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Emerging Technologies, Ethics, and Global Politics: A Primer

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A series of ethical concerns and tradeoffs emerge when technology is politicized and weaponized in an era of strategic competition between western democracies, China, and to a lesser extent, Russia. The potential invasion of Ukraine illustrates technology as a key component of conflict, with denial-of-service and cyber-attacks crippling Ukrainian government and banking websites as recently as February 14, 2022 (Hopkins 2022). Update: the potential invasion of Ukraine is now a brutal reality, with emerging technologies playing no small part in the strategic landscape of the conflict. With technology at the center of this contest, a sound technology policy with full consideration given to ethics is necessary if the United States and its partners wish to avoid losing its status as arbiters of the international order. Further, identifying the technologies that are at the center of the competition, including artificial intelligence, cyberweapons, quantum computing, and big data, will provide an advantage for all involved parties on the road to collaboration. The losers of such applications will be China, the United States, and other countries caught in the middle if responsible collaboration is not observed. Fortunately, the possibility exists for technological cooperation by sharing of innovation and information to solve shared challenges. Development of new technologies certainly has economic and commercial use, but the focus of new innovations also has implications on foreign policy and security as technology influences geopolitical norms in the 21st Century. As an integral component of geopolitical strategic rivalries in an increasingly bipolar world, the introduction of emerging and critical technologies plays an important role in national strategy and will require responsible management to resolve differences short of disastrous conflict and peacefully reconcile authoritarian and democratic ideals.

Historical Context of Technology in State Competition

The development of cutting-edge technologies has historically provided nation-states with advantages in terms of foreign policy, sovereignty, and economic influence. The development and usage of the atomic bomb effectively ended World War II at a tremendous cost to Japan. Strategic competitions between great powers are hardly new, however. The Athenians and the Spartans battled for supremacy during the Peloponnesian War in the fifth century BC. The causes and history of the Peloponnesian War were captured in Thucydides' writing in which he expounded on the technological competition that existed between Sparta and Athens, eventually driving the two nation-states into a state of conflict. More recently, the Soviet Union and the United States engaged in a Cold War that centered on technological means to fuel ideological ambition. The likelihood of conflict when one rising nation challenges a ruling power is so prevalent political scientists have popularized the phenomenon in a unifying term: Thucydides Trap (Allison 2015). In fact, in 12 of 16 historical cases in which an ascending power in terms of technological prowess challenges an incumbent power, the result was warfare (Allison 2015). The common thread of each scenario that enabled the rising power to establish political, military, and economic dominance: capability supported by technological developments. While psychology and politics certainly play a role in great power dynamics, great power status is ultimately achieved through superior technology woven throughout a nation's fabric.

To use a familiar case study, federal investments in education and science propelled the United States to leader of the free world in the aftermath of World War II. The prospect of falling behind to the Soviet Union's technological prowess, however, fueled a deluge of federal

spending into private-public partnerships that eventually prompted rise of Silicon Valley. A Center for Strategic and International Studies analysis goes so far as to conclude that Silicon Valley would not have been possible were it not for a "foundation of private defense contracting" (CSIS Briefs 2019). When the Soviet Union successfully launched the world's first artificial satellite into space, the United States responded with a rapid transformation of the innovation ecosystem that included massive investments in technology to maintain military and economic advantage. Both nations amassed nuclear arsenals so destructive, the resulting stalemate earned the moniker *mutually assured destruction*. The weaponization of new technologies has historical precedent, but a new arms race is happening outside the familiar realms of nuclear and conventional weapons. Rather than bullets and tanks, artificial intelligence (AI), quantum computing, cyber warfare, orbital systems, and robotics are now the currency of capabilities nation-states can wield in geopolitical competition. Each of these emerging technologies warrant further examination from an ethical perspective and are at the center of the geopolitical chessboard with today's environment of an aspiring China and an established United States.

Pressing Issues: China's Strategic Goals

Today, capabilities in the technology space form the geopolitical chess board between the United States and China, creating concerns about an escalating rivalry with other countries caught in the crosshairs. Technology has rapidly ascended as the most central challenge to U.S.China strategic competition. Specifically, the newer technologies of content-producing platforms are an ongoing area for rivalry as do space and cyber domains as warfighting domains. Troll farms, for example, seek to change the nature of search engine optimization and the information audiences consume, undermining democratic processes. Manipulation of online

platforms however barely scratches the surface of China's ambitions to become the global leader in emerging technologies.

