SPECIAL COMPETITIVE STUDIES PROJECT

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The Character of Future War to 2030

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Contents

Executive Summary

War is an enduring element of human existence, but it continuously evolves with societal, technological, and political developments. The current era is one of technological innovation and societal change, and disruptions impact human competition and conflict. This paper addresses how recent changes, especially in the past three years, are influencing the character of war.

The accelerated pace of change is the fundamental factor influencing modern conflict. In this period of accelerated change, four additional factors are driving the security environment:

1. Authoritarians seeking to change the global system through violence, if necessary,
2. Authoritarians (and others) disrupting regional security,
3. The development of advanced technologies made widely available, and
4. The deepening impacts of climate change.

In this fluid security environment, the most relevant trends that will inform military force development in the short and medium terms (through 2030) are as follows:

1. A state of constant confrontation that takes advantage of rapid transition above and below the violence threshold.
2. An increasingly transparent understanding of the battlespace that remains imperfect and thus exploitable.
3. War conducted on a massive scale requiring mass for victory, which drives a need to mobilize society.
4. Learning and adaptation as prerequisites for victory.

These trends have serious implications for the future force, and this paper makes a total of 21 recommendations related to these trends.

Introduction

Over the past decade, the United States and its allies have sought to define the future operating environment to focus research and development, inform force structure planning, and enhance the readiness of deployed military forces. To this end, three key publications bear mentioning.

The United States Joint Staff's Joint Operating Environment (JOE) 2035 document[1], published in July 2016, provided a foundation for strategic planning by joint and single service planners across the United States Department of Defense. The document explored critical security challenges faced by the United States and the trends and conditions underpinning these challenges. As the report noted, "the intersection of trends and conditions reveals the changing character of war."[2]

The United Kingdom's Future Operating Environment (FOE) 2035 document, published in 2015, is a second noteworthy exploration of the future operating environment.[3] Similar to the JOE, this report from the British Development, Concepts, and Doctrine Centre (DCDC) examined the global context and salient characteristics of the future operating environment most likely to challenge military forces. The report was designed to complement and reinforce the regular series of Global Strategic Trends documents published by the DCDC. This document argued that "the future will be characterised by an increase in the rate and impact of some current global trends...and an increasingly complex, ambiguous and wide range of potential threats. The rate of change in some technological fields is likely to be particularly dramatic."[4]

Finally, the Special Competitive Studies Project (SCSP) published its *Offset X Strategy* in 2023. Designed to draw on the lessons of previous offset strategies developed and implemented by the U.S. Department of Defense, this groundbreaking document also explored critical trends in the security environment and explained how the character of warfare has been transformed by a combination of new technologies and new threats posed by authoritarian regimes like China and Russia.[5]

A common theme is the accelerated pace of change as a defining characteristic of the modern world, resulting in profound challenges to governments in general and militaries in particular. For example, the 2021 National Intelligence Council report contended that, "the pace and

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[1]   U.S. Joint Chiefs of Staff, *Joint Operating Environment 2035: The Joint Force in a Contested and Disordered World* (Washington DC: The Joint Staff, July 2016)

[2]   U.S. Joint Chiefs of Staff, *Joint Operating Environment 2035: The Joint Force in a Contested and Disordered World* (Washington DC: The Joint Staff, July 2016), ii.

[3]   UK Ministry of Defence, *Future Operating Environment 2035* (Shrivenham: Development, Concepts and Doctrine Centre, 2015)

[4]   UK Ministry of Defence, *Future Operating Environment 2035* (Shrivenham: Development, Concepts and Doctrine Centre, 2015), viii.

[5]   Special Competitive Studies Project, *Offset X: Closing the Deterrence Gap and Building the Future Joint Force* (Washington DC: SCSP, 2023)

reach of technological developments will increase, transforming human experiences and capabilities while creating new tensions and disruptions."[6] This pace of change is a fundamental challenge for military institutions, as it will be nearly impossible to forecast the demands of future conflict and anticipate the equipment, training, and tactics needed for victory.

As an alternative to prescience, our times call for military forces that can orient, learn, and adapt to change. The *FOE 2035* document noted that "simply procuring superior capability will not be enough – the speed at which Defence can adapt and integrate technologies will be more important."[7] In response, militaries must continuously scan and reassess the strategic environment and interpret what it means. To be sure, this is not a new requirement. The pace of change, however, means that learning and adaptation are more challenging to accomplish and more critical to outcomes than in the past. The margin for error is razor thin.

This paper does not try to replicate these previous reports' excellent work or challenge their conclusions. Instead, it will identify relevant changes over the past three years and explore how they influence war's evolving character. Particular focus is placed on the wars in Ukraine and Israel, the escalation of Chinese confrontation against its neighbors in the Pacific and the United States, and how technologies that are making new military concepts possible.

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[6] *Global Trends 2040: A More Contested World*, (Washington DC: National Intelligence Council, March 2021), 5.

[7] UK Ministry of Defence, *Future Operating Environment 2035* (Shrivenham: Development, Concepts and Doctrine Centre, 2015), 15.

Part 1: Factors Driving Change in the Security Environment

Today's security landscape features the danger of direct military conflict between great powers. Condoleezza Rice, The Perils of Isolationism

The three documents mentioned above provide detailed explorations of the future security environment—up to the point of their publication. However, changes observed over the past three years provide additional insight into the security environment through 2030.

We see four key factors driving change in the security environment. These are:

1. Authoritarians seeking to change the global system through violence, if necessary,
2. Authoritarians (and others) disrupting regional security,
3. The development of advanced technologies made widely available, and
4. The deepening impacts of climate change.

1. Authoritarians seeking to change the global system

In the past several years, there has been a tendency to group Russia, China, Iran, and North Korea into a single axis of authoritarian powers (or Axis of Growing Malign Partnerships as described in the Commission on the National Defense Strategy) because they each share an interest in challenging the global order established after the Second World War. However, this may not be the most helpful way to analyze the threats posed by these four states.

Only two of these countries—Russia and China—actively seek to provide an alternative model of world governance and undermine U.S. leadership worldwide. Iran and North Korea, on the other hand, are strategic disruptors and more regionally focused. They possess limited to no capacity to alter the global trade and security environment fundamentally.

Russia

Russia has both the capability and will to challenge global norms and initiate conflict. The recent report of the Commission on National Defense Strategy notes, "the threat Russia poses is chronic—ongoing and persistent."[8] Russia possesses significant military, space, and cyber capabilities (including large stockpiles of nuclear weapons) that can be used for coercion. Under President Putin's leadership, Russia aspires to the global role it enjoyed during the Cold War. In frequent speeches over the past two and half years, Putin has referenced a favorable interpretation of Russian history to describe his vision for what he believes is Russia's rightful pre-eminence in the global order. Since his speech to the Russian people on the eve of launching the large-scale invasion into Ukraine in February 2022[9], to recent comments where

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[8] RAND Corporation, *Commission on the National Defense Strategy*, July 2024, 7

[9] President of Russia, *Address by the President of the Russian Federation*, 21 February 2022. http://en.kremlin.ru/events/president/news/67828

Putin has mused about the recreation of the Russian empire[10], Putin has foreshadowed a willingness to use aggression, subversion, and violence to achieve this goal. In the past two years, this willingness has manifested in the continuing occupation of nearly 20% of Ukraine. Despite the mass casualties and economic pain, Russia has demonstrated both the will and capacity to continue the conflict.

In the near future, we can expect ongoing offensives to seize more Ukrainian territory as well as threats against immediate neighbors in Scandinavia, the Baltics, and Western Europe.[11] Should Russia be able to outlast the West and defeat Ukraine, the threat posed by a victorious and more confident Russia would result in greater demands to deter Russian aggression against NATO.

Russia is also expanding its presence beyond Europe. It has increased its defense and diplomatic ties with nations in Africa, Latin America, and South Asia since the beginning of the war in Ukraine.[12] Importantly, Russia retains a significant presence in the Pacific theater with its Pacific Naval Fleet.[13] This presence is magnified through the growing interaction with Chinese military forces there. In July 2024, China and Russia conducted joint naval exercises in the Pacific,[14] and they also executed a joint patrol in July 2024, forcing the North American Aerospace Defense Command (NORAD) to intercept two Chinese Xian H-6K bombers and two Russian Tu-95MS Bear bombers flying near Alaska.[15] These joint exercises are set against the background of an evolving strategic relationship between Russia and China, which was in 2022 declared as a "No Limits Friendship." At a meeting in May 2024, the Russian and Chinese leaders signed a joint statement proclaiming a "new era" of opposition to the United States on a range of security issues.[16]

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[10] Peter Dickinson, "Putin's history lecture reveals his dreams of a new Russian Empire", *Atlantic Council*, 12 February 2024. https://www.atlanticcouncil.org/blogs/ukrainealert/putins-history-lecture-reveals-his-dreams-of-a-new-russian-empire/

[11] Radio Free Europe, *Putin Warns Finland Of Unspecified 'Problems' As Helsinki Closes Border Again*, 17 December 2023. https://www.rferl.org/a/russia-putin-finland-nato-border-closure/32734153.html; VOA News, *Moscow threatens UK with strikes if Ukraine hits Russia with British weapons*, 06 May 2024. https://www.voanews.com/a/moscow-threatens-uk-with-strikes-if-ukraine-hits-russia-with-british-weapons-/7600425.html

[12] Mariel Ferragamo, "Russia's Growing Footprint in Africa", *Council on Foreign Relations*, 28 December 2023. https://www.cfr.org/backgrounder/russias-growing-footprint-africa; Indian Ministry of External Affairs, *Joint Statement following the 22nd India-Russia Annual Summit*, 9 July 2024. https://www.mea.gov.in/bilateral-documents.htm?dtl/37940/Joint+Statement+following+the+22nd+IndiaRussia+Annual+Summit

[13] Isabel van Brugen, "40 Russian Warships, Fighter Jets, Helicopters Join Pacific Fleet Drills", *Newsweek*, 19 June 2024. https://www.newsweek.com/russia-pacific-fleet-drills-warships-1914699

[14] Associated Press, *China, Russia start joint naval drills, days after NATO allies called Beijing a Ukraine war enabler*, 15 July 2024. https://apnews.com/article/china-russia-joint-naval-drills-nato-ukraine-08590a566d76ae1ddc47dde7cea8ad1a

[15] Heather Willians and others, "Why Did China and Russia Stage a Joint Bomber Exercise near Alaska?", Center for Strategic and International Studies 30 July 2024. https://www.csis.org/analysis/why-did-china-and-russia-stage-joint-bomber-exercise-near-alaska

[16] Bernard Orr, Guy Faulconbridge and Andrew Osborn, Putin and Xi pledge a new era and condemn the United States, Reuters, 17 May 2024. https://www.reuters.com/world/putin-visit-chinas-xi-deepen-strategic-partnership-2024-05-15/

