

## **GIGA and ESIWA Workshop**

# ***“Geopolitics, militarisation and risk - a new case for Confidence Building Measures in the Indo-Pacific”***

**November 27-28, 2023, Berlin and online**

# **Workshop paper**

**Session 1: The impact of military modernisation, including new arms technologies, on Indo-Pacific stability**

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Co-funded by the  
European Union



# **Interactive Arms Buildup and Modernizations Amidst Great Powers' Strategic Competition in the Indo-Pacific Region<sup>1</sup>**

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The Indo-Pacific region is undergoing dramatic changes that are defining its potentially perilous strategic future. This transformation is fueled by the Fourth Industrial Revolution (4IR), where a wave of innovative, transformative, and potentially disruptive technologies is being developed, such as artificial intelligence (AI), additive manufacturing, quantum information technology, hypersonic missiles, biotechnology, and directed energy; these have profound implications for societies and economies as they are dual applications that could affect national security. They are generating dramatic and rapid development in regional countries' conventional military capabilities that could undermine the nuclear strategic balance among the great powers. Consequently, they would alter the broader and larger economic competition among the great powers and the character of armed conflicts regionally and globally (Ward, 2021).

The intensifying strategic competition between the U.S. and China over the nature of the Indo-Pacific regional order is another factor fueling the transformation of the regional security complex. Historically, military power is the essential element of any international order, and a powerful state with overwhelming military capabilities ensures the stability and duration of this

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<sup>1</sup> Paper to be presented at the GIGA-ESIWA Workshop on Geopolitics, Militarisation and Risk," -a New Case for Confidence Building Measures in the Indo-Pacific," 27 and 28 November 2023, Berlin, Germany. **FIRST DRAFT. NOT FOR QUOTATION AND CITATION**

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order. Since the end of the Second World War, the U.S., its Indo-Pacific allies, and other like-minded states have formed the core of states, ensuring the stability of the regional order. In the second decade of the 21<sup>st</sup> century, an emergent China has altered the regional balance of power and undermined the post-1945 regional order buttressed by the U.S.' role as the Indo-Pacific strategic offshore balancer. Beijing aspires to establish a new type of great power relations that requires revising the existing regional order, which it sees as unjust, improper, and disadvantageous to developing countries, starting with China (Lida, 2019). Leveraging its enormous economic and military power, China's actions to reshape the international and regional order tremendously impact the regional security equilibrium. This has triggered stiff competition with the U.S. regarding values, norms, the nature of the regional order, and superiority in military prowess.

This article examines the impact of the 4IR and the U.S.-China strategic competition on interactive developments in six critical weapons systems—missile defense, hypersonic weapons, underwater domain, drone warfare, cyber warfare, and control of the cognitive domain—that could alter the prevailing geopolitical order in the Indo-Pacific region. It raises this central question: How do the 4IR and the U.S.-China strategic competitions affect five key weapons systems that can potentially alter the balance of power and armed conflict in the Indo-Pacific region?

### **The Military Dimension of the Fourth Industrial Revolution**

At the center of interactive force buildup and modernization in the Indo-Pacific region is the digital transformation triggered by the 4IR, such as AI, autonomy, robotics, quantum computing, biotechnology, directed energy, and hypersonic missiles. Collectively, they are called “emerging technology.” Many are genuinely new technologies; some might be the products of the

continuing development of existing technology. Emerging technology generates disruptive effects as it unravels human systems and habits it replaces because it has attributes and characteristics that are considered more efficient and superior (Ward, 2021). It significantly modifies how people, businesses, industries, government, and the military organization operate.

