance algorithms capable of identifying individuals in crowds, mass surveillance systems have been installed in Chinese cities in a short time. These systems are now being exported to many countries all over the world, in Africa, Europe, and South America. China also hosts the global leader in manufacturing small commercial unmanned aerial vehicles (UAVs), also known as drones. The Chinese manufacturer DJI has more than 70 percent of the world market.

These technologies neither originated in the military industry nor are typically seen as military equipment. However, in ground combat, small drones have become an important tool for situational awareness, target localisation, and increasingly, for delivery of a weapons payload. In the Russo-Ukrainian war, they are ubiquitous. In the first years following the full invasion, both sides used Chinese commercial systems, which provided unmatched affordability and performance, despite the tactical drawbacks of using non-military grade equipment.

On the battlefield, whether in the air, at sea or on the ground, information supremacy is crucial for awareness and the possibility to strike ahead of your adversary. In ground combat, characterised by a cluttered environment and many actors, the ability to rapidly distribute and coordinate sensors cannot be overrated. It creates control over the information flow and paves the way for effective weapon use and ensures one's own protective measures.

The Chinese military industry is the second-largest in the world. It long focused on arming Chinese forces, the vast People's Liberation Army (PLA), and aimed therefore at quantity rather than high-technology equipment. Since the last decade, this has changed, and the sights are now set on reaching the same technological level and maturity as the US. If small drones prove to be a key capability, China is in a favourable position on future battlefields.

THE COMMERCIAL MARKET, DEFENCE INDUSTRY, AND MILITARY APPLICATIONS

Drone manufacturers in China, as in other countries, operate in a commercial arena, and it is therefore interesting to describe the commercial segment of the drone market. The rapidly expanding market for commercial drones is affecting the general development and applications of cheap systems for dual-use in several aspects. These include the increased availability of parts and subsystems, capabilities for mass production, and technological and engineering solutions for low-cost but still relatively advanced drones. These low-cost systems can be used directly in a military context, but the production capacity and expertise gained can also be employed for development of dedicated military systems.

The commercial market for small drones began around 2013. The well-known Chinese company DJI was one of the first actors, and is still the leading and largest manufacturer in this arena. DJI released its Phantom UAV in 2013, with a price tag that made it accessible to a large number of private consumers. DJI had started out several years earlier, however, as an engineering company producing flight-controller electronics for the hobbyist community and specialists in aerial photography. Together with other manufacturers, DJI took the step of integrating parts and producing turnkey unmanned aerial systems that included all the necessary hardware and software to get a small drone flying in minutes. The market responded relatively quickly, with more than 100,000 DJI Phantom units sold in 2013 to consumers and commercial users globally. DJI continued

to develop the photography functions, collaborating with the famous Swedish camera company Hasselblad. DJI has reportedly been a majority shareholder of Hasselblad since the end of 2016, and DJI drones are now equipped with its high-end cameras. The global market grew quickly in the civilian sector, among both private consumers and commercial customers, such as photographers and real estate agents. The market size for consumer drones alone went from close to zero before 2013 to an estimate of over USD 4.5 billion in 2023 and is expected to grow at a rate of 10 percent during 2024–2030. The commercial segment, where DJI is also the dominant actor, is slightly larger.

Several US government departments, such as Defense (DOD) and Commerce, have imposed restrictions on the use of drones made in China or "other covered foreign entities," meaning "certain other" countries. Notwithstanding this restriction, DJI and other Chinese products are still used in many US state, county, and municipal agencies. Concerning the defence procurement of small drones, about USD 153 million of the US DOD's budget was allocated for small drone programmes, which was less than four percent of the US small drone market. This indicates that primarily commercial interests drove the small drone sector, at least in 2020.

Given the use of civil drones in military applications, there are implicit economic and technological relationships between the military and civilian small drone markets. The implicit connection is aligned with the Chinese strategy for increased civil-military integration. Since the last decade, this strategy, named *Military-Civil Fusion* (MCF), has had the purpose of eliminating the barriers between civilian and military research and industry in order to support the overall goal of military dominance.

MILITARY TECHNOLOGY

Drones enable the placement of cameras and other sensors freely in a combat zone, vastly increasing the amount of information intake and, in theory, increasing the intelligence-gathering in the area. The operation of many cameras alone is not sufficient, however, to gather mass volume intelligence. In 2007, the US Air Force had already gathered over 200,000 hours of reconnaissance video over Afghanistan and Iraq, overwhelming intelligence analysts. To prevent overload of human analysts, the video feed can be analysed by AI algorithms, a hot research topic in the global AI-research community. However, the big step towards information supremacy will occur when the sensors are networked to allow for multi-feed analysis. This kind of sensor fusion seems to be one of China's priority research topics.

Efficiency in not only information management and analysis, but also in sensor distribution, is essential. Borrowed from the world of insects, the term *swarming* is an emerging concept in the drone world. Grouped together, drones aggregate and exhibit collective behaviour to accomplish a task, much as birds and

insects swarm for mutual navigation or protection. Future military swarming systems could be used to distribute sensors to maximise information-gathering. Light shows produced by up to 5000 drones forming advanced shapes in the air demonstrate the ability to address logistics and the command and control of many drones. These shows typically employ a centralised control architecture, mostly unsuitable for military applications, but China is active in swarming research. A recent US Air Force survey of Chinese inventions relating to swarming drones found that from 2009 until early 2023, the Chinese patent office received 256 unique patent applications relating to swarming drones. 160 of the applicants were from the PLA or other defence-related institutions.

The use of drones is well integrated into all branches of the Chinese armed forces. The French Foundation for Strategic Research (FRS) reports on the use of drones in the Sino-Indian border dispute. Drones have been used in many different roles, such as: surveillance, damage assessment, targeting, mine clearance, communications support and, notably, logistical transport. The terrain in the contested zone is difficult to negotiate by other means than by foot or air, which constitutes a good case for air transport. A recent FRS report states that the majority of the smaller drones come from civilian manufacturers, rather than military.

Several media outlets report that the PLA's Unit 78092 has published a Concept of Operations (CONOPS) for a scenario in 2035 that uses long-range, long-endurance drones to deliver offensive capability to an adversary. This matches well with observations of the airspace around Taiwan, where the US DOD estimates that 10 percent of all flights are drones. The *PLA Daily* has described the future use of drone-fleet operations as emphasising quantity to reach firepower supremacy, while identifying a weakness in employing centralised command in large-scale military applications.

In the autumn of 2023, the Chinese Ministry of Commerce stated that it will impose export controls on drones and drone equipment in order to "safeguard national security and interests." This is a response to the US investment blacklisting of DJI and other market-control policies, as well as China's need to appear neutral in the Russo-Ukrainian war. The official statement from the Ministry was that "China has always opposed the use of civilian drones for military purposes." However, the export-control measures for consumer-grade drones do not necessarily prevent military use, although they prohibit direct procurement by the armed forces.

FUTURE AUTONOMOUS WARFARE

Superiority in information and speed have always been important on the battlefield. Automation will increase the speed of both information-gathering and decision processes. When aggregated, swarming drones and mass-surveillance technologies will give any nation that masters them a good vantage position for more automated warfare. China has proven diligent in all these areas. Its strategic focus

and strong commitment to building high-level technological industrial capabilities have borne fruit. Backed by the Chinese industrial complex, the PLA's future capabilities will be impressive, making China the strongest actor in some of the future's potential battlefields. The US and Europe are not presently behind in the technology race, but they have not shown the same commitment to industrial development. Is there time to catch up? Is strong political will necessary? What instruments are needed to create industrial incentives? The questions are many, and they need to be answered soon.

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14. Taiwan 2027: Exploring the Implications of a China-US War for the Nordic Armed Forces

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The conflict over Taiwan's status is the hottest flashpoint in the Indo-Pacific Region between China and the USA. In this article, we take one step further beyond the common acknowledgement that a war would have severe global consequences to identify specific challenges for the Norwegian Armed Forces. These challenges are also relevant to the Nordics at large and should be included in scenarios and defence planning.

According to scholarly consensus, warfighting in the Taiwan Strait will mainly involve regional powers, that is, China, Taiwan, the United States, and perhaps Japan and Australia. With respect to European involvement, the literature is largely limited to political and economic sanctions. However, recent research conducted by the Norwegian Defence Research Establishment (FFI), which explores implications for Norway in more detail, finds that these are more complex, numerous and severe than is often acknowledged. In this article, however, we specifically discuss only three of these challenges as they apply to the Norwegian Armed Forces: the impact on US ability to support Europe, the possibility of national needs triggering subsequent tasks in the Indo-Pacific Region, and, finally, the disruption of the supply of semiconductors from Taiwan. Although we use Norway as a case, these implications are arguably also relevant to other Nordic countries. They share many of the same characteristics: all are small states with an open economy; they have an international shipping industry; and, importantly, they are all formal allies of the US. Thus, we argue that the three challenges in this article will be useful starting points for the Nordic armed forces in general as they prepare for a great power war over Taiwan.