China

As significant as the threat posed by Russia may be, the threat posed by China is much more challenging over the long term. China has been described as the pacing challenge for the United States in the 2022 National Defense Strategy.[17] Even more explicitly, the 2024 Commission on the National Defense Strategy report states:

> China poses the preeminent challenge to U.S. interests and the most formidable military threat. We agree with the 2022 NDS in making China the top priority for U.S. planning and investment. China is in fact outpacing U.S. defense production and growth in force size and, increasingly, in force capability and is almost certain to continue to do so.[18]

China presents a more dangerous threat than Russia in terms of scale, technological sophistication, the level of resourcing available, and pace of development. Moreover, the speed with which it has developed and deployed new technologies and capabilities is unprecedented in the past 80 years. The U.S. Department of Defense describes this buildup in detail in its annual reports to Congress. The most recent of these reports, published in 2023, explores not only the massive growth of the People's Liberation Army (PLA) but also how it is increasingly becoming an effective tool of Chinese statecraft with global reach.[19] The Chinese defense budget, while impossible to assess with total accuracy, is massive. This allows for continued investments in ships, aircraft, ground equipment, missiles, space capability, cyber capabilities, and personnel. In size, the PLA has become at least the equivalent of the United States' military in many areas. For example, the Chinese Navy now has the largest fleet of surface warships in the world, and the Chinese are also rapidly expanding their stockpile of deployed nuclear warheads, clearly seeking parity or superiority vis-à-vis the United States.[20]

Prudence dictates that the United States and its allies must revise their thinking about China, its capabilities, and its aspirations. This is especially true as China seeks to expand its influence through military power. China is assisting Russia in areas related to defense technology as well as its war effort in Ukraine. The 2024 NATO Summit Declaration described China as Russia's primary enabler in its war against Ukraine.[21] China used to be cautious about partnerships that could lead to entanglement. With the war in Ukraine, this appears to have changed for the worse. To be clear, Russia and China do not share the same goals or aspirations for their

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[17]   White House, *National Security Strategy*, 2022, 8

[18]   RAND Corporation, *Commission on the National Defense Strategy*, July 2024, 5.

[19]   U.S. Department of Defense, *Military and Security Developments Involving the Peoples Republic of China, 2023*, Annual Report to Congress.

[20] Stockholm International Peace Research Institute, *SIPRI Yearbook 2024: Armaments, Disarmament and International Security - Summary*, (2024), 12-13

[21]   NATO, *Washington Summit Declaration*, 10 July 2024.
https://www.nato.int/cps/en/natohq/official_texts_227678.htm

respective roles in the global system. Still, their increasing collaboration—and the resulting indifference to international condemnation—is a warning flag for democratic nations.

Unfortunately, these are not the only malign actors in the evolving global security environment.

2. Authoritarians disrupting regional security

Iran and North Korea both use destabilizing activities to influence their regions. Primarily, they have chosen threatening rhetoric, subversion, cyber operations, information operations, and support for violent extremists to achieve these goals. For the most part, neither has demonstrated a willingness to directly engage in large-scale military hostilities against those they view as their regional competitors. However, in the case of Iran, this may be changing, as demonstrated by the direct missile/drone attack on Israel in April 2024.[22]

Iran

Iran presents a continuing threat to its neighbors—especially Israel—and to U.S. national security. The Iranian threat includes its decades-long aspiration to develop nuclear weapons, its extensive support for violent extremist networks, and its unapologetic and deepening support for Russia's war in Ukraine.

The recent election of Masoud Pezeshkian as the president of Iran has raised hopes for an Iranian policy that moves away from its absolutist, anti-Western past. Unfortunately, as Daniel Byman observes, "the new president's power is limited, however, and uncertain U.S. politics also make any significant change in relations less likely."[23] Iran's ongoing support for Hezbollah and other entities that engage in hostilities against Israel, America, and Saudi Arabia are indications that the new president has little influence to moderate Iranian activities. In addition, the July 2024 assassination of Hamas leader Ismail Haniyeh on Iranian soil has inflamed tensions between Iran and Israel, making near-term moderation even less likely.[24]

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[22]   Dan Williams and Parisa Hafezi, "Iran launches retaliatory attack on Israel with hundreds of drones, missiles", *Reuters*, 14 April 2024. https://www.reuters.com/world/middle-east/iran-launches-drone-attack-israel-expected-unfold-over-hours-2024-04-13/; Sanam Vakil and Bilal Saab, "Iran's attack on Israel was not the failure many claim but it has ended Israel's isolation", *Chatham House,* 16 April 2024. https://www.chathamhouse.org/2024/04/irans-attack-israel-was-not-failure-many-claim-it-has-ended-israels-isolation;

[23]   Daniel Byman, "Can Iran's New President Change the Regime's Confrontational Foreign Policy?", *Center for Strategic and International Studies,* 9 July 2024. https://www.csis.org/analysis/can-irans-new-president-change-regimes-confrontational-foreign-policy

[24]   Abby Sewell, "Hamas' top political leader is killed in Iran in strike that risks triggering all-out regional war", *Associated Press*, 1 August 2024. https://apnews.com/article/iran-hamas-israel-30968a7acb31cd8b259de9650014b779

North Korea

North Korea's Kim Jong Un has assumed a more confrontational stance toward South Korea in 2024. While South Korean President Yoon Suk Yeol has proposed dialogue toward a peaceful unification with North Korea, Kim designated the South as North Korea's "principal enemy," shutting the door on any overtures. A recent Council on Foreign Relations assessment notes, "Kim will likely be more militant and aggressive to the extent that he perceives greater room for maneuver as he pursues provocations, especially aimed at South Korea, with relative impunity."[25]

It is essential to remember that North Korea is a nuclear power controlled by an unchallenged leader who is unaccountable to his people or even to China or Russia. Kim appears to remain committed to further expansion of his nuclear weapons capability, which is currently estimated to comprise at least 50 nuclear warheads.[26] North Korea has also continued to launch missiles and undertake demonstrations of military capability. The recent depiction of several North Korean nuclear missiles launched against the United States in Annie Jacobsen's book, *Nuclear War: A Scenario*, provides a fictional yet helpful insight into the threat posed by the North Korean arsenal.[27] The recent leaking of a U.S. government document that provides Presidential direction for the U.S. nuclear arsenal provoked a response from North Korea. A spokesperson for North Korea's Foreign Ministry noted that "the move to update the nuclear policy of the U.S...will have a significant negative impact on the security situation and the nuclear disarmament system."[28]

North Korea is not completely isolated, for better or worse. It is a crucial supplier of munitions to the Russian Army for its Ukraine operations. Without access to North Korean artillery shells, it is unclear how Russia could continue the assaults in Ukraine that rely on extensive barrages of firepower. Recently, Kim signed a treaty with Russia's Putin during the latter's visit to North Korea in June 2024. The agreement contains a pledge for military assistance, although the full terms of this agreement are unknown.[29]

3. Technological developments

Technological change has continued to impact society and national security over the past three years. Many of the technologies that have emerged as highly influential in the wars in Ukraine and Gaza have been commercial technologies that have been adapted and militarized

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[25] Scott Snyder, "Why Is North Korea Turning More Aggressive?", *Council on Foreign Relations*, 7 February 2024. https://www.cfr.org/expert-brief/why-north-korea-turning-more-aggressive

[26] Stockholm International Peace Research Institute, *SIPRI Yearbook 2024: Armaments, Disarmament and International Security – Summary*, (2024), 12-13

[27] Annie Jacobsen, *Nuclear War: A Scenario*, Penguin Books, 2024.

[28] Mandy Taheri, "North Korea Issues Nuclear Warning After Report of New US Strategy", Newsweek, 25 August 2024. https://www.newsweek.com/north-korea-issues-nuclear-warning-after-report-new-us-strategy-1944101

[29] Huma Rehman, "With friends like these...Russia and North Korea partner up", *The Interpreter*, Lowy Institute, 1 July 2024. https://www.lowyinstitute.org/the-interpreter/friends-these-russia-north-korea-partner

for battlefield operations as well as strategic support functions such as planning, strategic influence operations, and logistics. Technological trends in the past three years have reinforced those identified in the three documents discussed above. Three trends stand out: the proliferation of technology, the meshing of technology across civil-military divides, and the pace of technological change.

Proliferation of Technology

Internet connectivity, open markets, and the broader adoption of AI for research and development underpin expanded access for states and non-state actors to potent capabilities.[30] New manufacturing techniques—including additive manufacturing—reduce production costs for certain products, allowing for the widespread availability of capabilities such as drones and surveillance technology. This has allowed state and non-state actors to deploy advanced military capabilities, such as persistent battlefield surveillance and long-range strike, that until recently were reserved for a few wealthy and advanced countries. Examples of this include the long-range strike capabilities developed indigenously by Ukraine and the targeting and surveillance capabilities deployed by non-state actors such as Hezbollah and Hamas.

Meshing of Technology Across Civil-Military Divides

The past three years have seen a deeper integration of traditionally distinct civil and military capabilities. For example, drones available in commercial markets have been adapted and modified for military use, often with outsized effects. First-person view (FPV) drones have been widely used in Ukraine, and their presence imposes costs on opposing militaries, especially when trying to move on the battlefield. Another example is the *Ghost Shark*, a large autonomous underwater vehicle developed by Anduril for the Australian Department of Defence.[31] This design was primarily based on a vehicle developed for civil applications and adapted for military use. Similarly, commercial developments in robotics and autonomy are being adapted for military missions.

This civil-to-military trend is most apparent in the areas of sensing and distributed command and control. Consumers have demanded inexpensive and capable sensors such as cameras and microphones, plus the memory needed to record their outputs. The markets have responded, and now cheap, capable sensors are ubiquitous. This is especially true on the modern battlefield, where these sensors make it difficult to remain undetected. In addition, advanced communications technology is widely available, as is access to communications

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[30] This trend in the proliferation of technologies is explored in U.S. Joint Chiefs of Staff, *Joint Operating Environment 2035: The Joint Force in a Contested and Disordered World* (Washington DC: The Joint Staff, July 2016), and in UK Ministry of Defence, *Future Operating Environment 2035* (Shrivenham: Development, Concepts and Doctrine Centre, 2015)

[31] Gordon Arthur, Australia And Anduril Jointly Invest To Promote Ghost Shark Production, Naval News, 9 August 2024. https://www.navalnews.com/naval-news/2024/08/australia-and-anduril-jointly-invest-to-promote-ghost-shark-production/

networks. The use of commercial technology in communication is so prevalent that it has become challenging to distinguish military communication networks from commercial ones. In Ukraine, all sides have used commercial networks for military communications. These networks carry and fuse sensor data used by analysts and commanders, and the result is improved situational awareness through applications such as *Kropyva*[32] and *Delta*.[33]

The vast array of sensor data carried over commercial networks has provided a capable and readily available alternative to closed, military-only intelligence systems. In the last three years, intelligence analysis based on open-source data has grown in capability with impressive results. Today, non-profit and commercial intelligence agencies operate in parallel—and sometimes in partnership—with military and other government intelligence agencies. Examples of these organizations include *Belligcat, Dataminr*, and the *Institute for the Study of War*.