As a case in point, it is claimed that emerging technology could undermine the nuclear parity and stability among the major powers through its effects on nuclear second-strike capabilities or dual-use systems, including nuclear command, control, and communications (Kroenig, 2021). Accordingly, cyberattacks and conventional missiles could be deployed to provide credible and effective first-strike capabilities against an adversary's nuclear forces. In contrast, advanced and state-of-the-art directed-energy missile defense systems could be deployed to neutralize an adversary's first- and even second-strike capabilities (Kroenig, 2021). For this reason, the U.S. Department of Defense (DoD) has always focused on developing emerging military technologies to enhance U.S. national security and maintain strategic superiority over America's potential armed adversaries (Ward, 2021). The U.S. and its allies have incorporated emerging technology among their militaries to provide the necessary hard power to reinforce the prevailing distribution of power and the existing bases of strategic stability and order. In contrast, China has developed and utilized emerging technology to enable its military to position itself better to fight and prevail in regional wars, protect its growing global concerns, facilitate expeditionary operations, and pursue revisionist objectives in global affairs.

## **The U.S.-China Strategic Competitions**

The idea of a strategic competition between the U.S. and China is primarily an American narrative (Masayuki, 2023). It emerged from their perception, approach, and policy toward China, which underwent structural changes from the latter half of the Obama administration to the Trump administration (Masayuki, 2023). By the early part of Trump's administration, a consensus emerged in the U.S. government that the "central challenge to U.S. prosperity and security is the emergence of long-term strategic competition by China and Russia" (Masayuki, 2023).

In early 2021, key members of President Biden's foreign policy team signaled that the incoming administration largely agreed with its predecessor's diagnosis of the new international environment and the strategic competition narrative about U.S. foreign and defense policy toward China. Based on this assumption, the Biden administration increased public investments in the country's diplomatic, intelligence, and military capabilities. It enhanced collaboration with its allies and security partners to gain a diplomatic and strategic advantage over China in technology, economy, politics, diplomacy, military, and global governance. The Biden administration's decision to continue its predecessor's policy of engaging Beijing in a strategic competition is based on the premise that while China has successfully eroded American military advantage in potential locations of conflict near its shores and inside the first island chain, the U.S. retains the overall advantage in military technology, power projection, and with a regional political and military alliance structure unmatched by China (Lynch, 4th Quarter 2021).

Washington's narrative of an ongoing strategic competition with Beijing stemmed from China's emergence as a significant global economic power, dissatisfaction with the current rules-based global system, and its proposal to replace the current global order with its system, juxtaposed

with Chinese ideals, values, and institutions. President Xi Jinping's efforts to transform and rebuild the current rules-based global order are based on two assumptions: 1) the emerging global balance of power that is increasingly favorable to China and 2) the relative decline of the Western advanced countries along with the rapid rise of the power and status of emerging and developing countries, which included China (Lida, 2019).

China's efforts to transform the current global system coincide with the People's Liberation Army's (PLA's) shift from preparing for "informatized local wars" to "informatized and 'intelligentized' local wars." Formulated by China's National Defense University in 2015, the new Chinese defense doctrine provides for the following: 1) local wars are susceptible to the effects of global politics and the world economy, 2) the side that has superior intelligence capabilities has the initiative at the battlefield and strategy, and 3) 21st-century battlefields are now multidimensional since combats do not only occur on the actual battlefield but also at the electromagnetic, cyberspace, and cognitive domains (Rira, China's Preparations for Informatized Warfare, 2023). Since 2020, the PLA has begun considering joint operations and adopted emerging technology to accommodate the concepts of "winning informatized and intelligentized local wars" (Yasuyuki, 2021).