THE TAIWAN 2027 SCENARIO

We use a specific scenario as a starting point for identifying the challenges. We assume that China triggers the scenario by deciding to invade Taiwan, and that, in defence, the US responds by intervening militarily. An alternative, forceful course of action to attempt to "reunite" Taiwan could be some kind of quarantine or blockade. Different military approaches to the same objective may lead to many of the same implications, although the level of severity may vary. Because

a full-scale Chinese invasion is the worst-case scenario, we limit the analysis to this course of action. We choose the year 2027 to emphasise that a possible war is not just a distant scenario.

As a scenario, the Chinese invasion of Taiwan involves an amphibious force traversing the Taiwan Strait. In such a campaign, landing these forces ashore, establishing beachheads, and occupying ports and airports to underpin force sustainment are key objectives for the People's Liberation Army (PLA). If the US decides to defend Taiwan, the best way is to destroy the amphibious force as it crosses the strait. That means that the US forces must project power within the PLA anti-access/area denial (A2/AD) bubble. This steel-on-steel contest in the strait implies that both great powers must commit a huge number of forces. The area of operations – from the Korean Peninsula to Vietnam – would be closed to civilian shipping, at least until the great powers agreed on any exclusive zones for maritime transportation. Additionally, the PLA is likely to establish a blockade around Taiwan as an operational step in the overall invasion and thus block it from any incoming or outgoing transportation. How would such a scenario impact the Norwegian Armed Forces?

THE IMPACT ON US ABILITY TO SUPPORT EUROPE

The fundamental assumption underpinning Norwegian defence planning process is US military support to defend against potential aggression from Russia. Until recently, this option was taken as a given. However, the arising US security problem of deterring, and ultimately combating, China in the Indo-Pacific challenges this assumption. Chinese A2/AD capabilities are now so formidable that they have the capacity to inflict severe losses on US forces. Wargames suggest that the USA will lose troops in the thousands, aircraft in the hundreds, surface ships in the dozens, and even have to anticipate losing aircraft carriers and submarines. US satellites, bases, and ultimately the US territory of Guam may be targeted. The military problem confronting US forces in the Taiwan 2027 scenario requires significant force concentration in the region, particularly air and sea forces. Prioritising the Indo-Pacific theatre means fewer forces elsewhere. Several analysts argue that military crises occurring concurrently in the North Atlantic theatre and in the Indo-Pacific represent a strategic challenge to the US, questioning its ability to provide sufficient military support in our region.

The question of US military support is not necessarily a "support/no support" question but could also imply changes regarding the type of support it is able to provide and in what form of cooperation by host nations. For example, host nations may have to provide more capabilities to underpin US forces than today. The Taiwan 2027 scenario necessitate that we rethink the fundamental assumption regarding US military support and how it may impact host-nation requirements.

NATIONAL NEEDS AND TASKS IN THE INDO-PACIFIC REGION

In a Taiwan scenario, the primary contribution of the Norwegian Armed Forces to international crisis management will be to stay on guard at home. Being strong enough to monitor and handle security issues in our national area of operations (AoO) will be the best way to support allies operating in the Indo-Pacific. However, the national AoO may not be the only place where these forces operate. We have identified two possible security problems that can necessitate support from the Norwegian Armed Forces in the Indo-Pacific: strategic evacuation and protection of civilian shipping.

The Norwegian footprint in Taiwan is modest, with around a hundred Norwegian nationals. Sweden and Denmark have a much larger footprint on the island. However, the Norwegian presence in the Taiwan Strait AoO at large is, as with any country, much greater than that in Taiwan. The need for government-facilitated evacuation, so-called strategic evacuation, arises in situations where civilian transportation is insufficient to satisfy demand. This happens if the security situation makes civilian transportation too risky or if the demand to exit quickly simply becomes too large. A great-power war in the Indo-Pacific will likely lead to both, and thus the need for government-facilitated evacuation is to be expected. Strategic evacuation is a whole-of-government task, to which the armed forces contribute, for example, with transportation, medical assistance, and protection measures.

The Taiwan Strait AoO is one of the world's most trafficked shipping lines. Products from China's ports are transported to the global market and energy supplies are shipped into China. Approximately 10 percent of Norwegian-affiliated vessels are present in this area. In the outbreak of war, these vessels are exposed to several hazards, including harassment, blocking and capture of vessels and personnel, mines, and specific acts of war, such as blockades. In addition, during wartime, civilian vessels can be requested to contribute to transportation missions. Norwegian-affiliated vessels have made several contributions in recent conflicts. Examples of missions are the evacuation of personnel, transport of dangerous materials, and providing support to non-governmental organisations. Civilian vessels within or near the Taiwan Strait AoO during the war may be exposed to the same threats as trapped vessels at the beginning of the war. As a risk-mitigating effort, it may be necessary for armed forces to protect civilian transportation missions, for example, by maritime escort.

DISRUPTED SUPPLIES OF SEMICONDUCTORS FROM TAIWAN

Taiwan has a unique position as a supplier of semiconductors to the world, as it produces 60 percent of the total volume and 90 percent of the most advanced chips worldwide. Numerous production lines across the globe incorporated these semiconductors, making supply dependencies and consequences difficult to predict. Disruption of supply is a risk that will affect Nordic societies as well as any other.

Semiconductors are ubiquitous components in our surroundings. They produce computing power, which can be considered a critical societal resource. Computing power is crucial in military operations, underpinning precision weapons, sensor fusion, and network-centric warfare, to name a few. Technologically advanced armed forces need spare parts and resupplies containing sophisticated semiconductors to exploit their equipment and perform effectively as a complex system. The international sanctions on Russia in response to its full-scale invasion of Ukraine include a ban on supplying it with semiconductors. Reports suggest that this has forced Russia to prioritise the computing power available. Allegedly, this has resulted in semiconductors intended for household items being found in Russian weapons.

In recent years, several countries have tried to manage the vulnerability of semiconductor supplies from Taiwan by establishing national production facilities. Semiconductor production, however, is an advanced and highly technological process, requiring specific types of materials, machinery, and competence. This makes such diversifying efforts very challenging, time-consuming, and difficult to achieve by 2027.

Semiconductor dependency is a combination of the need for a large volume of components and their level of technological sophistication. Advanced semiconductors provide more computing power. Disruptions of semiconductor supplies, or supplies of commodities containing semiconductors, are a societal challenge that will impact the Norwegian Armed Forces at least as severely as any sector. Disruption will affect the armed forces both directly and indirectly via the defence industry and new acquisitions. Considering that computing power is a critical societal resource, alongside electricity, water, and fuel, the problem can be handled as part of national crisis management. However, it is necessary for the Norwegian Armed Forces to address their computing power requirements in the governmental process that is responsible for the national prioritisation of critical resources.

CONCLUSION

The Taiwan 2027 scenario has several implications for the Norwegian Armed Forces. We argue that this is also relevant for the armed forces of other Nordic countries. One challenge is that a potential great-power war in the Indo-Pacific Region could impact the US's ability to support Europe militarily. Another challenge is that such a war may create national needs in the Indo-Pacific region that in turn trigger military tasks there, such as strategic evacuation and maritime protection. A third challenge is the disruption of Taiwan semiconductor supplies. Including these and other challenges in today's planning will help the armed forces manage the situation if the scenario becomes a reality in the future.

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Part Four

Technology and Science

15. China's Defence Research Policy: Insights from Weak Signals Analysis

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China is the world's premier country in scholarly output, surpassing the US in 2022. Much of this research falls into areas that have potential military implications. However, such links are ambiguous, and there is scant insight available into Chinese defence research. Here, we use "emerging weak signals" as indicators of cutting-edge research when examining China's current research trajectory. The results suggest an ongoing global power shift in several research areas with relevance for defence. Continuous monitoring of Chinese research activities appears to be the prudent approach.

CHINA TAKES THE LEAD

China's rapid economic development couples to an equally rapid increase in efforts directed towards innovation, research, and development. Its national strategic plans and industrial policy goals are explicit about these ambitions. An example is the 2015 government plan, *Made in China 2025*, which sets targets to become self-sufficient and in some cases world leader in: information technology, robotics, green energy, aerospace equipment, ocean engineering, railway equipment, power equipment, new materials, medicine, and agricultural machinery. Several of these have potential connections to defence and security ambitions. However, such links are often inexplicit, with differences between policy and implementation.

To follow such developments and the impact that policy has on research and development output, independent examination and evaluation are important. Tools for monitoring innovation and research include the numbers of patents or startup companies. For fundamental research, a useful indicator is scholarly output in the form of peer-reviewed research articles. Monitoring research on potential military applications provides a window of opportunity to identify emerging technologies, including those presumed to be critical for defence. One example is the *Australian Strategic Policy Institute's Critical Technology Tracker*, which is an ongoing effort to monitor the evolution of technology competition. It analyses high-impact research publications in selected technology areas of vital importance for national security, societies, economies, health, energy production, and climate security. Their analysis reveals China's leading position in most of those areas. In this essay, we focus on a method for detecting nascent research directions that are at low technology readiness levels, before they end up being

classified. Formulated this way, our approach deals with the detection of "weak signals." Before turning to those, however, it is informative to examine the general picture by looking at the total publication trends.