In current conflicts, tactical movements are often detected through open sources, and strategic intelligence can be gained through commercial satellite data. Since February 2022, civilian analysts have used satellite imagery and other open-source data to chart the progress of Russian and Ukrainian military forces. This includes current efforts to monitor Russian progress in the Donbas and the Ukrainian campaign in the Kursk region of Russia. Non-state actors such as Hezbollah and Hamas also employ their versions of open-source intelligence to aid in their activities. For instance, Hamas used extensive open-source intelligence in its preparations for the October 7 massacres in southern Israel.

Pace of Change

Almost all surveys of the future environment agree that the pace of technological change is increasing. As the British FOE 20235 report noted, "the rate of technological change will accelerate out to 2035, serving to highlight inadequacies in less adaptable procurement processes within Defence. Civil companies will be able to raise revenue far more quickly, driving technology development in new directions and at faster rates."[34] The past three years have provided additional evidence to support this conclusion.

In Ukraine, the pace of development in autonomous systems has accelerated beyond all expectations. The use of these systems was limited to small quantities and ad hoc concepts of employment in the early days after the Russian invasion. Today, both Ukraine and Russia deploy dozens of different types of drones in the air, on land, and in the maritime environment. These systems have become critical enablers of successful operations. Both sides put

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[32]   Army SOS, Defence Mapping Software. https://armysos.com.ua/defense-mapping-software/

[33]   The development and adaptation of DELTA is explored in Mick Ryan, *The War for Ukraine: Strategy and Adaptation Under Fire* (Annapolis: US Naval Institute Books, 2024), 195-197. It is also examined in Seth G. Jones, Riley McCabe, and Alexander Palmer, Ukrainian Innovation in a War of Attrition, Center for Strategic and International Studies, 27 February 2023. https://www.csis.org/analysis/ukrainian-innovation-war-attrition

[34]   UK Ministry of Defence, *Future Operating Environment 2035* (Shrivenham: Development, Concepts and Doctrine Centre, 2015), 14-15.

tremendous effort into disrupting the adversary's systems and hardening their systems. The resulting competition has become a daily battle for advantage, driving a dizzying pace of change.

Another area of accelerated change is evidenced in both analytical and generative AI. While generative AI has dominated recent headlines, analytical AI is also improving rapidly. Analytical AI generates structured data from large volumes of both structured and unstructured data. It can be used to support data management and analysis and, more recently, has been used to improve operations through real-time optimization. An MIT Sloan Management Review report notes that while "automation is helping to increase productivity and enable broader data science participation, the greatest boon to data science productivity is probably the reuse of existing data sets, features or variables, and even entire models."[35] There is much more to come in this area of AI application for civilian organizations and militaries alike.

The rise of generative AI seized headlines worldwide in 2023, and a range of companies have rapidly developed and deployed newer versions. A recent survey by McKinsey has found that the adoption of generative AI in the commercial sector is surging. Sectors such as marketing and sales, human resources, service operations, and content creation are seeing a significant increase in the use of generative AI. Respondents have indicated that AI is starting to result in meaningful cost reductions in many business areas.[36]

Military organizations will benefit from the pace of change in AI or be disrupted by it. Target recognition activities will become increasingly dominated by AI tools, and intelligence analysis will never be the same after the adoption of analytical and generative AI.

These three trends in technology have multiple implications for military institutions. Proliferation means that a wider variety of technologies will be available to both friendly organizations and potential adversaries. The cost of entry to some advanced military capabilities will be radically lowered. Civil-military meshing means that commercial technologies will be adapted for military operations in the coming years, and in turn, military operations will be influenced by what is commercially available. This meshing will also increase the lethality and persistence of potential state and non-state adversaries. Finally, the pace of change is only accelerating.

In response, militaries must allow for more risk tolerance and a faster tempo in military procurement practices. If they don't, their expensive platforms are likely to be disrupted by innovative combinations of technologies and concepts.

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[35]   Thomas Daveport and Randy Bean, "Five Key Trends in AI and Data Science for 2024", *MIT Sloan Management Review,* 9 January 2024. https://sloanreview.mit.edu/article/five-key-trends-in-ai-and-data-science-for-2024/

[36]   *The state of AI in early 2024: Gen AI adoption spikes and starts to generate value*, McKinsey and company, 30 May 2024. https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai

4. Deepening impacts of climate change.

In 2023, the earth set a new high for global temperatures – it was the hottest year known to science. The year was a new record of 1.45 (± 0.12) °C above the pre-industrial average.[37] Concentrations of the three main greenhouse gases – carbon dioxide, methane and nitrous oxide – reached record-high observed levels in 2022.[38] Carbon dioxide concentrations in the earth atmosphere now exceed 400 parts per million. The last time the earth had such concentrations of CO2 in the atmosphere was during the Pliocene Era, around 3 million years ago. Average temperatures then were around 3 degrees Celsius hotter than pre-industrial temperatures. Sea levels were about 15 metres higher than present.[39]

Two of the documents surveyed at the start of this document, the Future Operating Environment 2035 and the National Intelligence Council estimate, both describe climate change as a profound and accelerating security risk. The UK MoD assessment describes how:

> As a result of climate change, sea levels will rise and extreme climatic events are likely to increase in intensity, frequency and duration out to 2035, resulting in loss of life, physical destruction, disease and famine. Secondary effects may lead to migration, social unrest, instability and conflict...There is likely to be an increased need for humanitarian assistance to address greater and more widespread suffering.[40]

In its detailed assessment, the National Intelligence Council's 2021 *A More Contested World* supports this assessment and finds that:

> The physical effects of climate change are likely to intensify during the next two decades, especially in the 2030s. More extreme storms, droughts, and floods; melting glaciers and ice caps; and rising sea levels will accompany rising temperatures. The impact will disproportionately fall on the developing world and poorer regions and intersect with environmental degradation to create new vulnerabilities and exacerbate existing risks to economic prosperity, food, water, health, and energy security.

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[37] World Meteorological Organization, *State of the Global Climate 2023*, 2024, ii. https://library.wmo.int/viewer/68835/download?file=1347_Global-statement-2023_en.pdf&type=pdf&navigator=1

[38] World Meteorological Organization, *State of the Global Climate 2023*, 2024, 2.

[39] National Geographic, *Climate Milestone: Earth's CO2 Level Passes 400 ppm*, https://education.nationalgeographic.org/resource/climate-milestone-earths-co2-level-passes-400-ppm/6th-grade/

[40] UK Ministry of Defence, *Future Operating Environment 2035* (Shrivenham: Development, Concepts and Doctrine Centre, 2015), 3.

> Governments, societies, and the private sector are likely to expand adaptation and resilience measures to manage existing threats.[41]

The Intergovernmental Panel on Climate Change, *Climate Change 2023 Synthesis Report* describes with high confidence how continued greenhouse gas emissions will result in increasing global warming and that with each increment of global warming will come the intensification of multiple, concurrent natural threats.[42] As the report notes, "with potentially very large adverse impacts increases with higher global warming levels."[43]

There is an array of impacts on societies, nations and institutions from these changes. These include food insecurity, conflict over access to dwindling natural resources such as water and arable land, the impacts of more frequent natural disasters, and possibly, sudden shifts in climate that could result in more catastrophic regional disasters.

This will have a potential impact on military endeavours. The military in many nations, particularly in Asia where a large proportion of natural disasters occur, is likely to be more frequently engaged in providing assistance alongside non-government aid agencies. And while military organisations continue to adapt to prepare for large scale conflict, climate change impacts will place an increasing strain on readiness.

At the same time, climate change will have an impact on military infrastructure. Storm surges, large storms and sea level rises will force adaptation in the design, protection, location and resilience of naval bases, military airfields and training areas. Extreme heat will have an impact on the amount of time that military organisations can spend training in the field. And, as a UK MoD study notes:

> Climate change will require ships, aircraft and vehicles to operate in more extreme environmental conditions and planning assumptions (such as where ships and aircraft can be based and when routes will be passable) will need to be revised.[44]

Political pressure will force governments to consider rebalancing their military institutions to provide an enhanced capacity for disaster relief and humanitarian assistance. Even this may not be equal to the challenge, forcing deployable military capabilities to divert a larger proportion of their people and resources to disaster relief in domestic and international emergencies.

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[41] *Global Trends 2040: A More Contested World*, (Washington DC: National Intelligence Council, March 2021), 6-7.

[42] Intergovernmental Panel on Climate Change, *Climate Change 2023 Synthesis Report: Summary for Policy Makers* (United Nations, 2023), 12.

[43] Summary for Policy Makers (United Nations, 2023), 18.

[44] UK Ministry of Defence, *Global Strategic Trends: The Future Starts Today, 6th edition* (Shrivenham: Development, Concepts and Doctrine Centre, 2018), 34.

Part 2: The Evolving Character of War

The nature of war is, arguably, immutable… But the character of war—how armies fight, where and when the fighting occurs, and with what weapons and leadership techniques—can evolve. It can change in response to politics, demographics, and economics. Yet few forces bring more change than technological development. Mark A. Milley and Eric Schmidt, America Isn't Ready for the Wars of the Future[45]

When considering the future of military conflict, it is essential to distinguish between what is changing and what is unchanging. Much about human conflict is unchanging, as it derives from the nature of humanity itself. It is not necessary or advisable to discard the lessons of history. Colin Gray observes that, "it is a reasonable assumption that future strategic history will resemble the past and present. Because it rests upon the evidence of 2500 years, this is not a recklessly bold claim."[46]

To better distinguish between what is changing and unchanging in war, it is useful to adopt a framework originated by Carl von Clausewitz's in his treatise *On War*. The unchanging aspects of war can be ascribed to its enduring *nature*. Such aspects include war as a clash of human will, the influence of politics on war, systemic difficulty in war (known as *friction*), and the relationship between the government, the people, and the military. In contrast, the aspects of war that change comprise its evolving character. We must recognize that technological, political, and societal change results in modifications to how war is waged effectively. The military profession requires an appreciation for war's nature and character. We ground our approach to war in its unchanging nature, and we adapt to its evolving character.