China has long been suspected of economic espionage resulting in acquisition of foreign intellectual property, but evidence is mounting that China has developed the capability to develop innovative ecosystems in-house. The Chinese Communist Party has fostered cells of innovation by connecting state-owned enterprises (SOEs) with private industry to create a formidable military-civil fusion. The state-run capitalist model has cultivated innovation in ways not commonly seen in Western capitalist democracies. The mobile application WeChat is a prime example. WeChat started as a messaging app like Signal or WhatsApp, but with the assistance of government investment, it has transformed into China's "app for everything" (Chao 2017). Owned by China tech company Tencent, WeChat offers users the convenience of ordering food, making payments, and even filing for divorce. Much like the Chinese system of government, the application is centralized, actively collects data on its userbase, and is highly capable in its ability to surveil its users.

WeChat reflects a broader trend in China's strategy to aggregate immense national investment to focus on major tech developments. The country has embraced emerging technologies towards its national strategy as a peaceful rising power. In 2019, President Xi Jinping publicly endorsed blockchain as a critical technology, urging Chinese companies to seize the opportunity to become proficient in this nascent field (Ellis, 2021). The Chinese Communist Party has not only supported closely monitored technological initiatives, but it has also supported the development of smart cities, defined as the United Nations as a city that uses "information and communication technology (ICT) to improve quality of life" (Weinstein 2022). China's smart cities integrate surveillance and population monitoring that feed into a network of data and

a social credit system. While many United States regulators would balk at technologies that explicitly surveil the population, China's illiberal government with capitalist characteristics has enabled innovation with state-sponsored oversight in key areas. United States intelligence agencies and leadership no longer hold the majority opinion that non-free market nations are unable to innovate.

China's Security and the Role of Information

China’s national security is closely linked with its ability to control information. Outside of military-specific applications, a handful of international incidents spurred the importance of the Chinese Communist Party’s desire to control the information space. Widespread public protests after the Iranian election in 2009 were organized with early iterations of social networking tools like Facebook and Twitter. (Carafano 2009). Shortly after, the Arab Spring swept across the Middle East and North Africa, providing a clear demonstration of social media being used to undermine authoritarian rule and organize demonstrations. Subsequent rallies and demonstrations like Occupy Wall Street and the London Riots of 2011 underscored the importance to China of controlling information to prevent civil and social unrest. Had the Tiananmen Square protests occurred in an era of prevalent social media usage, the outcome on political liberalization movements in China may have had a different outcome. The Chinese Communist Party views controlling the information space as critical to not only winning wars of the future, but also as a buttress against existential challenges of public disagreement with China’s policies. As a result, China has prohibited many military, academic, and scientific experts from speaking with foreign media. Think tanks are closely monitored to ensure state secrets are not leaked to potential adversaries. The social context is important to understanding

China’s information dominance aspirations, as a legacy of self-preservation exists within the top levels of leadership in China, fueling many information space operations to be defensive in nature against outside attacks and protective of social stability. China views AI and associated technologies as an opportunity to provide leapfrog development that can skip multiple development stages and offer a decisive military advantage over the United States. Additionally, implementation of these developments faces less resistance in China than in the West.

Technologies at Play

The technology competition between China and the United States is expanding across all industries, but can be observed in the military domain, holding important implications for national security. China's advances in the technology space fuels geopolitical competition, presenting questions on how the Chinese government will deploy newfound capabilities to defend its core values and interests. Artificial intelligence (AI), fifth-generation telecommunications networks, quantum computing, big data, space, and cyberweapons are all areas in which China has made rapid advances to equal or in some instances, surpass the United States and its partners. Beijing's modernization campaign is guided by a national big data strategy that envisions China as the global center for AI by 2030 (Grossman 2020). The use of computers to master large sets of data comprises the lynchpin of China's strategic plans for analytic capabilities. The Chinese government views big data as essential to attaining great power status. China has surpassed every other nation in the world in terms of AI patents being filed and produces nearly twice as many AI scientific papers as the second closest country, the United States (Li 2021). China's State Council published *New Generation Artificial Intelligence*

Development Plan (AIDP) that when coupled with *Made in China 2025* form China's long-term AI strategy. The reason for such a strong national push into the AI space is ultimately to reduce dependence on imports of international technology.

The weaponization of AI systems is underway not only in China, but also in the United States and its partners. The grave concern is that AI will lower the threshold of military conflict because some states may be willing to launch an attack due to virtually no risk of casualty. As an element of a shifting warfighting domain, AI systems do not have the same well-defined rules and norms outlined in the Geneva Convention and thus require internationally agreed upon norms for control and responsible usage, particularly in cyber military units and military robotics. Despite concerns on an AI arms race, China and the United States are aggressively pursuing military usage of AI. The AIDP document offers that China will promote AI technology and quickly integrate it into national defense innovation architecture.