During the period 2009 to 2019, China's global share of peer-review scholarly output doubled. By 2022, China accounted for 22 percent, becoming the world's largest producer of scientific publications, thereby surpassing the US, at 19 percent. In comparison, the third-largest contributor was the United Kingdom, with a 5 percent share. In addition to these general trends, there are specific signals for research of defence relevance.

China's "Seven Sons of National Defence" is a group of seven universities with reportedly close ties to the Chinese defence sector and the People's Liberation Army (PLA). Seven Sons serves as a proxy to gain insight into Chinese research that has a more specific defence focus. For Seven Sons, the publication growth rate is 40 percent higher than for China in total. This signals its high ambitions in defence-related research.

WEAK SIGNALS OF A TECHNOLOGICALLY STRONGER DEFENCE?

Previously, much of Chinese research and development focused on reverse engineering to keep up with innovations from the US and other countries. In recent years, Chinese research has shifted, becoming increasingly innovative. Here, we discuss weak signals in scientific publications as a means to investigate whether this shift is visible in China's scientific output.

A weak signal is something that is difficult to detect, but could have potentially large impact on future developments. The presence of weak-signal keywords within a scientific publication provides information, not otherwise evident from the general scientific publication record, on the novelty of the conducted research. We use a compilation of 439 search terms from the report, *Emerging weak signals 2023 in Science and Technology*, published by the Korea Institute of Science and Technology (KIST), as frontier-of-research indicators. It lists keywords for a broad range of novel and trending research topics with the potential to impact future society.

China's research activities in fields relating to "emerging weak signals" have grown in the last decade. This is revealed not only by an increase in the number of publications, but also because its share of the world's publications is greater and overtaking the US, mirroring the trend in total publication output. This is similar to the number of citations – another measure of scientific impact – of China's emerging weak signals output. However, the shift in citations is not as pronounced as it is for the number of publications. This difference may indicate that Western society lacks awareness of current Chinese research activities.

Another key aspect is the areas in which China currently focuses its research activities. An analysis of emerging weak-signals keywords based on metadata from the scientific publication databases, Scopus and OpenAlex, using two time windows, 2010–2016 and 2017–2023, shows that China has surpassed the US as the leading nation in several research areas, primarily within STEM (science, technology, engineering and mathematics) fields. China's research activities relating to emerging weak signals are summarised in Table 1 below. In medicine and social science, the US is still in the lead, but the difference is decreasing in the later time-period (i.e., China is closing in on the US). In biology, computer science, energy, and physics, China was behind the US in the earlier time-period, but has now surpassed it. In chemistry, engineering and materials science, China was already ahead of the US in 2010–2016 and is now widening the gap.

For China in general and the Seven Sons in particular, we see that the highest share of their research is in STEM fields. They also have the highest number of STEM publications when compared to the rest of the world. This indicates a targeted approach to being competitive in these fields. This is in line with *Made in China 2025,* which specifically mentions areas such as information technology, robotics, and new materials.

China has established long-lasting, strong connections, of which the Seven Sons are the most prominent examples, between research institutions and the military sector. For the analysed emerging weak signals, publication data for the Seven Sons universities verify their STEM research focus. The strongest increases in research efforts, comparing the two time-periods, from the Seven Sons universities relative to China as a whole are in energy and social science. At the same time, there is a decrease in research activity, relative to China as a whole, in agricultural and biological science.

By observing the emerging weak signals data for the share of publications that are co-authored with authors outside of China, we can get an overview of China's international cooperation in these areas. The share of international cooperation increased between the periods 2010–2016 and 2017–2023, but the trend has stagnated or slightly decreased since 2018. Possible reasons for this include the effects of the pandemic, an increased domestic research focus in China, and increased awareness in other countries of the security aspects and risks involved when collaborating with it.

The latter explanation may seem contradictory given the fact that the Seven Sons have a higher degree of international cooperation than the rest of the Chinese research community. This could be a sign of a deliberate Chinese ambition to make use of international research cooperation to strengthen the Seven Sons, but there are other possible explanations, such as how attractive the research at different universities is for international partners. However, note that although the Seven Sons have a higher degree of international cooperation than China in general, they follow the same overall stagnating or slightly decreasing trend.

Table 1. A compilation of the top 5 (ordered) emerging weak signals in different research areas for China and Seven Sons. The activity is sorted based on a comparison with the US. Data refers to the number of publications during the period 2010–2023.

Emerging Weak Signals			
China's research activity	**Subject areas**	**Seven Sons**	**China**
Widening the gap with the US	**Chemistry**	conductive hydrogel n-gqds CuCo2O4 mil-53 fe micro- and nanomotors	conductive hydrogel mil-53 fe n-gqds CuCo2O4 ssz-13 zeolite
	Engineering	unmanned surface vehicles more-electric aircraft energy router capsule network collaborative robots	unmanned surface vehicles energy router capsule network cold chain logistics charging piles
	Material Science	solid-state electrolytes additive manufacturing technologies transition metal sulfides 2d nanomaterials perovskite quantum dots	solid-state electrolytes transition metal sulfides 2d nanomaterials cdots graphdiyne
Surpassed the US	**Biology**	gpx4 alphafold2 livestock and poultry manure mpro intestinal organoids	gpx4 m6a modification kmt2d alphafold2 livestock and poultry manure
	Computer Science	connected vehicles uav swarm label noise vr technology lower limb exoskeleton	vr technology hesitant fuzzy connected vehicle vgg19 label noise
	Energy	lithium plating solar power plants prelithiation clean energy consumption photovoltaic power station	solar power plants photovoltaic power station lithium plating clean energy consumption agricultural carbon emissions
	Physics	berry curvature metalens magnetic skyrmions hybrid nanofluids CrI3	berry curvature metalens magnetic skyrmions hybrid nanofluids CrI3
Closing in on the US	**Medicine**	radiomics signature pgt-a neoantigen u-nets mirna-lncrna	neoantigen mirna-lncrna neutrophil-lymphocyte ratio tfh cells mlkl
	Social Science	ride-sharing omnichannel last-mile delivery e-bike leader humility	ideological and political course ride-sharing smart tourism e-bike showrooming

A LOOK INTO THE FUTURE

Predicting how science and technology contribute to shaping the future, akin to employing weak signal detection, presents a grand challenge but promises significant rewards. On the other hand, we can find inspiration in the fact that the current paradigm for any time and place was also once a weak signal. The basic problem is that we have no means of actually determining the relevance of an individual signal until later. Such is also the case, of course, for the weak signals used here. Still, if we evaluate a comparably large number of weak signals from a broad set of disciplines, the laws of statistics may work in our favour.

The present approach focuses on signal detection. An alternative approach is to detect the absence of signals in cases where they are expected. A classic example from 1942 is when the Soviet physicist, Georgy Flyorov, reviewed the scientific literature for recent papers on nuclear physics and found none, something he interpreted as a sign of an imminent nuclear bomb: the Manhattan project. Detecting the disappearance of a weak signal is in general even more challenging than finding a weak signal. Our present focus on examining trends in the emergence of weak signals in fundamental research may be a way of avoiding the Flyorov situation: by detecting a signal before it becomes strong and, if it has military applications, potentially becomes classified.

The Swedish Defence Research Agency (FOI) has in the past studied China's research and technology interests and capacity from various points of view. In 2016, a study examined "urban warfare" in publications from Chinese sources (in Chinese). One conclusion was that many publications, despite being published in Chinese journals and written in Chinese, primarily discussed developments in Western countries, particularly the US. An interpretation is that China, at that time, was looking towards the outside world and the US in particular.

Today, there may be good reasons for the outside world, including Sweden and FOI, to look at China. The signs are that China is the world leader in many science and technology areas of interest and relevance for defence. We see a need for continuous monitoring of defence-relevant research in China, including cooperation patterns. This will improve our familiarity with their thinking, making their defence research policy, ambitions, and abilities more transparent.

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16. Swedish Research Collaboration with China at a Crossroads

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In early 2023, reports in Swedish media exposed risks associated with research collaborations with China, including researchers with connections to the Chinese military who had worked with Swedish universities. Increased awareness of such risks has prompted the Swedish government to step in more actively to regulate international research collaborations. To what extent the government will intervene in the process of mitigating risk, however, is still uncertain, as there are both benefits and risk with such measures. Striking an appropriate balance between maintaining relative openness and enforcing more regulation will therefore be an increasingly difficult topic for the Swedish government and research community to manage.

CHINA IN INTERNATIONAL RESEARCH COLLABORATION

One determining factor driving the developments in Sweden to mitigate risk in international research collaboration can be traced to the emergence of China on the global stage in research and innovation. China's rise as a science nation over the past few decades has been unprecedented. Many observers now deem that it is a world leader in several key research areas, most notably critical technologies such as artificial intelligence and quantum technologies.