Over the last three years, we have observed critical trends that point to the changing character of conflict. We must recognize these trends and adapt to them. The alternative is defeat in one or more of its many forms. The most relevant trends that will inform force development in the short and medium terms (through 2030) are as follows:

1. **A state of constant confrontation** that takes advantage of rapid transition above and below the violence threshold.
2. An **increasingly transparent understanding of the battlespace that remains imperfect and thus exploitable.**
3. **War conducted on a massive scale** requiring mass for victory, which drives a need to mobilize society.
4. **Learning and adaptation as prerequisites for victory.**

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[45]   Mark Milley and Eric Schmidt, "America Isn't Ready for the Wars of the Future", *Foreign Affairs* 103, No. 5, September/October 2024, 29.
[46]   Colin Gray, *Strategy and Defence Planning: Meeting the Challenge of Uncertainty* (Oxford: Oxford University Press, 2014), 94.

A State of Constant Confrontation

The West now exists in a state of constant confrontation with authoritarian regimes. Fundamentally, this confrontation reflects a battle of ideas about political power and the question of balancing individual freedom and prosperity versus collective order and security. This confrontation will not be settled in this decade. Instead, it is likely to grow in intensity. We can expect an ongoing, sometimes violent struggle that features strategic influence operations, disinformation and misinformation, subversion, coercion (physical and financial), sabotage, and the possibility of clashes between forces in the commons.

At times, this confrontation leaps above the threshold of violence. While the Russian invasion of Ukraine is the most obvious example, there are many examples of confrontations by authoritarian forces that are violent but calibrated and managed to produce specific effects. China, for example, has engaged in recent confrontations that include Chinese vessels ramming Philippine coast guard ships and Chinese use of sonar to injure Australian Navy divers.

Confrontation with authoritarians is not new for democracies. However, **it is becoming increasingly clear that Western governments will be challenged by constant confrontation and the direct threat this condition imposes on their legitimacy.** As such, constant confrontation cannot be ignored, even if each instance of confrontation may not justify a response. At the political level, constant confrontation requires leaders who can explain the threat and create consensus between governments, citizens, the military, and industry to provide the human, intellectual, technological, and financial resources necessary to resist the pressure. Perhaps most importantly, political leaders must provide a compelling strategic purpose to sustain this approach over the long term.

On a military level, constant confrontation requires military and security capabilities capable of identifying the provocations, attributing each to the proper source, and providing options for response. Military institutions will be in demand, but effective response options will not adhere to traditional force-on-force doctrine. Instead, militaries must adapt to the situation and provide options across the entire spectrum of conflict, including intelligence collection, international engagement, disaster relief, and humanitarian support, while remaining prepared for high-level, peer-on-peer joint and coalition warfighting activities. Essentially, the concept of military "readiness" must include the demands of constant confrontation.

To some degree, Western politicians and bureaucrats have enjoyed the luxury of strategic drift since the end of the Cold War, but they can no longer afford such an approach. They need to accept that the world is in constant confrontation. The four authoritarian regimes are probing for military, societal, and technological weaknesses and will exploit them to undermine democratic legitimacy. Where they go unchallenged, they will view this as a tacit invitation to continue. They are likely to escalate until they experience pushback. For the West, active confrontation is necessary. Some may see confrontation as risky, but avoiding

confrontation through appeasement or strategic risk aversion will likely be more expensive in the long term. Eventually, it will grow to be existential.

The Imperfect Transparency of the Battlespace

Perhaps the biggest surprise of the recent Ukrainian offensive into Kursk is that people were surprised. They should not have been. Surprise is an enduring characteristic of human conflict across at least two millennia of recorded history. The Peloponnesian War, the wars of Imperial Rome, the Middle Ages, the world wars of the 20th century, and the insurgencies of the early 21st century all featured many surprises. The wars of the future will be no different.

The war in Ukraine has witnessed the following examples of surprise at the tactical, operational, and strategic levels of war:

The defeat of the Russian Army north of Kyiv. As the Russian invasion of Ukraine commenced, many Western commentators believed that Ukraine would not be able to hold out against the Russians for more than a few days, or a few weeks at the most. The Ukrainians, however, maintained control of the capital and forced the withdrawal of Russian forces threatening it. This was a massive surprise for the Russians. It was also a surprise for the West, which no longer regarded the situation as hopeless and responded with increased military assistance.

The 2022 Kharkiv offensive. In September 2022, the Ukrainians achieved surprise against the Russians in the Kharkiv region. The Ukrainians attacked what appeared to have been a thinly defended area and achieved deep penetration into Russian rear areas. This 2022 offensive shifted momentum in the war, and Ukraine held the strategic initiative for several months.

Reinvigoration and expansion of NATO. After Russia's large-scale invasion in February 2022, NATO responded more forcefully than Russia expected. Called "brain dead" by French President Macron in 2019,[47] NATO responded with rhetoric and action. It has found renewed purpose, deeper unity, and additional members. It is very unlikely that Putin expected NATO to respond in this way when he considered the invasion of Ukraine, as it undermines the core of his theory of Russian security.

The Failed Ukrainian Counteroffensive. In June 2023, a much-heralded Ukrainian counteroffensive commenced in southern Ukraine. Led by newly formed brigades trained by Western militaries, the attacks into the strongest sectors of Russia's Surovikin defensive line quickly bogged down. Almost no territory was liberated. In December 2023, President Zelensky admitted the operation had failed. It led to political and strategic consequences, including the dismissal of Ukraine's top military leader, General Zaluzhnyi. This unexpected

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[47] "Emmanuel Macron warns Europe: NATO is becoming brain-dead", *The Economist*, 7 November 2019. https://www.economist.com/europe/2019/11/07/emmanuel-macron-warns-europe-nato-is-becoming-brain-dead

defeat also influenced the U.S. congressional debate over assistance to Ukraine, dragging it out over many crucial months.

The Prigozhin Mutiny. In June 2023, then head of the Wagner Group, Yevgeny Prigozhin, launched a mutiny that saw Wagner irregulars advancing towards Moscow. While the event triggered panic in Moscow and delighted Western observers, the mutiny was called off by Yevgeny Prigozhin within hours of its beginning. Prigozhin himself was surprised when he was killed in a retaliatory act of sabotage directed by Putin.

Perhaps the most shocking example of surprise in the past three years was **the Hamas invasion of Israel** in October 2023. Despite Israel's extensive surveillance of Gaza, Hamas achieved complete surprise. The resulting shock has deeply affected Israeli society, with reverberations likely for the rest of our lives.

Surprise happens. It happens so regularly that it should be expected, but it is not. Surprise is not new; what is new is the expectation that surprise is a thing of the past. Notably, some see increased battlefield transparency as an antidote to surprise. The battlefield is indeed becoming more transparent. As identified earlier in this document, proliferated technologies have made it much more difficult to remain undetected in any warfighting domain. In Ukraine, there were times when it seemed like both sides could see everything that the other was doing. Transparency, however, does not ensure understanding or negate surprise. In modern conflict, two things are true at the same time. **The character of war is changing because the battlefield is becoming more visible, and the nature of war is constant in that surprise remains a potent possibility.**

Today's combatants possess an unparalleled capacity to view the battlespace in breadth and depth. The massive rollout of digitized command and control systems across Western military units in the past decade has increased the real-time information that combatants—and those who support them—possess about operations, fires, logistics, and other relevant matters. Likewise, Ukraine's military has made battlespace data available to almost every combatant with a wide array of digital command and control systems, which are available through secure apps on personal mobile devices. Leaders at the front can use these devices to detect enemy movements, respond to enemy actions, and call in fires against enemy units. At times, it has been nearly impossible to mask movements along the front.

This new level of visibility, however, is not confined to the area where forces are in contact. The meshing of civil and military technologies has allowed organizations to observe what their adversary is doing far away from the front lines, often with enough detail to target deep-strike weapons. In a late August 2024 attack on Kiryat Shimona, Hezbollah was able to precisely strike an Israeli Defence Force barracks in a dense urban environment.[48] In the past year, the

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[48] See https://x.com/GeoConfirmed/status/1828906143244267952

Yemeni Houthis have also demonstrated an advanced capacity to target and strike civil shipping.[49]

Even while the battlespace is increasingly transparent, surprise still happens. While cameras and sensors may reveal much, piecing together what a visual image or an intercepted message means is more complicated. No sensor can peer into the opponent's mind, assess their morale, or forecast their future intentions. The human element of war is still dominant, and humans can surprise and be surprised.

Surprise has many contributing factors. As Thomas Schelling writes,

> Surprise, when it happens to a government, is likely to be a complicated, diffuse, bureaucratic thing. It includes neglect of responsibility, but also responsibility so poorly defined that actions get lost...It includes the alarm that fails to work, but also the alarm that has gone off so often it has been disconnected...It includes the inability of individual human beings to rise to the occasion until they are sure it is the occasion – which is usually too late.[50]

These observations ring true when considering the surprise operations conducted by Hamas and Ukraine in the last few years. Surprise is increasingly likely when military operations combine five key factors:

1. Thorough intelligence preparation, allowing for understanding of the enemy
2. Deception measures, especially when matched to enemy expectations
3. Operational security, with an emphasis on minimizing observable phenomena,
4. Timing that takes advantage of the enemy's established rhythms
5. Exploiting the opponent's lack of humility and imagination, especially when observing something outside of "normal."

These fundamental factors are not new, but effective application in modern warfare will require fresh thinking. Given the transparency all sides enjoy, leaders will need a renewed appreciation of the art of surprise.

The Ukrainians successfully surprised Russia with the recent Kursk offensive, and in doing so, they have provided us insights into the modern art of surprise and deception. In the months leading up to this offensive, the Ukrainians observed Russia's force disposition and their

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[49] Sam Cranny-Evans, Houthi Maritime Strike Capabilities, *EDR Online*, 4 January 2024, https://www.edrmagazine.eu/edr-analysis-houthi-maritime-strike-capabilities; Max Mutshler, Marius Bales and Esther Meininghaus, "The impact of precision strike technology on the warfare of non-state armed groups: case studies on Daesh and the Houthis", *Small Wars and Insurgencies*, 8 March 2024. https://www.tandfonline.com/doi/full/10.1080/09592318.2024.2319216#abstract

[50] Thomas Schelling, *Foreword*, in Roberta Wohlstetter, *Pearl Harbor: Warning and Decision*, (Stanford: Stanford University Press, 1962), 2-4.

established rhythms. They developed a comprehensive plan based on this intelligence. They deceived Russian intelligence and kept their plan secret, which included protecting:

- The intent to conduct a major offensive in 2024.
- The movement of forces to be employed in that offensive.
- The location and timing of where the Ukrainian offensive would be conducted.
- The stockpiling of logistics to support the operation.
- The movement of key supporting elements to the operational area, including air defence and electronic warfare assets.

It is also clear that the Russians were limited in their ability to imagine that Ukraine would attempt such an audacious offensive, especially when the Ukrainian forces were under heavy pressure from Russian forces along the front. In retrospect, we see how the Ukrainians leveraged the human element, implemented an effective deception campaign and achieved a surprise outcome that shifted the fundamentals of the war.