While AI is a central element of the Chinese military modernization strategy, the country has embraced disruptive technologies in other arenas as well. *China Standards 2035* outlines plans to expand a quantum-secure communication ground line to connect all major cities in China with satellite assistance. The PLA Air Force has fielded and tested a hypersonic glide vehicle that drew that alarm of the United States Chairman of the Joint Chiefs of Staff who called it a "Sputnik moment". The construction of a National Cybersecurity Center reflects the national importance of China's desire to be a peer cyber power to the United States. Bolstering investments in disruptive technologies serves three purposes in great power competition: reduces the shortage of cyber-proficient operators, creates an asymmetric advantage over more formidable opponents, and lowers reliance on foreign technology that can facilitate espionage. A distinct advantage enjoyed by China over the United States are fewer barriers to collaboration

between private and public partners in terms of weaponization of emerging technologies. In the United States, private companies often morally object to providing technology solutions to the Department of Defense.

Ethical Implications of the "Third" Arms Race

Historically conventional arms races have propelled countries to develop increasingly sophisticated weaponry to defend its national interests. The development of nuclear weapons ushered an era of nuclear arms proliferation in which the world's leading superpowers ensured mutually assured destruction in the event of a nuclear attack. The introduction of artificial intelligence, networked weapons, and cyber weapons into military domains presents a third arms race that requires a unique ethical analysis to responsibly manage. Without the risk of casualty in deploying autonomous systems on the battlefield, the decision-making calculus changes tremendously.

Advanced modern computing and manufacturing technologies have made it easier for technical innovation in weapons design. The widespread availability of information also precludes one nation from acquiring a long-term sustainable competitive advantage because asymmetric counters are always accompanying advances in new weapons. China's strategic efforts to decouple itself from reliance on foreign technology translate into self-sustainment and long-term technological competitiveness. China seeks to retain access to foreign technology but slowly wean its dependence to prevent Soviet-style stagnation. The implication of such a strategy point towards an arms race in automation between two superpowers, one with free-market, democratic ideals and the other in favor of authoritarian style of government with capitalist characteristics.

Kantian ethics informs that people's actions ought to be guided by universal moral laws where everyone is held to the same standard (Quinn 2019). China believes it is in an arms race with the United States. Should the United States fail to acknowledge this reality, the likelihood of conflict may actually increase as one nation can develop capabilities far superior to the other. If American and partner interests fail to compete, competition will fill the power void with values much different than the liberal governance that have ruled the international order since the conclusion of the Cold War. This proclamation is not intended to stoke fears, but rather is grounded in historical truth where rising powers view ruling powers as entities to overcome, both technologically and ideologically. An honest discussion is necessary to determine which universal, moral laws govern an emerging technologies arms race, regardless of national goals and interests. If China and the United States are willing to entertain such discussions, a peaceful rise of a superpower is fully within the realm of possibility.

Rule utilitarianism promulgates the idea that moral rules leading to the greatest increase in total happiness over all affected parties should be adopted. Deterrence has long been a principle of war. Diplomacy is supported by the ability to wield a big stick. The complicated nature of international relations relies on current technologies for diplomatic channels to have any effect and peace to become a probable outcome. The United States should invest heavily in autonomous systems, cyber defenses, and space capabilities for this very reason: provide deterrence and force China to the negotiating table for non-violent pursuit of its interests. The development of AI military applications, while potentially risky, may provide senior military leadership with additional decision-making time and reduce the overall fog of war by providing real-time information across disparate data sources. This capability may reduce the risk of miscalculation in combat, resulting in a greater good for the highest number of people.

Conclusion

A slew of emerging technologies has simultaneously materialized at a time when China is actively challenging the United States as the world's preeminent superpower. Technological competition is nothing new between ascending and incumbent powerful nation-states and generally leads to conflict if not managed responsibly. The People's Republic of China has fully merged disruptive technology into its overall national strategy, prompting the United States to rethink its strategic priorities in an era of strategic competition. The technologies at play include weaponization of artificial intelligence, big data, quantum computing across cyber, space, and conventional warfighting domains. One area where China holds an advantage over the United States is its undeterred willingness to invest in private-public partnership in developing military applications that utilize emerging technologies. China shows no signs of economic stagnation and continues to reduce its reliance on foreign technologies in pursuit of self-sustaining great power status. The ethics of a new form of arms race are unique from previous arms races between nation-states, requiring careful examination of moral boundaries and strategic use of deterrence to manage responsibly in an uncertain geopolitical climate.