Chinese research policy is dominated by a push for so-called "self-reliance in science and technology," a political concept that first appeared in late 2020. While goals of self-sufficiency and protection of critical sectors of the economy are not new in China, the further development of this policy has been interpreted by Western observers as a response to what China's leaders view as an increasingly hostile international environment. The rationale behind this policy is that if other countries, such as the US, limit China's access to critical technologies, China will need to learn to develop these technologies itself. Consequently, China's leaders want collaboration to take place on China's terms and in ways that directly benefit and align with its national interests and policy goals. Compared to Western countries, its research and innovation policies are more heavily influenced by the national government. Most importantly, the military and civil sectors are deeply intertwined, and it is becoming increasingly difficult to distinguish the two. During the era of Xi Jinping, this fusion of the civil and military sectors has been raised to the level of a national strategy.

BENEFITS AND RISKS OF SWEDISH RESEARCH COLLABORATION WITH CHINA

As China's state involvement in research has increased, research collaboration between Sweden and China has seen rapid development over the last decade. Researcher-to-researcher collaboration between the countries has continued to increase in terms of the number of co-publications. A 2023 report by the Swedish Foundation for International Cooperation in Higher Education and Research, referring to the latest available copublication data, from 2021, noted that China has now surpassed Denmark and Norway and emerged as Sweden's fourth-largest research partner. In other words, Chinese and Swedish research have become increasingly interwoven, which presents the Swedish research community and national government with the dilemma of how to deal with academic collaboration with China.

In this context, researchers, universities, and government must navigate an increasingly complex landscape of benefits while dealing with significant risks, both real and perceived. On the one hand, from a scientific point of view, evidence certainly suggests that cooperation with China has brought many benefits to Swedish researchers. For example, copublications including at least one author in Sweden and one in China have higher citation index ratings than publications authored solely by individuals from either Sweden or China. While high citation standings do not automatically equal high scientific quality, such data indicate that both sides benefit from the collaboration. Sweden and China also collaborate in several areas where China is at the scientific forefront, including materials science and energy technology. At the same time, partnerships with colleagues in China have improved Swedish researchers' access to large-scale datasets as well as financial and personnel resources.

On the other hand, the challenges and risks of research collaboration have become increasingly difficult for researchers and universities to navigate. Such challenges include a lack of transparency and reciprocity, violations of academic freedom, political efforts to influence, concerns regarding data security and technology transfer, as well as ethical dilemmas. Until recently, the Swedish government had largely left the responsibility to mitigate risk to the universities and research communities themselves. But, following a debate in the media during 2023 concerning the risks of research collaboration with China, the government asked three government agencies to develop national guidelines on "responsible internationalisation."

THE PATHS AHEAD: INCREASED REGULATION OR CONTINUED OPENNESS

In light of China's rise as a science nation and increased awareness of the threat it may pose, Sweden is currently at a crossroads regarding its research collaboration with the country. The central question is how Sweden will go about striking a balance between maintaining openness in scientific research and responding to

increasing security demands. Broadly speaking, Sweden can choose to continue its open approach or decide to be stricter in regulating collaboration, a path that has already been pursued by some other national governments.

Stricter export control, for instance, is one aspect of legislation that governments use to regulate universities' international activities. Other aspects include visa requirements for researchers and students or thorough eligibility regulations for public funding. In Canada, the government has recently published lists of both "sensitive technology research areas" and "named research organisations." For any grant application by Canadian universities advancing research in one of the sensitive areas, none of the research team members involved may have any links, defined as affiliations, funding or in-kind support, to the named research organisations. Worth noting is that while the list is country-agnostic, more than 80 of the approximately 100 organisations named are based in China. Australia, for its part, has announced a new critical technology "enhanced visa screening" for individuals wishing to undertake studies in such fields.

There are several arguments why a stricter approach would be in Sweden's best interest. To begin with, Chinese policies on self-reliance and state involvement in the research sector are more likely to continue to increase than abate, thereby increasing both the real and perceived risks of research collaboration with China. In this context, a stricter approach could have several potential benefits, including more stringent protection of research and technology assets. Using lists to clearly communicate to the research community which technologies and research areas have potential security concerns could provide a basis for a more targeted review.

A stricter and more regulative approach to international collaboration would also seem to fit well with the EU's current focus on security issues. Notably, in January 2024, the European Commission included research and innovation in its broader set of initiatives dealing with economic security, in the form of a "Proposal for Council recommendations on enhancing research security." Stricter regulation would therefore seem to be the appropriate response to China's policies within this larger context and a way to mitigate risks and dependencies.

However, there are also arguments for Sweden to continue its relative openness, supporting the research community with guidelines and support structures but not interfering significantly with regulations. Firstly, more intrusive measures could be both impractical and have several negative side effects. For example, evaluations of existing screening measures in the UK and the Netherlands have demonstrated the risk of long delays and uncertainty, as well as discrimination or nationality profiling of applicants. Such measures threaten to make Sweden a less attractive destination for excellent researchers from non-European countries. The research community often argues that even if lists of technologies are regularly fine-tuned and updated, it would still be impossible to keep up with the

development of emerging fields. Because of this, lists remain a blunt tool, meaning both that research and know-how on potentially harmful technologies might still slip through and that there is a possibility of either overregulation or a false sense of security.

Another argument for continued openness towards academic collaboration and exchange with China is that over-restriction would also result in lower access to Chinese higher education institutions. It would also make it more difficult to understand China's situation, both in terms of research and society in general. Researchers and research organisations in Australia and Germany have recently warned that increasingly restricted exchange could result in a lack of access to and competence about China..

Finally, policies designed to provide support to universities are also more likely to be well-received and implemented than those that might be perceived as threatening academic freedom or interfering in universities' affairs. There are also indications that non-binding measures, including the proposed national guidelines, will be enough for the government to send universities and the research community a strong signal to better manage and enhance their awareness of the risks in research collaborations.

Effectively, an approach of continued relative openness would mean that the universities themselves would remain responsible for dealing with risks related to international collaboration and that the national government would remain in a minor role. In practice, this would entail that the government supports universities and research-funding organisations through non-binding guidelines and possibly also by establishing some kind of helpdesk or contact point. Such means have already been implemented in the Netherlands with some degree of reported success. Such an approach could also include suggested measures to enhance university boards' competence in security aspects of research collaborations, which focus on raising awareness rather than defining any red lines of collaboration.

For the above reasons, it is important to continue to discuss Sweden's research collaboration with China and other authoritarian states. How to find the appropriate balance between maintaining relative openness and enforcing more regulation will be an increasingly difficult issue for the Swedish government and research stakeholders to manage in the coming years.

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17. Divine Manipulation of Cyber Threads

Henrik Karlzén

The cyber domain has room for both benevolent and malicious use. China not only has much influence through its powerful cyber-related global industries, but it can also use this power for manipulation and disruption. China's capability for cyberattacks is considerable, but it maintains that its intent is globally beneficial trade. Careful consideration is needed to determine the extent to which China should be given the benefit of the doubt, and to understand the underlying rationality. Given this doubt, Sweden requires a cyber security and defence strategy that includes responsibility, candour, and detection.

INFLUENCE AND MANIPULATION

China is also a global superpower in the cyber domain. China's cyber-related industries play a major role internationally, and its control of information crossing its borders is comprehensive. It would be foolish for the rest of the world to reject all technological advancement and scientific research that originates in China. However, it not only exerts cyber influence, but substantial cyber threats. The US government considers China the probably most active cyber espionage threat, with the capability of using cyberattacks to disrupt critical infrastructure. Similarly, the US views China's export of cyber technologies, such as microchips and lithium-ion batteries, as increasing that threat. China likewise has the capability to threaten Swedish society.

Many of the possible threats to Swedish society are due to overt and ostensibly benevolent, Chinese involvement. For instance, when Swedish society is dependent on Chinese cyber technology, it becomes contingent on timely updates and services, which may be suddenly cut off or manipulated in a time of crisis. When developing its 5G infrastructure, this reasoning was part of Sweden's decision to ban Huawei from developing it. Furthermore, both overt and covert Chinese technological involvement in Swedish society increases China's intelligence-gathering opportunities. This applies to the stealing of trade secrets from technology companies and exerting softer influence by, for example, sending Chinese citizens to conduct scientific research and study at Swedish universities. There are also cases where China has been accused of being affiliated with cyberattacks, such as the Cloud Hopper supply-chain campaign, which affected Sweden, among other countries. In addition, cyber threats do not necessarily need to target Sweden in order to negatively affect it. Collateral damage can occur, causing additional victims of an attack. For instance, the 2017 NotPetya attack, attributed to Russia, was likely aimed at Ukraine, but also had a significant impact on the transport giant, Maersk, subsequently affecting Gothenburg's port operations.

Collateral damage can also occur by being made an unwilling accomplice, such as in "botnets" where attackers take over one's infrastructure and use it against others. A version of this has been used by China's "Great Firewall" internet censorship regime to inject passing traffic with malicious code that instructs the traffic-originating computers to attack a third party. Whether the damage is collateral or not, Sweden's reliance on cyber technology means that numerous threats must be considered, with those emanating from China among the most significant.

