Integrated Warfare: How U.S. Special Operations Forces Can Counter AI-Equipped Chinese Special Operations Forces

整合式作戰：美軍特種作戰部隊如何反制配備人工智慧的中共特種作戰部隊

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(譯註：中國大陸將artificial intelligence譯為人工智能，我方則譯為人工智慧)

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Artificial intelligence (AI) is becoming a dominant tool in various fields. It is on track to become a $1.3 trillion market by 2032, and numerous companies and industries are looking to "rethink how [humans] integrate information, analyze data, and use the resulting insights to improve decision making." From the medical field to the entertainment industry, AI changes how humans go about their private lives, redevelops how businesses function, and overall alters human society and culture.

人工智慧已在各種領域成為不可或缺的工具。依據2018年布魯金斯學院研究，2032年，其市值上看1.3兆美元，而各公司與產業都「積極思考人類該如何整合資訊、分析資料，以進而強化決策流程」。[1]從醫療到娛樂產業，人工智慧不僅改變了人們的生活方式、企業經營模式，甚至翻轉了人類社會與文化。[2]

AI's use in the defense industry, military, and national security space is no different. It is becoming a highly discussed topic. Many individuals, from military officers to private sector executives, to politicians and government officials, have identified the numerous benefits that AI principles can have upon improving the U.S. military and counter emerging technology and mandates of other nation-states. Prior to his retirement in September 2023, chairman of the Joint Chiefs of Staff Gen. Mark A. Milley stated, "Artificial intelligence is extremely powerful. It's coming at us. I suspect it will be probably optimized for command and control of military operations within maybe ten to 15 years, max ... Our military is going to have to change if we are going to continue to be superior to every other military on Earth."

人工智慧在國防產業、軍事領域及國家安全範疇的運用亦復如此。它成為大家耳熟能詳的話題。許多軍官、企業執行長、政治人物及政府官員都深諳人工智慧的優點，不僅可精進美軍戰力，還可以反制新興科技、避免其他民族國家角逐霸權。2023年9月，美國參謀首長聯席會議時任主席馬克・密利上將在退役前表示：「人工智慧威力無窮。它正朝我們而來。未來10～15年內，人工智慧能否用來優化軍事作戰之指管，個人對此抱持懷疑態度……我軍必須有所改變，才能繼續持盈保泰，稱霸全球。」[3]

1 Darrell M. West and John R. Allen, "How Artificial Intelligence Is Transforming the World," Brookings Institution, 24 April 2018, https://www.brookings.edu/articles/how-artificial-intelligence-is-transforming-the-world/; "Generative AI to Become a $1.3 Trillion Market by 2032, Research Finds," Bloomberg Intelligence, 1 June 2023, https://www.bloomberg.com/company/ press/generative-ai-to-become-a-1-3-trillion-market-by-2032-research-finds/.

2 Kanadpriya Basu et al., "Artificial Intelligence: How Is It Changing Medical Sciences and Its Future?," Indian Journal of Dermatology 65, no. 5 (2020): 365-70, https://doi.org/10.4103%2Fijd. IJD_421_20; Josh Wilson, "Artificial Intelligence, Machine Learning, and the Future of Entertainment," Forbes (website), 6 December 2022, https://www.forbes.com/sites/joshwilson/2022/12/06/artificial-intelligence-machine-learning-and-the-future-of-entertainment/?sh=4cffee9b6de4.

3 Brit McCandless Farmer, "AI in the Military: Gen. Milley on the Future of Warfare," CBS News, 8 October 2023, https:// www.cbsnews.com/news/artificial-intelligence-in-military-general-mark-milley-future-of-warfare-60-minutes/.

While the United States has become more proactive in recognizing the use of AI to improve the country's national defense and security frameworks, this recognition and activity has been slow, and only recently has it improved in speed. No country has been better prepared for using AI in modernizing its nation's military forces than China. Over the course of twenty years, China has improved its AI standing by enacting official government policies based around the tool and "organizing to build capabilities in anticipation of future [intelligentised] warfare, in which AI will be integral to military power ... [these initiatives reflecting] a candid recognition of current challenges and impediments to progress, which has motivated the Chinese defence industry's call for greater support from the government."

雖然美國積極推廣人工智慧之運用，以強化國防與安全架構，但其認知與進展有如牛步，直到近期才加快腳步。中共是全世界運用人工智慧強化部隊戰力的領頭羊。過去20年，中共不斷提升國家人工智慧地位，透過制定人工智慧專屬政策工具，並且「組織建立研判未來(智能化)戰爭的各種戰力，把人工智慧融合至軍事戰力(這些方案舉措)，直白地認識到當前的挑戰和妨礙進步的影響障礙，進而促使中國國防工業界要求政府給予更大支持的呼聲」。[4]

China's entire AI policy and framework aim to make it a global leader in the field by 2030, and China is on track to, at the least, become a dominant national power that is powered by AI. One of the main methods by which China integrates AI into its military capabilities is by supporting its special operations forces (SOF).

中共整體人工智能(人工智慧)政策與架構的主要目標是要在2030年前成為人工智慧領域的領頭羊，至少，目前正持續朝向人工智能(人工智慧)大國的目標邁進。[5] 中共將人工智能(人工智慧)納入部隊戰力的主要方式之一，即為支援特種作戰部隊。

AI in Modern Warfare
人工智慧在現代戰爭的運用方式

4 Daitian Li, Tony W. Tong, and Yangao Xiao, "Is China Emerging as the Global Leader in AI?," Harvard Business Review (website), 18 February 2021, https://hbr.org/2021/02/is-china-emerging-as-the-global-leader-in-ai; Elsa B. Kania, "China's Embrace of AI: Enthusiasm and Challenges," European Council on Foreign Relations, 6 November 2018, https://ecfr.eu/article/ commentary_chinas_embrace_of_ai_enthusiasm_and_challenges/.

