Geopolitical Ramifications of Widescale Artificial Intelligence Integration into Military and Intelligence Collection Systems of the World's Major Powers

by

Michael Spencer, Ph.D., MBA, MIM
Halcyon Institute

March 15, 2023

Abstract

Artificial intelligence (AI) integration into the militaries and intelligence collections systems of the world's major powers is escalating. Every technologically advanced developed nation is accelerating development of digital technologies, especially AI, for economic and national security purposes and to remain competitive within the international order. AI integration is also increasing the likelihood of a new form of highly complex security dilemma and a technology driven arms race occurring. This type of security dilemma is different from those analyzed in the past due to the enabling characteristics associated with AI and digital technologies, their highly integrative capacity, and their transformative capabilities to existing platforms, all of which makes it exceedingly difficult for each nation's leadership to comprehend its vast complexities and what widescale integration will entail. The result has been a negative feedback loop of growing leadership suspicions and uncertainty concerning their counterparts' motives and intentions regarding and further enactment of S&T and AI specific strategies, policies, and investments.

Introduction

The purpose of this report is to assess the integration of digital technologies, especially artificial intelligence (AI), into the militaries and intelligence collections systems of the major economically developed and technologically advanced nations of the world and to ascertain the possibility of an ensuing new form of highly complex security dilemma and technology driven arms race occurring. Evidence of such an occurrence resides in the accelerating development of digital technologies, its large-scale integration potentials into military and intelligence collection systems, and the growing distrust among each nation's senior leadership over their counterparts' intentions and motives (Gates 2021; Meserole, 2018a).

I argue that the integration of a dual use enabling digital technologies, specifically AI, throughout the militaries and intelligence collection systems among the economically developed countries creates uncertainty and tension among their senior leadership. This in turn, results in national strategies and science and technology (S&T) policies designed to escalate digital technology R&D and implementation. This type of security dilemma and arms race is different from those analyzed in the past due to the enabling characteristics associated with digital technologies, their highly integrative capacity, and their transformative capabilities to existing platforms, all of which makes it exceedingly difficult for each nation's leadership to comprehend its vast complexities and what widescale integration will entail. It also creates negative feedback loops indicative of all security dilemmas as leadership suspicions and uncertainty concerning their counterparts' motives and intentions all but guarantees the enactment of further S&T strategies, policies, and investments in favor of digital technology investment and integration (Meserole, 2018b).

Since assessing all digital technologies (AI, cloud networks and computing, blockchains, advanced internet communication technologies (ICT), 5G, internet of things (IOT), etc.) and the approximate 43 economically developed countries would be beyond the scope of this research, AI will be the principle digital technology analyzed and the primary countries of emphasis will be the US and China. Defensive realism was selected as the overarching international relations theory to evaluate whether this highly complex security dilemma and subsequent high-tech arms race is occurring. The reasoning for using defensive realism is that despite the appearance of aggressive actions and/or motives on the part of technologically advanced developed nations, in this case the US and China, nations are actually more concerned with maximizing their security and position in the international order rather than aggressively seeking dominance which could compromise their standing and result in countervailing measures. For the US, it means retaining economic and technology hegemony, and in the case of China it involves becoming a high technology manufacturer, avoiding or mitigating the middle-class trap, and modernizing its country into first world status. Becoming or remaining a leader in digital technologies helps meet both nations objectives by providing each the potential for unprecedented technological advances and economic wealth.

The findings of-this research indicates that at minimum AI's dual use enabling capabilities and its large-scale integration capacity in military and intelligence collection do have a significant impact on the perceptions each nation's senior leadership regarding their counterparts' intentions and motives for escalating AI R&D and integration, which each side perceives as hostile. The enabling and integrative nature of emerging digital technologies, especially AI, are also so complex and interconnected that they convolute senior leaderships perceptions further increasing uncertainties and distrust, not only of their counterparts' intentions

but uncertainties associated with the AI technologies itself, its multiples use, leapfrogging capabilities, and how the AI technologies could be used against countries in unforeseen ways. These reasons (and others) create an action – reaction spiral that results in a series of reactive policies, lack of cooperation, and fear that AI must be increasingly explored and developed lest they fall behind the other nation. This spiraling effect and rush to develop AI is steering both nations straight into a highly complex security dilemma.

In evaluating my hypothesis, four qualitative case analysis were used: two historical, and two explanatory case studies. The two historical analyses concentrated on the linear progression of the US (first historical case) and China's (second case) S&T strategies and their policy making ecosystems; how each nation's senior leadership perceived the value of S&T R&D, especially digital technologies; and which strategies, plans, and policies received the greatest level of government support and funding. The third and fourth case analyses were explanatory case studies. The third focused on a growing S&T rivalry between China and its growing technological and economic power, and the US, the established hegemon. This case assessed both sides' senior leaderships perception regarding counterparts' motives and intentions over S&T R&D and implementation. The study looked at the evolution of S&T strategies and policies and whether those policies resulted in upsurges in government S&T R&D investments, academic research assistance, P3 collaborations, and private sector high-tech industry growth. The fourth case analysis concentrated specifically on AI, its dual use enabling capabilities, and its military integration capacity. Once again, the case evaluated senior leadership perceptions regarding their counterparts' motives for developing AI's technologies. The case looked for whether an increase in AI national strategies, plans, and policies resulted in increases in government funding for AI R&D, P3 and university collaborations, and private sector and industry AI development and led

to uncertainties and distrust among each nations leadership and contributed to a highly complex security dilemma and possible high-tech AI arms race.

The US and China were the nations selected for the case analyses due to their strong government support, immense technological and economic resources, and large well-established militaries. This places them in the best position to thoroughly research and develop dual use AI technologies for both the commercial sector and for military / intelligence collection applications, and to be able to afford the high costs of widescale AI implementation. Data collection sources included government reports, documents, and policies; defense and national security reports; S&T agencies, ministries, and Bureau reports; academic, think tank, and nonprofit publications, white papers, and reports; industry consulting reports; technical journals; and a variety of recent magazine articles, newspaper articles, and press releases. Units of observation varied depending on the case but generally included: US and China policy making ecosystems; S&T and AI specific national strategies, plans, and policies; government investments and incentives; P3 and university collaborations; AI military integration programs / projects, and senior leadership perceptions regarding their counterpart's intentions and motives for S&T R&D and AI integration.

The validity and verifiability of document analysis did present a problem. Information coming out of Chinese government, private sector, and university sources were suspect due to an inclination to propagandize documents. When possible, international sources were used to verify data. Magazine/website articles, research reports, government press releases were often used to provide the timeliest documents possible. Unfortunately, these sources can be subject to clear biases and/or inconsistencies.

US Science & Technology in the Modern Era

The first historical case analysis uncovered that US S&T development's principal function is to ensure its economic and national security and maintain its technological and economic hegemony. The US has a large, cumbersome bureaucratic policy making environment that is difficult to coordinate and manage (Lubell, 2019). The US federal government supports STI by helping develop infrastructure, establishing a supportive regulatory environment and legal framework, and providing funding assistance for basic and applied government and university research through numerous executive agencies, more than half of which is provided by the DOD (Hummel, Cheatham & Rossi, 2012). However, the greatest percentage of US government funding goes to the commercial sector and its research institutes S&T R&D programs (AIP, 2016).

Each US Administration's senior leadership perceptions regarding the value of S&T were critical to the enactment of US S&T policy and political affiliations and were one of the key driver of those perceptions (Schmitz & Murray, 2017). The major convoluting factor influencing leadership perceptions was the rapid evolution of new technologies (especially digital technologies) pitted against interlinked and often slow S&T bureaucratic systems which made policy enactment or strategic course changes difficult to implement in a timely manner and subject to partisan in-fighting (Clark, 2013). In addition to leadership perceptions, geopolitical and /or domestic pressures influenced policymaking. For example, evidence of China's unfair trade practices, intellectual property theft, illicit acquisition strategies, and clandestine cyber warfare against the US caused the Trump administration to implement safeguard tariffs on billions of dollars of Chinese products (Bulloch, 2018; The White House, 2018b; Noonan, 2019). Many of these policies remained in the Biden Administration (Bade, 2022; Labosco, 2022).

There have been many studies indicating the value of long term US S&T R&D. Lederman and Maloney uncovered that "a one percentage point increase in the ratio of total R&D expenditures to GDP increases the growth rate of GDP by 0.78 percentage points" (Lederman & Mahoney, 2003: 3, 32; Chen & Dahlman, 2005). While Edwin Mansfield discovered that more than 10% of all new products and services were brought about by academic research and that the combined research efforts of the private sector and academia were responsible for a 28 - 40% (depending on industry sector) return on investment (ROI) for businesses and a similar social rate of return on investment for a nations society (Mansfield, 1992: 180-181; Lubell, 2019). These studies and other indicate a clear correlation of value from US S&T R&D policy creation and investment.

China's Science and Technology Transformation

The second historic case analysis found that China's primary S&T objectives revolve around implementing long to medium-term strategies, plans, and policies to ensure its regime and national security, incrementally improve its position in the international order, and avoid any appearances of engaging in expansionist strategies involving high tech that could induce US counterbalancing measures (Johnston, 2003; Tang, 2003).

China senior leadership perceives US motives and intentions regarding China's rapid technological advancements as troubling. Beijing believes that the Trump administration's goals are to contain China's technological and economic growth and long overdue military modernization efforts (Jalil, 2019). There was considerable disappointment when the Biden Administration refused to reverse the new policies (Chalfant, 2021; Labosco, 2022). China's senior leadership have become convinced that they must become a global technological and economic power, reduce their reliance on foreign technologies and direct investment, and

advance their own indigenous high-tech manufacturing if they intend to maintain the economic growth levels their population has grown accustomed to. The key to this endeavor is the pursuit of cutting-edge dual use leapfrog technologies which reduces the need to compete against the US's well-established technology dominance (Veugelers, 2017; Bey, 2018; Kaplan, 2019).

Beijing also fears that any attempt to develop key emerging technologies will be met with additional US suspicions and distrust as to the motives of China's senior leadership and accompanied by additional rounds of counterbalancing measures (Motohiro, 2019, Edelman & Roughead, 2018). Beijing is deeply concerned about the action-reaction spiral and growing security dilemma forming between the US and China (Johnston, 2003). Finally, China's senior leadership is confronted with the same problem facing the US, the rapid advancements, dynamic nature of S&T development, and pace that emerging technologies are being integrated makes it difficult for Beijing's senior leadership to comprehend these complex advanced technologies and how to integrate them without stoking further distrust and tensions among Western nations (Clark, 2013; Kluz & Firlej, 2015).