We should not miss this lesson. Our opponents will attempt to surprise us, and sometimes, they will succeed. We cannot rely on a misplaced trust in transparency to save us from being surprised. In addition, we can achieve surprise against our adversaries, but this will require human ingenuity, thorough planning, courage, and creativity. As we prepare for modern conflict, we must nurture the capacity of our leaders to master the art of surprise and leverage audacity. In doing so, we want to build leaders who can combine the unchanging nature of war with its changing character. We must teach them that battlefield transparency will never equal total understanding for us or our enemy.

Uncertainty is constant in war. It is not something to be feared. It is something to leverage, especially against an opponent seized with the incorrect belief that war is a calculation determined by initial conditions.

War in All Domains at Scale

The character of modern war is heavily influenced by sheer scale. The war in Ukraine features hundreds of thousands of combatants engaged across many hundreds of miles. China has initiated an unprecedented build-up of military forces and weapons stockpiles. Across the globe, we are seeing the large-scale use of missiles, drones, and misinformation. This represents a new instantiation of a very ancient approach to war. The technologies and organizations may be more sophisticated, but the fundamental dynamic is simple. The bigger your military is compared to your adversary, the better your chance of victory.

Although this is an old concept, the return to mass features new realities. Mass is not only gained by building and fielding older technologies such as warships, aircraft, soldiers, artillery, and tanks but also by applying new technologies such as advanced manufacturing, the employment of autonomous systems in the land, sea, air, and space environments, and the

widespread application of modern tools of influence—sophisticated algorithms, big data, social media, and generative AI. To illustrate this point, we know that Russia, Iran, and North Korea possess large military forces, including traditional equipment and weapons systems. Increasingly, however, we see them adopting these modern tools of mass to augment their existing forces.

In particular, Russia and Iran have achieved mass with an ever-expanding arsenal of un-crewed systems. As demonstrated in Ukraine, autonomous systems can complement human-centric units while offering an inexpensive path to achieve mass. This path will be increasingly attractive as various AI and human-AI collaborative systems will proliferate in the coming years. Robot armies, navies, and air forces are inevitable because they are much less expensive than humans and effective enough to fill key roles. Henceforth, the large number of troops, aircraft, ships, and ICBMs possessed by the U.S. and its allies, as well as by China, Russia, and other potential adversaries, will increasingly comprise a smaller proportion of their total strength. Robots and un-crewed systems will grow in status and capability and be used—and lost—in large numbers.

In the concluding years of the Cold War, the countries of NATO and the Warsaw Pact deployed millions of regular and reserve military personnel. They also had over 17,000 nuclear warheads deployed on land- and submarine-based inter-continental ballistic missiles and on an array of air and ground-launched weapon systems.[51] In Central and Northern Europe, nearly one million NATO soldiers and 11,000 tanks faced off against Warsaw Pact forces that possessed 1.1 million soldiers and 29,000 tanks.[52]

The sheer scale of the Cold War can provide insight into the scale required for modern warfare. The composition of forces will differ from that of previous generations, but the scale is likely to be massive. Moreover, the richest countries in the world will be incentivized to field forces at a breathtaking scale, likely including millions of robotic systems augmenting hundreds of thousands of uniformed personnel.

This is especially true for the defining competition of our lifetimes—that between the United States and China. These massive, wealthy powers confront each other in a globe-spanning battle of trade, ideas, technology, influence, and military power. The U.S. and China are the two most capable military organizations on Earth, with a combined annual spending on military power that approaches $1 trillion US dollars.[53]

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[51]   U.S. Department of Defense, *Soviet Military Power 1990*, 52. David Miller, *The Cold War: A Military History* (London: John Murray publishers, 1999), 424.

[52]   Scott Boston, and others, *Assessing the Conventional Force Imbalance in Europe: Implications for Countering Russian Local Superiority* (Santa Monica: RAND Corporation, 2018), 3-5.

[53]   Anthony Cordesman, *US Competition with China and Russia: The Crisis-Driven Need to Change US Strategy* (Washington DC: Center for Strategic and International Studies, May 2020.

A 'mass mindset' dominates U.S. and Chinese thinking because of the roles that the military plays in each country's sense of security, plus the sheer quantity of resources available to undertake a large-scale and long-term military competition. In the past, the United States could rely on better technology and better-quality training to confront a larger Soviet conventional force.

Unfortunately, this approach will not work against China. The PLA has improved the quality of its people and equipment in the past decade. While there are qualitative gaps where the U.S. enjoys superiority over China, many new Chinese capabilities approach parity with the best U.S. weapon and sensor systems. More importantly, China is fielding vast numbers of these systems. The U.S. doctrine of qualitative overmatch remains relevant when the numbers of forces are relatively equal. But this alone cannot assure successful outcomes against the number of forces China can commit, especially with the "home-field advantage" that comes from fighting in its near abroad.

The return to scale also has another critical implication for modern warfare. Like in past conflicts, adversaries will use influence operations to affect the opposing military commander, the political leadership, and the mindset of a country's citizens. This is an old objective, but it is made much more likely through modern ways. As an extension of politics, war ultimately aims to persuade the other side to do something they are not inclined to do. This requires convincing, and the tools of persuasion include violence, fear, disinformation, subterfuge, and deception. In modern warfare, new technologies, such as the targeted delivery of disinformation through social media, make the traditional tools of influence much more precise and scalable.

The evidence from the war in Ukraine, Russia's influence operations in the global south, the global campaign to target Israel, and Chinese coercion in the Pacific are all contemporary examples of the modern capacity of nations and non-state actors to achieve influence. Strategic influence tools are highly effective when orchestrated as part of a more comprehensive approach employing economic, technological, legal, paralegal, paramilitary, media manipulation, and subversion elements. Increasingly, the scale and precision of influence tools will lead to a new reality. **Modern warfare will include—and perhaps be determined by—a clash of societies.**

Today, societies possess unparalleled means to attack each other, not just through their representative military institutions, but directly. Ukraine, in defending itself against Russia, has embraced a strategy that uses every element of its society—military, government, commercial, and civil—to degrade and destroy enemy forces on the battlefield. It has combined this with clever diplomacy and strategic influence campaigns to erode the will of Russian soldiers and citizens, slowly exhausting Russia's ability to wage war on Ukraine.[54] This demonstrates how the amount of 'surface area' of societies has increased, all subject to attack in modern warfare. War's nature is that it is a clash of wills for political purposes. **War's new**

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[54] Mick Ryan, *The War for Ukraine: Strategy and Adaptation Under Fire* (Annapolis: USNI Books, 2024), 42.

character makes it possible for societies to clash with each other in a massive, largely uncontrollable way.

Because scale is fundamental to modern warfare, mobilization will be critical to victory. This mobilization will undoubtedly include producing weapons systems and creating new military units, but it will encompass much more. Victory will require mobilizing society to attack, resist, and display resilience. In this way, war remains an extension of politics and a clash of wills. Modern war will extend the political clash to the level of the individual citizen.

Supercharging the Learning and Adaptation Battle

Today's pace of change, particularly in developing and deploying advanced technologies, is so rapid that it influences the character of war in profound ways. This was a foundational idea in the 2023 Offset X strategy, which argued that "militaries that dynamically change their processes and establish effective, integrated systems to take advantage of large datasets and emerging technologies can dominate the observe, orient, decide, act (OODA) loops by reaching speeds and scales that are impossible to match with analog processes."[55]

Today's challenge is that many different technologies are evolving rapidly and concurrently. At the same time, the injection of new technologies is changing the traditional operating methodologies of the U.S. military, its allies, and its potential adversaries. There are dozens of adaptation cycles spinning at different speeds and levels, including political, strategic, operational, and tactical. We must sift through the complexity and identify strategic advantage where it is most effective, efficient, and practical.

In some ways, this is not a new problem. Writing in 1974, British soldier-scholar Sir Michael Howard described how he was "tempted to declare that whatever doctrine the Armed Forces are working on now, they have got it wrong...it does not matter that they have got it wrong. What matters is their capacity to get it right quickly when the moment arrives."[56] This conclusion remains valid. The ability to learn, prioritize changes, and adapt to be more effective is fundamental to successful military activity at every level during war. However, the current pace of change, which is supercharged by big data and the capacity to analyze it rapidly, means that adaptive advantage is more transitory than ever.

An organization's adaptive capacity—its ability to adapt on the battlefield and as an institution—has always been and will remain critical to success in war. However, the pace of war and the speed of change in the geostrategic environment mean that military institutions' existing approaches to learning, adaptation, and organizational decision-making about change must be reinvented. Victory will smile on organizations that "supercharge" their learning and adaptation capacity.

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[55]   SCSP, *Offset X: Closing the Deterrence Gap and Building the Future Joint Force* (2023), 5.

[56]   Michael Howard, "Military Science in an Age of Peace", Chesney Memorial Gold Medal Lecture given on 3rd October 1973, *RUSI Journal*, 119, 1974, 7.

The wars in Ukraine and Israel have provided useful modern case studies of how state and non-state actors have discovered problems at the tactical, strategic, and political levels and then developed solutions to improve their chances of success. This has included the widespread deployment of autonomous platforms, which is far from the only example of learning and adaptation. Ukraine's meshing of civilian and military sensor networks and analytical capacity[57] on the battlefield, its rapid development of an indigenous fleet of uncrewed maritime attack vessels and long-range attack drones[58], and its continued integration in the air defense environment[59] provide important examples of adaptation. Likewise, Russia has adapted its approach, including in the fields of tactics and in the development of a potent electronic warfare capacity to degrade the performance of Western precision munitions[60] and Ukrainian drones on the frontline.[61]

Another layer of the adaptation competition is revealed in how others watch the Ukraine-Russia adaptation battle and learn for themselves. This is true of China, which has been systemically learning from Western wars since the Falklands War in the early 1980s. Most recently, several Chinese companies have watched the development of Ukrainian uncrewed maritime strike vessels and copied them. Several Chinese naval attack craft, which bear striking similarities to their Ukrainian predecessors, are available for sale.[62]

Learning by observation is preferred, but failure remains one of the most effective—if costly—ways for individuals and institutions to improve their performance. Many military training institutions employ failure as a method in their training to identify essential teaching points.[63] This approach recognizes failure not as a setback but as a powerful catalyst for growth and adaptation in military contexts. Failure in combat is much more painful, but it happens, and it teaches tough lessons.

Several recent examples of military failure have occurred in both Ukraine and Israel over the past three years. Three stand out: first, the Battle of Kyiv in February and March 2022 between Russia and Ukraine. Second, the 2023 Ukrainian counteroffensive in southern Ukraine. Finally, the October 2023 Hamas attack on Israel. Each of these featured a failure of intelligence and a failure of strategic leaders to heed the intelligence they did receive. Each of

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[57] This is examined in *Empowering the Edge: Uncrewed Systems and the Transformation of US Warfighting Capacity*, (Washington DC: Special Competitive Studies Program, 2024), 7-9.