5 Pablo Robles, "China Plans to Be a World Leader in Artificial Intelligence by 2030," South China Morning Post (website), 1 October 2018, https://multimedia.scmp.com/news/china/article/2166148/china-2025-artificial-intelligence/index.html.

Before describing the use of AI within Chinese SOF, it is beneficial to explain precisely what AI is and how it can be used in a military setting. According to Encycloadia Britannica, AI is effectively "the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings," combining computer science, machine learning, and deep learning "to create expert systems which make predictions or classifications based on input data ... to enable problem-solving."

在探討中共特種作戰部隊內部人工智慧相關運用之前，應該先行瞭解人工智慧之內涵與如何運用到軍事領域運用的方式。根據《大英百科全書》，人工智慧實質上是「數位電腦或電腦控制機器人，能夠執行智慧物種高階任務的一種能力」，並結合電腦科學、機器學習及深度學習技術，「開發一款專業系統，根據輸入之資料，執行預測或分類……以提升解決問題能力」。[6]

From a defense perspective, AI has immensely useful benefits for any nation's armed forces, from procurement to combat. It can be used to "highlight not only the direct costs of the decision [to purchase new aircraft] but also its effects on personnel, bases, aircraft availability, and other important domains ... collect data from a platform's sensors and predict when and what kind of maintenance will maximize its readiness and longevity while minimizing costs." In addition, it allows intelligence collection units to "better understand what's happening on the battlefield, make decisions faster, and then target the enemy faster and more accurately [by sifting] through satellite images and drone video feeds" while also making it a greater likelihood for unmanned aircraft to better carry out its operations, saving the lives of pilots and others in theater.

從國防的角度來看，人工智慧對於任何一個國家的武裝部隊從採購到作戰大有助益。人工智慧「不僅可以初估決策(如籌獲全新戰機)的直接成本，亦可呈現該項決策對於人員、基地、戰機出勤率及其他領域的衝擊……蒐集平臺感測器資料，預判最佳補保作業時機與執行作法，進而提升戰備效益、延長裝備壽命及降低全壽期成本」。[7]此外，情報蒐集單位亦可運用人工智慧「充分掌握戰場情況，即時下達決策，並快速過濾衛星與無人機影像，精準打擊敵軍」。與此同時，無人機也可藉人工智慧提升作戰效

6 Encyclopadia Britannica Online, s.v. "artificial intelligence," by B. J. Copeland, last updated 4 March 2024, https://www.britannica. com/technology/artificial-intelligence; "What Is Artificial Intelligence (AI)?," IBM, accessed 5 March 2024, https://www.ibm.com/ topics/artificial-intelligence.

7 Michele A. Flournoy, "AI Is Already at War," Foreign Affairs 102, no. 6 (November/December 2023), https://www.foreignaffairs.com/united-states/ai-already-war-flournoy.

益，間接減少飛行員與官兵傷亡。[8]

From a data collection and storing aspect, AI has been adopted by the U.S. Army's Cyber Command with great success, and as AI continues to grow and nation-states put emphasis on outsmarting their enemies, it is likely to expect that AI-enabled militaries will soon become commonplace. In terms of special operations, however, AI can be used in various ways, primarily in intelligence gathering and dissemination, language translation, and warfare in cyberspace.

就資料蒐集與儲存層面來說，美陸軍網路司令部在實際運用方面已頗有成效。目前，人工智慧將持續發展和民族國家挹注心思智取敵人，相信在不久的將來，有人工智慧驅動的部隊將會遍地開花。[9] 不過，若是談及特種作戰，人工智慧就有很多運用方式，主要包含情資蒐集與分發、翻譯及網路作戰。[10]

China's Special Operations Forces and Technological Innovation
中共特種作戰部隊與科技創新

As mentioned, China's military has increasingly relied upon AI and improving its current methods since the dawn of the twenty-first century to outpace and outsmart U.S. and Western militaries. Alongside developing a robust cyber intrusion network and integrating AI into its military schematics and operations, China has integrated its special-operations-capable units with AI, enabling them to make faster decisions; collating better warfighting information;

8 Paul Scharre, "How Militaries Are Using Artificial Intelligence on and off the Battlefield," by Ali Rogin and Harry Zahn, PBS NewsHour, 9 July 2023, https://www.pbs.org/newshour/show/ how-militaries-are-using-artificial-intelligence-on-and-off-the-battlefield; Chris Karns, "Military Superiority Demands Artificial Intelligence Proficiency," C4ISRNET, 27 September 2023, https://www.c4isrnet.com/opinion/commentary/2023/09/27/military-superiority-demands-artificial-intelligence-proficiency/.

9 John Luckenbaugh, "Army Hopes AI Will Give Soldiers an Information Advantage," National Defense Magazine (website), 21 July 2023, https://www. nationaldefensemagazine.org/articles/2023/7/21/ army-hopes-ai-will-give-soldiers-an-information-advantage.