China's S&T ecosystem and policymaking process is also large, bureaucratic, and cumbersome involving numerous interconnected leading groups, commissions, ministries, and agencies with overlapping responsibilities (Dolla, 2015). The ultimate policymaking authority resides in the hands of the CPC; no major strategic initiative, plan or policy is implemented without the direct approval of the Politburo Standing Committee (PSC) or its proxies, and all major commissions, ministries, and office leadership positions are held by CPC members (Anderson, 2013).

China's "Vision of Victory" laid out three strategic initiatives designed to assist China to become a global leader in S&T R&D and high-tech manufacturing and reduce the threat of

future US counterbalancing measures. These strategies included “Made in China 2025”, a plan to upgrade China to a global high-tech manufacturer in 10 strategic sectors by 2025, the Belt and Road Initiative (BRI) designed to offer billions of dollars’ worth of infrastructure development projects for developing countries in an attempt to create a continental superstructure of satellite nations with China as the hub; and China’s civil-military integration (CMI) military modernization program designed to update China’s aging military with cutting edge high tech military weapons systems by 2035 (Almond, 2018; Cavanna, 2018; McBride & Chatzky, 2019; Panda, 2019). These strategic S&T plans have raised global suspicion and mistrust among world leaders and condemnation from the both the Trump and Biden administration’s that they will subject nations to ongoing intellectual property theft and cyber espionage; electronic surveillance, debt, and contractual obligations providing China access to natural resources (BRI); and provide China time to develop its CMI programs to create advance leapfrog technologies at the expense of the “US innovation economy” (Almond, 2018; Oh, 2018; Cavanna, 2018; USCC, 2018a, Chafant, 2021).

To help achieve China’s greater ambitions and support its long-term strategic initiatives the CPC engaged in a series of ambitious S&T plans and policies. The most significant of these included the 2006 15-year ‘Medium to Long Term Plans’ (MLP) (2006 – 2020) established to oversee China’s policy agenda and prioritizes national interests and set the foundations for China’s rise into an “Innovation Oriented Society” by 2020 and a global leader in STI by 2050 (Springnut, Schlaikjer & Chen, 2011). To meet these objectives, China would need to become an “indigenous innovator” in the emerging technologies fields that are comprised of 11 key industry sectors, with an emphasis in developing dual use leapfrog technologies (State Council, 2006: 9-10; Springnut, Schlaikjer & Chen, 2011). The policy targeted seven emerging industrial sectors

that CPC senior leadership believed dual use cutting-edge breakthroughs were most likely, and provided a variety of incentive to China's growing high-tech private sector companies to pursue those(Springnut, Schlaikjer & Chen, 2011). In addition to the 2006 MLP, the most recent five-year plan (2016 FYP) addressed many rapidly evolving high tech concerns such as the need for S&T progress in emerging fields and the necessity for major policy revisions. Both of these plans would be the cornerstone for China's ambitions to become a global leader in international high-tech STI and a recognized "innovation nation" by 2020 and beyond (Cao, Suttmeier & Simon, 2006; State Council, 2010: 5; Springnut, Schlaikjer & Chen, 2011; Ou, 2016). They called for further increases in S&T funding, provided additional incentives for industrial innovation and entrepreneurship, and further targeted the emerging digital technologies for additional research and industry funding (Xinhua, 2017).

These strategic plans and policies demonstrated unwavering senior leadership support and China's centralized method of policy making which provided several advantages: policymaking is not subject to internal bipartisan fighting, and less affected by special interests or internal ministry squabbling. The Politburo, whose members are heads of the major ministries, drive policies forward and the PLA can demand, research lines with dual use capabilities be provided to its own CMI research institutes (Zhu, 2011; Sirkin, 2017).

As was the case with the US there are no reliable processes or established methods available to measure Chinese innovation or policy success. However, since China instituted its major S&T policy reforms, its rate of increase in R&D investments, technological progress, and contributions towards economic growth have outperformed every other technologically advanced developed nation (Veugelers, 2017). These reforms accelerated during the economic slowdown attributed to the Covid 19 global pandemic where China continued to increased S&T R&D

investment, patents, and publications moving their Global Innovation Index (GII) up from 14th in 2020 to 11th place on 2022 (Xinhua, 2022). This acceleration in innovation was even more prominent in AI and other digital technologies where leapfrogging strategies and "catch up cycles" were implemented that established China as a leader in AI – empowered businesses (Daitian, Tong, Xiao, 2021; Xinhua, 2023)

US – China Science & Technology Rivalry

The third case analysis uncovered how the US – China S&T rivalry was both the product of and catalyst for a growing shift in the global balance of power incurred when a rising challenger with a different political ideology and strategic objectives confronts an established hegemon (Kegley & Wittkopf, 2005; Kennedy & Lim, 2018). The rivalry is largely based on the perception of both nation's senior leadership and determined by their mutual need to preserve their national security interests and maintain economic growth (Eloot, Huang & Lenich, 2019).

China's leadership earnestly believes that to maintain its regime and national security it must become a dominant global high-tech manufacturer and exporter. It can no longer rely on being the world's dominant producer of low-value goods (Eloot, Huang & Lenich, 2019). To accelerate its technological progress, China "acquires" existing technological advances by requiring foreign companies to share technology through technology transfers in exchange for market access; or through illicit acquisition strategies such as intellectual property theft. It then uses these technologies to develop their own product/service lines, while at the same time it engaging in their own indigenous S&T R&D (Kennedy & Lim, 2018). The CPC Central Committee can require that any state-owned enterprise SOE or private sector large to medium size enterprise (LME) shift its R&D or product development to suit "The Party" needs. Refusal

by a foreign national company to comply with technology requests could result in expulsion or a denial to market access (Veugelers, 2017).

These practices combined with Beijing's aforementioned S&T strategies, plans, and policies have enabled China to become equal to or surpass most of the world's technologically advanced developed nations, especially in emerging technologies with dual use capabilities (Nouwens, 2018). In a reversal from prior administrations, the Trump administration perceived China as engaging in coercive gradualism to incrementally achieve a S&T leadership position at the expense of US innovation. Equally troublesome for US senior leaders is how many of the dual use technologies under Chinese development have direct applications for China's military modernization efforts, despite Beijing's claims otherwise (Bhatia, 2018, 25; Freeman, 2017). In essence, the US distrusts China's leadership's motives and their claims that it is merely trying to maximize its security, citing years of intellectual property theft, espionage, cyber-attacks, denials, and outright lies (Bennet & Bender, 2018; ISDP, 2018).

China on the other hand, perceives the Trump and now Biden's administration's intentions and actions as being equally hostile. China's leaders believe that US counterbalancing measures were not solely aimed at stopping unfair trade practices or intellectual property theft (which had been occurring for decades) and preserving national security, but was directed at stymieing China's technological progress and economic growth deemed vital to CPC regime legitimacy and China's economic survival (Borzykowski,, 2018; Tayal, 2019; Bateman, 2022).

Both nations realize that the future of economic growth resides in technological progress and if a nation does not keep abreast of STI they can easily be left behind by the other technologically advanced developed nations, especially in the development of state-of-the-art digital technologies with leapfrog capabilities (Schaaper, 2012: 7-8). This has caused each

nation's senior leadership to exaggerate potential threats (contrived or factual) and has led to unpredictable and irregular policy behaviors which further intimidates their counterparts (Wohlforth 1993; Christensen 1996; Schweller, 2006: 37, 47-48).

Circumstances have spiraled to the point where the US views China's technological and economic rise as an "unprecedented threat" to its industrial base and national security interests (Gavekal, 2018). Even China's ambitions to become a high-value, high-tech producer are considered a threat and challenge to US STI, because those are also the foundation of US technological and economic hegemony (McBride and Chatzky, 2019; Motohiro, 2019). The Trump administration also considers China's foray into emerging dual use leapfrog technologies as an underhanded attempt to render US military power inert in the Indo Pacific, challenge US military hegemony, and modify the international order to its benefit (McBride & Chatzky, 2019; Farley, 2018a). After mounting criticism that the Biden administration had loosened some patent restrictions and intellectual property protections that would aid China in leapfrogging US digital technologies the current administration engaged in significant policy shift aimed at expanding export controls and curtail China's advanced semiconductor production (Bedard, 2022, Feng 2022)

China's senior leadership has an equal distrust for US motives. They know that they must develop their own high-tech research, advance their commercial sector and industrial capacity, and reduce reliance on Western technologies should additional rounds of counterbalancing measures occur, as appears to be the case in the recent targeted decoupling aimed at semiconductors and controls placed on global supply chain chokepoints (McBride & Chatzky, 2019; Feng, 2022). Should such activities continue and affect Beijing's long-term ambitions to become a dominant high-tech producer it could incur the potential hostilities of their own

population, something the CPC will not tolerate. CPC leadership realizes that to avoid potential civil unrest it must be able to support the growth of its emerging middle class, meet their rising income levels, and provide high value high quality products they are growing accustomed to. The key to this lies in becoming the world's predominant high-tech manufacturer and exporter (McBride & Chatzky, 2019; Kania, 2019a).

Each round of Chinese technological developments has been countered by US counterbalancing measures and subsequently followed up by some type of Chinese economic retaliations. This exacerbates the S&T rivalry and spirals each nation into new rounds of distrust and tension (Tang 2009: 620-621; Kennedy & Lim, 2018). Further complicating matters, both nations exist at the polar ends of political ideologies. US founding principles reside within the concept of freedom, limited government, private property rights, and the US Constitution. To the Trump administration's National Security Strategy (NSS), "economic security is national security" and the threat to one is a threat to the other (Kania, 2019a). The Biden administration also supports this initiative identifying "strategic competition with China as the most consequential long-term threat the United States faces". The current administration's strategy is to rely strongly on cooperation with its allies and call for democratic governments to assume a more robust role in their economies to counter China's rising dominance (Fontaine et al, 2022). To the CPC, ensuring regime survival, promoting state security, protecting state sovereignty, and defending regional territorial interests, are its core interests. Beijing's strategy is to develop its technological power and expand its economic growth. This in turn is used as the central means of achieving its core interests (Kania, 2019a; Zhou, 2019).

Aggravating the political and ideological deference's are US' expectation that China would one day become a modern democratic society. The CPC considers this a direct threat to its

regime survival, and the survival of the communist party is of primary national security importance. Simply put, the US and China's senior leadership view national security maximization in fundamentally different ways (Kania, 2019a).

Another problem contributing to the S&T rivalry is the lack of understanding as to what each nation believes is important. China's senior leadership considers its standing and status in the international order of vital importance and a matter of national pride. The development of emerging dual-use technologies has as much to do with China's status on the world stage and keeping up with the other nations as it does in international competitiveness and providing for domestic needs (Xuejie, Zhao & Yuanyuan, 2015; Wolf, 2017; Ma, 2018).

