



從「未來裝騎部隊：多領域效應營應對戰區新型態偵搜」與 「未來陸軍戰場與裝甲部隊」對本軍裝甲部隊發展之省思

一、「未來裝騎部隊：多領域效應營應對戰區新型態偵搜」

Future of Cavalry: Multi-Domain Effects Battalions as New Theater
Reconnaissance

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二、「未來陸軍戰場與裝甲部隊」

The Future Land Battlefield and Armor

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提要

- 一、多域效應營有助於在潛在的危機或衝突中創造有利條件，透過衛星、空中、網路、電磁頻譜平台、搜索敵方通訊和網路等平台的情報，並遂行網路與資訊攻防與偵搜。
- 二、「多領域戰鬥」的戰場環境下，依賴以網路、衛星通信及海空力量的聯合作戰，為確保地面部隊作戰進展順遂，多域效果營幫助美國陸軍在太空、網路空間與電磁頻譜等領域佔據優勢。
- 三、多領域效應營開創裝騎部隊作戰技術革新的必要性，闡明戰場情報應是多維多面向，同時戰爭亦應注意網路戰與電子戰攻防，惟有適應並掌握多領域作戰概念，才能在未來戰場確保優勢。
- 四、資訊化戰爭是趨勢亦是未來建軍備戰必將獲得的技術，忽視以既定的軍事革命，一旦戰事發生必將產生代價嚴重的損失及傷亡，調適武器裝備技術、應用科技甚至發揮新型武器裝備的最大效益，作為當前兩岸情勢緊張的我們不可忽視的一部份，如何在開發技術、資源分配與實際應用間取得最妥適的組合，將是強化國家安全與維繫國家利益必須研擬議處的重要關鍵。

關鍵詞：：多領域效應營、多領域作戰、裝騎部隊、資訊戰。

壹、前言

自蘇聯解體後，美國迎來 30 年的「戰略休息」，同時此期間已無具備可與美國抗衡的傳統軍事力量國家，然而隨著近期地緣政治的劇變，即中國崛起和俄羅斯復興，再加上科技的快速進步，使當前美國可能面臨下一場重大的軍事衝突



在速度、殺傷力和影響範圍上都有前所未有的挑戰，認識到這項威脅，美國陸軍即著手對整個作戰部隊進行現代化升級，組建一個與能夠在陸、海、空、太空和網路空間與對手競爭的單位，以實現多領域作戰，並在必要時具備擊敗敵方能力；美國陸軍現有兩支多領域特遣隊，第一支部隊於 2017 年成立，任務重點為印太地區；第二支於 2021 年成立，任務重點在歐洲地區；作為美國陸軍運用多領域作戰的核心部隊。多領域特遣隊為美軍實施多領域作戰的核心部隊，亦為戰區層級的多領域機動作戰部隊，將電子戰、網路戰、資訊和太空等遠端精確效果與遠端精準打擊同步化，對加密乙太網路節點實施分散式指揮，以提高網路使用安全性，另一方面保持競爭力並爭取優勢，透過整合全域的資訊能力，為指揮官提供增強「反介入/區域拒止」能力。

另 21 世紀初的幾場軍事衝突為現代戰爭開啟新型式——「混合戰(Hybrid Warfare)」，諸如俄羅斯在克里米亞、烏東的行動和 2018 年 1 月敘利亞內戰、俄烏戰爭等，¹瞭解混合戰內涵與對傳統戰爭概念的挑戰，並可以清晰瞭解到「軍事革命」戰具的技術變革主宰戰場環境，舉例來說 1973 年的贖罪日戰爭中，戰車加速了美國軍隊的轉變，從當年在越戰中失利蛻變為在 1991 年伊拉克戰爭中得勝的一方，又從俄烏戰爭經驗總結三大啟示：第一，戰場透明：無處不在的無人機以及全球衛星定位，提供敵情與地理數據，又通過大數據從海量資料中找出關鍵資訊，取得資訊上的先機。第二，人工智慧：戰爭造成數十萬人傷亡及有生力量的折損，並耗費數百萬的武器裝備與彈藥，無人機及機器人成為更有效率的選擇。第三，科技至上：科技將會改變未來武裝衝突達成體需求的方式，2024 年 6 月 30 日，美國參謀首長聯席會議主席米利 (Mark Milley) 預測，在未來 10 到 15 年內，先進軍隊將有三分之一的軍力是機器人，包括：無人機隊與無人戰車。²混合戰呈現當前資訊、科技時代的戰爭模式，運用混合與創新、不對稱的戰術、戰法，配合戰具技術革新，無疑形成新的軍事革命，吾輩不可不察，亦應調整、建立適應混合戰的打擊能力，以便在未來戰場致勝先機。