10 Patrick Tucker, "How AI Will Soon Change Special Operations," Defense One, 18 May 2020, https://www.defenseone. com/technology/2020/05/how-ai-will-soon-change-special-operations/165487/; Mark Pomerleau, "Special Ops Will Look to Invest in New Technologies to Compete with Advanced Nation-state actors," DefenseScoop, 10 March 2023, https://defensescoop. com/2023/03/10/special-ops-will-look-to-invest-in-new-technologies-to-compete-with-advanced-nation-state-actors/.

and engaging in sea, air, land, and other forms of warfare to gain an advantage over its adversaries.

如前所述，自二十一世紀初期，共軍就益加仰賴人工智能(人工智慧)，精進戰術戰法與武器系統，試圖超越美軍與西方國家之部隊。除了發展無孔不入的駭客網路、將人工智慧納入軍事計畫作為與作戰外，中共也將人工智能(人工智慧)導入特種作戰部隊，加速決策流程、查核情資真偽，以及支援陸、海、空與其他領域作戰，掌握戰場優勢。

China's SOF units are relatively new, and the first was created in the late 1980s, but they have since "doubled in number in the last two decades," complementing China's overall "modernization and professionalization process." While many popular publications cite the total amount of SOF capable units in China's military between twenty thousand and forty thousand members, this number includes units specializing in airborne insertion, amphibious warfare, and marine units, which cannot truly be considered as SOF units. In fact, the real number is likely far smaller and no greater than five thousand to ten thousand members.

中共特種作戰部隊屬於新興部隊，第一個單位於1980年代末成軍，但「20年內人數倍增」，搭上「共軍全面現代化與專業化列車」。[11] 許多流傳甚廣的出版品推估，共軍特種作戰能力的部隊總員額在20,000～40,000人之間，這個數目包含空降滲透、兩棲作戰及海陸戰隊(這些部隊並非真的視同為特種作戰部隊)。[12] 實際上，中共特種作戰部隊總員額數應該更少，不到5,000～10,000人。[13]

The exact numbers and specifications are publicly unknown as China has kept its SOF capabilities and total strength a state secret and guards them closely. Yet, there is substantial evidence of China's limitations, namely that its supply and combat support systems lack quality when compared to the United States (alongside having no civil affairs teams), it fails to engage in foreign internal defense missions, it has little operational skill in psychological operations (PSYOP) or information warfare activities, and it has no "organic helicopter or fixed-wing

11 Scott J. Henderson, "In the Shadow: Chinese Special Forces Build a 21st-Century Fighting Force," Special Warfare 19, no. 4 (July-August 2006): 30-31, https://www.dvidshub.net/publication/ issues/8241.

12 Stavros Atlamazoglou, "How China's Special Operations Forces Stack Up against the US's Special Operators," Business Insider, 1 December 2020, https://www.businessinsider.com/how-china-special-forces-compare-to-us-special-operators-2020-12; Henderson, "In the Shadow."

13 Ibid.; Henderson, "In the Shadow," 30.

formations" with which to support its aerial missions.

中共從未公開特種作戰部隊之實際員額與特性，將其列為國家機密，並嚴格保密。然而，似有確切證據洩露中共特戰部隊有其不足之處，直言之，其補給與作戰支援系統不若美軍健全(亦無民事單位)、無法執行他國境內綏靖任務、心理作戰或資訊作戰能力，亦無「建制直升機或定翼機」可支援空中任務。[14]

While these limitations may not seem to be important, in a large-scale military conflict, having the ability to conduct PSYOP and civil affairs missions would prove ultimately beneficial in winning over an invaded or occupied populace. Furthermore, having a SOF unit with its own aerial capacity would (1) secure the force's operations from a security perspective and (2) allow them to have a more effective response to emergencies as they arise. In a Chinese invasion or occupation of Taiwan, for example, these limitations could very likely pose problems for the Chinese military. In these cases, AI and other technologies would be massively beneficial to China's warfighting and special operations teams.

雖然這些限制看似無關緊要，但在大規模軍事衝突中，具備實施心理作戰與民事工作能力，證明對入侵或占領人口稠密地區之任務大有助益。此外，特種作戰部隊若有自己的建制空中支援部隊，將可一、確保地面部隊之安全；二、能夠於其升空時有效因應戰場突發狀況。例如，中共入侵或占領臺灣，這些限制因素就極有可能牽制中共之軍事行動。在此情況下，人工智能(人工智慧)與其他新興科技就對共軍整體作戰能力與特種作戰部隊有極大的助益。

In 2015, China created the People's Liberation Army Strategic Support Force with the express goal of shifting Chinese military "capabilities from a focus on land-based territorial defense to extended power projection for the purposes of securing China's interests in space, cyberspace, and the far seas" alongside increasing the intelligence, surveillance, and reconnaissance proficiencies of the entire military and enhancing the joint military capabilities of the entire armed forces. In addition to the Strategic Support Force, 2015 and 2017 also saw the codification and publicization of Chinese policy on AI development and enhancement, largely focusing on domestic use.

2015年，中共成立戰略支援部隊，試圖展現調整國家軍事戰力的決心「從著重陸上

14 Dennis J. Blasko, "Chinese Special Operations Forces: Not Like 'Back at Bragg,'" War on the Rocks, 1 January 2015, https://warontherocks.com/2015/01/ chinese-special-operations-forces-not-like-back-at-bragg/.