The US considers China's recent national strategies such as the CPC's "Vision of Victory," and other major strategic initiatives to be of major concern to Western nations and a clear indicator as to China's true intentions. US leadership believes these strategies are a long-term challenge to US global hegemony, and a potential threat to the overall international order (Allison, 2017; Panda, 2019). The Trump administration's national security apparatus declared that if China succeeds at these strategic initiatives, it will be largely through "acquiring" Western technology, not by its own indigenous efforts, and will came at a major cost to Western STI. Western nations are reaching a consensus that if China does gradually become the dominant high-tech, high-value producer and exporter as it did with the manufacturing of low value products/services, the developed world could wake up one day faced by a China that has already overwhelmed high-tech markets, restricted supply chains, and rendered Western MNCs internationally less competitive (Daniels, 2017; Panda, 2019). Western nations are conducting critical reviews of China's unfair trade practices and are placing an increasing number of restrictions on China's foreign investments and strategic initiatives (McBride & Chatzky, 2019).

Another factor contributing to the US-China S&T rivalry was the emergence of the 2018 trade war and what looked to be the start of a potential decoupling between the world's two largest economies representing 40% of global GDP (Pei, 2019a; Pei, 2019b). US leaders understood that a trade war and possible decoupling would be economically and politically damaging, but continuing to feed China's economic growth, at the expense of US trade deficits and loss of intellectual property would be more devastating in the long run to the US and its Western allies (Pei, 2019a). China's leadership took the trade war to be a clear indication that it had become overly dependent on US investment, technologies, and market access (Motohiro, 2019; Pei, 2019a). Beijing has tried to reassure the both the Trump and Biden administrations that concerns over China's rise are misguided and it is not China's intention to threaten or unduly take advantage of the US, rather an attempt to make China a robust international competitor. Beijing also holds fast to notion that China's success is not to be attributed to trade infractions or corporate espionage, but accomplished through decades of successful pro-growth policies (Manning & Engelke, 2018; Cheng, 2019b; Monier, 2019, Chen, 2022). However, these efforts of reassurance, in certain circles of the CPC, are considered a display of vulnerability and have not pursued in earnest (Glasser, 1998: 181; Cheng, 2019b).

Exacerbating the trade war is the growing technology war (Lynch, 2019). The impetus for this tech war was China's accelerating development in leapfrog digital technologies with dual use capabilities. These technologies are deemed vital for any nation that wants to take a leadership position in the fourth industrial revolution (Mourdoukoutas, 2019). If US counterbalancing measures are successful at hindering China's technological progress, China's opportunity to become internationally competitive could be significantly diminished and the country itself overwhelmed by the middle-income trap and aging demographics. Such events

would limit high-tech research investments and industry development and lock Beijing into a long-term declining economic spiral (McBride & Chatzky, 2019; Motohiro, 2019).

The US has focused on containing China's technological development through legislation, policies, and regulations. This was done by restricting Chinese companies access to certain US technologies and supply chains and limiting commercial contract opportunities between US and Chinese Internet communication technology (ICT) companies accused of spying and installing eavesdropping backdoors in their products (Lynch, 2019).

The evolving tech war and US – China S&T rivalry is ultimately about a competition over which countries will be able to dominate the new emerging digital technologies. China's senior leadership realize they must be an early adopter or fast follower and quickly become a dominant player in at least some of these technologies, especially those with leapfrogging dual use opportunities (Nouwens & Legarda, 2018, 3). There is simply too large of a gap between China and the US in conventional S&T R&D and in high-tech product/service development for China to close the gap at a rapid enough pace. China has too many obstacles to overcome conventionally before US counterbalancing measures take their toll. Other nations are also growing tired of China's elicit trade behaviors and have begun their own decoupling efforts (Holland, 2018).

The final factor contributing to the S&T rivalry is China's plan for the PLA to become a modern military by 2035, and world-class military by 2050. To meet this objective, emerging dual use and digital leapfrog technologies with military applications are being developed to exploit US military weaknesses, and offset superior US firepower (Roblin, 2018; USCC, 2018b: 220).

However, much of the dialog coming out of China regarding China's need to prepare for an inevitable military confrontation while intimidating, has been largely rhetoric. Both the US and China know that developing advanced military weapons and modernizing China's military to be the equal of other developed countries is much different than actually being on par with the US military capabilities. Even with China's capability to "acquire" US weapons technology and its large-scale manufacturing capacity, it can take years to develop, test, and work out all the bugs needed for advanced weaponry, much more for fully combat ready weapons platform (Cheung, 2013).

Both the Trump and Biden administrations have taken China's ambitions to become a dominant player in the emerging digital leapfrog technologies seriously. The National Defense Strategy (NDS) guides the administration to both increase its investments in dual use digital technologies and to protect its high-tech commercial ecosystems from China's "acquisition tactics". The administration has responded by placing a number of Chinese companies under investigation or outright denying them access to work with or purchase US companies working in "sensitive" fields (Majumbar, 2018; Tayal, 2019; DOD, 2022). The DOD has also taken the initiative to expand DARPA projects and DIUx partnerships (DIU, 2019).

Despite the restrictions imposed by the Trump administration and their continued reinforcement into the Biden administration, China is resolute regarding the development of dual use digital technologies. China's senior leaders believe that dominating some of these fields will provide the needed economic wealth for modernizing its military and ensuring national security (Laskai, 2018; Jacob & Flatley, 2022; Lobosco, 2022). The US is determined to protect US technological innovation from China and it fully intends to remain the military hegemony (Triolo, 2019).

Complicating the overall S&T rivalry is the enormous complexity and highly integrative capacity of emerging technologies, especially dual use digital technologies. This complexity obscures leadership perceptions and makes S&T policy difficult. It requires new approaches to overcome integration problems and deal with highly complex systems, something both nations leaders are reluctant to do (Cetindamar. Lammers & Sick, 2020). The S&T rivalry and tech war has locked both nations into an action - reaction cycle that has culminated in increasing levels of high-tech decoupling. If left unchecked this could split the world into two separate global commerce camps (Trilio, 2019). All of the factors discussed that are contributing to a S&T rivalry are driving each nation towards a complex, multivariant, and new form of security dilemma.

Artificial Intelligence Military Integration

The fourth case analysis assessed whether increases in AI national strategies, plans, and policies resulted in an increase in government funding for AI R&D, P3 and university collaborations, and private sector companies. It also evaluated whether these increases in AI related policies contributed to distrust and uncertainties from each nations senior leadership thus increasing the likelihood of a highly complex security dilemma and potential AI arms race.

. The case analysis revealed a number of supporting findings. The first of which dealt with the international order and its influence on national strategies. The CPC values its position within the international order and recognizes how beneficial it has been to China's technological and economic ememrggence. China's senior leaders realize that any overt demonstrations of power maximization or an aggressive pursuit of power will be met with severe counterbalancing measures by the US (Elman & Jensen, 2012: 21, 28; Mearsheimer, 2015). Therefore, China's leadership have concluded that it is best to exhibit self-restraint and a gradual pursuit of its goals.

These activities have thus far proven advantageous at ensuring its primary objective, regime survival and national security (Tang, 2003; Mearsheimer, 2015).

China's leadership also understands that any serious attempt to rapidly maximize its security could be considered threatening to other nations, causing them to react in a similar manner (Jervis, 1978: 186; Lobell, 2010: 12). China's rapid development of emerging digital technologies, specifically AI, have already raised deep suspicions within many circles of the US government and among China's regional neighbors as to what Beijing's true motives are for rapidly developing dual use technologies with such vast integrative possibilities (CRS, 2019a: 9, 21; Hass & Balin, 2019). Because of China's actions, the US has escalated its own investments in AI research, establish new P3 collaborations and contracts domestically, and is assisting other develop nations financially and technologically to develop their high-tech industries (Meserole, 2018; Hass & Balin, 2019).

Due to these events, The US and China are already mired in a S&T rivalry and tech war and other nations are following suit. To intensify the problem, The US and China appear determined to rush headlong in developing the most revolutionary, enabling, dual-use digital technologies since the advent of the computer, with AI receiving the greatest emphasis. Both nations are also convinced that AI integration throughout the world's societies is all but inevitable and that becoming a first mover in AI technologies is, and will continue to be, essential to the economic and national security interests (Kania, 2017a: 14,18; Pawlyk, 2018). AI's revolutionary capabilities are alluring to each nation, but to China AI represents access into the world of high-tech manufacturing something its leadership believes is a necessity for the China's continued growth. This alone stands to complicate and aggravate the already complex nature of the US – China security dilemma (Kania, 2018; McBride & Chatzky. 2019).

Shifting into the investment environment. China's commercial sector ecosystem receives considerably more support than that of the US. This is important since the majority of AI algorithm development is coming out of the private sector. The Chinese government has significantly increased its support for venture capital and private equity firms which in turn provide seed financing for China's innovative startups and small businesses. This is occurring at a greater pace than that of the US and its Western allies (Allen, 2019: 10, 20). China also enjoys greater access to big data, arguably the most important component for AI machine learning algorithms. China's senior leadership accomplished this by removing access restrictions and privacy rights to more than 800 million of its citizens. This allows China's private sector companies and government ministries unfettered access to almost 20% of the world's data (CRS, 2019a: 22; Kewalramani, 2018).

Beijing enjoys others advantages as well. The CPC's Central Committee can coordinate and direct AI strategies, plans, and policies in a far more rapid and efficient manner than the US. This has allowed China to not only enact AI policy in a swift manner but ensures those policies are carried out according to the direct wishes of the Politburo Standing Committee (PSC) (Zhiyue, 2007: 300; Shirk, 2012; J.M., 2013). However, good policy is not simply about implementation, speed and efficiency, but which AI research lines and projects will be selected for integration and how companies and projects will be coordinated and funded, which is something China has yet to prove being superior at in this arena (Horowitz & Mahoney, 2018).

The US AI ecosystem has a well-established military-industrial academic complex with decades worth of well-established networks and an unmatched commercial sector. Over the past decade, the largest concentration of worldwide S&T breakthroughs has been being generated at US high-tech companies and research universities (NSTC, 2016: 7, 12; NSTC, 2019: 2, 7). US

commercial sector investments in research has grown dramatically during this period with the greatest percentage of funding increases being allocated to emerging digital technologies (Mckinsey, 2017: 14, 40; Priceconomics, 2018). In addition to final investments, Silicon Valley is able to attract the world's top software engineers and computer scientist talent (Davenport, 2019).

In comparing the US and Chinese AI ecosystems, six categories were selected. These categories were considered instrumental to AI dual-use development and included: access to top-tier talent, basic and applied R&D, speed of product/service, and computer hardware and microprocessor development. While the US retained the number one position, China finished first in two of the categories, AI adoption into commercial sectors, and the military and access to big data. What alarmed US analysts more, was how quickly China had been closing the gap in almost every category in the past few years (Castro, McLaughlin & Chivot, 2019).