	Period		Ruling Power	Rising Power		Result
1	First half of 16th century		France	Hapsburgs		War
2	16th–17th centuries		Hapsburgs	Ottoman Empire		War
3	17th century		Hapsburgs	Sweden		War
4	17th century		Dutch Republic	England		War
5	Late 17th–early 18th centuries		France	Great Britain		War
6	Late 18th–early 19th centuries		United Kingdom	France		War
7	Mid-19th century		United Kingdom, France	Russia		War
8	19th century		France	Germany		War
9	Late 19th–early 20th centuries		Russia, China	Japan		War
10	Early 20th century		United Kingdom	United States		No war
11	Early 20th century		Russia, U.K., France	Germany		War
12	Mid-20th century		Soviet Union, U.K. France	Germany		War
13	Mid-20th century		United States	Japan		War
14	1970s–1980s		Soviet Union	Japan		No war
15	1940s–1980s		United States	Soviet Union		No war
16	1990s–present		United Kingdom, France	Germany		No war

Figure 1: Harvard Belfair Center for Science and International Affairs 2019. Graham Allison

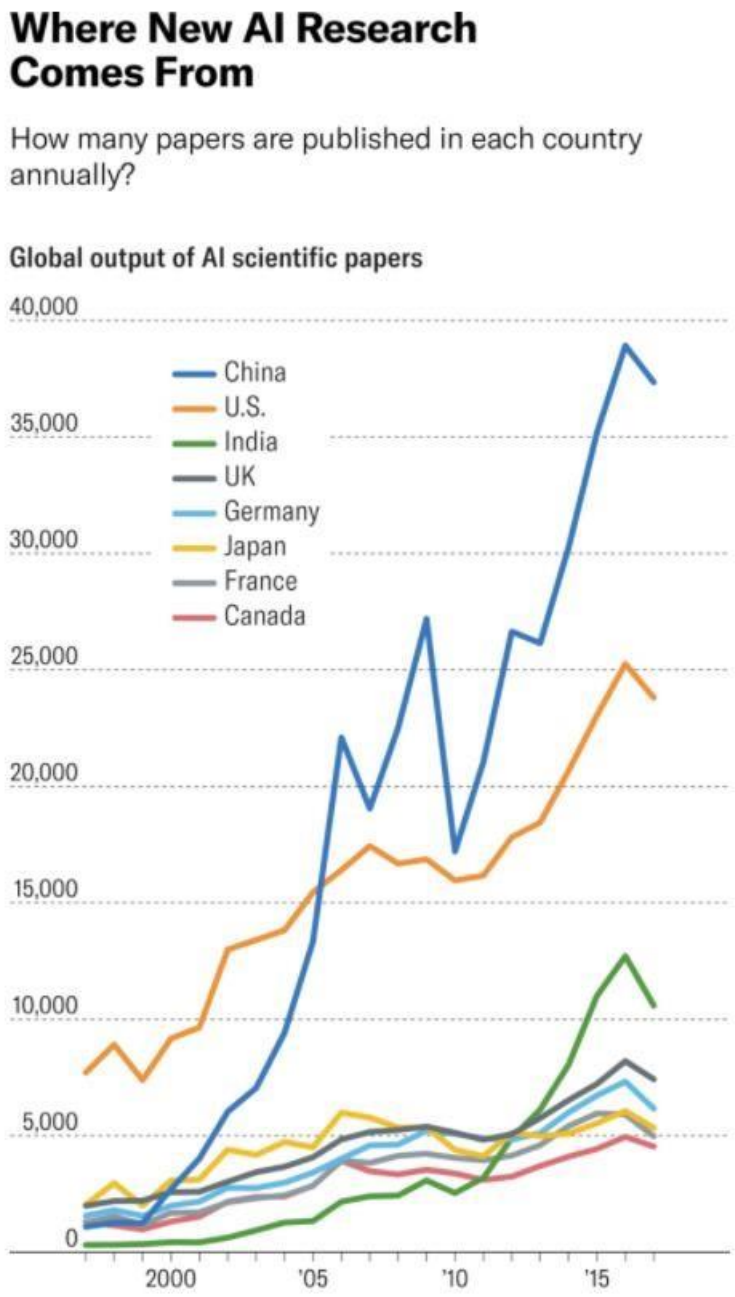

Figure 2: China AI Development Report 2018, China Institute for Science and Technology at Tsinghua University

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