BENEFIT OF THE DOUBT

The portrayal of China as a cyber menace is not shared by all. The Chinese government and Chinese corporations maintain that they seek cooperation within normative frameworks. This position is appealing to Western nation-states who wish to engage in diplomacy and trade while also conducting their own cyber espionage, which could therefore be construed as normal in international relations. Furthermore, China has not been a historical threat to Sweden. It is also appealing to react only slightly to smaller transgressions, adjusting the crossed line-in-the-sand to avoid escalation, while saving larger reactions for more serious situations. This line of thinking focuses on compromise and cooperation rather than punishment. Furthermore, it is difficult to obtain incontrovertible evidence of the originators of cyberattacks. For instance, an attribution based on attack toolchain similarities can be questioned due to the ease of weapon reuse, while the geolocation of attacker IP addresses can be dubious due to the connections via proxies and overtaken infrastructure. It is rarely difficult to extend the benefit of the doubt if one wants to.

EVERY GRAIN OF SAND

Extending the benefit of the doubt may be appealing, but a more cautious view would be that the Chinese government is highly skilled in the art of manipulation. Serious defence also requires preparing for the worst, and this is especially true in view of Sun Tzu's teachings from the ancient work, *The Art of War,* that "supreme excellence consists in breaking the enemy's resistance without fighting," supported by secret infiltration and deception by spies as "divine manipulation of the threads." In today's world, the threads may be cyber threads. While influential, these old phrases are difficult to interpret. Still, a useful stance would be to seek a better understanding of China and its intents and motivations. This understanding would make it easier to differentiate the real opportunities for cooperation from the threats. Such understanding should be based on observations of Chinese institutions and modern doctrines, as well as the intertwined behaviours. The Chinese political system and its authoritarianism are in many ways far removed from Swedish perspectives and motivations.

China's strong governmental control can be felt in many ways. In the cyber domain, the Chinese population is severely restricted and surveilled by the Great Firewall. The presence of China's strong government can also be perceived in its

2017 national intelligence law that globally requires Chinese organisations and citizens to contribute to state intelligence. This overall strategy of amassing intelligence widely has been likened to collecting every grain of sand from a beach and deciding later what the useful bits might be. In the cyber domain, some of these grains constitute software vulnerabilities, which can then be exploited by Chinese-affiliated hackers. Vulnerability exploitation, rather than public reporting and patching, is a contentious issue. Western governments maintain that they prefer quick improvements to defended systems, and there are indications that the Chinese government is slower in publishing high-severity vulnerabilities of the kind used by Chinese-attributed attackers. It is possible that China uses a different trade-off between attack and defence, or that its national defence is less dependent on digital infrastructure. Another possibility is that non-public dissemination of vulnerability information is more suitable in China.

A SWEDISH STRATEGY OF CYBER DEFENCE

In many ways, the Chinese threat is similar to other cyber threats, and basic cyber hygiene is important against all these threats. Remarkably, despite its vastly different type of government and associated motivations and intentions, China possesses a capability that approaches that of the US. Although not geographically close to Sweden, China's power is great and its every-grain-of-sand policy is especially worrisome in a time of data-driven AI technologies. The information-seeking infiltrations of the past can also support the disinformation and disruptions of tomorrow. In view of the broad Chinese threat, Swedish cyber security and defence must combine understanding of China with technical cyber measures and encompass all societal actors. A suitable strategy needs a correspondingly similar extensiveness, incorporating three often-overlooked aspects presented below: responsibility, candour, and detection.

Responsibility is a core aspect of achieving security. Swedish cyber security and cyber defence decision-makers must take more care to act responsibly and almost everyone in Swedish society is such a decision-maker. Private individuals must be more cautious in when trusting information on platforms such as TikTok. Risk assessments must be better utilised when procuring or offering IT services. Developers should be more diligent in making secure software, and system owners should be more conscientious in implementing security updates. Universities need to focus efforts on filling their cyber security PhD programmes with students from Sweden and the EU. When relying on and integrating Chinese technology, it is essential to prepare for alternatives in the event that sanctions must be implemented against the Chinese government. This should be viewed in light of the difficulty of enacting sanctions against Russia; it is probably even harder to successfully sanction China, given its strong suite of cyber products and services. Each grain of sand must be accounted for.

Candour is another vital aspect of achieving security. More voices must speak clearly about the possibilities and responsibilities concerning cyberattacks. Vic-

timised organisations often portray their victimhood as the result of attackers' high degree of sophistication, rather than the vulnerability of unpatched computers and basic mistakes in the handling of phishing e-mails. Likewise, government agencies blame low levels of security not on low priority or their own faulty perceptions but on the ever-changing world. Furthermore, cyber security needs more straight talk, rigorous technical expertise, and scientific, evidence-based, security stances. Swedish society must be realistic towards Chinese messages of benevolence, and understand that Chinese intentions and motivations might differ from Swedish intentions and motivations. Additionally, more care should be taken with the classification of information, keeping in mind that there is a risk of overclassifying important insights or protecting them in unnecessarily cumbersome manners, thereby hindering desirable information sharing with like-minded allies in and outside Sweden. Similarly, Swedish government agencies should leverage their influence to negotiate enhanced security measures for society as a whole.

Detection is also essential to achieving security. Detecting any Chinese cyberattacks must be based on building patterns from the commonalities of previous cyberattacks and of matching those patterns to new information from the same, or other, sensors. These commonalities can be studied from incident reports and inferred from gaps in public Chinese vulnerability databases. Studies can also utilise special sensors in various networks. These sensors include "honeypot" computers that act as decoys and environments for studying attacks, with the aim to establish attack techniques and origins. Another option is to implement proactive measures such as threat hunting in networks, going beyond reactive intrusion detection systems. Similar early-warning sensors must be used with care, in order not to result in the sort of surveillance society they are meant to fight. Further, publicly attributing attacks to China should also be done diligently, and balanced with diplomatic efforts.

Swedish society should welcome the fair trade of products and ideas with China, but be mindful of the trade leading to the exchange of principles with, or dependency on, China. Neglecting to learn from history is often said to make it more likely that history repeats itself. In this case, the proverbial threads of China should be studied now, or they might become inseparable from the fabric of Swedish society.

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18. China's Push in Artificial Intelligence: Covert Dangers of Using the Digital Silk Road to China

Niclas Wadströmer, David Gustafsson, and Frida Lampinen

Chinese digital services are gaining popularity worldwide. Every user, whether individual consumers, businesses, or governments, generates data transmitted back to the provider. Estimates claim that by 2030, over 30 percent of global data will be stored on Chinese servers. This article looks more closely at China's data statecraft. It considers how the country's advancing AI capabilities, combined with the regime's desire for global influence and political control, expose three areas of concern about Chinese data accumulation: legislation allowing state access to private-sector data, potential state interest in using AI for influence operations, and ambiguity in military-civilian applications.

AMBITIONS IN ARTIFICIAL INTELLIGENCE

Chinese digital services are increasingly popular among many international audiences for a wide range of purposes. The Digital Silk Road, a branch of the infrastructure project, the Belt and Road Initiative (BRI), serves as a key platform for diffusing Chinese technologies in the global digital economy. Of the 151 countries across Asia, Europe, and Africa that had joined the BRI by December 2023, approximately one-third are believed to be participating in the Digital Silk Road. Like the historical Silk Road, where for centuries mercantile trade propelled exchanges of ideas on religion, philosophy, and science, the contemporary market for digital technologies is characterised by a bidirectional flow of information, user-to-provider and vice versa, yet this aspect is often overlooked. However, concerns about the use of Chinese technologies for espionage have emerged in multiple countries amid the growing US-China rivalry. Critics warn against installing Chinese hardware and software in critical infrastructure; the debates on banning Huawei 5G equipment and TikTok are two prominent examples. While misgivings about illegal access and supply dependencies are valid, it is important to note that most data collected by Chinese entities is provided voluntarily (if unknowingly) by consumers in return for using a service.

China's trajectory towards global data dominance emerges from President Xi Jinping's ambition to transform the country into a "science and technology power" in time for the PRC's 100th anniversary in 2049. Over the course of China's industrial development, its science and technology (S&T) sector has assumed an increasingly central role in driving economic growth. It has gained added signifi-

cance in light of Xi's emphasis on technological innovation in bringing about the "rejuvenation" of the Chinese nation. Since 2014, the state has invested massive resources in advancing a total of seven "frontier" areas of S&T research: AI, quantum information, semiconductors, neuroscience, biotechnology, medicine, and space exploration. The investments aim to secure China's competitive edge in emerging technologies and enable Beijing's transformation into a global leader in economic and security affairs. In 2017, China earmarked USD 150 billion in government funding to become world-leading in artificial intelligence technologies by 2030, elevating AI development to a national "core priority." In 2021, Xi stated that "innovation has become the main battlefield of the international strategic game."

THE DATA ADVANTAGE

Before discussing China's potential covert uses of data, it is important to establish the data's significance for AI development. In the past few years, Chinese tech companies such as Huawei, Tencent, Baidu, and Alibaba have made astounding progress in AI. They have presented intelligent algorithms capable of advanced object and people recognition, language processing, and big-data analytics, promising effective or automated workflows in the healthcare and education sectors, vehicles, surveillance, and "smart" infrastructure, among others. While vast government funding and clever engineering certainly play a role in the success of Chinese AI services, it is likely not the whole story, since two things are necessary to develop AI models: technical expertise and training data.