## Interactive Arms Buildup and Modernization in the Indo-Pacific

The diplomatic and military domains are the critical arenas of strategic competition between the U.S. and China. In this context of fluid power dynamics, emerging technology is diffusing into the Indo-Pacific region, where the U.S. has been the world's leading military power for decades; China is challenging the U.S. by using the advantages of emerging technology to advance its revisionist foreign policy objectives. The development of these military weapon systems reflects China's hostile and dynamic interactive arms buildup and modernization in the Indo-Pacific Region:

- A) *Missile Deployment and Missile Defense System*—Central to the PLA's efforts to win local conflicts is the development of its missile forces designed to prevent the U.S. from intervening in any significant flashpoints in the Indo-Pacific. In 1996, the PLA created the People's Liberation Army Second Artillery Corps (PLASAC) to administer its massive, diverse, technologically advanced regional offensive missile force that can attack U.S. forces, allies, and partners. Since 2000, the PLASAC has been transformed from a small force operating liquid-fueled nuclear and land-based conventional missile forces into a much larger and modern force equipped with solid-fueled ballistic missiles; most missiles are conventional rather than nuclear (Logan, 2019). In January 2015, President Xi upgraded the PLASAC into the People's Liberation Army Rocket Force (PLARF). Enhanced to full service on par with other armed services, the PLARF fields missiles with various ranges, including the DF-26 IRBM capable of conducting precision strikes against targets on land or at sea, potentially as far as Guam, and anti-ship ballistic missiles with the ability to hit American aircraft carriers operating within the waters of the first island chain.

In response to China's missile force, the U.S. is upgrading its existing highly capable missile defense systems like the Terminal High Altitude Area Defense (THAAD) and the Aegis weapon systems and its associated SM-3 missile interceptors, along with improving variants of the multi-mission SM-6 (Obering & Heinrichs, Winter 2019). The U.S. is also developing the F-35 Lightning II as an interceptor capable of shooting down ballistic missiles in their boost phase (Obering & Heinrichs, Winter 2019). Additionally, it is looking to adopt space-based sensors that can monitor, detect, and track missile launches worldwide.

- B) *Hypersonic Missiles*—These maneuverable projectiles can travel at over five times the speed of sound. This could allow states to launch low or no-warning attacks and to evade missile defense. In 2003, the Pentagon developed and planned to deploy hypersonic

systems as conventional weapons designed to rapidly penetrate its adversaries' anti-access/area denial or A2/AD capabilities (Watts, Trotti, & Massa, 2020). However, Russia and China have prioritized production, testing, and deployment. China has conducted more hypersonic tests than any other state and has deployed hypersonic weapons. It is devoting considerable work and resources to developing these weapons, including hypersonic cruise missiles and hypersonic glide vehicles (HGVs) (Obering & Heinrichs, Winter 2019). Nevertheless, U.S. interest in multidomain applications for hypersonic weapons would likely continue as it prioritizes submarine-launched, ground-launched, and air-launched HGVs (Watts, Trotti, & Massa, 2020).

C) *Underwater Competition*—With its fleet of nuclear-powered attack and ballistic missile submarines, the U.S. maintains its supremacy in the underwater domain (Kajiwara, 2020). China, however, has challenged this in the last few decades. The PLA has established China's extensive and sophisticated intelligence, surveillance, and reconnaissance (ISR) system in its near seas to detect the movements of American surface combatants and submarines. It includes extensive anti-sea radar and anti-submarine sonar reconnaissance networks and a maritime reconnaissance intelligence system (Yamaguichi, 2019). The PLA operates under a "system of system" approach requiring coordination of the domains (land, sea, air, cyber, space, and electromagnetic) with each other to improve situational awareness, targeting, and other ISR functions in China's near seas. More significantly, since the early 1990s, the People's Liberation Army Navy (PLAN) has engaged in a robust modernization program by building large-tonnage surface combatants equipped with modern sensors and weapons systems, expanding its submarine fleet with better warfighting capabilities, improving anti-submarine warfare and fleet air defense capabilities, and acquiring aerial refueling and expanded underway replenishment capabilities (Huang, 2015). The PLAN's fleet includes new guided-missile destroyers (DDGs) and guided-missile frigates (FFGs), which substantially increase the Chinese navy's air defense, anti-ship, and anti-submarine capabilities and are crucial to expanding maritime operations overseas (Gunness, 2021). The PLAN has also built and added ten nuclear-powered submarines—six nuclear-powered attack submarines and four nuclear-powered ballistic submarines—to its force, initially consisted primarily of diesel-powered attack submarines, most of them capable of launching advanced anti-ship cruise missiles (Caslin & Erickson, 2019).