[58] H.I. Sutton, "Guide To Ukraine's Long Range Attack Drones", Covert Shores, 25 August 2024. http://www.hisutton.com/Ukraine-OWA-UAVs.html

[59] Mick Ryan, *The War for Ukraine: Strategy and Adaptation Under Fire* (Annapolis: USNI Books, 2024), 176-180.

[60] Isabelle Khurshudyan and Alex Horton, Russian jamming leaves some high-tech U.S. weapons ineffective in Ukraine, Washington Post, 24 May 2024. https://www.washingtonpost.com/world/2024/05/24/russia-jamming-us-weapons-ukraine/

[61] These examples of adaptation, among others, will be explored in Mick Ryan, *The War in Ukraine: Strategy and Adaptation Under Fire*, USNI Books, 13 August 2024. https://www.usni.org/press/books/war-ukraine

[62] H.I. Sutton, "Chinese Companies Now Selling Export USVs Suitable For Weaponization", *Covert Shores*, 27 August 2024. http://www.hisutton.com/Chinese-USVs-Weaponization.html

[63] The US Army's National Training Center and the Australian Army's Combat Training Centre, for example, both employ failure as a mechanism for learning.

these failures had significant and continuing political ramifications. More importantly, these failures drove institutional learning and adaptation.

It is possible, and vastly preferred, to create institutional mechanisms for recognizing changes and adapting appropriately. Therefore, the examination of organizational adaptation is an essential field of study. The research shows that institutions or units that are at increased risk of high-impact failures (such as aircraft carriers or nuclear power plants) have developed methods that allow them to cope with complexity better than most other organizations. The appropriate fear of failure drives adaptation. These institutions have been described as "high-reliability organisations" because they can operate in highly complex environments and suffer fewer accidents than others.[64] By understanding patterns of failure and developing a culture of high reliability, the United States and its allies can better prepare for potential pitfalls and enhance their ability to learn and adapt.

The Evolving Character of War

Humans have moved from sticks and rocks to swords and shields, through to horse-borne warfare, and now into the age of machines that are used across all domains of human competition and conflict. Along with developments in the tools of war, the ideas of war have also evolved.

In their book, *Unrestricted Warfare*, two Chinese Colonels describe how "the great fusion of technologies is impelling the domains of politics, economics, the military, culture, diplomacy, and religion to overlap each other. Warfare is now escaping from the boundaries of bloody massacre, and exhibiting a trend towards low casualties, or even none at all, and yet high intensity. There is now no domain which warfare cannot use, and there is almost no domain which does not have warfare's offensive pattern."[65]

One of the harsh realities of human conflict is that regardless of how compelling the need for change may be, it is simply not possible to adapt every aspect of an organization in response to each new threat or technological advance. The size and complexity of military institutions—comprised of their human, intellectual, and technological elements—all work against rapid, holistic change. In addition, there is another compelling obstacle: cost. It is extraordinarily expensive to develop, test, and deploy new capabilities. Every good idea cannot be pursued. Military institutions must place bets on the capabilities most likely to generate an advantage in a coming fight. Because of this, old and new capabilities will exist side-by-side in military institutions, be they technologies, organizations, or ideas.

The design challenge—and the leadership imperative—is to ensure that old and new are property integrated. New ideas might be applied to older equipment. Old ideas might be the

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[64] Karl Weick and Kathleen Sutcliffe, *Managing the Unexpected: Resilient Performance in an Age of Uncertainty* (John Wiley and Sones, 2007).

[65] *Unrestricted Warfare*, p. 189.

most appropriate way to employ new technologies. No new technology will provide the ultimate advantage. Even the most stunningly advanced and impressive capabilities must be used within an orchestrated joint and coalition construct.

Part 3: Implications for the Joint Force: Tensions, Priorities and Recommendations

Adaptation will be both an imperative and a key source of advantage for all actors in this world. Global Trends 2040[66]

The findings in this document do not fundamentally change the recommendations proposed in Offset X (see chart below). However, we can identify updated considerations for building a force that wins based on what we have learned over the past three years.

For each of the four observations in the preceding section of this paper, there are tensions for the Joint Force to manage and critical priorities to pursue.

Capabilities of a Joint Force

Functions	Mission Requirements	Capabilities Needed	Tech-Enabled Solutions
Command & Control (C2)	• Make real-time, informed decisions • Generate predictive and proactive insights • Present PLA with dilemmas • Have structure to C2 globally • Generate and assess feasible and creative courses of action faster than adversaries	• Resilient communications • All-domain operational picture • More network-based decision-making	• Adaptive communication systems and modular C2 • HMC enabled planning tools • Mesh networks • Software baselines
Intelligence	• Live, dynamic analysis for military operations • Networks, platforms, and sensors that penetrate adversary defenses • Shift from a "manpower-intensive, permissive environment force to an automation-intensive, high-threat environment force"	• Data source integration • Greater speed and scale for data analysis • Human-machine collaboration for intelligence analysis • Intelligence dissemination for distributed forces • Enhanced deception against adversary AI-systems	• Open-source intelligence, autonomous intelligence, surveillance, and reconnaissance (ISR) platforms • Micro-satellite constellations • Digital nervous systems • HMTs leveraging ML capabilities
Movement & Maneuvers	• Disrupt or destroy adversary forces • Defend allied or partner territory • Expand options for alternative bases • Maneuver as a distributed force	• Access to allied bases and airspaces • Improved deception operations or masking, including through the use of decoys • Impose large costs on PLA ground-based or amphibious offensive operations	• Multi-agent swarms • HMT • Counter-autonomy • Prepositioned assets
Fires	• Project power into denied space • Destroy or disrupt PLA air, amphibious, and missile forces • Achieve dynamic targeting and fire • Disrupt PRC sensing and targeting networks • Disrupt or destroy adversary ISR and electromagnetic spectrum operations	• Long-range, deep strike capabilities • High volume of munitions, drones, and multivector fires • Access to fire for disaggregated forces	• Next-generation conventional cruise missiles • Hypersonic weapons • 3D printing of custom munitions and drone components
Sustainment (Expeditionary Logistics)	• Project logistical support with a depth of munitions, energy, personnel, replacement parts, and end items, such as drones	• Proactively distribute critical materials and supplies • Reduce sustainment requirements • Avoid detection • Cyber and physical hardening	• Low-profile autonomous vessels (LPVs) • Rapid, transportable runway repair kits • Portable hydrogen fuel generators • Metal 3D printing
Information	• Undermine adversary's censorship system • Inject narratives among leaders • Reduce the spread of misinformation and disinformation at home • Undermine adversary command systems and trust in autonomous systems	• Saturate or bypass censorship systems • The ability to attack AI/ML models	• Media Manipulation Monitor • Offline, peer-to-peer communication applications • Data poisoning injects and and other counter-AI methods
Protection	• Expand sensor network of real-time threat-detection and response • Tactical and strategic missile defense system • Defend platforms and reduce the effects of enemy long-range fire	• Layered missile defense systems • Integrate regional missile defense systems with allies and partners • Strengthen active and passive missile defense systems	• Agent-based modeling and simulations • Cyber-hardening of networks, sensors, and operational systems • Zero trust architecture • Counterspace weapons
Adaption	• Adapt faster to unanticipated developments • Place trained and authorized personnel in the right positions in the right organizations	• Improve digital Infrastructure • Place trained and authorized personnel in the right position • Create mechanisms and processes for continuous integration and continuous delivery (CI/CD) • Create an authorization to operate processes that move at an operationally relevant space	• Automated machine learning (AutoML) • Open Architecture

Capabilities of a Joint Force. Source: Offset X, 2023.[67]

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[66]   *Global Trends 2040: A More Contested World*, (Washington DC: National Intelligence Council, March 2021), 3.

[67]   SCSP, *Offset X: Closing the Deterrence Gap and Building the Future Joint Force* (2023), 23.

Implications of Constant Confrontation

The constant confrontation between Western democracies and authoritarian regimes challenges military institutions because it creates a powerful demand for activity across the spectrum of conflict. On any given day, the U.S. military and its allies may be conducting humanitarian relief, interdicting clandestine logistics routes, training with a partner force, providing lethal aid, analyzing an adversary's force movements near a border, intercepting a potentially hostile bomber aircraft, conducting cyber surveillance to support civil authorities, and building bases for a major contingency. All of these are important. It is tempting to assume that all need to be done well. But at what opportunity cost?

The tension, therefore, is: **The Joint Force must be ready to engage across the spectrum of conflict while maintaining the ability to win (and thus deter) a war with another great power.**

Even a military as well-trained and well-resourced as the United States cannot excel at every mission worldwide. Moreover, attempting to do so is dangerous, as it dilutes the necessary focus and energy to do the most important things. Unfortunately, this belief dominates much of the thinking and writing about the U.S. Department of Defense.

For example, the recent report of the Commission on the National Defense Strategy is built on the impossible recommendation that the U.S. military must do it all, everywhere, all the time. Doing so would require a fundamental change in the political reality. If the U.S. Department of Defense were to achieve the full recommendation of the Commission, the following would need to happen:

- Congress would need to appropriate trillions of additional dollars to defense above the Fiscal Responsibility Act caps (one estimate calculates this increase to be between $5 and $10 trillion in additional appropriations over the next ten years[68]).
- Congress would need to raise taxes and reform entitlement spending.
- Congress would need to fully fund nuclear modernization—including all three legs of the nuclear triad—without decreasing the Navy and Air Force budgets for conventional modernization.
- Congress would need to authorize extensive growth for each Service—including large increases in people and platforms, the most expensive elements of a military force.

None of these are likely, given the current political climate. The United States would need to suffer a significant military loss before these became politically feasible. Without a fundamental change in the political environment, the report reads more like wishful thinking rather than a serious proposal.

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[68] Christopher Preble and Julia Gledhill, "Hawks want a new Cold War but are cagey about the cost. So we did the math." *The Hill*, September 10, 2024.

The alternative is to make a hard choice. The best choice is to focus the U.S. military on the most important task. **In a state of constant confrontation with authoritarian regimes, the priority must be developing and maintaining the ability to deny—and thus deter—a major offensive action by China.**

The global consequences of a war between the United States and China would be disastrous for all. Such a war would likely produce casualties in the hundreds of thousands and a global recession characterized by widespread water, food, energy, and medicine shortages. There would be intense pressure on both sides to escalate, and nuclear exchanges would be possible. Alternatively, there would be little incentive to pursue a peace agreement requiring unpopular concessions. Conflict could oscillate between hot and cold for decades. It would be a global catastrophe. The top priority must be to avoid this outcome through strength and deterrence.

The demands of constant confrontation in modern warfare can make military institutions feel stuck between two metaphors. On one hand, they are the "Swiss Army knife" of foreign policy; militaries can be used to pursue objectives across the instruments of national power. Often, they succeed because they are comprised of intelligent, disciplined, and well-trained people. On the other hand, militaries are the "fire extinguisher behind the glass," only to be reached for in an emergency. They provide political leaders with the ultimate tool of coercion—the threat of violence on a massive scale. This is their *raison d'être*. Military force is critical to deterring the world's most dangerous outcomes.