領土防禦調整為延伸兵力投射，以達成確保中國大陸太空、網路空間及遠洋之利益為目標」。與此同時，並強化共軍情監偵能力及精進聯合軍種整體作戰之效能。[15] 除了成立戰略支援部隊外，中共也在2015年與2017年策頒人工智能(人工智慧)發展與精進的相關政策，主要以其國內運用為主。[16]

While some may not equate the development of AI for domestic purposes to relate to China's national defense mission, these two go hand in hand. Each year the Office of the Secretary of Defense prepares a report, Military and Security Developments Involving the People's Republic of China, to Congress. In 2023, they identified that China has been using its domestic AI production centers to "leverage their [Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance] network that incorporated advances in big data and artificial intelligence to rapidly identify key vulnerabilities in the U.S. operational system and then combine joint forces across domains to launch precision strikes against those vulnerabilities." This is all part of a larger policy to integrate China's "military and civilian institutions ... for developing AI-enabled military capabilities ... [as well as establishing] military-civilian R&D centers and procured commercially developed AI and robotic technologies to ensure PLA access to cutting-edge AI technologies." In addition, it is a means of becoming self-reliant in the production of semiconductors, electronic software, and other technical material to more quickly and readily develop the means to make war in this new technological age. Already, with the assistance of U.S. companies, we see evidence of China "purchasing AI systems for all manner of applications, including autonomous vehicles, intelligence analysis, decision support, electronic warfare and cyber operations."

雖然，有些人不認為國內人工智能(人工智慧)科技發展與中共的國防任務有關，但其實是兩手策略。每年，美國國防部長辦公室都會提交《中共軍力報告書》給國會。2023年，該書指出中國大陸已利用國內人工智能(人工智慧)發展中心，以「強化(指揮、

15 Amy J. Nelson and Gerard J. Epstein, "The PLA's Strategic Support Force and AI Innovation," Brookings Institution, 23 December 2022, https://www.brookings.edu/articles/ the-plas-strategic-support-force-and-ai-innovation-china-military-tech/; Stew Magnuson, "China Pursues Its Own Version of JADC2," National Defense Magazine (website), 13 July 2023, https://www.nationaldefensemagazine.org/articles/2023/7/13/ china-pursues--its-own-version-of--jadc2.

16 Jieruo Li, "Artificial Intelligence Technology and China's Defense System," Journal of Indo-Pacific Affairs 5, no. 2 (March-April 2022): 105, https://media.defense.gov/2022/ Mar/28/2002964034/-1/-1/1/FEATURE_LI.PDF.

管制、通信、電腦、情報、監視及偵察)網路，藉整合大數據與人工智能科技，以快速找到美國作戰系統之弱點，然後整合聯合部隊跨領域能量，精準打擊這些弱點」。[17] 這些都是高層政策框架下的一環，以整合中國大陸「軍民機構能量……打造具備人工智能能力的軍事力量……(以及)建立軍民研發中心、採購商用人工智能與機器人科技，以確保共軍手握尖端人工智能技術」。[18] 此外，這也是自給自足、更快速生產半導體、電子軟體及高科技材料的手段，同時準備發展科技時代的全新作戰手段。其實，由美商銷貨資料的協助下，我們清楚可見中國大陸「採購各式人工智能系統，包含自動駕駛車輛、智慧分析、決策支援、電子戰及網路作戰的各種證明」。[19]

From a tactical special operations viewpoint, China's efforts would allow its ground combat SOF units to gain access to better intelligence from unmanned aircraft (in which China is rapidly expanding and innovating). At the same time, from a strategic standpoint, China's fledgling PSYOP department would be supported with AI by way of "exploring the potential employment of intelligent agents to enable 'guidance' of public opinion" and in overall improving the control systems of vehicles and other armored equipment to function and respond similarly to a human brain. From an information technology frame, China has not been keeping up with its own networks in the past and has been using AI to adapt and capitalize "upon today's technological trends, fearing the emergence of another 'generational gap' between its capabilities and that of the U.S. military" and ensuring that China's cyber operations remain capable of protecting against and performing cyberattacks when needed. Finally, even from a leadership perspective, China is making headways by integrating its civil and private sector partnerships to reinforce the desire to be at the forefront of AI development and updating its national defense frameworks to fully reflect the state's commitment to AI.

從戰術層面來看，中共所作所為可讓地面特種作戰部隊取得無人機情報(目前中共正快速發展與創新)。同時，在戰略層面，中共甫成立的心理作戰部門亦可善用人工智

17 Office of the Secretary of Defense, Annual Report to Congress: Military and Security Developments Involving the People's Republic of China, 2023 (Washington, DC: U.S. Department of Defense, 2023), iv, https://media.defense.gov/2023/Oct/19/2003323409/- 1/-1/1/2023-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF.

18 Ibid., 169.

19 Ryan Fedasiuk, "We Spent a Year Investigating What the Chinese Army Is Buying. Here's What We Learned," Politico (website), 10 November 2021, https://www.politico.com/news/ magazine/2021/11/10/chinese-army-ai-defense-contracts-520445.