Fundamentally, algorithms consist of millions of parameters, which are numerical settings that precisely guide the instruction of the models' computing processes. During a training phase, the parameters are continuously adjusted until the model generates the expected output. This demands an advanced training methodology that systematises how parameters relate to each other in a network; it also requires very large amounts of training data that show examples of an input alongside an expected output. Developing the method for creating a network structure requires advanced technical expertise. This used to be the most difficult part of AI development. Today, however, much fundamental research has been conducted, making AI accessible to developers with less technical expertise. This leaves training data as the limiting factor in becoming a leading developer pushing the boundaries of innovation, in turn making data an invaluable asset. In that sense, it can be said that, as oil was central to industrialisation, data is golden to the digital economy.

The competitiveness in machine learning of Western companies at the forefront of AI development, such as Google, Meta, and Microsoft, mainly stems from their sizeable data records ("big data") accumulated over time as first-generation tech giants. In comparison, engineers in many prominent Chinese firms have not needed to spend as much resources on data collection. By collaborating with state entities, private actors can tap into the large quantities of digital information that

are readily available within the regime's meticulous surveillance infrastructure. For instance, public-security organisations have partnered with private tech developers to innovate, among other things, AI-based facial-recognition software, merging private-sector technical expertise with public-sector data banks. The tradition of keeping records on citizens is deeply rooted in Chinese governance; the boom in digital surveillance methods in the mid-2000s, combined with the country's large population, meant that material collection soon outpaced the capacity to analyse it, providing an incentive to invest in automated solutions. In an industry where big data is everything, it is worth paying attention to the power aspects of a widening data-access asymmetry, especially when large portions of the information are generated through authoritarian governance.

THE MERGE OF PUBLIC-PRIVATE INFORMATION

Conversely, it is possible that Chinese state entities gain access to data collected by private companies, and Chinese tech powerhouses will accumulate enormous amounts of data as their user base expands internationally. Although users normally consent to companies storing and utilising data for business and development, this consent is often uninformed, as users remain unaware or uninterested in how their data is utilised across value chains. This concern is exacerbated when different countries have varying data protection laws that complicate user oversight. The transnational dimension of data transfers is particularly pertinent for China-based providers, as People's Republic of China (PRC) laws allow state access to all servers within its borders in a manner inconsistent with European legislation and consumer expectations.

Despite, or perhaps because of, China's tradition of collecting extensive records on its citizens, it only adopted data protection laws relatively recently. When the state began allocating increased funding to S&T research, it did so in a legal vacuum, typical of its experimental approach to policymaking. Since the mid-2010s, the state has systematically adopted regulations tightening control over data flows. The 2017 Cybersecurity Law grants government entities wide-ranging access to private-sector data while mandating multinational companies in the Chinese market to store information on local servers and strictly regulating cross-border data exports. This has prompted Western authorities to be apprehensive about the loss of personal information (PI) from their legal jurisdiction. To counter data mismanagement considerations, some Chinese companies such as TikTok and Zoom have relocated servers to Western countries. Despite this, US lawmakers are pushing to ban TikTok entirely unless it changes ownership. Still, such worries remain valid for many other service providers, for example, the up-and-coming electric-vehicle manufacturer, BYD. In 2021, the PRC enacted two laws addressing privacy protection, the Personal Information Protection Law (PIPL) and the Data Security Law. Both serve to enhance the state's legal access to data. Like the EU's 2018 General Data Protection Regulation (GDPR), the PIPL stipulates that data processing should be limited to the minimum amount necessitated by the purpose. Yet, it significantly diverges from the GDPR in that

it primarily regulates the relationship between companies and consumers, allowing state authorities multiple loopholes to collect and process data without prior consent or regard to data minimisation. The state's claim on commercial data was strengthened further under the 2021 Anti-Monopoly Law. It stipulates that tech enterprises risk law enforcement action for "inhibiting innovation" by failing to share data. This unilateral approach to data management – collecting but not sharing – suggests the aim of maximising government information pools.

THE POWER OF PREDICTION

So, why does it matter if the Chinese state can access private sector data? The growing data feedback from international audiences will allow companies and, by extension, state authorities to better understand the aggregated preferences, behaviours, and routines of populations across Asia, Europe, and Africa. Given the growing geopolitical tensions, one concern is the potential interest of state-affiliated actors in using predictive AI capability to fuel political instability in other countries.

An intelligent algorithm not only can predict the output of examples it saw during training but also the output of inputs it has not seen before. This capacity to make generalised assessments is an essential aspect of machine learning, and also the point of many AI services. Targeted marketing using algorithmic predictions of user preferences is one example. However, coupled with malicious intent, this predictive capability could be leveraged to reinforce the polarisation of political landscapes or systematically micro-target specific portions of a population for influence campaigns. To illustrate, the Cambridge Analytica case, where personal data from millions of Facebook profiles was used to boost the 2016 US presidential campaigns of Republican candidates, set a worrisome precedent for data misuse for political advertising and online information manipulation. More recently, Chinese state actors have been implicated in public-opinion influence campaigns in Taiwan, and US intelligence suggests that Beijing may seek to influence the upcoming 2024 US presidential election. The advent of progressively smarter algorithms boosts the potential scope and reach of targeted online disinformation in ways that could serve Chinese policy interests, implying a greater need for third-party due diligence on digital service providers.

AT THE END OF THE DATA SUPPLY CHAIN

Additionally, China may employ aggregated data in ways that undermine freedoms within the PRC. Since 2015, Xi Jinping has pursued a national strategy of military-civilian fusion in S&T research, blurring the lines between commercial and defence engineering. Some Chinese AI companies have institutionalised relationships with public-security organisations; even when formal ties are absent, the state's legal claim to all personal information in the Chinese research ecosystem means international user data could contribute to the state's e-governance, which involves digitalised and data-driven public-administration solu-

tions, and to its defence industries. This inadvertently bolsters China's military modernisation and refines its digital surveillance capacity, which is at odds with democratic values.

The People's Liberation Army (PLA) aims to become a "world-class military" by 2049, with unmatched competence in "intelligentised" next-generation warfare based on human-computer algorithmic operations. Over the past decade, the PRC has intensified surveillance of "high-risk" groups, notably the Uighur population in Xinjiang, and operates more than 200 million security cameras nationwide. In 2017, the security apparatus introduced big-data analytics to "maintain social stability" in Xinjiang, assigning citizens an automated risk assessment based on social-media activity, surveillance footage, biometrics, and other data. Human-rights observers have widely criticised this system for infringing on the freedom of movement, assembly, and free speech. On a national scale, authorities can leverage AI predictive capacity to anticipate outbursts of regime-critical public opinion, enabling the pre-emptive suppression of unrest. These applications run counter to liberal values and raise ethical concerns about using international data to hone dual-use and potentially repressive AI technologies. Even though China has called for more attention to "legal, ethical and social issues related to AI," the country's political tradition suggests that whatever benefits emerging technologies can bring to enhancing the Chinese Communist Party's social and political control will be seized upon, unperturbed by criticism of infringements on individual freedoms.

COVERT USES OF DATA

China, through its strategic investments and statecraft, has positioned itself at the centre of the global digital economy. The possible integration of private-sector information into governance infrastructure highlights the significance of the location of servers that store transnational data and perform computations. It is worth emphasising that there is no concrete evidence suggesting that Chinese companies systematically hand over international data to the government, but the state's efforts to formalise its claim to all information stored within its borders make it a risk that is impossible to either confirm or reject. Combined with what is known about China's policy interests, the implications this has for the proliferation of authoritarian governance are likely far from obvious to international users of digital services. Additionally, multilateral best practices in AI are in an early stage, where international initiatives present China with a venue for expanding its influence in setting the legal, technical, and normative standards of the global AI agenda. It is important to be aware of the potential covert uses of data exchanged on the Digital Silk Road.

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19. Hoarding Helices: China's Worldwide Collection of Genetic Data

Anders Lindblad and Per Wikström

During the last decade, the Chinese government has amassed a large amount of genetic information. This was initially collected from its own population, but today it is increasingly collected on a global scale. There could be at least two reasons for this. First, to map their own population through biometric data, including DNA information; second, to use the analysed data for research and development with the goal of becoming a world leader in precision medicine.

DOMESTIC HOARDING

In 2016, China announced a USD 9 billion, 15-year programme with the goal of becoming a global leader in tailored precision medical treatment based on the genetics of individual patients. The structural collection and analysis of DNA data is a crucial part of this effort.

However, China's collection of large amounts of genetic information is not limited to advances in medical treatments. China has also initiated ambitious programmes to collect biometric data, including DNA, from portions of its population.

In 2017, Human Rights Watch reported that Chinese authorities were collecting DNA samples, fingerprints, and iris scans of all residents between the ages of 12 and 65 in the Xinjiang Uygur Autonomous Region. The University of Toronto conducted research and reported on a similar mass collection of DNA samples in Tibet in 2022. Their study estimated that the Chinese police had collected DNA samples from between one-quarter and one-third of Tibet's population. It appears that the police apparently collected the data from the general population, independent of any ongoing criminal investigations. These efforts generate genetic data that could be used to establish societal control over the ethnically diverse minority populations. The US Secretary of State, Antony Blinken, has expressed concern over the reports of China's gathering the DNA information of Tibetans.