The two nations AI ecosystems, and their overall R&D programs, differ from one other in a highly crucial manner; US researchers and entrepreneurs excel at innovation, conceptualizing new ideas and turning it into an innovative new product or service. China's researchers and entrepreneurs are outstanding implementers, and are able to take an existing technology, product, process, or service and improve it, produce it faster, and provide it at a lower cost (Lee & Sheehan, 2018). China has also been working diligently to improve its innovative capabilities, but with only marginal levels of success throughout its large state-owned enterprises (SOEs) and government research institutes. To account for this the CPC has shifted its ambitions for indigenous innovation to its rapidly growing private sector (Webster, et al., 2017a).

Another critical factor that has led success in AI development within both nations are how their national S&T strategies, initiatives, plans, and policies are implemented. China's AI

specific strategic initiatives have followed the same course of action as their overall S&T strategies. AI was first introduced as an emerging technology of interest back in the 2006 MLP (He, 2017). In 2011, the release of the 12th FYP increased AI's importance to that of a "primary objective" and assigned to the growing field of smart manufacturing. By the 13th FYP, AI's relevance had increased and become a critical component of their new S&T development paradigm. The 13th FYP also contributed to an escalation in AI-specific strategic initiatives, policies, and documents (He, 2017). The two most significant of these are the Made in China (MIC) 2015 and the "Internet Plus" action plan, both of which further demonstrated AI's growing importance to CPC senior leadership (He, 2017; Triolo & Goodrich, 2018). In 2017, China introduced the Artificial Intelligence Development Plan (AIDP), the first plan exclusively dedicated to AI. The AIDP would become known as China's national AI strategy and outlined a three-phase agenda that addressed and fixed problems in China's R&D ecosystem, called for the expansion of AI products and applications, and created China's AI industry (Kania, 2017a).

The US' AI strategies and policies appeared to be more of a reaction to China's AIDP and CMI initiative than a well-thought-out standalone process. The US' initial AI policies appeared more concerned with implementing counterbalancing measures designed to limit access to the growing number of Chinese digital technology companies to US dual use technologies. (Borzykowski, 2018; Tayal, 2019). It was not until 2019, almost 2 years after the AIDP, that the Trump administration launched the American AI Initiative, a comprehensive national AI strategy with the full backing of the federal government to develop an earnest AI's dual-use capabilities and explore its highly integrative capacity (Hansen, 2017: 3). One day later, the DOD announced their own artificial intelligence strategy to fully develop the military applications of AI's dual use nature, and the Joint Artificial Intelligence Command (JAIC) was also created to coordinate and

operationalize AI technologies (Cronk, 2019). The Biden Administration expanded on these initiatives establishing through the Office of Science and Technology Policy (OSTP) and the National Science Foundation (NSF) the National Artificial Intelligence (AI) Research Resource. This task force would be responsible for creating the blueprint for the National AI Research Resource (NAIRR) a joint research infrastructure designed to spur AI R&D and innovation throughout multiple government and commercial sectors (White House, 2021)

When assessing AI strategies and policies dealing specifically with military and intelligence collection applications and R&D programs, these policies are recognized by the senior leadership of both nations as crucial to the future of their national security. However, AI military integration has not been not proceeding at the same pace or with the levels of success as AI integration into the commercial sector. There have been some significant advancements in autonomous hardware systems and military drones but the overall integration has been slow and problematic due to a variety of reason (Allen & Chan, 2017: 2, 13-14; Allen, 2019: 6, 8). This is projected to change, with the increase in ML and DL functional capabilities and the declining costs of embedding AI into weapons platforms, AI-embedded weapon systems will see a dramatic increase in proliferation over the upcoming years; and this pace will continue to escalate for decades to come (Allen & Chan, 2017: 20-21).

When considering current levels of AI military integration, AI's autonomous decision-making capacity and growing availability of data sets and sensor arrays are beginning to outperform many of the old human – computer system paradigm (Allen & Chan, 2017: 20-21). In the immediate future, and with AI military integration in only its introduction stage, AI-embedded military weapons systems and command-and-control functions are expected to redefine military power projections. With each new generation of ML algorithms developed for

military applications, AI-embedded weapon systems will increase in proficiency and discover new ways to ingeniously outperform existing systems at a significant reduction in costs (NSTC, 2016: 37-38). The main advantages to AI military integration thus far are AI's ability to adapt, learn, and evolve in battlefield scenarios in near real-time, providing the algorithms have access to reliable data (Button, 2017). As more prototypes and functional systems are developed and tested, what is becoming evident is that AI-embedded weapons platforms will be integrated and networked across multiple levels, use battlefield information for ongoing situation analysis and contingency assessment, and be able adapt to hostile scenarios in a fraction of the time of their human counterparts (Cole, 2018).

There are still significant problems and bugs that need to be worked out. Decision-making is only as good as the data that is analyzed. Some tasks are still difficult for ML algorithms to solve like deciphering through numerous layers of contextual information in a dynamic environment. Perhaps the biggest problem is a lack of trust or fear of using the AI's capabilities by senior officers and government leaders (Azati, 2019).

China's strategies and plans for AI military integration are based off its strength in applied, and development research. What this means is that China will continue to use its ability to "acquire" AI technologies from external sources, then use its competitive advantage in implementing to rapidly develop prototypes and fully functioning weapons and intelligence collection systems **(**Allison, 2019**).** The Central Military Commission (CMC) of the CPC foresees AI is a key component to its military modernization efforts. The CMC intends to take advantage of China's already well-developed AI research programs and ecosystems (Horowitz, 2018: 41-42). Beijing also intends to take advantage of AI's eventual ability to replace tactical

commanders and to “intelligenticize” decision-making by taking humans ‘out of the loop’ where applicable (NSITeam, 2019: 141-142).

The US AI policies and plans intend to take full advantage of AI military integration as well. The DOD believes that integrating AI and other emerging digital technologies into military systems will be a necessity in preparing to fight and win the wars of the future (DOD, 2018: 3-4). DOD analysts agree that AI technologies will provide US defense forces a strategic advantage and competitive edge that could last for decades, providing that the US can keep up with China (Lye, 2019; CRS, 2019a: 34, 36).

Despite the benefits that US and Chinese senior leaders attribute to AI commercial sector and military integration, one concern still stands out. Each new strategy, plan, and policy involving the development of AI for military and intelligence collection purposes also increases apprehensions of counterparts’ motives. In addition, despite clear and impending evidence of AI’s contribution to a growing security dilemma, both nations seem to be unconcerned and instead are rushing ahead to increase AI development in all possible sectors (Kania, 2017a). This places the US and China in a quandary; the more each nation develops AI’s dual use capacity and military applications, the more distrust and suspicion each nation’s senior leadership experience, the more unlikely they will be able to escape from this new form of highly complex security dilemma (Gavekal, 2018; Hass & Balin, 2019).

Complicating matters further, both nations’ senior leaders are convinced that should a conflict breakout, AI embedded military weapons systems will undoubtedly be used. US analysts are growing increasingly troubled that should China decide to remove humans decision making from critical nodes in the decision-making loop, scenarios that could have been de-escalated with human intervention, could instead result in confrontation if managed solely by AI, Such

scenarios could happen very quickly, have potentially devastating effects, increase the risk of an inadvertent conflict, or result in war. (Allen & Hussain, 2017; Kania, 2017a: 37).

AI strategies and policies geared at rapid escalation of AI applications also contributed to the growing distrust among leadership perceptions as to their counterparts' intentions and this is only projected to increase over time. Intensifying this problem, is that there are currently no planned protocols or regulatory restrictions barring AI military integration. Because of these factors and other unknowns associated with AI military integration, the chance of each nation misinterpreting their counterparts' intent will continue to rise, which increases the probability of overreactions or unintentional responses (Jervis, 1978: 175; NSITeam, 2018: 133-134). As AI technologies continue to advance, development speeds increase, and AI algorithms shift from ML to DL, the capabilities of AI military integration will exceed the comprehension levels of battlefield commanders and each nation's senior leadership. This will make good policymaking extremely difficult. It could also compel each nation to want to develop AI at the fastest pace possible in fear of falling behind their potential adversary, further exacerbating mutual tensions and distrust (Jervis, 1978: 175; Meserole, 2019**).**

Leadership perceptions, and in many cases their misperceptions, are not the only issue of concern, the sheer complexity and vast integrative capacity is also problematic. AI technological advancements are becoming so sophisticated, that it is expected to revolutionize existing military systems. This will occur so rapidly that each nation's senior leadership will not be able to keep pace or comprehend the magnitude of changes, how the systems work in combination, or how decisions are reached (Bey, 2018a; Sharikov, 2018). This could lead to a distrust of AI itself, especially if the leaders have no way of understanding how or why AI algorithms are making their decisions, or if a problem develops, what or where the cause is (Marr, 2017).

The final finding this case analysis uncovered, and one that was also mirrored in the third case analysis, was that this new form of AI driven security dilemma is much different than any security dilemma the two nations (or any nation) have faced in the past. This highly complex security dilemma is multifaceted, interrelated, continuously evolving, and filled with unknowns that each nation's senior leadership is ill prepared to deal with. It is comprised of AI's enabling dual-use nature, AI's vast integrative capacities, and massive synergetic potentials. Where this security dilemma truly differentiates itself is that it operates in regions where there are no borders or boundaries, occurring in the cyber environment, where even the most gifted programmers will have difficulty navigating in a time sensitive manner, and where a thousand battlefield scenarios can be determined in milliseconds. This could render battlefield commanders in a perpetual state of slow reactionary responses, and each nation's senior leadership are regulated to only broad strategic decision-making moves.

Theoretical & Empirical Analysis

Empirical evidence presented in case analysis three and four confirmed the hypothesis which argued that widescale AI integration into the militaries of the US and China did significantly contribute to a new form of complex security dilemma occurring within the theory of defensive realism. The rate progress for this security dilemma did not accelerate as fast as originally expected. The reason being that despite the appearance of aggressive actions, the evidence indicated that both countries have been more concerned with maximizing their security and positions within the international order, which provides each with unprecedented technological advances and economic wealth, rather than engaging in outright conflict. However, with the increasing pace of advances in AI, the benefits attributed to AI integration in military

and intelligence collection, and the growth of an economic and high-tech rivalry, the threat of a security dilemma is escalating.

Case analysis three did not directly address an AI driven security dilemma but did discuss the emergence of a S&T driven security dilemma of which digital technologies, and by default AI, resides within, and is a primary catalyst of. The case laid out how the S&T rivalry and tech war is occurring between the US and China and the complexities involved in developing dual use technologies and integrating those technologies throughout a nation's commercial, military, and intelligence collection sectors. The case also described how the S&T rivalry and tech war between the two nations was actually about a competition to dominate the new emerging digital technologies, including AI, and how these digital technologies also have extensive dual use and enabling capabilities, and in China's case leapfrogging potentials. Finally, the case went over the integration of these digital technologies into the military weapon systems of China and the US and how both nation's S&T ecosystems, strategic initiatives, plans, and policies were devised to support the development of these new advanced emerging technologies.