本篇將針對「未來裝騎部隊：多領域效應營應對戰區新型態偵搜」與「未來陸軍戰場與裝甲部隊」兩篇文章予以翻譯，期藉由了解新型態部隊編組與多領域及資訊戰等作戰環境提供本軍對軍事事務革新汲與的新啟發，俾利未來裝騎或是裝甲部隊調整作戰編組與任務之參考。

¹ 謝游麟、葛惠敏，〈論戰爭型態之發展與因應〉，《國防雜誌》，頁 79-99，第 30 卷第 1 期，2015 年 1 月。

² 天下雜誌，〈戰爭型態大改變！烏俄戰爭帶來的 3 大高科技戰啟示〉，
<https://www.cw.com.tw/article/5126606>，檢索日期：114 年 2 月 3 日。



貳、譯文一：「未來裝騎部隊：多領域效應營應對戰區新型態偵搜」

自戰爭開始以來，指揮官們一直在尋找提高發現敵軍行軍速度、武器射程、確定其位置並制定適當應對措施的方法，首先運用騎兵、再著是空中觀測，指揮官依靠騎兵的偵察行動為決策提供正確時空因素，並比對手更快地了解戰場環境，隨著技術的進步，進行偵察、監視和安全行動的手段和方法朝多元化發展，對多域感測器的日益普及和依賴電磁頻譜的重要性，迫使人們重新評估陸軍編制如何執行裝騎部隊職能，雖然本文大部分集中在師級以下探討，但多領域特遣隊的組建及多領域效應營替代裝騎部隊多領域偵察任務，未來以支援戰區階層為目標，為進一步探討此點，我們將回顧裝騎部隊的職能，其中關於網路戰和電磁戰中偵察、監視和安全行動的理論觀點，我們還將討論多領域效應營的任務編組，並展示其如何以創新戰術與戰法執行傳統裝騎部隊的角色和功能。

Since the dawn of warfare, commanders have looked for ways to increase the speed and range of their ability to find enemy forces, determine their location and develop an appropriate response. First with the horse, then through the air, commanders have depended on cavalry operations to provide time and space for decision making and inform their understanding of the battlefield faster than the adversary. As technology has advanced, so have the means and methods for conducting reconnaissance, surveillance and security operations. The increased prevalence and reliance on multi-domain sensors and growth in importance of the electromagnetic spectrum have forced a re-assessment of how Army formations conduct these cavalry functions. While most of this analysis is focused on the division and below, the formation of the multi-domain task forces, and their multi-domain effects battalion (MDEB) represents the future of cavalry as it performs integrated reconnaissance, security and surveillance in support of targeting at the theater level. To further explore this, we will review the role and purpose of cavalry, review the current doctrinal perspective on reconnaissance, surveillance, and security in cyberspace operations and electromagnetic warfare. We will also discuss the task organization and employment concept of the MDEB, and then demonstrate how the MDEBs perform the traditional cavalry roles and functions in a new and innovative way.

裝騎部隊的角色與功能

美軍野戰教則 3-98，闡述偵察和安全行動作戰目的，將騎兵基本功能描述為「為其上級指揮部的成功行動開創有利條件」，基此，騎兵部隊扮演 7 項角色，直接使指揮官能夠將所獲情報，能可視化、理解、描述並加以運用。

- 1.能直接遂行作戰。
- 2.提供作戰期間準確且及時的資訊。
- 3.展開兵種協同空地整體作戰。
- 4.提供反應時間和機動空間。



- 5.維持戰鬥力。
- 6.促進作戰進程並提供掩護。
- 7.資訊戰。

從歷史上看，上述 7 項職能已轉化為屬於資訊收集範疇的 3 個特定任務：偵察、監視和安全行動，最終，3 項特定任務有助於指揮官指揮部隊，並在決定性的時間和地點提供卓越的影響力，以下段落總結聯合陸軍準則關於裝騎部隊的任務，揭櫫多領域效應營如何作為新型裝騎部隊。

Role, purpose of cavalry

Field Manual (FM) 3-98, Reconnaissance and Security Operations, describes the fundamental purpose of cavalry as “set(ting) conditions for successful operations of their higher headquarters.” To do this, cavalry units perform seven roles that directly enable the commander to visualize, understand, describe, and direct:

- 1.enable combat operations,
- 2.provide Accurate and Timely Information to the Operations process,
- 3.operate as combined arms air-ground teams,
- 4.provide reaction time and maneuver space,
- 5.preserve combat power,
- 6.facilitate movement and transitions, and
- 7.fight for information.