The Australian Strategic Policy Institute (ASPI) has also reported that, in addition to China's collection of genetic data from its minority populations, the Chinese government is building a gigantic genetic database that will contain millions of samples from its general male population.

China's large-scale and far-reaching domestic genetic data collection stands in stark contrast to, for example, the situation in Sweden, where non-anonymised DNA samples are only taken and stored if someone is suspected of an offence that could result in imprisonment or has been sentenced to imprisonment or probation.

HOARDING ABROAD

China is not only collecting genetic information from domestic sources but is also tapping into and expanding its global reach. By far the largest player in this field is the BGI Group. Founded as a small research institute in Shenzhen in 1999, it has grown to become one of the world's largest genomics companies. Although the BGI Group is a privately owned entity, it has developed deep ties with the Chinese government, ties that include responsibility for maintaining the first national-level gene storage bank, the China National GeneBank DataBase (CNGBdb). Researchers from the company have also published several scientific studies together with researchers from the People's Liberation Army (PLA).

It has been reported that the BGI Group has, for at least a decade, been selling prenatal genetic test kits that are used by millions of women in over 50 countries. In addition to prenatal DNA sampling, BGI also markets test kits for detecting possible genetic diseases in both prospective parents and newborn babies.

When the COVID-19 pandemic dramatically increased the global need for fast and reliable genetic analysis, the BGI Group offered a ready-made, on-site solution that could ease the burden of overworked and undersized laboratory capacities around the world. The BGI Group initially developed the so-called Huo-Yan (Fire Eye) laboratories for domestic use, but laboratories were soon established in some twenty countries around the world, in several cases as donations. The medical university Karolinska Institutet in Sweden established a Huo-Yan laboratory in the spring of 2020. The institute already had well-established cooperation with the BGI Group and was able to obtain the lab from China in only four weeks. Some have questioned the establishment of the laboratory from a privacy and security perspective, fearing the transfer of genetic data to China. According to those responsible at the institute, no such transfer takes place.

In 2023, the US Department of Commerce added several BGI subsidiaries to an "Entity List." This means that, among other things, US companies need to apply for licenses for exporting to entities on the list. BGI's units were added to the list based on indications that its collection of genetic data poses "a significant risk of contributing to monitoring and surveillance by the government of China, which has been utilised in the repression of ethnic minorities" and "collection and analysis of genetic data present a significant risk of diversion to China's military programs."

COMMERCIAL CONCERNS

China's 14th Five-Year Plan, 2021–2025, lists a number of long-range objectives through the year 2035, including advancements in biotechnology. A supplement to the plan specifically aims to stimulate the bioeconomy. According to official documents, ". . . the new plan is in line with the requirements of the 14th Five-Year Plan, which pledged to promote the integration and innovation of biotechnology and information technology, as well as accelerate the development of biomedicine, biological breeding, biomaterials, bioenergy and other industries to enhance the bioeconomy in scope and strength." According to the bioeconomy plan, China is striving to increase global market share in the bioeconomy and aims to be at the forefront globally, in terms of comprehensive strength, by 2035.

Genetic information is considered a crucial ingredient in a scientific revolution that could produce numerous new medical drugs and cures. Here, China's scientific and medical community can make a positive contribution. Collections of a large number of DNA sequences have the potential to enable researchers to identify genetic variations associated with disease susceptibility and treatment response. If the genetic information is large enough and has a good geographic representation, it could enhance the understanding of genetic diversity across populations, which can influence disease prevalence and progression. In addition, it can also be used to facilitate the discovery of novel drug targets and personalised therapies based on individual genetic profiles, that is, personalised medicine.

Research and development of personalised medicine is rapidly evolving. According to a report by Grand View Research, a market research firm, the global market size was valued at USD 225 billion in 2022, focusing on areas such as therapeutics and diagnostics. The market is expected to expand at a compound annual growth rate (CAGR) of 7.2 percent from 2023 to 2030. This growth is driven by factors such as the availability of genetic data, advancements in genomics, increasing adoption of personalised treatment options, and a growing focus on precision medicine for various diseases, including cancer, cardiovascular disorders, and neurological conditions.

Up until now, North America has dominated the market, but Asian countries show an increasing trend. The countries that manage to harvest a large and diversified amount of genetic data have a clear commercial advantage in the biotechnological race towards conquering shares of the global market.

BIODEFENCE CONCERNS

During the 20th century, a number of countries researched and developed biological weapons (BW). There are still suspicions today that these activities have continued despite being banned by the ratification of the Biological and Toxin Weapons Convention. A possible BW ambition could be to utilise human genetic data with malicious intent. One example is the potential use of such data for nefarious purposes, such as genetic profiling of political leaders. This profiling

could reveal latent severe health conditions, such as mental illness, which could be used for blackmail or to induce political stress or pressure in sensitive political situations. Certain political leaders' genetic material is therefore guarded as a valuable asset.

Tracing individuals or ethnic groups that are political opponents and, hence, enemies of a regime can be done using DNA-based genealogy. DNA samples could link a suspected perpetrator or unwanted troublemaker to their relatives, who the authorities can then subject to pressure. Both Tibetans and Uyghurs fall within this category of ethnic groups that are currently suppressed by the Chinese regime. The DNA repositories are already massive and growing rapidly. By studying and identifying genetic variations and correlating these with sensitivity to external stimuli such as pharmaceuticals or pathogenic microorganisms, it could theoretically be possible to target individuals or a specific ethnic population that harbours similar genetic variants.

Military and political leaders have raised the possibility that using ethnic weapons could become an aggressive tool in the future. They would provide a way to target an ethnically and genetically homogenous population that shares a genetic variant with some kind of biological agent. Targeting a subpopulation to the exclusion of other subpopulations based on genetic traits presents, however, a significant technical challenge. Generally, the more frequently a genetic marker is present in a given subpopulation, the less likely it is to be specific to that subpopulation, and vice versa. Genetic markers of high frequency in one subpopulation will also be present in neighbouring subpopulations due to migration and interbreeding. Ethnic populations are not as homologous as a perpetrator might wish. This means that while targeting the majority of a certain ethnically similar group with some kind of genetic weapon, collateral damage in other populations would be inevitable. Theoretically, to achieve an increase in specificity, one could use multiple markers simultaneously. The expected result, given the relative frequencies of different markers in different subpopulations, would be that a smaller proportion of the target population is affected.

In general, there are sub-populations that are more genetic homogeneous than others and could in theory be more vulnerable to genetic targeting than populations that show, e.g. due to an extensive migration during the last centuries, pronounced genetic heterogeneity. Nevertheless, with today's technology, a weapon system that targets ethnic groups based on genetic traits is not feasible. On the other hand, inducing genetic disease in humans, animals, or plants, is scientifically possible today.

FINAL WORDS

Today, it is not possible to establish that Chinese companies or authorities currently, or will, use foreign genetic data for malign purposes. Nor is it surprising that the Chinese leadership supports domestic companies in their efforts to col-

lect genetic data both domestically and abroad, as this type of data will continue to be a valuable asset in the development of all kinds of biomedical products in years to come. However, without strong safeguards, such as transparency and security provided by oversight mechanisms, there is a risk that anyone collecting biometric information may do so for dual-use purposes.

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20. China's Ambitions in the Space Domain

Anna Maria Wårlind and Jonatan Westman

China views its national space activities as instrumental in its ambition to be a world-leading power. Its rapid technological development over the last 10 years has been characterised by its striving to achieve a completely autonomous space capability. This effort has resulted in China becoming the number one strategic competitor of the US and its Western allies in space.

BUILDING UP A PRESENCE IN SPACE – MILITARY INCENTIVES

China's space age started in 1970, with the launch of its first satellite, *China 1*, well over a decade after Russia and the United States had placed their first satellites in Earth orbit. After a couple of decades of relatively low activity, it was not until the 1990s and 2000s that China's space programme started growing in scope and numbers. This expansion was driven, not least, by the realisation of the military significance of space borne assets by the Chinese Communist Party (CCP) and People's Liberation Army (PLA), particularly following the first Iraq war. Fast forward to today, and China by most measures is one of the two undisputed leaders in the space domain, catching up with, and in some areas even surpassing, the United States.

Many space systems have an inherent potential for so-called *dual use* (having both civilian and military applications) which makes the delineation between civilian and military space activities difficult in general, but regarding China specifically, matters are further complicated. The Chinese concept of military-civil fusion, which expects all civilian activities to support the PLA on demand, aims to leverage the most advanced technology for military purposes. Space technology is no exception to this concept; rather, space technology is seen as an especially prominent example of it. All space activities within government R&D institutes, industry, state agencies, universities, and the private sector can be seen as supporting the PLA, rendering moot any ideas of purely civilian space activities or space collaborations in relation to China.