The third case analysis also explained how the ongoing introduction of these technologies affected each nation's leadership perceptions regarding the intent and motive of their counterparts in developing technologies with such a wide range and vastly integrative dual use capacity. It also explained how the increasing complexity of dual use and enabling digital technologies convolutes leadership perceptions. This intensifies uncertainty and distrust among each nation's leaders which in turn contributes to a downward spiral of negative action - reaction response culminating in a security dilemma. The third case also provided the broader context and set the foundation for the fourth case.

The fourth case study analysis delineated the emergence of a complex new form of security dilemma, one specifically attributed to the development and integration of AI throughout each nation's military and intelligence collection systems. AI's ability to enable existing electronic technologies and improve its performance both complicates and aggravates the growing US China security dilemma. The onset of this security dilemma originated in 2006 with China's 13th FYP which initiated the US – China S&T rivalry and the start of a high-tech trade war over emerging technologies and has since progressively grown as China and the US continued to develop highly efficient AI ecosystems, AI national strategies, and a series of AI related plans and policies. The case describes how AI embedded military systems are projected to revolutionize each nation's fighting capabilities and command-and-control systems, and how the senior leadership from both countries felt compelled to escalate AI development or run the risk of falling behind potential adversaries.

The fourth case also goes into detail on how AI's rapidly evolving, large scale capacity, and complex integrative nature ignites apprehension and fears among each nation's senior leadership regarding the potential of AI embedded weapons systems, how these advanced weapons systems could be used against their countries, and how lethal and effective they could be. The case goes further describing the overall quandary each country finds itself in as they rush to develop and integrate AI throughout their commercial sectors, militaries, and intelligence collection apparatus to maximize their economic and national security. As time progresses each nation's leadership is becoming more consumed with distrust and suspicion over their counterpart's motives and ambitions. In essence, they do not feel more secure but less. They are finding themselves trapped within a complex new form of security dilemma with no apparent way out. Adding to the complexity, they believe that if they attempt to engage in cooperation,

transparency, or establish a mutually agreed upon regulatory framework for slowing down or limiting AI military integration, thus reducing the security dilemma's impact, it would be construed as weakness and forfeit any competitive advantages acquired thus far. Succumbing to an international regulatory council would also require a loss of strategic control over AI development and integration. Control over AI development is something China senior leadership believes is vital to their continuing economic growth and long-term goals of becoming a high value high-tech exporter. The US also wants to retain its control over how it develops and integrates AI, since it believes that AI is an essential factor for retaining its technological and economic hegemony. Seeking cooperative solutions with a country, they have already lost trust in, or following the mandates of an international council which could allow other counties the opportunity to catch up or leapfrog US dominance is equally unacceptable.

Case four demonstrates that with each new generation of AI algorithms embedded into military and intelligence collection applications, the US and China's senior leadership is not only becoming more distrustful of one another's motives and intentions but are more likely to misinterpret their counterparts' actions as a direct threat. In addition, the growing complexity of AI's dual use and enabling capabilities, its multiplier effect, and its rapid expansion throughout military and commercial sectors makes it next to impossible for those senior leaders to adequately comprehend what they have gotten themselves involved with. They only know that they must proceed forward as fast as possible, or their competitors will move ahead of them. The lack of comprehension and neglect of long-term risks associated with rapid AI development and integration creates a pattern of reactionary policy decisions which is never a good foundation for good sustainable policy making.

The final component the fourth case analysis presents, is how this security dilemma is unlike any prior security dilemma a nation has had to face. AI can be literally be integrated into almost any digital product the technologically advanced developed societies can make. Every application possesses dual use characteristics which can be exploited not only by the governments but also nonstate actors, including dissident groups within their own populations. This is a major concern of China's CPC which has already used fear and intimidation tactics, widescale invasive surveillance, "re-education" internment camps on a number of different groups within its 1.3 billion population. The size and scope of the security dilemma is also problematic due to the aforementioned action - reaction cycle which no longer solely subjected to the physical plane, but now occurs in cyberspace. In this environment AI can operate in such a wide array of channels, and at such a fast speed (milliseconds), that even the best programmers developing the cyber warfare or cybersecurity applications cannot keep pace. Each nation's senior leadership has no idea what is occurring in real time or whether the AI will make a decision that leads to a potential conflict, or why that particular decision was reached. Very soon military decisions, at least at the tactical level, could be removed from both military commanders and each nation's senior leadership in order to maintain a competitive battlefield advantage. The bottom line, with AI algorithms at the decision-making helm, the senior leadership of the US and China may never know how their orders were carried out, whether they were accomplished as intended, or if their perceptions regarding what represents a successful operation are even remotely accurate.

US and China Strategic Policies and Implications of AI integration

The practical applications of AI integration and its implications are straightforward, AI is being integrated throughout society at a rapidly expanding rate. Its dual-use nature makes every

potential algorithm useful for a variety of purposes including enabling existing commercial technologies to become more functional and efficient or to enhance military and intelligence collection systems. For reasons already provided, the US and China will continue to research, develop, and integrate AI into their commercial and military sectors at an accelerating rate. The benefits and future opportunities simply outweigh any potential costs to both nation's senior leadership. China's leaders feel compelled because China must retain its economic strength and become a high-tech manufacturer in order to validated CPC legitimacy and regime security. The emerging digital technologies, especially AI, are the primary means to accomplish this. US leaders realize they must retain US technological hegemony at almost any cost since they have exported much of the manufacturing base and STI is one of the few remaining sectors guaranteeing US economic power and military prowess. Under these circumstances, the two nations are at an impasse, and the inevitable entrapment in this new form of highly complex security dilemma is fast becoming an inescapable reality.

A more thorough understanding of this new form of high-tech security dilemma is required. As previously stated, its complexity is beyond the comprehension of the world's leaders to adequately assess. Because of this, the uncertainty and distrust that the nations senior leadership experience leads to impromptu or reactive policy decisions that further fuel the security dilemma, creating a self-reinforcing negative feedback loop. Ironically, it may require AI to analyze and interpret all the possible ramifications and nuances of AI military integration in order to increase a nation's senior leadership and battlefield commander's situational awareness and to improve their comprehension of the new battlefield. What still needs to be conducted is objective analysis of AI military capabilities and its integration potentials to discover the best avenues for future R&D, policy enactment, and funding that will benefit the US

national security. It is certainly a brave new world and I conclude by reiterating the following statement by Mark Esper, Secretary of Defense, “like it or not, future war will be AI driven”.

Shortfalls and Future Research

The primary shortfalls and gaps within this study reside around the lack of accurate information in the document analysis as to what is actually taking place in each nations government and private sector AI R&D programs, especially classified programs, the success rate of the algorithms, are they doing what they claim, to what degree is military and intelligence collection integration occurring, and can the programs be scaled in a cost effective and timely manner. While sources of AI military integration can be gleamed from projects such as Project Maven, Gordon Stare, Night Stalkers and their Chinese equivalents, most of the cutting-edge AI technologies in the military and intelligence collection arenas are compartmentalized, highly classified, located at secretive facilities such as the US’ Defense Advanced Research Projects Agency (DARPA), Intelligence Advanced Research Projects Activity (IARPA), National Laboratories lines like Los Alamos and Sandia, and their equally classified and restrictive private sector defense contractor collaborations. Information that is not classified is subjected to heavy bias or outright propagandizing, certainly the case with China, as nation’s try not to “tip their hat” as to their what their most profound research lines are. Even within the private sector, much of the advanced research is protected by nondisclosure and non-compete agreements in high-tech companies. These companies are very leery of releasing information in fear of cyber-attack, corporate espionage, or similar such measures designed to “acquire” their proprietary AI research or new product/application before they get the chance to bring the technology to market. Therefore, the study had to rely on a lot of recent magazine articles, tech journals, consulting reports, and press releases many of which were not peer-reviewed or strongly verifiable. Another

problem reside in how older publications are quickly outdated and not of much use due to the dynamic and rapidly changing landscape of AI technologies.

The cases were proficient at describing what is occurring in the present, but had to take the same liberty as the referenced authors who engaged in varying degrees of speculation regarding the future events since many of the strategic initiatives, plans, and policies, were created not just for the present moment but for years yet to come. The cases were also faced with the difficulty of accurately describing the new form of highly complex security dilemma the US and China are entangled in which is by its very nature to complex and interconnected to adequately account for. The same problem occurs in describing each nation's senior leadership perceptions, decision making, and policy enactment in such a complex and rapidly evolving environment. The only assumptions that can be derived with any gradation of confidence is that each nation's leadership simply lack the conceptualization and comprehension necessary to make productive proactive strategies. policies, and plans. Instead, they will continue to be suspicious and distrustful of one another's motives and actions and reactionary in both their strategic initiatives and in their short-term decision making as they strive to attain or retain AI dominance.

Additional lines of research need to be conducted in the supporting digital technologies associated with AI integration (next gen ICT, 5G, cloud computing, big data extrapolation, advances in semiconductors, etc.) and how these technologies are vital to AI integration in the commercial sectors and government agencies. Research also needs to be conducted on the ethical ramifications of AI integration concerning AI's potential replacement of large-scale repetitive jobs, widescale video and electronic surveillance of entire populations (already occurring in China), and the potential creation of never before seen weapons of mass destruction (new energy weapons, targeted viruses, mind altering frequencies, etc.). Finally, ongoing research should be

done on the efficiencies of AI's ongoing military integration since this process is still in its fledgling stage and within a few years more data will be available for analysis, the caveat would be possessing the appropriate clearance.