Historically, this has translated into three specific mission sets that fall under the information collection umbrella: reconnaissance, surveillance, and security operations. Ultimately, these three roles facilitate the commander’s ability to maneuver their forces and concentrate superior combat power at the decisive time and place. The following paragraphs summarize Joint and Army doctrine on these mission sets to set the stage for demonstrating how the MDEB performs these tasks as the new face of cavalry.

監控

美軍野戰教則 3-90，將監控定義為「通過視覺、空中、電子、攝影或其他方式對航空、航太、網路空間、地表或地下區域、地點、人員或事物進行系統觀察」。與偵察的目的類似，監控通常更加被動、持久，為目標定位和目標運動過程提供情報，以支援戰場情報準備。

Surveillance

FM 3-90 defines Surveillance as “the systematic observation of aerospace, cyberspace, surface or subsurface areas, places, persons, or things by visual, aerial, electronic, photographic, or other means.” Similar to reconnaissance in its purpose, surveillance is typically more passive, persistent, and feeds the targeting and target development processes in support of Intelligence Preparation of the Battlefield.



安全行動

美國陸軍準則出版物 (ADP 3-90)，攻擊和防禦篇章中將安全行動定義為指揮官執行的行動，目的對敵人的行動警告，為被保護的部隊，提供敵人反應時間與機動空間情資，以開創有利態勢，使指揮官能夠有效地使用其受保護的部隊。與偵察一樣安全行動是確定敵人活動、部署和意圖的一種手段，主要區別在於安全行動面向受保護的部隊或區域，而不是敵人或地形，安全行動有 5 個基本原則：

- 1.提供先期和準確的偵防與預警。
- 2.提供反應時間和機動空間。
- 3.掩護的受保護部隊、區域或設施。
- 4.持續偵察。
- 5.保持與敵人接觸。

Security Operations

Army Doctrine Publication (ADP) 3-90, Offense and Defense, defines security operations as those operations performed by commanders to provide early and accurate warning of enemy operations, to provide the forces being protected with time and maneuver space within which to react to the enemy and to develop the situation to allow commanders to effectively use their protected forces. Like reconnaissance, security operations are a means to determine enemy activity, disposition and intent. The primary difference is that security operations are oriented on the protected force or area rather than on the enemy or terrain.

There are five fundamentals of security operations:

- 1.provide early and accurate warning,
- 2.provide reaction time and maneuver space,
- 3.orient on the protected force, area or facility to be secured,
- 4.perform continuous reconnaissance, and
- 5.maintain enemy contact.

有 4 種類型的安全行動可以為受保護部隊提供更高等級的安全保護：

- 1.掩蔽。
- 2.守衛。
- 3.掩護與區域安全。

There are four types of security operations that provide increasing levels of security for the protected force :

- 1.screen,
- 2.guard,
- 3.cover, and area security.



支援作戰進程歸根結底便是偵察、監控和安全行動的作用與目標，為指揮官提供準確及時的情報，這些情報有助於指揮官更好地理解 and 可視化作戰環境，並進一步描述、指導、領導和評估作戰行動，指揮官在戰鬥中的主要資訊來源是偵察和安全行動，而在戰區級別則是多領域效應營，選擇目標並確定目標優先順序並選擇適當應對方式的程序，目標確定是作戰行動的延伸，也是偵察和安全行動的集成過程之一，裝騎部隊透過及時且準確的報告，進行目標情報蒐集，從而進一步完善目標識別和位置，從而選用適合兵、火力或武器系統，以達到預期的作戰效果。

Support to the operations process. Ultimately, the role and goal of reconnaissance, security operations, and surveillance is to provide the commander with accurate and timely information. This information helps the commander better understand and visualize the operating environment and further describe, direct, lead, and assess combat operations. The primary source of information for the commander during battle is the reconnaissance and security organization, which at the theater level, is the MDEB. Support to targeting. Targeting is the process of selecting and prioritizing targets and matching an appropriate response. Targeting is an extenuation of the operations process and one of the three integrating processes for reconnaissance and security operations. Cavalry organizations support targeting through timely and accurate reporting allowing for further refinement of target identification and location enabling the application of capabilities or weapons systems to achieve a desired effect.