能(人工智慧)「廣泛部署智能細胞『左右』輿論風向」，以及全面提升車輛與其他裝甲武器控制系統操作性能，達到近乎人腦的思維邏輯之反應。[20] 從資訊科技框架的角度來看，過去，中共未能跟上網路發展步伐。不過，中共業已努力運用人工智慧，搶搭「當前科技潮流，惟恐在人工智能(人工智慧)時代，再度與美軍部隊產生『代溝』」。與此同時，確保中共網路作戰能力足以防護外來攻擊，甚至在必要時主動發起攻擊。[21] 最後，中共領導階層不斷整合民間與私人企業資源，矢志成為人工智能(人工智慧)領域的佼佼者，並持續精進國防架構，搭上人工智能(人工智慧)浪潮，充分展現國家發展人工智能(人工智慧)的決心。[22]

U.S. Special Operations Forces and Technological Innovation
美國特種作戰部隊與科技創新

Like Chinese SOF, the United States is making full use of AI and machine learning for its own warfighting effort. However, what sets it apart from China is that where China is faltering in its special operations fields, the United States has a robust framework to support its missions. Unlike China, the U.S. Armed Forces have been able to integrate the various branches upon strategic and geographic combatant commands since the 1980s, place emphasis on expanding its civil affairs and PSYOP capabilities, and continually innovate the supply chain and logistics systems to become a global role model in the combat support area.

就如同中共特種作戰部隊，美國也大幅運用人工智慧與機器學習科技，以不斷強化其作戰能力。然而，美國依循既定之精實框架遂行任務，不若中共特種作戰部隊那樣支離破碎。自1980年代起，美軍戰略與地區作戰司令部就具備跨兵科整合能力，致力強化民事與心理作戰能力，以及不斷創新供應鏈與後勤系統，成為作戰支援領域的全

20 Li, "Artificial Intelligence Technology," 106; Elsa B. Kania, "Minds at War: China's Pursuit of Military Advantage through Cognitive Science and Biotechnology," Prism 8, no. 3 (January 2020): 87-90, https://ndupress.ndu.edu/Portals/68/Documents/prism/ prism_8-3/prism_8-3_Kania_82-101.pdf.

21 Elsa B. Kania, Battlefield Singularity: Artificial Intelligence, Military Revolution, and China's Future Military Power (Washington, DC: Center for a New American Security, November 2017), 14, https://s3.us-east-1.amazonaws.com/files.cnas.org/documents/ Battlefield-Singularity-Kania_November-2017.pdf; Nelson and Epstein, "The PLA's Strategic Support Force and AI Innovation."

22 Michael C. Horowitz and Lauren Kahn, "DoD's 2021 China Military Power Report: How Advances in AI and Emerging Technologies Will Shape China's Military," Net Politics and Digital and Cyberspace Policy Program (blogs), Council on Foreign Relations, 4 November 2021, https://www.cfr.org/blog/dods-2021-china-military-power-report-how-advances-ai-and-emerging-technologies-will-shape.

球楷模。

However, the United States has not been cognizant of the benefits that AI and machine learning technologies can have upon its combat and combat support structures. It has only been since the late 2010s that the U.S. military, from active-duty and retired personnel to defense industry experts, has begun to focus on the advantages such technologies may offer, namely to its SOF.

然而，美軍尚未領悟到人工智慧與機器學習對作戰與作戰支援架構能夠帶來何種效益。直到2010年代末期，美軍志願役官兵、退役人員到國防產業專家，才開始聚焦這些科技所能帶來的好處，直言之，提升特種作戰部隊作戰效益。

As mentioned, SOF can be emboldened in its operations by using AI for faster intelligence collection or better supply systems, and this remains the primary method in which AI can be able to assist U.S. SOF units, but there are other areas in which AI can assist the warfighting mission. For example, high-level leaders within the Air Force Special Operations Command (AFSOC), Marine Corps Special Operations Command (MARSOC), and U.S. Army Special Operations Command (USASOC) have all commented on how they use AI algorithms and systems in their recruiting and selection process to move away from a performance based process and "more toward one based on attributes ... [and] to control for any biases in their recruiting efforts" alongside analyzing for any technical skills that may provide them with an edge in the field or in a joint strategic center. Another example of this is using AI algorithms to bolster U.S. Department of Defense health-care systems to "predict injuries or point to treatments to get operators in the fight more quickly" which could eventually benefit the entire U.S. Armed Forces, not simply SOF units. From both an intelligence and recruiting standpoint as well, both the Army and Marines have been enhancing their IW capacities and even integrating AI into larger force restructuring design plans.

如前所述，特種作戰部隊可運用人工智慧加速情報蒐集或強化供應鏈，而這也是目前人工智慧得以優化特種作戰部隊作戰效益的範疇。但是，人工智慧其實還可以協助其他作戰任務的地方。[23] 舉例來說，空軍特種作戰司令部、陸戰隊特種作戰司令部及陸軍特種作戰司令部高階領導幹部都提到，運用人工智慧演算法與相關系統，協助兵源招募

23 Sydney J. Freedberg Jr., "Artificial Intelligence: Will Special Operators Lead the Way?," Breaking Defense, 13 February 2019, https://breakingdefense.com/2019/02/ artificial-intelligence-will-special-operators-lead-the-way/.

與人員甄選，拋開過往績效導向流程，「轉變成人格特質導向模式……降低招募人員偏見所帶來的負面衝擊」，同時也分析何種特殊專長為人工智慧領域或聯合戰略中心的必備技能。[24] 另一個案例就是運用人工智慧演算法強化美國國防部健康管理系統，「及早判定患部或出血點，爭取戰傷救護時效」。這種作法不僅嘉惠特種作戰官兵，也會造福整個美軍。[25] 從情報與招募面向來看，陸軍與陸戰隊早就著手強化軍種非正規作戰能力，甚至將人工智慧納入大型兵力整建計畫。[26]

In the late 2010s, U.S. Special Operations Command leadership highlighted their desire to become a leader in cyberwarfare and military science and technology development. In the past four years, U.S. Special Operations Command has certainly lived up to this desire by developing a new office "to harness AI for language translation, scanning captured laptops and cellphones, collating and countering Taliban messaging, and ... [create] visualization software that can show relevant tactical information"; helping stand up a Department of Defense program to process and automatically identify enemy targets from unmanned aircraft; and aligning with private companies to develop equipment and software intended to better assist in the warfighting mission. While having initially been behind China in AI development and slower in recognizing the benefits that AI can offer to military forces in theater, the United States has made substantial gains in equipping its forces with high-tech gear and systems to compete with any enemy adversary.