Bibliography

Allen, Gregory. 2019. “Understanding China’s AI Strategy, Clues to Chinese Strategic Thinking on Artificial Intelligence and National Security”. *CNAS: Center for a New American Security*. February 6, 2019. Accessed January 10, 2020. https://www.cnas.org/publications/reports/understanding-chinas-ai-strategy

Allen, Gregory and Chan, Taniel. 2017. “Artificial Intelligence and National Security.” *Harvard Kennedy School, Belfer Center for Science and International Affairs.* July 2017. 1--71

Allen, John & Husain, Amir. 2017. “On Hyperwar”. *U.S. Naval Institute: Proceedings.* p 30-33. July 10, 2017. Accessed February 5, 2020. https://www.usni.org/magazines/proceedings/2017/july/hyperwar

Allison, Graham. 2017. “What Xi Jinping Wants, China’s Leader Is Determined to Turn His Country Into “The Biggest Player in The History Of The World.” Can He Do It While Avoiding A Dangerous Collision with America?. The Atlantic. May 31, 2017. Accessed October ,2019. https://www.theatlantic.com/international/archive/2017/05/what-china-wants/528561/

Almond, Roncevert. 2018. “Deciphering U.S. Foreign Policy in the Trump Era: A Narrative of Power, Without Persuasion”. *The Diplomat.* January 18, 2018. https://thediplomat.com/2018/01/deciphering-u-s-foreign-policy-in-the-trump-era/

Anderson, Kreab. 2013. “How Policies are ”Made in China””. *Global Reach: China.* June 2013. https://facingchinadotme.files.wordpress.com/2013/06/policymaking-in-china.pdf

Azati. 2019. “How much does artificial intelligence (AI) cost in 2019?”. *Azati Software, Technology.* January 23, 2019. Accessed in Chapter 1. https://azati.com/how-much-does-it-cost-to-utilize-machine-learning-artificial-intelligence/

Bade, Gavin, 2022. “‘A Sea Change’: Biden Reverses Decades of Chinese Trade Policy”. *Politico – Special Report.* 26 December 2022. https://www.politico.com/news/2022/12/26/china-trade-tech-00072232

Bateman, Jon. 2022. “Biden Is Now All-In on Taking Out China”. *Foreign Policy.* 12 October 2022. https://foreignpolicy.com/2022/10/12/biden-china-semiconductor-chips-exports-decouple/

Bedard, Paul. 2022. “Critics Fear Biden Helping China Leapfrog US High Tech”. *Washington Examiner.* 20 April 2022. https://www.washingtonexaminer.com/news/washington-secrets/fears-biden-helping-china-leapfrog-us-high-tech

Bennet, Cory & Bender, Bryan. 2018. “How China Acquires ‘the Crown Jewels’ of US Technology”. *Politico.* May 22, 2018. Accessed October , 2019. https://www.politico.eu/article/china-investment-uber-apple-us-tech-how-china-acquires-the-crown-jewels/

Bey, Mathew. 2018. “The Coming Tech War with China”. Stratfor, Worldview. February 6, 2018. Accessed January 29, 2020. https://worldview.stratfor.com/article/coming-tech-war-china

Bhatia, Kapil. 2018. “Coercive Gradualism Through Gray Zone Statecraft in the South China Seas, China’s Strategy and potential US Options”. *JFQ 91*. 4th Quarter 2018. Accessed October 2019. https://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-91/jfq-91_24-33_Bhatia.pdf

Borzykowski, Bryan. 2018. “The Dire Ripple Effect from a US China Trade War: A Drop in Foreign Investment Worldwide”. *CNBC: Global Investing.* July 6, 2018. Accessed November 10, 2019. https://www.cnbc.com/2018/07/05/ripple-effect-from-pending-us-china-trade-war-drop-in-fdi-worldwide.html

Button, Robert. 2017. “Artificial Intelligence in the Military”. *RAND Corporation, The RAND Blog.* September 7, 2017. Accessed in Chapter 1. https://www.rand.org/blog/2017/09/artificial-intelligence-and-the-military.html

Cavana, Thomas. 2018. “What Does China’s Belt and Rode Initiative Mean for US Grand Strategy?”. *The Diplomat, Trans – Specific View.* June 05, 2018. https://thediplomat.com/2018/06/what-does-chinas-belt-and-road-initiative-mean-for-us-grand-strategy/

Cao, Cong; Suttimeier, Richard; & Simon, Denis. 2006. “China’s 15 Year Science and Technology Plan”. *American Institute of Physics.* 2006. *Physics Today.* December 2006.

Castro, Daniel, McLaughlin, Michael, Chivot, Eline. 2019. “Who Is Winning the AI Race: China, the EU, or the United States?”. *Center for Data Innovation: Artificial Intelligence*. August 19, 2019. Accessed January 23, 2020. https://www.datainnovation.org/2019/08/who-is-winning-the-ai-race-china-the-eu-or-the-united-states/

Cetindamar, Dilek; Lammers, Thorsten; Sick, Nathalie, 2020. “Digital Technologies, Competitiveness & Policies: An Integrative City-based Roadmap for Entrepreneurial ecosystems”. p 38. 10.1007/978-3-658-27241-8.4

Chalfant, Morgan. 2021. “Biden Holds Trump’s Line When It Comes to China”. *The Hill – Administration.* 19 October 2021. https://thehill.com/homenews/administration/577319-biden-holds-trumps-line-when-it-comes-to-china/

Chen, Derek & Dahlman, Carl. 2005. “The Knowledge Economy, The KAM Methodology and World Bank Operations”. *The World Bank, Washington DC.* October 19, 2005

Chen, Dingding & Lei, Wang. 2022. “Where Is China-US Technology Competition Going?”. The Diplomat. 2 May 2022. https://thediplomat.com/2022/05/where-is-china-us-technology-competition-going/

Cheng, Evelyn. 2019a. “Fallout from US – China Trade Conflict Could Be ‘Even Worse ’the WWI, Kissinger Says”. CNBC: *China Economy.* November 22, 2019. Accessed November 30, 2019. https://www.cnbc.com/2019/11/22/us-china-economic-conflict-could-be-worse-than-wwi-henry-kissinger-says.html

Cheung, Tai Ming. 2013. “China's Emergence as a Defense Technological Power”. Talylor & Francis, Routledge. ISBN13:978-0-415-51984-7. 2013

Christensen, T.J. 1996. *Useful Adversaries: Grand Strategy, Domestic Mobilization, and Sino-American Conflict, 1947–1958*. Princeton: Princeton University Press.
Clark, Tom. 2013. “The Politics of Perception”. *Global News, National.* September 27, 2013. https://globalnews.ca/news/868904/the-politics-of-perception/

Cole, Sally. 2018. “Artificial Intelligence Can Help War Fighters on Many Fronts”. *Military Embedded Systems, Military AI.* 2018. Accessed in Chapter 2. http://mil-embedded.com/articles/artificial-intelligence-help-warfighters-many-fronts/

Cordesman, Anthony. 2019. “China’s New 2019 Defense White Paper: An Open Strategic Challenge to the United States, But One Which Does Not Have to Lead to Conflict”. CSIS, Center for Strategic International Studies. July 24, 2019. Accessed March 19, 2020. https://csis-prod.s3.amazonaws.com/s3fs-public/publication/190724_China_2019_Defense.pdf

Cronk, Terri. 2022. “DoD Unveils Its Artificial Intelligence Strategy”. *Defense.gov.* 12 February 2019. https://www.defense.gov/News/News-Stories/Article/Article/1755942/dod-unveils-its-artificial-intelligence-strategy/

CRS. 2019. “Artificial Intelligence and National Security”. *Congressional Research Service: CRS Report.* Updates November 21, 2019. Accessed February 16, 2020. https://fas.org/sgp/crs/natsec/R45178.pdf

Daniels, Jeff. 2017. “Chinese Theft of Sensitive US Military Technology is Still a ‘Huge Problem”. *CNBC: Defense.* November 8, 2017. Accessed November 24th, 2019. https://www.cnbc.com/2017/11/08/chinese-theft-of-sensitive-us-military-technology-still-huge-problem.html

Davenport, Thomas. 2020. “China is Overtaking the US as a Leader in Artificial Intelligence”. *Market Watch: Industries, Software*. March 7, 2019. Accessed 22, 2020. https://www.marketwatch.com/story/china-is-overtaking-the-us-as-the-leader-in-artificial-intelligence-2019-02-27

DIU. 2020. “Accelerating Commercial Technology for National Security”. *Defense Intelligence Unit, diu.mil.* 2020. Accessed February 5, 2020. https://www.diu.mil/

Dolla, Varaprasad. 2015a. Science and Technology in Contemporary China, Part 3 – S&T Policy and Progress in Contemporary China". *Cambridge University Press.* p 133-278. https://www-cambridge-org.ezproxy.lib.usf.edu/core/books/science-and-technology-in-contemporary-china/st-policy-and-progress-in-contemporary-china/4A50EF1D67927E65982695301CF471DA/core-reader

Elman, C., & Jensen, M. A. 2012. "Realisms, Security Studies an Introduction, by P.D. William". *New York: Routledge*. May 17, 2012. Chapter 1, p 13-31

Farley, Robert. 2018. "China's Rise and the Future of Liberal International Order: Asking the Right Questions". *The Diplomat.* February 23, 2018. https://thediplomat.com/2018/02/chinas-rise-and-the-future-of-liberal-international-order-asking-the-right-questions/

Feng, John. 2022. "Joe Biden Quietly Crushes China's Tech Ambitions". *Newsweek – World.* 24 October 2022. https://www.newsweek.com/us-joe-biden-semiconductor-export-controls-china-high-technology-decoupling-1754134

Fontaine, Richard; et al. 2022. "CNAS Responds: Analyzing the 2022 National Security Strategy". *CNAS.* 13 October 2022. https://www.cnas.org/press/press-note/cnas-responds-analyzing-the-2022-national-security-strategy

Freeman, Chas. 2017. "The United States and China: Game of Superpowers". *Remarks to the National War College Student Body.* February 8, 2018. Accessed November 5, 2019. https://chasfreeman.net/the-united-states-and-china-game-of-superpowers/

Gates, Megan. 2021. "The AI Race is On". *ASIS International, Security Management.* 1 April 2021. https://www.asisonline.org/security-management-magazine/monthly-issues/security-technology/archive/2021/april/The-AI-Race-is-On/

Gavekal Research. 2018. "What's Really at Stake in the US-China Rivalry". *Gavekal.* May 09 2018 http://web.gavekal.com/article/whats-really-stake-us-china-rivalry

Glaser, Charles and Kaufmann, Chaim. 1998. "What is the Offense–Defense Balance and Can We Measure it?". *International Security 22, 44–82*. 1998

Hass, Ryan & Balin, Zach. 2018. "US-China Relations in the Age of Artificial Intelligence". *The Brooking Institute, Series: A blueprint for the Future if AI: 2018-2019*. January 10, 2019. Accessed January 18, 2020. https://www.brookings.edu/research/us-china-relations-in-the-age-of-artificial-intelligence/

He, Yujia. 2017. "How China is preparing for an AI-powered Future". *Wilson Center: Wilson Briefs.* June 17. Accessed January 10, 2020. p 1-16. https://www.wilsoncenter.org/sites/default/files/media/documents/publication/how_china_is_preparing_for_ai_powered_future.pdf

Horowitz, Michael. 2018. “The Promise and Peril of Military Applications of Artificial Intelligence”. Bulletin of the Atomic Scientists, Collections, Military Applications of AI. April 23, 2019. Accessed March 19, 2020. https://thebulletin.org/2018/04/the-promise-and-peril-of-military-applications-of-artificial-intelligence/

Horowitz, Michael & Mahoney, Casey. 2018. Artificial Intelligence and the Military: Technology is Only Half the Battle”. *War on the Rocks.* December 25, 2018. Accessed February 5, 2020. https://warontherocks.com/2018/12/artificial-intelligence-and-the-military-technology-is-only-half-the-battle/