網路戰、電磁戰

網路戰和電磁戰中遂行偵察、監控和安全的盛行促使聯合部隊和陸軍進一步擴大這些角色的定義，與裝騎部隊一樣，網路戰及電子戰部隊組織其主要目的實踐於戰場情報的理解、保護友軍人員和其作戰能力以及支持作戰行動，此外，指揮官使用網路戰和電子戰能力與裝騎部隊相同的 3 個角色：偵察、監控和安全活動，電磁偵察是對外來電磁輻射(能量)的檢測、定位、識別和評估 (JP 3-85)，指揮官使用電磁偵察收集電磁頻譜 (EMS) 中的資訊，識別敵人以再次獲得戰場主動權的過程，並要求攻擊性行動支援以在網域內進行網路戰，指揮官和參謀人員可以重新調整目標優先順序和火力支援計畫，包括網路空間攻擊和電磁攻擊 (EA)，以使敵軍處於防禦狀態，此外，電磁支援(ES)任務進行電磁偵察，以獲取有關電磁頻譜中敵方威脅並加以修改確保安全，網路監控是在網路空間和電磁頻譜中實施資訊收集，針對組織、社會、通信、網路空間或基礎設施連接和關係 (摘自情報準則 FM 2-0) 實施觀察，監控還可以包括有關個人、團體和組織之間的聯繫和關係的詳細資訊，以及物理或虛擬基礎設施各個方面的重要訊息，指向性電磁頻譜監控是一項重要的監控任務，指向性電磁頻譜監控可獲取射頻發射



器的方位，使用配賦於各部隊具有測向功能的電磁支援平臺來創造覆蓋區域，可以定位敵軍、監控指定區域。

網路空間防禦、網路空間安全和電磁防護包括及早發現和緩解網路攻擊及電磁頻譜中的安全行動，在安全行動期間，蒐集有關敵人在網路空間和電磁頻譜中的行動資訊使部隊能夠採取先發制人的措施，防範敵人的情報、監控和偵察手段以保密友軍訊息確保優勢，安全行動亦提供識別未來網路攻擊高價值目標的機會，類似於反偵察戰，威脅警告使指揮官和參謀人員能夠快速識別對友軍的直接威脅，並實施電子攻擊、反制及保護對策，網路空間和電磁頻譜中行動的部隊並非機動作戰部隊，因為他們無法守住地形要點，筆者認為這種觀點過時且狹隘，只關注地面要點的佔領控制，網路空間作戰和電磁戰準則(摘自美軍 FM 3-12)清楚述明電磁頻譜是一個機動空間，同樣地網路空間作戰行動亦需要相關部隊遂行任務，而電磁頻譜或網路空間都是具有爭議的作戰環境，需要具有鑑別度的關鍵要點以凸顯其重要性，其中關鍵資訊對於任務成功的重要性與實體作戰部隊的重要性相當，在電磁頻譜或網路空間能主導關鍵資訊為指揮官提供顯著的優勢，然而需要改變傳統思維，因為我軍與敵軍可能佔據相同的作戰條件，即使不知道彼此在同一空間行動，電磁頻譜關鍵領域包括頻率、設備和基礎設施，網路空間關鍵領域包括收集情報的位置、支援網路連接的位置、需要防禦的友軍網路的開點以及友軍需要網路訪問位置，因此，為取得作戰有利優勢，電磁頻譜和網路空間必須有自己的障礙物、接近途徑、掩護和隱蔽作為以及隔離區，以便在戰鬥中識別敵我，並確定敵可能接近路線，以利作戰進程中的攻擊進展。

Cyber domain, electromagnetic warfare

Recon, surveillance, and security in cyberspace and electromagnetic warfare. The emergence of the cyber domain and prevalence of electromagnetic warfare (EW) has driven the Joint Force and Army to further expand the definition of these roles. Like cavalry, cyberspace forces and EW organizations' primary purpose is to enable situational understanding, protect friendly personnel and capabilities, and to deliver effects. Additionally, commanders use cyberspace and EW capabilities in the same three roles as cavalry: reconnaissance, surveillance and security activities. Electromagnetic reconnaissance is the detection, location, identification and evaluation of foreign electromagnetic radiations (energy) (JP 3-85). Commanders use electromagnetic reconnaissance assets to collect information in the electromagnetic spectrum (EMS), identify enemy attempts to regain the initiative and request offensive cyber operations support to conduct cyberspace exploitation in cyberspace. Commanders and staff can also readjust targeting priorities and fire support plans, including cyberspace attacks and electromagnetic attack (EA), to keep adversaries