D) *Drone Warfare*—Another significant weapons system in the Indo-Pacific region is developing and using small unmanned aircraft systems (UAS) or drones. The availability of commercial and military technology to create swarms of these capabilities results in multilayer and unmanageable threats to adversaries (Ball, 2022). The U.S. has successfully deployed UAS in actual combat; Global Hawk and Predator are leading examples. Without the need for human crew, UAS are more accessible to design, have better stealth capabilities, smaller volume, and lighter weight. UAS can conduct saturation attacks against the enemy's high-performance but high-cost targets. The technological revolution that enables state actors to deploy drones to win actual battlefield combat began during the armed conflict between Azerbaijan and Armenia in the disputed region of Nagorno-Karabakh in the South Caucasus. During this short war, Azerbaijan's deployment of armed



UAS significantly assisted its decisive victory against Armenia, which deployed conventional air and ground forces. Azerbaijan's use of UAS enabled it to neutralize the Armenian air defense system, ground forces, and armored vehicles effectively with relatively cheap air interdiction capabilities (Ball, 2022).

The China Academy of Electronics and Information Technology (CAEIT) has tested the launch and deployment of multiple UAS from ground-based and airborne launchers in swarm formations (Ball, 2022). In several instances, the PLA National Defense University's College of Intelligence Science and Technology carried out research tests of UAS and other uncrewed vehicles and is anticipated to aspire to cooperate with the CAEIT to enhance technologies through military-civil fusion (Rira, China's Preparations for Informatized Warfare, 2020). This indicates the PLA's growing attention to intelligentized local warfare, where AI is more fully integrated into tactical, operational, and strategic military activities (Nurkin, 2020).

E) *Cyber Warfare*—In preparing for winning informatized and intelligentized local wars, the PLA has recognized the importance of cyberspace in informatized warfare. Based on the lessons it learned in the 1990-1991 Gulf War, the PLA identified the information domain to include not only cyberspace but also electronic and psychological warfare and espionage operations, as representing a distinct battlespace alongside land, sea, and air domains that would become the linchpin of future global conflict (Chen & Joe McReynolds, 2021). The PLA's cyberwarfare strategy requires incorporating information and communications technology (ICT) into the military, connecting military services and units via information networks, enhancing information collection and transmission capabilities, and improving the military's capabilities through systematization (Masaaki, 2020). In December 2015, the PLA's Strategic Support Force (SSF) was formed to reorganize the PLA's vast network of electronic warfare and space units into a unified fighting force. The SSF has three essential functions: a) it links the cyber and electromagnetic domains and is expected to conduct operations by merging the two domains; b) it is responsible for the "Three Warfares" that utilize cyberspace; and c) it oversees educational institutions, including Information Engineering University and Space Engineering University as well as research institutions, and appears to have the role of training specialist in the cyber and space domains (Masaaki, 2020). By assuming these three missions, the PLA believes that the SSF will be able to realize its core wartime mission of seizing and exploiting the information domain to enable other PLA forces to achieve decision superiority and, therefore, victory (Chen & Joe McReynolds, 2021).

At the onset, the U.S. government showed wariness toward China and the increasing cyberwarfare capabilities and cyberattacks (Masaaki, 2020). It became dissatisfied with the Chinese government's and the military agencies' commercial espionage of U.S. companies. Eventually, it decided to confront China's growing capabilities for cyberwarfare by taking law enforcement measures against Chinese cyberattacks, excluding Chinese cyber infrastructure companies from the market, and adopting a cyber deterrence policy. The U.S. Department of Justice indicted five PLA officers in Unit 61398 for espionage against companies through cyberattacks (Masaaki, 2020). The U.S. has also