Hummel, Robert, Cheatham, Patrick, & Rossi, Justin. 2012 “US Science and Technology Leadership, and Technology Grand Challenges”. SYNESIS: *A Journal of Science, Technology, Ethics, and Policy.* 2012

ISDP. 2018. “Breaking the Mould: Trump’s China Policy”. *Institute for Security & Development Policy, Focus Asia.* February 2018. Accessed November 20, 2019, https://isdp.eu/publication/breaking-mould-trumps-china-policy/

Jacobs, Jennifer & Flatley, Daniel. 2022. “Biden Weighing Actions to Curb US Investment in China Tech”. *Bloomberg.* 2 September 2022. https://www.bloomberg.com/news/articles/2022-09-03/biden-weighing-actions-to-curb-us-investment-in-china-tech#xj4y7vzkg

Jalil, Ghazala. 2019. “China’s Rise: Offensive or Defensive Realism”. *Strategic Studies; Islamabad. Vol. 39, Iss. 1.* Spring 2019. http://issi.org.pk/chinas-rise-offensive-or-defensive-realism/

J.M. 2013. "The Communist Party plenum: Behind Closed Doors". *The Economist*. 8 November 8, 2013. Accessed January 20, 2020. https://www.google.com/search?q=the+economist+J.M.&oq=the+economist+J.M.&aqs=chrome..69i57j33l5.8269j0j8&sourceid=chrome&ie=UTF-8

Jervis, Robert. 1978. “Cooperation Under the Security Dilemma”. *Cambridge University Press*, World Politics, Vol. 30, No. 2. January 1978. p 167-214

Johnston, Alastair. 2003. “Is China a Status Quo Power?,” *International Security Vol* 27, no. 4 (Spring 2003), 14, 38. https://www.belfercenter.org/sites/default/files/files/publication/johnston_spring_2003.pdf

Kania, Elsa. 2017a. “Battlefield Singularity Artificial Intelligence, Military Revolution, and China’s Future Military Power”. *CNAS: Center for a New American Security*. November 28, 2017. Accessed in Chapter 1. https://www.cnas.org/publications/reports/battlefield-singularity-artificial-intelligence-military-revolution-and-chinas-future-military-power

Kania, Elsa. 2018. “The AI Titans’ Security Dilemmas”. Hoover Institution: Governance in an Emerging World, Fall Series, Issue 218. October 29, 2018. Accessed January 12, 2020. https://www.hoover.org/research/ai-titans

Kania, Elsa, 2019a. "The 'Regime Security Dilemma' in US–China Relations". *Center for Security Studies.* 12 April 2019. https://isnblog.ethz.ch/international-relations/the-regime-security-dilemma-in-us-china-relations

Kegley & Wittkopf, 2005. "World Politics: Trends and Transformations". 10th Edition. 2005. BOP - Ch 15, SD – 4 & 15

Kennedy, Andrew and Lim, Darren. "The innovation imperative: technology and US–China rivalry in the twenty-first century". *International Affairs*, Volume 94, Issue 3. May 2018. Accessed in Chapter 5. p 553–572, https://doi.org/10.1093/ia/iiy044

Kewalramani, Manoj. 2018. "China's Quest for AI Leadership: Prospects and Challenges". *Takshashila Institution: Takshashila Working Paper.* October 1, 2018. Accessed January 18, 2020. p 3-22. https://takshashila.org.in/wp-content/uploads/2018/10/Chinas-Quest-for-AI-Leadership-Takshashila-Institution-3.pdf

Klutz, Artur & Firlej, Mikolaj. 2015. "The Impact of Technology on Foreign Affairs: Five Challenges." *Foreign Policy Association.* December 22, 2015. Accessed October 13, 2019. https://foreignpolicyblogs.com/2015/12/22/the-impact-of-technology-on-foreign-affairs-five-challenges/

Laskai, Lorand, and Sacks, Samm. 2018. "The Right Way to Protect America's Innovation Advantage," *Foreign Affairs,* October 23, 2018, https://www.foreignaffairs.com/articles/2018-10-23/right-way-protect-americas-innovation-advantage

Lee, Kai-Fu & Sheehan, Matt. 2018. "China's Rise in Artificial Intelligence: Ingredients and Economic Implications". The Hoover Institute: Fall Series, Issue 218. October 29, 2018. Accessed January 20, 2020. https://www.hoover.org/research/chinas-rise-artificial-intelligence-ingredients-and-economic-implications

Lo, Daitan; Tong, Tony; Xiao, Yangao. 2021. "Is China Emerging as the Global Leader in AI?". *Harvard Business Review.* 18 February 2021. https://hbr.org/2021/02/is-china-emerging-as-the-global-leader-in-ai

Lobosco, Kate. 2022. "Why Biden is Keeping Trump's China Tariffs in Place". *CNN – Politics.* 26 January 2022. https://www.cnn.com/2022/01/26/politics/china-tariffs-biden-policy/index.html

Loebel, Steven. 2010. "Structural Realism/Offensive and Defensive Realism". *Oxford Research Encyclopedias.* March 2010. Accessed January 18, 2020. p 1-26 https://oxfordre.com/internationalstudies/internationalstudies/abstract/10.1093/acrefore/9780190846626.001.0001/acrefore-9780190846626-e-304?print

Lubell, M. S. (2019). *Science and Technology Policy: A Practical Guide to Navigating the Maze*. Elsevier Science & Technology. Retrieved from http://search.ebscohost.com.ezproxy.lib.usf.edu/login.aspx?direct=true&db=cat00847a&AN=usflc.036879384&site=eds-live

Lye, Harry. 2019. “The AI Arms Race is On – and China Might Take the Lead”. *Global Defense Technologies.* 2019. Accessed February 5, 2020. https://defence.nridigital.com/global_defence_technology_jan20/the_ai_arms_race_is_on_-_and_china_might_take_the_lead

Lynch, David. 2019. “How the US – China Trade War Became a Conflict over the Future of Tech”. *The Washington Post: Business*. May 22, 2019. Accessed November 24, 2019. https://www.washingtonpost.com/business/economy/how-the-us-china-trade-war-became-a-conflict-over-the-future-of-tech/2019/05/22/18148d1c-7ccc-11e9-8ede-f4abf521ef17_story.html

Ma, Alexandra. 2018. “China has Started Ranking Citizens with a Creepy 'Social Credit' System - Here's What You Can Do Wrong, and the Embarrassing, Demeaning Ways They Can Punish You”. *Business Insider*. October 28, 2018. https://www.businessinsider.com/china-social-credit-system-punishments-and-rewards-explained-2018-4

Marr, Bernard. 2017. “The Biggest Challenges Facing Artificial Intelligence (AI) In Business and Society”. *Forbes*. July 13, 2017. Accessed February 7, 2020. https://www.forbes.com/sites/bernardmarr/2017/07/13/the-biggest-challenges-facing-artificial-intelligence-ai-in-business-and-society/#1ea1bead2aec

Majumdar, Dave. 2018. “Dirty Little Secret: How China Built Its Military Might (Thanks to American Russia)”. *The National Interest.* July 24, 2018. Accessed December 4, 2019. https://nationalinterest.org/blog/buzz/dirty-little-secret-how-china-built-its-military-might-thanks-america-and-russia-26721

Manning, Robert and Engelke, Peter. 2018. “The Global Innovation Sweepstake. A Quest to Win the Future”. *Atlantic Council, Scowcroft center for Strategy and Security*. June 2018

McBride, James & Chatzky. 2019. “Is ‘Made in China 2025’ a Threat to Global Trade?”. *Council on Foreign Relations.* May 13, 2019. Accessed November 4, 2019. https://www.cfr.org/backgrounder/made-china-2025-threat-global-trade

McKinsey, 2017.” Artificial Intelligence the Next Digital Frontier?”. *McKinsey Global Institute.* June 2017. Accessed January 22, 2020. p 3-72. https://www.mckinsey.com/~/media/McKinsey/Industries/Advanced%20Electronics/Our%20Insights/How%20artificial%20intelligence%20can%20deliver%20real%20value%20to%20companies/MGI-Artificial-Intelligence-Discussion-paper.ashx

Mearsheimer, John. 2015. “Public Appearances: Structural Realism, 2015”. *CGTN, World Insight, China – US Competition: Inevitable or Manageable?* Accessed November 2, 2019 https://www.youtube.com/watch?v=M37Wxt5yLUI

Meserole, Chris. 2018. “Artificial Intelligence and the Security Dilemma”. *The Brookings Institute*. November 6, 2018. Accessed January 18, 2020. https://www.brookings.edu/blog/order-from-chaos/2018/11/06/artificial-intelligence-and-the-security-dilemma/

Monier, Stephaane. 2019. “China: Trade, Technology and the Changing Balance of Power”. *Lombard Odier Darier Hentsch: Investment Insights.* January 28, 2019. Accessed November 8, 2019. https://www.lombardodier.com/contents/corporate-news/investment-insights/2019/january/china-trade-technology-and-the-c.html

Motohiro, Tsuchiya. 2019. “America, China, and the Battle for Techno – Hegemony”. *Nippon.com In-depth.* April 16, 2019. Accessed November 8, 2019. https://www.nippon.com/en/in-depth/a06301/america-china-and-the-battle-for-techno-hegemony.html

Mourdoukoutas, Panos. 2019. “US – China Trade War: The Official and Unofficial Reasons behind It”. *Forbes*. January 24, 2019. Accessed January 24, 2019. https://www.forbes.com/sites/panosmourdoukoutas/2019/01/24/us-china-trade-war-the-official-and-unofficial-reasons-behind-it/#62891e7346da

Nouwens, Meia. 2018. “China’s Pursuit of Advanced Dual Use Technologies”. *IISS. International Institute for Strategic Studies, Research Papers.* 18 December 2018. Access October 30, 2019. https://www.iiss.org/blogs/research-paper/2018/12/emerging-technology-dominance

Nouwens, Meia & Lagarda, Helena. 2018. “Emerging Technology Dominance: What China’s Pursuit of Advanced Dual-Use Technologies Means For The Future Of Europe’s Economy And Defence Innovation”. *IISS, the international Institute for strategic studies.* December 2018. https://www.merics.org/sites/default/files/2018-12/181218_Emerging_technology_dominance_MERICS_IISS.pdf

NSB. 2018. “Science and Engineering Indicators 2018”. *National Science Board: Science and Engineering Indicators 2018 Report (NSB-2018-1).* January 2018. https://www.nsf.gov/statistics/2018/nsb20181/report

NSF. 2018. “Report shows United States leads in science and technology as China rapidly advances”. *ScienceDaily: Science News, Source: National Science Foundation*. January 24, 2018. https://www.sciencedaily.com/releases/2018/01/180124113951.htm