on the defensive. Further, ES missions conduct electromagnetic reconnaissance to attain information about the disposition of enemy threats in the EMS and modify security efforts. Network surveillance is the collection of information in cyberspace and the EMS. It is the observation of organizational, social, communications, cyberspace, or infrastructure connections and relationships (FM 2-0, Intelligence). Surveillance can also include detailed information on connections and relationships among individuals, groups, and organizations, and the role and importance of aspects of physical or virtual infrastructure. The electromagnetic support task of direction finding is a relevant surveillance task. Direction finding obtains bearings of radio frequency emitters. Using electromagnetic support (ES) platforms with direction finding capabilities deployed in various formations to create a coverage area can locate enemy forces, akin to surveillance of a named area of interest. Cyberspace defense, cyberspace security, and EP include security actions that allow early detection and mitigation of threats in cyberspace and the EMS. During security operations, information collected on an enemy's course of action in cyberspace and the EMS allows units to take preemptive measures that prevent enemy intelligence, surveillance, and reconnaissance assets from determining friendly locations, strengths, and weaknesses. Security operations also present opportunities to identify high value targets for future cyberspace attacks or EA. Akin to the counter-reconnaissance fight, Threat warning enables the commander and staff to quickly identify immediate threats to friendly forces and implement electronic attack and electronic protection countermeasures. A common observation of units primarily operating in cyberspace and the electromagnetic spectrum is they are not maneuver units because they cannot hold terrain or fight for information. This view, in the authors' opinion, takes a dated and narrow view which focuses only on the dirt of the ground domain. FM 3-12, Cyberspace Operations and Electromagnetic Warfare is clear though, the electromagnetic spectrum is a maneuver space. Similarly, cyberspace operations require units to maneuver. These are both contested environments that require identifying key terrain and fighting for information. Key terrain in both domains is just as critical to mission success as a hilltop may be to ground maneuver. Retaining it provides a marked advantage to whoever holds it. However, a change in traditional thinking is required as friendly and enemy forces may be occupying the same terrain, even without knowing each other is operating in the same space. EMS key terrain includes frequencies, devices, and infrastructure. Cyberspace key terrain includes locations to gather intelligence, locations that support network connectivity, entry points to friendly networks that require defending, and locations friendly forces requires access to. EMS and cyberspace have their own obstacles, avenues of approach, cover and concealment, and observation/fields of fire to identify for both friendly forces and the adversary. In this fight, step 1 of engagement area development is still, "identify likely enemy avenues of approach."



多領域效應營

多領域效應營最初設想為一個反區域拒止的部隊，部隊編組，(如圖 1)，通過在電磁頻譜中運作的地面、空中發射和間隔能力的組合，使其能夠作為多領域效應營發揮作用，與網路空間作戰和電磁戰準則(美軍野戰教則 3-12)的電磁戰分類法一致，這些平臺和能力可以進行全方位的電磁戰，幫助指揮官看到自己電磁防護(EP)與敵人(電磁支援和電磁攻擊)電磁戰交戰過程，在完整的多領域效應營包括以下單位：信號連及軍事情報連各 1，軍事情報連將直接支援多域特遣隊，1 個擴展範圍感測和效果的連隊，該單位包含 3 個高空小隊，帶有特定形式的高空氣球或平臺，4 個三級無人機系統，³以及 1 個用於管理電子支援/攻擊有效酬載電磁戰的小隊，1 個航太連隊，由 3 個單位組成，各有 3 名成員，配備最多 3 個太空控制電磁戰套件。一個完全成熟的多領域效應營將能夠通過將國家情報、偵察、監控和安全數據生成的數據融合來支援陸軍指揮官實現戰場情報理解，以支持指揮官的決策，空中發射效果、太空能力以及長時間徘徊平臺和有效載荷的結合將運行範圍，擴展的覆蓋範圍有助於作戰環境整體狀況，並為指揮官提供高度的靈活性和同步性，後續段落將進一步闡述，以概念圖顯示了多領域效應營如何在支援多領域特遣隊(MDTF) 同時執行多領域行動與裝騎部隊功能。