In 2022, the Chinese government published a white paper on space, describing past achievements and outlining a plan for the coming five-year period. The central ambitions laid out include continued scientific exploration of outer space, advancement of the national space industry in support of economic growth, and furthering China's position as one of the most powerful players in the space

domain. The white paper notably emphasises principles of peaceful exploration and use of space, while mentions of space for security and defence are almost entirely absent.

THE TECHNOLOGICAL LEAP – UNPRECEDENTED GROWTH

China's rapid growth in space systems is nothing short of impressive and unparalleled. In just six years, it has tripled the number of its launches, substantially increased the quantity of both commercial and civilian satellites, and more than doubled the number of military satellites. As China continues to expand and develop its military space capabilities all across the board, two efforts in particular account for a large part of the observed expansion: the completion of the BeiDou satellite navigation system to full constellation, and the more than doubling of the number of military ISR (intelligence, surveillance, and reconnaissance) satellites; in total, these now far exceed the US numbers.

Another area where China is believed to possess and continue to develop considerable military capacity is within so-called counterspace capabilities, i.e denying an opponent access to and free use of their space systems. This not only includes non-kinetic attacks (without physical impact) such as laser blinding, electronic warfare, and cyber attacks, but also kinetic attacks (with physical impact) either from in-space systems or ground-based missiles. While few details about China's non-kinetic capabilities are known, its kinetic capability was demonstrated in a very public manner in 2007 when China fired a ground-based missile, destroying one of its old weather satellites. The test created several thousand new pieces of space debris that, due to the satellite's high orbit, will remain in orbit for a very long time. This event led to widespread international condemnation and is often described as causing the US to increasingly view space as a domain of military operations, alongside the ground, air, sea and cyber domains.

Late 2023, China launched the first few satellites for a mega-constellation. Planned to consist of up to 13,000 satellites primarily for space-based broadband services, it is being developed in collaboration between an entirely state-owned company and the Government of Shanghai. While discussions on the project have long been underway, the decision to proceed was clearly influenced by the commercial US Starlink satellite-communications constellation, particularly by how its services have been leveraged militarily, as shown in Ukraine. China's rhetoric regarding Starlink has been one of harsh criticism, describing Starlink as a US military project under the guise of a civilian one. Another Chinese concern is that the US, via Starlink, would establish a de facto monopoly on certain strategic resources in the form of satellite orbits and frequency bands, reinforcing China's resolve to promptly establish a corresponding presence in space via a constellation of its own.

BECOMING A GLOBAL SPACE POWER – STRATEGIC COMPETITION AND PARTNERSHIPS

China's ambitions as a spacefaring nation must be considered in light of the first space race, but cannot be well understood without looking at the current circumstances of the ongoing second space race. The dynamics between competing powers in space have drastically changed since the US and the Soviet Union first went head to head in orbit in the 1950s. The paradigm in which only states conducted space activities is now in the past. It has become clear that states embracing the commercialisation of the space sector, such as the US and, in its own adapted forms, China, have attracted investments to their national space sectors, making them more robust as the commercial space era is shifting into what should be characterised as a defence and security paradigm. China's ambitious investments in its autonomous space capability have positioned China as the US's new strategic competitor in space.

The renewed focus on the space environment as a military domain once again sheds new light on Chinese space activities. China has fostered international civilian and commercial space collaborations, both multilateral and bilateral, building up its own technical capacity to benefit both its civilian and military capacities in space. Today, China is in a position itself to offer opportunities to other nascent space-faring nations to collaborate on Chinese flagship programmes, such as its planned International Lunar Research Station (ILRS), the planned Chinese scientific research station on the moon. China has also, for example, engaged in the development of regional space situational-awareness capabilities within the Asia-Pacific Space Cooperation Organization (APSCO) collaboration on observation of space objects. The data-sharing platform is indeed hosted by the National Astronomical Observatories of China. The APSCO collaboration provides data from observatories based in countries such as Iran, Pakistan, and Peru, while the plan is to install telescopes used for tracking objects in all APSCO member states. This illustrates how China uses investments abroad to further its reach in the global sector.

Through such collaborations, China seeks to gather reciprocal support for its positions in international fora where global space policy is under development. In 2008, within the UN workflow on arms control in space, China alongside Russia proposed a new legally binding instrument to prevent an arms race in outer space: the Draft Treaty on the Prevention of Placement of Weapons in Outer Space and the Threat or Use of Force Against Space Objects (PPWT). It has been heavily criticised by the West, mainly due to the lack of a verification mechanism and restrictions on development and stockpiling of anti-satellite weapons. The Chinese and Russian destructive tests of such ground-based destructive weapons have also brought negative attention to the fact that their draft treaty does not prohibit ground-based attacks. Non-kinetic weapons which may cause temporary disturbances to space systems also fall outside of the scope of the draft treaty. To circumvent the credibility issues raised by Western countries, instead of

addressing the issues, China (and Russia) have engaged in harnessing political support they consider is owed them by their international cooperation partners who rely on technology transfer and capacity building.

DETERIORATING SPACE SECURITY – NEW REALITIES

Armament in space continues to escalate, while global societal dependencies related to space infrastructure and data tend to increase. These ill-matched trends increase vulnerabilities in society as a whole. The rapid growth of objects sent into space is also increasing congestion in orbit, which raises the operational risks and also makes incidents that may escalate into conflict more likely to occur. Actors interpret the data available to them differently and may have different levels of risk perception and risk acceptance. These issues are being debated in UN fora on arms control in space, and were well illustrated by a diplomatic dispute between China and the USA in 2021. It was caused by a Starlink satellite passage of the space station Tiangong, considered dangerously close by China but referred to as normal operations by the US actor. Incidents like this one escalate tensions between the superpowers, and have contributed to the rapidly deteriorating security situation in space.

This affects all spacefaring nations having a national space program, including Sweden; a stakeholder in the EU's space programme, member of the European Space Agency (ESA), and more recently a member of NATO (which entails space collaboration for defence and security). Since Sweden became a spacefaring nation it has concluded collaboration agreements with China; companies and scientists have maintained scientific civilian space collaboration with Chinese counterparts; and as an ESA-member state Sweden took part in developing the cooperation between ESA and Chinese counterparts. Geopolitics is now turning that page. The EU space programme is being renewed, shifting focus towards European strategic autonomy transforming the space program to fit security and defence uses while deepening the collaboration with NATO and the USA. NATO, meanwhile, has proclaimed space a domain for military activities and expressed that an attack on allied space systems will trigger the collective defence mechanism enshrined in Article 5 of the North Atlantic Treaty. The EU is taking an aligned approach in its policy development, underlining in its European Union Space Strategy for Security and Defence that the mutual assistance clause, Article 42(7) in the Treaty on European Union (TEU), shall apply if a space threat or incident amounts to an armed attack on a member state's territory. In UN fora, China has repeatedly criticised the use of such terminology by others, indicating that the use of space as a military domain and potential arena for warfare, in itself can be perceived as threatening.

THE SECURITY CHALLENGE—IMPLICATIONS FOR THE SWEDISH SPACE SECTOR

The described movements stand in stark contrast with what has constituted Swedish policy on space collaboration with China. A continued change in approach by the civilian and commercial space sector can be foreseen over the coming years. For example, in 2020, the state-owned Swedish Space Corporation announced that no new contracts would be signed with its Chinese customers regarding ground-station services at the space base Esrange. Considering Esrange's potential future contribution to Sweden's and Europe's autonomous access to space, the work to reassure customers, partners, and allies of the integrity of the services provided will be key. Seeking to mitigate weaknesses in the space sector, of concern to the Union in its entirety, the EU's Foreign Direct Investment Regulation (FDI), and the directives on measures for a high common level of cybersecurity across the Union (NIS2 Directive) and Critical Entities Resilience (CER Directive) target space-related activities, such as ground stations handling space data. Investments in Swedish space businesses by Chinese entities, and scientific collaborations, which were welcomed over the years by companies, scientists and the Swedish national space agency, are likely to shrink to a minimum as additional regulatory measures targeting the space sector are being developed on EU level.

The ongoing geopolitical convulsions are amplifying the shifting balance and powers in the space domain. With China and its allies accessing capabilities previously only accessible to the West, the ongoing second space race is a race with very uncertain outcomes. The great-power competition and looming conflicts in space pose a threat to all space assets. Access to basic space-based services and possibly space itself is at risk if security in space continues to deteriorate. The Chinese space ambition will be one of the most significant influences on any future scenario regarding the development of the space domain.

FURTHER READING

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This year's edition of Strategic Outlook aims to provide an overview of China's emergence as a global great power and what it means for Sweden and the rest of the world. Utilising FOI's unique expertise and competence, this anthology spans a variety of topics and perspectives that help us conceptualise the rise of China, understand its foreign relations, and explore the significant political, economic and legal issues it represents. It also delves into military issues and a wide range of topics related to science and technology.

China's continued rise has the potential to fundamentally reshape the current Western-led international order. Therefore, one of the most important analytical challenges of our time is to better understand and assess China's ambitions, policies, and behaviour, as well as the impact these will have on global affairs and security.

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