2010年代後期，美軍特種作戰司令部領導高層擘劃一個願景，意圖成為網路戰、軍事科學及軍事科技領域的領頭羊。[27] 過去四年，特種作戰司令部已設置一個新的辦公室「強化人工智慧，應用於翻譯、快速檢視所扣留的筆記型電腦與手機內部資料、查證與反制塔利班的假訊息，以及開發視覺化軟體……以『建立』圖像化關鍵戰術資訊」，確

24 Meghann Myers, "Special Operations Using Artificial Intelligence, Personality Traits to Recruit and Select," Military Times (website), 13 May 2020, https://www.militarytimes.com/news/ your-military/2020/05/13/special-operations-using-artificial-intelligence-personality-traits-to-recruit-and-select/.

25 David Vergun, "Special Operations Strives to Use the Power of Artificial Intelligence," U.S. Department of Defense News, 7 December 2020, https://www.defense.gov/News/News-Stories/Article/Article/2438076/special-operations-strives-to-use-the-power-of-artificial-intelligence/.

26 Luckenbaugh, "Army Hopes AI Will Give Soldiers an Information Advantage"; Sean Carberry, "Marine Special Operators Seeking New Tech, AI for Future Missions," National Defense Magazine (website), 29 September 2023, https:// www.nationaldefensemagazine.org/articles/2023/9/29/ marine-special-operators-seeking--new-tech-ai-for-future-ops.

27 Freedberg, "Artificial Intelligence."

實達成了這個期望。協助國防部建置之專案，分析與自動識別無人機蒐獲的目標資訊，甚至攜手私人企業，共同開發裝備與軟體，更加能協助部隊完成作戰任務。[28] 雖然，美國初期人工智慧發展不及中共，後來才發覺人工智慧對於軍隊在戰區作戰的效益，但美國仍然急起直追，迅速為美軍添購高端裝備與武器系統，以對抗來犯之敵。

Countering Chinese AI Operations
反制中共人工智慧作戰

The question that remains is how U.S. advancements can counter Chinese AI operations in the field and how to prevent its military from further advancing or adapting its military technology capabilities. Naturally, there are many efforts and initiatives the United States and the international community can take to limit Chinese aggression and advancement.

現在的問題是美國將如何反制中共人工智慧作戰運用進程，以及如何防止共軍進一步提升或調整其軍用技術人工智慧運用效能。當然，美國與國際社會有很多方式，可以嚇阻中共躁進舉措與腳步。

According to Paul Scharre, an executive with the Center for a New American Security, perhaps one of the best measures nation-states and others can take is by "[establishing] global norms for lawful, appropriate and ethical uses of technologies like facial recognition" with the United States specifically needing to make "international standard-setting" a priority by "working with domestic companies to ensure that international AI and data standards protect human rights and individual liberty." Scharre also highlights that China has been exceptional in setting international standards that benefit themselves. In this context, the United States can amplify pressure upon international agencies and organizations (e.g., the United Nations and

28 Tucker, "How AI Will Soon Change Special Operations"; Richard H. Schultz and Richard D. Clarke, "Big Data at War: Special Operations Forces, Project Maven, and Twenty-First Century Warfare," Modern War Institute at West Point, 25 August 2020, https:// mwi.westpoint.edu/big-data-at-war-special-operations-forces-project-maven-and-twenty-first-century-warfare/; Stavros Altamazoglou, "U.S. Special Forces Want an Edge over China? Is Artificial Intelligence the Answer?," The Reboot (blog), The National Interest (website), 16 July 2021, https://nationalinterest.org/blog/reboot/ us-special-forces-want-edge-over-china-artificial-intelligence-answer-189817; Patrick Tucker, " 'Collaborative, Portable Autonomy' Is the Future of AI for Special Operations," Defense One, 25 May 2022, https://www.defenseone.com/technology/2022/05/collaborative-portable-autonomy-future-ai-special-operations/367408/.

International Organization for Standardization) to try to alter Chinese behavior.

根據新美國安全中心執行長保羅・史凱羅說法，主權國家與其他利害關係人最好能夠「建立全球適用的法律與倫理規範，以約束人臉辨識等科技的運用範疇」，而美國更要以「設定全球通用規範」為首務，「與國內企業並肩合作，確保國際人工智慧與資料安全相關規範能夠維護人權與個人自由」。[29] 此外，史凱羅指出，中共擅於訂立有利自身的國際規範。若是如此，美國則可對國際機構與組織(如聯合國與國際標準組織)施壓，運用國際輿論以改變中共作為。

It should be noted that China desires to be seen as a near-peer adversary in all aspects of strategic dominance, cyber included, and it is possible that some diplomatic overtures to limit such technological advancement would achieve minimal success. It is nonetheless important to peacefully as possible make efforts to resolve situations among foreign nations.