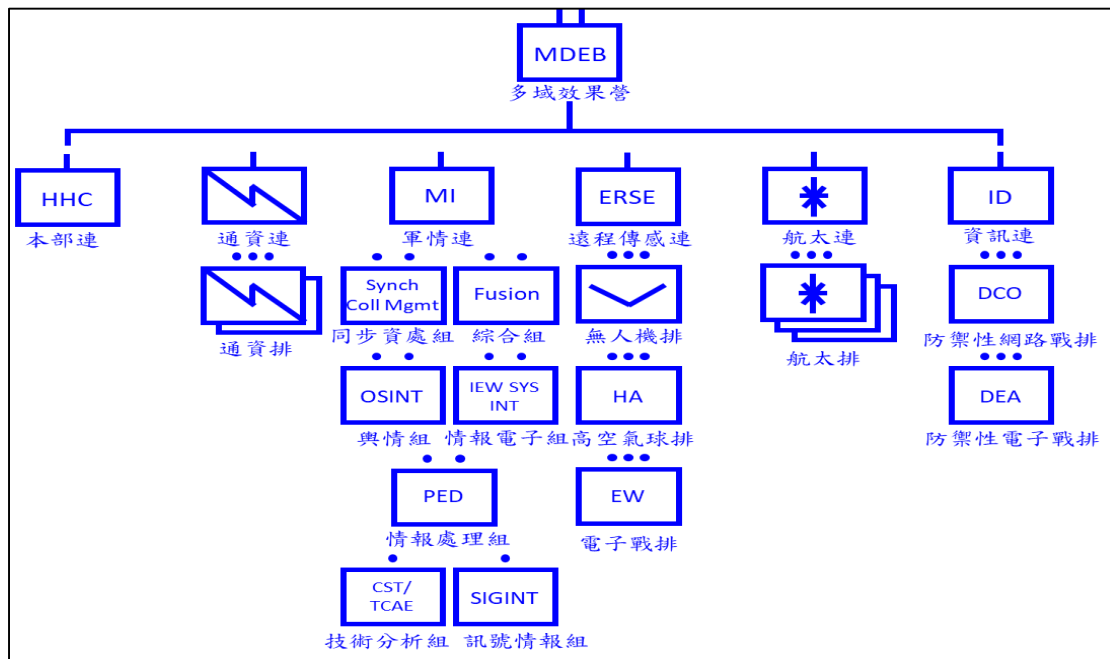
Multi-Domain Effects Battalion,(MDEB)

Primarily envisioned as a counter anti-area access denial organization, the MDEB is equipped to function as multi-domain cavalry through the employment of a combination of terrestrial, air launched, and spaced based capabilities that operate primarily in the EMS. In alignment with FM 3-12's electromagnetic warfare taxonomy, these platforms and capabilities can conduct the full spectrum of Electromagnetic Warfare helping the commander to see themselves (electromagnetic protection (EP)), the enemy (electromagnetic support) and deliver effects (electromagnetic attack). In the full objective build, an MDEB will consist of the following: a signal company and a military intelligence company that are in direct support to the task force; an extended range sensing and effects company that will contain three high altitude sections with some form of (to be determined) high altitude balloon or platform, four Class III unmanned aerial systems, and an electromagnetic warfare section to manage the ES/EA payloads; and a space company with three sections of three crews to staff up to three Space Control Electromagnetic Warfare kits. A fully mature MDEB will have the ability to support the Army service component commander in achieving situational understanding through the fusion of national intelligence, reconnaissance, surveillance and security data with data generated by organic assets to

³ 第三級無人機的重量超過 55 磅，但小於 1320 磅。它們通常在 18,000 英尺平均海平面以下以低於 250 節的速度運行。

support the commander's decision-making cycle. The combination of air launched effects, space capabilities, and long loitering platforms and payloads will extend the operational reach of organic effects. This extended reach enables situational understanding and offers a high level of flexibility and synchronization across all domains to the commander. Subsequent paragraphs will further elaborate while the following concept map shows how the MDEB performs cavalry functions while supporting the multi-domain task force's (MDTF) synchronization of multi-domain operations and targeting functions.

圖 1-多領域效應營部隊編組



資料來源：本刊物及作者自行整理。

多領域效應營如何執行偵察任務。

鑒於電磁偵察的性質，多域效應營只針對在戰略縱深區域的指定區域內行動對敵軍進行區域偵察，在競爭與危機中，多領域效應營能夠偵察中間目標和後續非致命參考點，以支援戰區指揮部，衝突中其能通過定位發射和機載電磁資訊來回應優先情報需求，以確定根據敵軍電磁特徵偵察位置、部隊組織和敵軍作戰企圖，從而支援作戰，多領域效應營為聯合部隊提供額外的偵察和安全保障，以抵消資訊情報收集的分散。

How the MDEBs perform reconnaissance operations.