For the foreseeable future, it is more important for the U.S. military to provide a credible threat to China than to do anything else. Even if the U.S. military fails in a humanitarian relief mission, in hunting extremists, or in managing conflict in the Middle East, it will not result in consequences anywhere close to those of war with China. This must be the priority.

- **Recommendation #1: The next President of the United States should issue a classified National Security Policy Memorandum that reorganizes the Executive Branch for long-term competition with China and directs the Departments to prioritize this competition.** It should direct the U.S. Department of Defense to prioritize preparation for conflict with China to have the best chance to deter this conflict.

- **Recommendation #2: The U.S. Congress should organize itself for long-term competition with China.** Specifically, beginning with the 119th Congress, the Armed Services Committees should stop organizing around functions and establish a subcommittee on military competition with China (in addition, they should establish subcommittees on Homeland Defense and Russia). The Appropriation Committees should create mechanisms to track military capabilities vis-à-vis China to ensure prioritized funding.

- **Recommendation #3: The U.S. Congress should separate nuclear and conventional modernization funds.** Specifically, Congress should expand the National Sea-Based Deterrence Fund to comprise all nuclear modernization programs—including the B-21 and

Sentinel programs—and ensure these programs do not crowd out other modernization programs relevant to a conflict with China.

- **Recommendation #4: The Secretary of Defense, with the support of Congress, should fully implement the recommendations of the Commission on Planning, Programming, Budgeting and Execution Reform,** especially the recommendations detailed in Section IV, "Improve the Alignment of Budgets to Strategy," in the final report.

- **Recommendation #5: The Secretary of Defense should work with Congress to create a Joint Futures Organization.** This recommendation is described in the SCSP Vision for Competitiveness, which proposes that this organization's "mission is to scan the horizon and comprehend how new technologies will change the speed and character of warfare. This organization should provide prescriptions for the design of U.S. forces that are anticipatory and responsive to these changes, develop future concepts for employment, and — critically — be resourced to acquire select emerging capabilities that are of joint use." Essentially, this organization will provide the warfighting concepts that drive the strategy-to-budget process mentioned above.

Implications of Imperfect Transparency

On the modern battlefield, sensors are everywhere, and information is shared widely. Despite this, fog and friction persist, and surprise happens. We can observe nearly everything, but cognitive challenges remain in interpreting what we see.

The tension, therefore, is: **The Joint Force must adjust to the undeniable power of transparency while maintaining humility about what is truly known.**

Operating in a battlespace where transparency is real can be a jarring experience. It is nearly impossible to move without being seen. This reality requires major adjustments in tactics and doctrine, as clandestine movement is only possible through extraordinary means. Principles of war, such as mass and maneuver, will require new approaches. Someone will figure out how. It may be us, or it may be the adversary.

In a time of imperfect transparency, the priority must be to develop and trust the technology of transparency up to the point where we attempt to translate information into understanding. This is where we must apply healthy distrust on both personal and procedural levels. The point where we ascribe intent is the most precarious. It is where the human element is most salient and, therefore, where fog exists.

Every military leader should develop a sixth sense for this transition point, with the appropriate response being a distrust in proposed assumptions. Every military organization should apply procedures to identify this transition point and be explicit about what is known vs. what is assumed. Every assumption should be questioned and examined. This should be so ingrained as to be reflexive.

- **Recommendation #6: The Joint Force must develop tactics in all domains to account for transparency.** This includes leveraging transparency for an effective defense while adjusting offensive tactics to minimize the vulnerabilities of being seen.

- **Recommendation #7: All-Domain Command and Control technologies must allow options for the end user to adjust information feeds to mitigate information overload.** Too much or too little information can induce fog and make one vulnerable to surprise. Leaders need the ability to find the Golden Mean for their information streams.

- **Recommendation #8: The Joint Force should implement a standard procedure at every command echelon that incorporates best practices for red teaming.** These practices include leaders who require alternative views and organizations that require alternative analysis in their planning cycles.[69]

- **Recommendation #9: The Joint Force must develop leaders who can adjust to being surprised while leveraging surprise for their purposes.** This preparation must include academic instruction and practical training in the elements of surprise, including the potential and limits of intelligence preparation, the usefulness of deception measures, the importance of operational security, the benefits of encouraging the adversary to make certain assumptions, and the exploitation of adversary rhythms. This development overlaps with what is necessary for developing learning and adaptive leaders (see below).

Implications of War at Scale

Should the United States engage in hostilities with China or Russia, the chaos of the initial battles will give way to an uneasy equilibrium. Political leaders will face a choice about whether to undertake a national mobilization, a choice with significant societal impacts. Since the end of the Cold War, Western societies have become used to their countries engaging in conflict without the need for societal mobilization. We have been able to live normally while a very small proportion of society engages in fighting. Additionally, these conflicts have had only minor ideological components that have not provoked heavy engagement by Western citizens. Conflict, therefore, has been compartmentalized.

This is unlikely in a modern conflict between great powers. These will be massive in scale and scope. Conflict will include violence between militaries and large-scale information campaigns aimed at entire societies. We must anticipate the possibility of cognitive conflict between societies, with a vastly increased "surface area" for attack. War will come to the homeland with unpredictable—and perhaps extreme—consequences. Our citizens may demand that their political leaders disengage, concluding that "it's not our fight." In contrast, the attacks

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[69] For an excellent discussion of red teaming, see Micah Kenko's *Red Team, How to Succeed by Thinking Like the Enemy*, (New York: Basic Books, 2015).

against society may provoke the rise of national will that enables a stiff resistance to aggression with a multi-pronged response across all instruments of power.

Given potential scenarios such as the defense of Taiwan/Japan against Chinese aggression or the defense of NATO against a Russian offensive, military action alone is not sufficient for victory, especially in the early battles. However, if Chinese or Russian aggression is successful in these early battles, the result may be a *fait accompli* where the cost of retaking territory is prohibitively high. Military operations cannot achieve full victory, even with success in the early battles. Failure, however, could result in a permanent loss.

The tension, therefore, is: **The Joint Force and allies must be trained, equipped, and positioned to deny a fait accompli early in great power conflict while being ready to mobilize for a protracted war.** Successful denial is a prerequisite for victory, but it alone is insufficient. Victory in a war between great powers will demand the ability to sustain conflict over time.

For Western democracies, sustaining conflict past a few weeks/months depends on mobilizing national will. If the national will exists, the United States and its key allies will be able to contest, contain, and attrit. Without the national will, the countries will capitulate or, worse, tear themselves apart. It is essential to consider that the national will of countries in an alliance will coalesce at different rates and magnitudes. The very situation may drive much different demands on the populations. The people of Taiwan or Poland may have hours to mobilize their will to fight, while others may take much longer.

Therefore, in an era of war at scale, the priority must be to avoid losing in the opening rounds of a conflict, buying time for the national wills in allied countries to surge. Doing so will require defensive capabilities positioned forward and capable of working with the threatened populations to resist the initial aggression from China or Russia. There is an added benefit if sufficient forces are in place to deny aggression, as it gives us the best chance to deter war in the first place.

Holding on allows political leaders to engage in dialogue with the population and mobilize the will to fight. With sufficient will, the United States and its allies can execute mobilization plans for effective resistance over time. This will require advanced planning for national mobilization, of which mobilization for military operations is just one component. Effective mobilization demands the use of a society's resources to achieve national objectives in war, crisis, or disaster.[70] It requires a holistic approach to appropriating and focusing national capacity to preserve national sovereignty and achieve political objectives. The experiences of Ukraine, Israel, and Russia all offer important lessons in the conduct of national mobilization in the modern era.

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[70]   This is a variation of the definition of mobilization offered in Peter Layton, *National Mobilization During War: Past Insights, Future Possibilities*, Occasional Paper, Canberra: Australian National University, 2020, 1.

The imperative for mobilization is not just to build the capacity to fight and win wars. There is also a compelling need to have a mobilization strategy that can contribute to deterring wars. Mobilization is a key element of deterrence because the existence of mobilization strategies and the rehearsal of mobilization plans will be visible to potential adversaries and influence their strategic decision-making. Deterrence is ultimately about impacting the perceptions of a potential aggressor. They will be more inclined to attack if they perceive that will is lacking in a potential target nation. However, if they perceive that their target possesses the will to resist aggression, they may conclude that the cost is too high.

- **Recommendation #10: The next President of the United States should issue an executive order directing the Departments to develop mobilization plans for protracted conflict.**

- **Recommendation #11: The Secretary of Defense should direct that the National Defense Strategy and the Joint Warfighting Concept—documents that stress the requirement for denial and provide a workable concept to achieve denial—serve as the foundational documents for strategy and budgeting guidance as well as modernization requirements for the Joint Force.** Following the recommendations of the Commission on Planning, Programming, Budgeting and Execution Reform, a review period should precede the development of Service budgets. Critical capabilities for denial should be designated as non-negotiables in these budgets.

- **Recommendation #12: The Secretary of Defense should establish a temporary, cross-service mobilization task force to explore the warfighting implications for service and joint personnel.** This work should also explore organizational constructs in the air, sea, and land domains that draw on contemporary lessons. This task force should draw on current DoD personnel initiatives and be co-led by the Deputy Secretary of Defense and the Vice Chairman of the Joint Chiefs of Staff.

- **Recommendation #13: This task force should direct a study of Israeli, Ukrainian, and Russian personnel mobilization in the past three years.** The 2022 Russian partial mobilization debacle[71] could provide useful insights into mobilizing people. Having hollowed out the training cadres required for military expansion; the Russian mobilization effort struggled for months. Ukraine and Israel have also experienced issues in mobilizing people, from training quality to training bottlenecks and leadership issues. These should be the subject of a rapid study to provide lessons for practical approaches to contemporary mobilization.

- **Recommendation #14: This task force should work with Australia and the United Kingdom to explore an alliance variation of mobilization under an AUKUS-like model of collaboration.** This collaboration should include pre-war mobilization planning and

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[71]   Reuters, *After weeks of chaos, Russia says partial mobilisation is complete*, 1 November 2022.
https://www.reuters.com/world/europe/russia-completes-partial-mobilisation-defence-ministry-2022-10-31/

cooperation on industrial and personnel policies underpinning any successful mobilization strategy.

- **Recommendation #15: This task force should also assess how much capacity can or should be mobilised for addressing non-military challenges.** This assessment should focus on how military institutions can or should contribute to disaster relief in the expectation that climate change may lead to more significant natural disasters more often in the coming years.