不可諱言，中共一直希望在戰略與網路領域和美國平起平坐。因此，運用外交手段限制科技發展，可能成效不彰。[30] 然而，運用和平手段解決國與國的分歧依然不容忽視。

In the event diplomatic efforts are not successful or achieve only minimal success, however, a more militaristic option is available in a physical and cyber battlespace. Scharre has stated that drone and counterdrone equipment and weapons would likely be some of the main devices used in a combat setting. The Under Secretary of Defense for Research and Engineering released a "need statement" in May of 2023 indicating that the U.S. military must develop technologies to disable enemy drone fleets, utilize "kinetic, directed-energy and control-link defenses to answer or avert physical and electronic attacks by unscrewed systems," create barriers to network intrusion by enemy agents, and improve internal assessment capabilities, this being in direct response to the 2022 Russian invasion of Ukraine.

若外交斡旋成效不彰或者失敗，那麼就可以在現實環境與網路空間中，採取較軍事化的手段。史凱羅表示，在有些以戰鬥為解決的時候，無人機與反無人機武器裝備就是

29 Paul Scharre, "Opinion: How to Counter China's Scary Use of AI Tech," Los Angeles Times (website), 26 February 2023, https://www.latimes.com/opinion/story/2023-02-26/ us-china-artificial-intelligence-uighurs-surveillance.

30 Noah Robertson, "What China's Increasing Use of Military over Diplomacy Means for US," DefenseNews, 7 December 2023, https://www.defensenews.com/outlook/2023/12/04/what-chinas-increasing-use-of-military-over-diplomacy-means-for-us/.

主要工具。[31] 2023年5月，美國國防部研究與機械助理部長公布一份「需求聲明」，指出美軍務必發展科技，以癱瘓敵軍無人機編隊，運用「動能、導能及管制鏈路等手段，回應或反制零星的實體與電子攻擊」，阻撓敵軍間諜入侵網路，強化內部評估能力，這也是對2022年俄羅斯入侵烏克蘭的正面回應。[32]

To make this kind of AI-enhanced warfare fully effective, having appropriately trained special operators is a must. Kelley Jhong, a commissioned U.S. Army PSYOPS officer, wrote in War on the Rocks that not only should all SOFs be well aware of AI technology and its uses, there should also be individuals who can "provide informed feedback to AI developers to facilitate continual improvement ... [and those who] can act as a bridge between technical experts ... and other members of their special operations team at the edge" with persons overall working "to identify and diagnose the more complex issues posed by AI."

這種人工智慧強化作戰全面效益的關鍵，就是務實訓練精良的操作人員。美陸軍心理戰軍官凱利・瓊在礁岩上的戰爭上撰文表示，特種作戰部隊必須嫻熟人工智慧科技與相關運用，但那些「回饋意見(使得開發人員得以不斷優化)、扮演專家間溝通橋樑，以及發掘與診斷人工智慧疑難雜症者」，都應該深入瞭解相關專業知識。[33]

It is important to note that the U.S. military's gains, while impressive, are still only a starting point. Dr. Paul Maxwell, a retired U.S. Army lieutenant colonel and an associate professor at the U.S. Military Academy at West Point, wrote in 2020 how AI will continue to be a highly relevant aspect of future military operations, "[AI] has many application areas where it will enhance productivity, reduce user workload, and operate more quickly than humans. Ongoing research will continue to improve its capability, explainability, and resilience ... Given the high probability that our exposed AI systems will be attacked and the current lack of resilience in AI technology, the best areas to invest in military AI are those that operate in uncontested domains. Artificial intelligence tools that are closely supervised by

31 Rogin and Zahn, "How Militaries Are Using Artificial Intelligence."

32 Hope Hodge Seck, "US Military Calls for Better Weapons to Fight Artificial Intelligence," Marine Corps Times (website), 5 July 2023, https://www.marinecorpstimes.com/news/your-marine-corps/2023/07/05/ us-military-calls-for-better-weapons-to-fight-artificial-intelligence/.

33 Kelley Jhong, "Special Operations Forces Require Greater Proficiency in Artificial Intelligence," War on the Rocks, 23 February 2023, https://warontherocks.com/2023/02/special-operations-forces-require-greater-proficiency-in-artificial-intelligence/.

human experts or that have secure inputs and outputs can provide value to the military while alleviating concerns about vulnerabilities……All of these can provide value to the military while limiting the risk from adversarial attacks, biased data, context misunderstanding, and more.

重要的是，美軍必須有所體認即便目前在人工智慧領域甚有所斬獲，但僅是個開始。2020年，美陸軍退役中校暨西點軍校副教授保羅・馬克斯威爾博士在論述人工智慧如何在未來軍事作戰扮演要角的文章中提到：「人工智慧」應用領域多元，不僅提高整體生產力，減輕人員工作負荷，手腳也比人類俐落。當前研究持續強化人工智慧性能、運作原理及系統韌性。鑑於暴露在外的人工智慧系統容易遭受攻擊，且目前人工智慧科技韌性不足，軍事領域人工智慧投資應聚焦冷門領域。人類專家密切監督或具備安全傳輸管道的人工智慧工具，對軍事領域深具價值，同時也較不須防範弱點攻擊。……這些對軍事領域都深具價值，同時也可降低敵方攻擊、資料偏頗及誤解文意等風險。[34]

Furthermore, it is important to not forget the human component to AI advancement and integration. Some aspects of the warfighting mission will be heavily assisted by AI principles, algorithms, and practices, but they cannot replace human ingenuity or oversight. Chris Maier, assistant secretary of defense for special operations and low-intensity conflict, stated in March 2023 before the Senate Armed Services Committee, "At some point, probably there's going to be a human being that makes a decision." Using AI as a means of assistance in a combat or combat-support setting is necessary, but it cannot be done without a watchful human eye that is cognizant of the potentiality of civilian casualties and can effectively manage the technical systems.