Given the nature of electromagnetic reconnaissance, the MDEB almost exclusively conducts area reconnaissance oriented on enemy forces operating within named areas of interest across the strategic deep area. In competition and crisis, the MDEB enables intermediate target development and follow-on non-lethal reference points in support of the geographic combatant command. In conflict, the MDEB supports the operations process by answering priority intelligence requirements through the positioning of launched effects and



airborne electromagnetic warfare assets to identify the position, composition, and intent of enemy forces homing in on their electromagnetic signatures. The MDEB provides additional reconnaissance and security capability to the Joint Force to offset the dispersion of signals intelligence collection assets.

偵察原則。

雖然並非包羅萬象，但多域效應營堅持偵察的基本原則，在電磁頻譜中獲取並保持與敵軍接觸，並使用強大的網路及電磁頻譜感測器將資訊快速回饋到多領域作戰中心，電磁感測器發現並記錄敵人的電磁特徵，使指揮官能夠更好地了解敵人的部署，並將資訊回饋作戰部隊，以獲得後續動能或非動能作戰效果，此外，其亦使用電磁攻擊，通過刺探敵人，幫助辨識別或將他們引導到特定位置或其他通信方式，以達迫敵現蹤效果，從而推展作戰進展，多域效應營本質上以其組成之連隊或小隊的運作形式，從某種意義上說，借鏡聯合部隊與空地部隊，使用各種平臺、網路戰、電子戰和太空領域感測器，這些部隊的組成、規模和執行任務範圍可能因任務與目標而異，多領域效應營亦可與特種作戰部隊、網路遠征軍、安全援助旅、其他合作夥伴和盟友合作，進一步擴大行動範圍與部署，以提升原本偵察能力。

Principles of reconnaissance.

While not all inclusive, the MDEB adheres to the fundamentals of reconnaissance by gaining and maintaining contact with enemy forces in the EMS and using a robust sensor network to feed information rapidly back into the all-domain operations center. Electromagnetic support sensors find and fix enemy electromagnetic signatures allowing the commander to gain a better understanding of the enemy disposition and feed that information back into the targeting process for follow on kinetic or non-kinetic effects. Additionally, the MDEB uses electromagnetic attack sensors to develop the situation by stimulating enemy capabilities to aid in identification or canalize them into a specific posture or means of communication to achieve other effects. MDEBs inherently operate as multi-domain teams, or cells, that replicate the combined arms air-ground teams in the sense that they employ cyber, EW, and space assets with a variety of platforms and capabilities. The composition, size and scope of these teams can vary depending on mission, target set, and range required. The MDEB also can partner with special operations forces, expeditionary cyber teams, security force assistance brigades, other partners and allies to further extend operational reach, placement and access to overcome reconnaissance gaps when limited to organic assets.

多域效應營如何進行監控以支援目標定位。

多域效應營通過使用高空和太空電磁感測器完全集成，這些感測器提供「持續觀測」以支援有目的的目標搜索，通過電磁支援能力的分層，多領域效應營可



以對目標進行偵察和排程，以搜索和完善其有效的目標數據庫，或在特遣隊、聯合部隊和國家層級推動目標搜索。

How the MDEBs conduct surveillance in support of targeting.

The MDEB is fully integrated with the targeting cycle through the employment of high altitude and space-based electromagnetic support sensors that provide a “persistent stare” in support of deliberate target development. Through the layering of electromagnetic support capabilities, the MDEB can tip and queues assets to develop and refine targeting data for MDTF organic effects or drive target nomination at the task force, joint and national levels.

在軍事衝突中的監控和目標搜索。

透過目標識別和發現以及情報網路分析師提供的闕漏分析，有意識地破解目標網路資訊數據封包，這支援在衝突前準備好的特定電磁攻擊和網路工具，以利在作戰過程中遂行監控和目標定位，在危機和衝突中，多領域效應營的監控能力為後續空中和機載感測器提供初始資訊行列，這些感測器匯集在一起，為作戰部隊與火力支援提供詳細的目標數據，多領域效應營感測器資訊和非動能性行動彼此整合，與聯合部隊與空中偵察任務所獲資訊集成，以搜索、追蹤重要資訊並排定目標優先順序。

Surveillance and target development in competition.