sought to delist the communication devices of companies suspected of maintaining ties with the Chinese government's intelligence agencies, such as ZTE and Huawei, from the U.S. market (Masaaki, 2020). It has adopted a policy of deterrence against malicious cyber actors by creating the expectation that retaliatory costs will exceed the benefits of malicious activities against American targets (Tate, 2022). This requires the U.S. to impose swift, costly, and transparent consequences outside of cyberspace for malicious cyber activities against the U.S. government and American private companies. This also behooves the U.S. government to declassify and release sufficient information to malicious cyber actors and publicly reveal their activities. The U.S. Cyber Command (USCYBERCOM) was formed to conduct offensive cyber operations against determined, resilient, and often profitable actors engaged in malicious cyber activities (Tate, 2022). The U.S.'s evolving cyber warfare strategy requires it "to set the terms of cyber operations by dictating the acceptable threshold of activities by determining which cyberattacks it is willing to absorb and where its cyber 'red lines' for retaliation exist" (Manley, 2022).

F) *Control of the Cognitive Domain or Influence Operations*—This refers to a targeting state's ability to control information and use it to shape and control psychology and cognition in the targeted state's human psychological and cognitive domains (Shinji & Rira, 2023). China is the quintessential model of a state actively engaged in influence operations in its struggle for ideological security and dominance against the U.S.-led, rules-based international order. Beijing perceives the West as trying to spread its universal values, such as human rights and democracy, and undermine authoritarian states into a political system akin to the Western democracies. China does this by propagating the Chinese narrative in domestic and global discourses, intensifying its influence operations in China and overseas (Shinji & Rira, 2023). Chinese narratives call for the need to reshape the global order because of the deterioration of the global order centered around the U.S. and other Western powers, juxtaposed with the greater strength and resilience of the Chinese political system, China's growing comprehensive power, and the superiority of the leadership of the Chinese Communist Party (CCP) as the core of the emerging new global order (Masayaki, 2023). In carrying out China's influence operations to control the global cognitive domain, the SSF has incorporated the elements of the PLA's psychological and political warfare missions as it manages the military's ability to conduct information operations in peace and wartime. The SSF is China's primary force for information warfare and is responsible for achieving information dominance in any conflict (Costello & McReynolds, 2019).

There is a growing realization within the U.S. government and armed services that there is an urgent need to protect the U.S. against asymmetric narratives. This requires enacting laws allowing the DoD to incorporate psychological methods to defend the country against perceptual manipulation (Hall, 2023). Such legislation will legally require the U.S. military to codify the cognitive warfighting domain. This will lead to a change in the current joint doctrine that emphasizes understanding information's pervasiveness to determine effects on relevant actors and military operations into one that discusses how to shape target audience perceptions for desired strategic effects (Hall, 2023). This will require two drastic measures within the armed services: 1) the Joint Chief of Staff to

formulate a cognitive warfighting doctrine to provide the military organization with the ways and means to prevail on the cognitive battlefield, and 2) the Joint Chief of Staff to restructure the USCYBERCOM to a U.S. Cognitive Dominance Command that will consolidate cyber, electronic warfare, military information support operations, civil affairs, and all other joint information functions (Hall, 2023).

## **Conclusion**

Led by the U.S. and China, defense communities all over the Indo-Pacific are investing in new and emerging 4IR technologies to adjust to the region's complex, uncertain, competitive, and fast-moving strategic milieu. Their mutual distrust and competitive interactions drive the U.S. and China as they become more open and granular in adopting emerging technology and its application in the military realm. The fog of peace still covers the future. It is not yet definite and clear what these interactive force buildups and modernizations will bring to the Indo-Pacific region. This would likely become clearer amid the dynamic interplay of variables, such as developments in emerging technology, its ability to be used for civilian and military purposes, and the logic and dynamic of the U.S.-China strategic competition occurring within a dangerous and fluid regional strategic environment.

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