此外，千萬不可輕忽人類在人工智慧發展與整合過程中所扮演的角色。未來，部分作戰任務將大幅整合人工智慧原則、運算及應用，但人工智慧無法全盤取代人類巧思與監督。2023年3月參議院軍事委員會聽證期間，美國國防部特戰與低強度衝突助理部長克利斯・梅爾表示：「有些時候，還是可能要由人類做出決定。」[35] 作戰或作戰支援任務期間，人工智慧勢必要從旁協助，但人類仍須全程督導，落實掌握人工智慧系統狀況，避免殃及平民。[36]

34 Paul Maxwell, "Artificial Intelligence Is the Future of Warfare (Just Not in the Way You Think)," Modern War Institute at West Point, 20 April 2020, https://mwi.westpoint.edu/ artificial-intelligence-future-warfare-just-not-way-think/.

35 Pomerleau, "Special Ops Will Look to Invest in New Technologies."

36 於下頁。

Going in hand with proper human oversight, responsibility is the key. In the November-December 2023 issue of Foreign Affairs, Michele A. Flournoy, managing partner of WestExec Advisors and former undersecretary of defense for policy during the Obama administration, writes that "without proper safeguards, AI models could cause all kinds of unintended harm," including the unintentional killing of U.S. troops or noncombatants, and argues for a speedy yet safe pathway "to implement better approaches to accelerating adoption as well as ensuring safety."

人工智慧系統與適當人類監督的協作過程中，責任是關鍵。2023年11～12月《外交事務雙月刊》上，美國國防部前政策副部長暨WestExec Adivisor共同管理人米歇爾・佛洛諾伊撰寫專文指出：「若無適當監管，人工智慧模組可能會衍生意外事件。」諸如，誤殺美軍或非戰鬥人員。此外，米歇爾・佛洛諾伊大聲疾呼，在國家安全前提下，美軍應加快腳步，「想方設法加速人工智慧整合與應用，同時確保使用過程安全無虞」。[37]

Conclusion
結　論

In defeating AI-enhanced Chinese SOF, the United States must not only invest funding, research, and battlefield application in the appropriate weaponry, equipment, and hardware and software but also develop new training and skill development programs to specifically have AI-capable combat and combat support operators. They must have the skilled individuals needed to defeat China's monolithic and highly advanced cyberwarfare capability.

應對配備人工智慧的中共特種作戰部隊時，美國不僅須投入資金與研究能量，將人工智慧納入武器裝備與軟硬體設備，也要研擬全新訓練方針與專業專長訓練計畫，培養具備人工智慧專業的作戰人員與作戰支援人力。如此一來，他們才可抵禦中共運用傾國之力所發展的先進網路戰能力。

China's SOF units may not be the most advanced, best equipped, or best organized to perform on par with American Tier 1 and Tier 2 operators, but they still pose a formidable

36 C. Anthony Pfaff et al., Trusting AI: Integrating Artificial Intelligence into the Army's Professional Expert Knowledge (Carlisle, PA: U.S. Army War College, February 2023), 71-72, https://press.armywarcollege.edu/cgi/viewcontent. cgi?article=1955&context=monographs.

37 Michele A. Flournoy, "AI Is Already at War," Foreign Affairs 102, no. 6 (November-December 2023), https://www.foreignaffairs.com/united-states/ai-already-war-flournoy.

threat to American units in the field. Where they desire to be effective in and harness a tactical and strategic advantage, the world of AI and technological advancement may prove to be their downfall if the United States can invest and develop countermeasures to secure its systems, improve its vehicles and other equipment to be safe from foreign cyberattacks and network intrusion, and be able to cripple Chinese SOF teams before they engage in direct physical warfare.

中共特種作戰部隊戰力雖非世界第一，武器裝備或組織編裝也無法與美國第一、二級單位並駕齊驅，但仍在戰場上對美軍部隊構成威脅。中共特種作戰部隊戮力取得戰略與戰術優勢。然而，美國若能斥資發展人工智慧反制手段，藉此防護武器系統、強化輸具及裝備韌性、抵禦外部入侵與駭客攻擊，以及癱瘓中共特種作戰部隊實體戰力的話，人工智慧與尖端科技就會成為中共特種作戰部隊的軟肋。

AI and other advancements in military technology will become hugely important in the coming armed geopolitical conflicts around the world. As society becomes more and more interconnected and advancements continue to be made in technology of all kinds, other nation-states will utilize such advancements for its own national security and defense strategies. The United States must be proactive and be able to counter any threats before an enemy nation or nonstate actor uses them for a purpose that could harm American citizens or other innocents.

未來全球區域武裝衝突中，人工智慧與其他軍事尖端科技將會扮演要角。不同國家與族群間更加緊密相連，各領域科技發展日新月異，其他主權國家勢必會依照前述科技發展趨勢，修調國防戰略與強化國家安全。美國必須先發制人、枕戈待旦，在敵對國家與非國家行為者傷害美國公民與其他無辜民眾前，率先採取必要行動。

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