NSITeam. 2019. “AI, China, Russia, and the Global Order, Technological, Political, Global, and Creative Perspectives”. *NSITeam, A Strategic Multilayer Assessment (SMA) Periodic Publication.* December 2018. Accessed January 31, 2020. p ii-v, 1-190. https://nsiteam.com/social/wp-content/uploads/2018/12/AI-China-Russia-Global-WP_FINAL.pdf

NSTC. 2016. “Preparing for the Future of Artificial Intelligence.” *Executive Office of the President National Science and Technology Council Committee on Technology.* October 2016. Accessed January 11, 2019. p iii, 3-37. https://www.nitrd.gov/PUBS/national_ai_rd_strategic_plan.pdf

NSTC, 2019. “The National Artificial Intelligence Research and Development Strategic Plan: 2019 Update”. *Whitehouse.gov. National Science and Technology Council: Select Committee on Artificial Intelligence.* June 2019. p iii & 1. Accessed January 22, 2020. p 1-42. https://www.whitehouse.gov/wp-content/uploads/2019/06/National-AI-Research-and-Development-Strategic-Plan-2019-Update-June-2019.pdf

Ou, Helena. 2016. “China’s 13th Five Year Plan on Science and Innovation”. *SAIN: UK-China Sustainable Agriculture Innovation Network.*. May 2016. http://www.sainonline.org/pages/News/Inforsheet%20No%204.pdf

Oh, Sunny. 2018. “Why is the US accusing China of stealing intellectual property?” *MarketWatch, Economics and Politics.* Apr 6, 2018. https://www.marketwatch.com/story/why-is-the-us-accusing-china-of-stealing-intellectual-property-2018-04-05

Panda, Ankit. 2019. “Understanding China’s Vision of Victory: Jonathan Ward describes the conditions that China’s leaders seek to create in the Asia-Pacific by 2049”. *The Diplomat, Asia-Pacific.* May 26, 2019. Accessed November 2, 2019. https://thediplomat.com/2019/05/understanding-chinas-vision-of-victory/

Pawlyk, Oriana. 2018. “China Leaving US Behind on Artificial Intelligence: Air Force General”. *Military.com: Defensetech*. July 30, 2018. Accessed February 16, 2020. https://www.military.com/defensetech/2018/07/30/china-leaving-us-behind-artificial-intelligence-air-force-general.html

Pei, Minxin. 2019a. “US – China Trade War Is More about Geopolitical Rivalry, Such As in the South China Sea, and Soybeans”. *South China Morning Post.* February 20, 2019. Accessed November 8, 2019. https://www.scmp.com/comment/insight-opinion/united-states/article/2186739/us-china-trade-war-more-about-geopolitical

Pei, Minxin. 2019b. “International Development Cooperation in the Age of US – China Strategic Rivalry”. Brookings Institute: Brookings Blum Roundtable on Global Poverty Report. July 25, 2019. Accessed November 8, 2019. https://www.brookings.edu/research/international-development-cooperation-in-the-age-of-us-china-strategic-rivalry/

Priceonomics. 2018. “Which Industries Are Investing in Artificial Intelligence?”. *Priceonomics Data Studio.* November 28, 2018. Accessed January 22, 2020. https://priceonomics.com/which-industries-are-investing-in-artificial/

2017 Report to Congress. 2017. “US-China Economic and Security Review Commission, Section 2: China’s Military Modernization in 2017”. *US Government Publishing Office.* November 2017. p 201.

Roblin, Sebastien. 2019. “The U.S. Military Is Worried About China's Military Modernization (For Good Reason)”. *The National Interest*. November 10, 2019. Accessed February 16, 2020. https://nationalinterest.org/blog/buzz/us-military-worried-about-chinas-military-modernization-good-reason-94571

Schmitz, David & Murray, Gregg. 2017. “Perception of Political Leaders”. *Politics and Life Sciences*. December 2017. p 60-69

Schweller, Randall. 2006. “Unanswered Threats: Political Constraints on the Balance of Power.” *Princeton: Princeton University Press.* 2006.

Sharikov, Pavel. 2018. “Artificial Intelligence, Cyberattack, and Nuclear Weapons—A dangerous Combination. *Taylor Francis Online, Volume 74 – Issue 6, 368-373, DOI: 10.1080/00963402.2018.1533185*. October 22, 2018. Accessed. January 22, 2020. https://www.tandfonline.com/doi/full/10.1080/00963402.2018.1533185

Sirkin, Hal. 2017. “An Innovation – Led Boost for US Manufacturing”. *Boston Consulting Group.* April 17, 2017. https://www.bcg.com/publications/2017/lean-innovation-led-boost-us-manufacturing.aspx

Shirk, Susan. 2012. “China’s Next Leaders: A Guide to What’s at Stake”. *ChinaFile*. Novemner 13, 2012. Accessed January 20, 2020. https://web.archive.org/web/20130210034750/http://www.chinafile.com/china%E2%80%99s-next-leaders-guide-what%E2%80%99s-stake

Smith, Michael; Greber, Jacob; Tillet, Andrew. 2020. “Tensions Have eased, but Trade War Far from Over”. *Financial Review*. January 18, 2020 Accessed February 16, 2020. https://www.afr.com/world/asia/tensions-have-eased-but-trade-war-far-from-over-20200116-p53s05

Snyder, Jack. 1991. “Myths of Empire: Domestic Politics and International Ambition”. *Cornell University Press*. March 28, 1991. p 1-322

Springnut, Micah; Schlaikjer, Stephen; & Chen, David. 2011. “China’s Program for Science and Technology Modernization: Implications for American Competitiveness”. *Prepared for the U.S.-China Economic and Security Review Commission, Centra Technology, Inc*. January 2011. https://www.uscc.gov/sites/default/files/Research/USCC_REPORT_China%27s_Program_forScience_and_Technology_Modernization.pdf

State Council. 2006. “The National Medium-and Long-Term Program for Science and Technology Development (2006-2020) An Outline.” *The State Council, The People’s Republic of China.* 2006. October 13, 2019. Accessed October 7, 2019. https://www.itu.int/en/ITU-D/Cybersecurity/Documents/National_Strategies_Repository/China_2006.pdf

State Council, 2010. “State Council's Decision on Accelerating the Cultivation and Development of Strategic Emerging Industry.” The State Council, The People’s Republic of China. October 10, 2010. Accessed October 3, 2019. https://chinaenergyportal.org/wp-content/uploads/2017/01/Development-Strategic-Emerging-Industries.pdf

Taliaferro, J. W. 2000. “Security Seeking Under Anarchy Defensive Realism Revisited”. *International Security, 23(3).* Winter 2000. p 128-161

Tang, Shiping. 2003. “The Rise of China as a Security Linchpin”, *Asia Times*. June 21, 2003
Tayal, Puja. 2019. “The trade War Triangle among the US, China, and Huawei”. *Market Realist.* August 2019. Accessed November 10, 2019. https://articles2.marketrealist.com/2019/08/trade-war-triangle-united-states-china-ad-huawei/

The State Council Information Office of the People’s Republic of China. 2019. “China’s National Defense in the New Era”. *Xinhuanet, Full Text: China's National Defense in the New*

The White House. 2021. “The Biden Administration Launches the National Artificial Intelligence Research Resource Task Force”. *The White House*. 10 June 2021. https://www.whitehouse.gov/ostp/news-updates/2021/06/10/the-biden-administration-launches-the-national-artificial-intelligence-research-resource-task-force/

Era. July 24, 2019. Accessed March 19, 2020. http://www.xinhuanet.com/english/2019-07/24/c_138253389.htm

USCC. 2018a. “2018 Report to Congress of the US – China Economic and Security Review Commission”. US Government Publishing Office, Washington. 2018. https://www.uscc.gov/sites/default/files/2019-09/2018%20Annual%20Report%20to%20Congress.pdf

USCC. 2018b. “China's Military Reorganization and Modernization, Implications for the United States *US – China Economic and Security Review Commission. 2018 Annual Report to Congress*. Chapter 2 Section 2. p 205 – 206. November 2, 2018. Accessed November 8, 2019. https://www.uscc.gov/sites/default/files/Annual_Report/Chapters/Chapter%202%20Section%202%20China%27s%20Military%20Reorganization%20and%20Modernization%2C%20Implications%20for%20the%20United%20States_0.pdf

US Department of Defense. 2022. “DoD Transmits 2022 National Defense Strategy”. *US Department of Defense.* 28 March 2022. https://www.defense.gov/News/Releases/Release/Article/2980584/dod-transmits-2022-national-defense-strategy/

Vuegelers, Reinhilde. 2017. “China is The World’s New Science and Technology Powerhouse”, *Bruegal, Innovation & Competition Policy,* August 30, 2017. http://bruegel.org/2017/08/china-is-the-worlds-new-science-and-technology-powerhouse/

Wohlforth, William. 1999. “The Stability of a Unipolar World”. *International Security, 24*(1), 5. Retrieved from http://search.ebscohost.com.ezproxy.lib.usf.edu/login.aspx?direct=true&db=edsjsr&AN=edsjsr.2539346&site=eds-live

Wolf, Albert. 2017. “What Thucydides’s Trap Gets Wrong about the United States and China”. *Modern War Institute*. July 25, 2017. https://mwi.usma.edu/thucydidess-trap-gets-wrong-united-states-china/

Xinhua. 2016. “China Rolls Out 5-Year Plan for Intelligent Manufacturing”. *English.gov.cn: The State Council, The Peoples Republic of China*. December 6, 2016. Accessed January 25, 2020. http://english.www.gov.cn/state_council/ministries/2016/12/08/content281475510926985.htm

Xinhua. 2017. “China Has Made a Series of Achievements In Science And Technology Over The Past Month As The Country Quickens Its Pace In Becoming A Leading Science And Tech Power By The Middle Of The Century”. *Global Times: Sci–Tech.* 9/10/2017.

Xinhua. 2023. “China Speeds Up Sci-Tech Innovation Amid COVID-19 challenges in past three years”. *China.org.* 23 February 2023. http://www.china.org.cn/china/2023-02/23/content_85123033.htm

Xuejie, Zhao & Yuanyuan, Hu. 2015. “Internet Plus Strategy to Help Solve Manufacturing Overcapacity.” *ChinaDaily.com.cn: Business/Industries.* August 27, 2015. Accessed September 30, 2019. http://www.chinadaily.com.cn/business/2015-08/27/content_21721255_2.htm

Zhiyue, Bo. 2007. “China's Elite Politics: Political Transition and Power Balancing”. *World Scientific: Series on Contemporary China – Vol 8.* 2007. p 1- 434

Zhou, Jinghao. 2019. “China’s Core Interests and Dilemma in Foreign Policy Practice”. *Specific Focus.* Volume 34, issue one. 21 April 2019. https://doi.org/10.1111/pafo.12131

Zhu, Zhiqun. 2011. “Chinese Foreign Policy: External and Internal Factors”. *NUS Press Singapore. China: An International Journal Volume 9, Number Two.* September 2011.