Implications for Supercharging the Learning and Adaptation Battle

Modern militaries enjoy many learning opportunities, especially from the developments over the last three years. Unfortunately, not all military organizations or units possess the learning cultures to recognize the need for change and conduct disciplined, multi-level adaptation to improve effectiveness.[72] Learning demands leadership, training, educational, and cultural characteristics that are established and practiced in peace. This allows the institution to be reflexively adaptive when war occurs. This was discussed in the Offset X strategy.[73]

Military organizations must overcome many obstacles to learn and adapt. It can be challenging to find effective ways to communicate observations and lessons across the force, and this is especially true in an environment of fog and friction, where time is scarce, and the commander's attention is divided. Even when communication is effective, a lack of resources can hinder implementation. In addition, institutional cultures can be a barrier to learning. Ukraine and Russia have proven to be quite adaptive under the pressure of conflict, but these obstacles have hindered both sides in applying their learning to the battlefield. For example, in the Russian system—and, to some degree, the Ukrainian system—the fear of reporting failure and a culture of centralized command obstruct rapid learning and adaptation. This could happen in Western militaries as well.

Although they are subject to the constant confrontation described earlier in this paper, Western militaries are not subjected to the pressure of large-scale combat like the Ukrainians and Russians. It is exceedingly difficult to achieve the same sense of urgency in a military organization during a period of relative calm versus a period of battle. But there is a real problem here. As discussed in the previous section, it is critical that the U.S. military and its allies not be defeated in the first battles of a great power war. We may not have the luxury of learning and adaptation in the critical period between conflict initiation and the first culmination.

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[72] Millett and Murray, writing in *Military Effectiveness: Volume 1*, define define military effectiveness as "the process by which armed forces convert resources into fighting power." In my book *War Transformed*, I offer an updated definition: "the process by which military forces convert resources into the capacity to influence and fight within an integrated national approach." Mick Ryan, War Transformed (p. 130). Annapolis: Naval Institute Press, 2022. 130.

[73] SCSP, *Offset X: Closing the Deterrence Gap and Building the Future Joint Force* (2023), 21-22.

The tension, therefore, is: **The Joint Force must learn and adapt in the relatively calm period before a great-power conflict without the urgency of being in combat.**

If the adaptations needed were relatively minor, this tension may be easily managed. Unfortunately, the force required to deny Chinese aggression in the first island chain is much different from the force we have today. Moreover, many powerful officials have strong interests in defending the old vs. fielding the new. Even worse, the lack of a clear strategy with priorities allows space for these officials to argue for their portfolios or preferred capabilities, even when these are ineffective due to the changing character of war. Despite the size of the U.S. military budget, it remains true that when the old stuff is funded, it crowds out the opportunity to field the stuff that wins.

The U.S. military and those of its allies are slowly changing. However, this is not likely to be enough. We are unlikely to reinvent the conventional force for denial, especially in the Pacific. The best we can do is to partially adapt to the changing character of war. When combat ensues, our warfighters will need some ability to apply rapid learning and adaption in fog and friction. This will require intention.

Given the situation, the priority must be fielding a denial force based on the best learning while preserving the capability for quick learning and adaptation cycles in the initial battles. There will not be time for Manhattan projects in the opening days of a war with China. With the right preparation, however, it is possible to create opportunities to learn and adapt within the first battles. This preparation includes developing adaptable leaders, building a culture of adaptation, implementing learning procedures, incorporating adaptable tactics, and fielding flexible equipment.

- **Recommendation #16: The Chairman of the Joint Chiefs of Staff should write a memorandum or white paper to the Joint Force explaining the warfighting requirement for learning and adaptation.** The culture change must begin with a clear statement about the changing character of war and how learning and adaptation will be necessary for victory. The Chairman should be clear about the importance of leadership in a learning and adaptive force because effective adaptation doesn't just happen; it must be led. Furthermore, a culture that encourages learning and adapting must tolerate intelligent risk-taking and new ideas. The Chairman should describe what *acceptable failure* means for individuals and teams because failure is a pathway to learning. Finally, the Chairman must be clear that questioning old assumptions—what former Chairman General Martin Dempsey describes as "responsible rebellion"—is desired and encouraged.[74]

- **Recommendation #17: The Secretaries of the Army, Navy, and Air Force should direct the creation of alternative career pathways for leaders who "don't fit the mold."** Every service

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[74]   Martin Dempsey, *No Time for Spectators: The Lessons that Mattered Most from West Point to the West Wing*, New York: Missionday, 185-206.

tends to promote leaders with similar characteristics, backgrounds, and career tracks. This works against an adaptive culture. The services must have access to a diverse set of people to lead them in combat, and there is extensive historical evidence that some of the most innovative leaders will come from non-standard career paths.

- **Recommendation #18: The Chairman of the Joint Chiefs of Staff should direct the development of adaptation doctrine accompanied by the widespread implementation of learning procedures and practices for military units.** For too long, the "lessons learned" offices in military organizations have been separated from the mainstream and relegated to disconnected stovepipes. If learning and adaptation are keys to victory, this must change. The first change is to hold leaders accountable for organizational learning. Every commander must be the Chief Learning Officer of their unit. Every unit should practice learning and adaptation in their training. The best units do this already. They analyze their performance, debrief the successes and failures, and adjust. They recognize that learning is a non-negotiable activity. Their best practices should be directed in doctrine and shared widely.

- **Recommendation #19: Combatant Commanders should ensure that their C2 procedures include rapidly disseminating tactics updates to engaged units.** Tactics are inherently flexible. Significant gains in tactical effectiveness are possible through rapid learning loops accomplished in battle. However, the fog and friction of battle make it challenging to communicate successful learning and adaptation across the force. The Combatant Commanders should overcome this with processes and procedures for dissemination that are incorporated in standard C2 cycles. They should test their processes against the experiences of Ukraine and Israel in current conflicts.

- **Recommendation #20: The Secretaries of the Army, Navy, and Air Force should acquire and field equipment that can be modified and updated in combat conditions.** With today's pace of change, overly specialized equipment can be rendered ineffective by new developments on the battlefield. The Services must field equipment designed to be updated and modified in combat. A timely software update, for example, can be a combat multiplier. So can open systems architecture, especially when it allows new components to be inserted on existing platforms. Uncrewed vehicles are especially suited for these advantages, as the risks of making big changes do not include operator safety. An additional requirement for this adaptable equipment is that it must be able to operate in anticipated more extreme climatic conditions – including regular extremes in heat - anticipated in the coming decades.

- **Recommendation #21: The Chief Data and Artificial Intelligence Officer should develop AI capabilities for the Joint Force that 'supercharge' learning and adaptation.** For example, as part of Joint All-Domain Command and Control, AI algorithms should be trained to observe battlefield developments, recognize when patterns change, and suggest adaptation options for the Joint Force. There are multiple areas where improvements in

learning and adaptation might be made possible through a meshed human-AI adaptation capability.[75] Many military institutions have explored the value of AI in improving decisions and the overall effectiveness of their organizations, with the U.S., Britain, and Australia all publishing AI strategies in different stages of resourcing and implementation.[76]

There is unlikely to be a one-size-fits-all algorithm or AI approach that can enhance learning and adaptation at every level. At the tactical level, algorithms will need to be simple and easy to use by people who are tired, hungry, and under constant time pressure. Adaptation support systems at this level should be capable of being routinely disconnected from digital command and control systems, given the existing adversary concepts designed to disaggregate and break down the cohesion of military formations and their digitized command and control systems.[77]

Different adaptation support tools will be required at the operational level, where algorithms must analyze patterns from the land, space, air, sea, and cyber domains to support future operational planning. Finally, strategic-level adaptation tools should support decision-making about force structure and warfighting capabilities. This should include a strategic wargaming capability to enable the testing of new concepts and hypotheses across the Joint operating environment.

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[75] Mick Ryan, 'An Australian Intellectual Edge for Conflict and Competition in the 21st Century', Centre of Gravity Paper No. 48, Coral Bell School, Australian National University, March 2019.

[76] Summary of NATO's revised AI strategy, *NATO webpage*, 10 July 2024. See also United States Marine Corps, United States Marine Corps Artificial Intelligence Strategy, 10 July 2024. https://www.marines.mil/News/Publications/MCPEL/Electronic-Library-Display/Article/3834385/united-states-marine-corps-artificial-intelligence-strategy/

[77] Jeffrey Engstrom, "Systems Confrontation and Systems Destruction Warfare: How the Chinese People's Liberation Army Seeks to Wage Modern Warfare" *RAND Corporation*, February 2018, https://www.rand.org/pubs/research_reports/RR1708.html

Conclusion and Areas for Further Study

Victory smiles upon those who anticipate the change in the character of war, not upon those who wait to adapt themselves after the changes occur. Giuilo Douhet

In this paper, we have tried to anticipate changes in the character of war. No matter how well we have done this, we cannot be fully successful. The world is changing at an accelerating pace, and new and unexpected developments will further induce changes in the character of war. We agree with Douhet that we cannot wait to adapt, but we also know that we cannot fully predict what will happen.

Nevertheless, as we look to 2030 and beyond, we are confident in the following:

- The constant political confrontation between the West and authoritarian regimes will continue, with varying degrees of intensity.
- There is an increasing chance of war between great powers, especially between NATO and Russia and the United States and China. These wars would be global catastrophes.
- Western militaries cannot meet all the demands placed on them, and therefore, they must prioritize.
- The most important priority for Western militaries is to prepare for a great power war with the intent to deter.
- The battlefield is increasingly transparent, but the human element in war ensures that fog, friction, and surprise still exist. Creative leaders and organizations can use these to gain advantage.
- Great power wars will be conducted on a massive scale. Winning will require the mobilization of both the military and society. Societies will be attacked directly, and they will engage each other.
- In a great power war, aligning the government, the military, and society will be critical to sustaining the war effort. There will be tremendous pressure on political leaders to mobilize and sustain national will. If they cannot do so, it will force concession.
- It is critical that the United States and its allies not be defeated in the first battles. It will take time to mobilize national will.
- Drones and robots will comprise an increasing proportion of the engaged force. Massive amounts will be both committed and lost.
- It is impossible to fully anticipate the character of a great power war. Western militaries will need to learn and adapt, or they will lose. Being adaptable in war requires the intentional preparation of people and equipment. It also requires strong leadership in creating a learning culture.
- Artificial intelligence and human-machine teaming are powerful tools for learning and adaptation.

We see the following as important topics for further study:

- Effective organization for democratic governments in constant confrontation.
- Mobilization of military forces, including the roles of reserve and National Guard units.
- Mobilization of society for sustained conflict.
- Protection of the homeland, including civil defense.
- Industrial policy for a great power war.
- Escalation options for a great power war.
- Alliance warfare in the modern era.
- The role of time in a great power war.
- New era joint tactics and operational concepts for a more transparent and automated battlespace.
- The conduct of effective deception campaigns in modern war.
- Potential 'Manhattan Projects' in a great power war.