In competition, surveillance allows for the deliberate development of target packets through target identification and discovery along with vulnerability analysis provided by intelligence and cyber analysts. This supports the development of concept of operation packets and specific electromagnetic attack and cyber tools that can be prepared ahead of crisis and conflict. Surveillance and targeting in crisis and conflict. In crisis and conflict, the surveillance capabilities of the MDEB provide the initial que for follow-on air launched effects and airborne sensors that converge to provide refined targeting data for organic and external fires and effects. MDEB sensors and non-kinetic effects capabilities integrate with the Joint Targeting Cycle and Air Tasking Order cycle to find, fix, track and on-order engage.

多域效應營如何執行安全行動，職能示意，（如圖 2）。

雖然很容易瞭解多領域效應營如何執行偵察和監控任務，但可視為它們如何執行安全行動則要抽象一些，如前所述，安全行動與偵察的不同之處在於它們以受保護的部隊為導向，但其執行安全行動的能力通過結合防禦性網路戰和電磁戰，為指揮官提供反應時間和空間，相關部隊在網路和電磁頻譜中執行各種支持和保護功能，為指揮官爭取決策空間，以對敵人的部署、行動與戰略縱深進一步發展做出反制，其相對的資訊防禦連隊通過防禦性網路行動（DCO）任務在網路和電磁頻譜中執行安全行動，防禦性電磁攻擊元件使該營能夠執行反偵察和電磁對抗，通過保護與掩護友軍的電磁特徵來防止敵人確定友軍位置與相關資

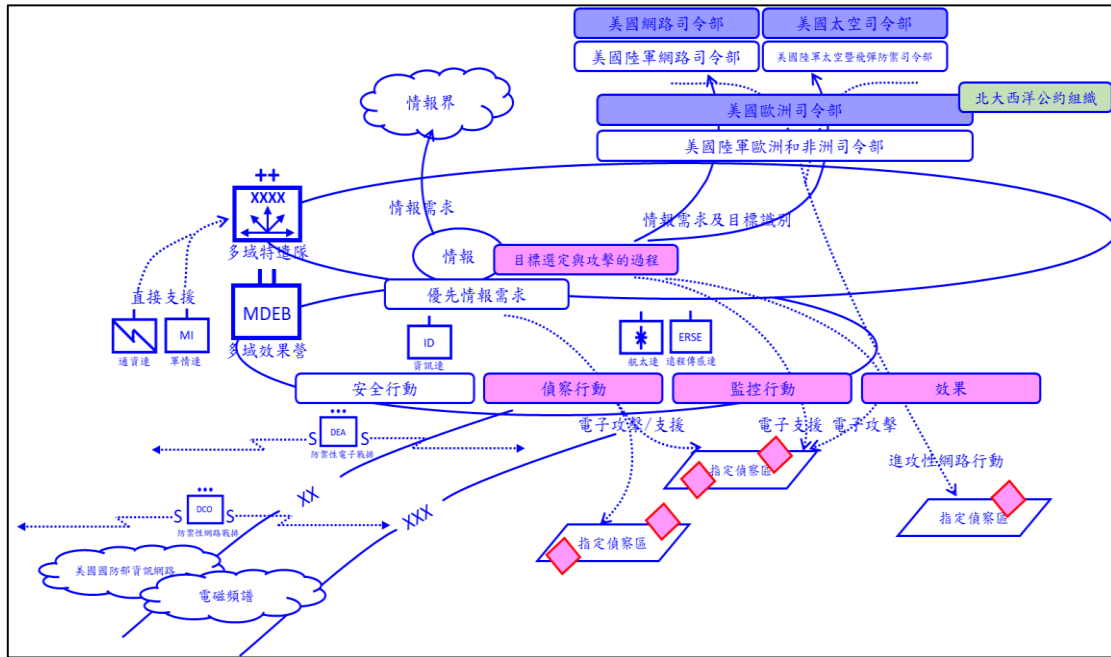


訊，它們為受保護部隊提供早期預警，並允許採取任務編組或配屬的方式掩護友軍作戰，以減少敵人在電磁頻譜中接觸和偵察威脅，有限的電磁攻擊亦提供反偵察以攻擊或破壞敵方電磁頻譜偵察能力，同樣，防禦性網路行動任務篩選第一線及戰區層級網路的關鍵網路資訊以提供早期預警，並協調和同步網路以消除或反制敵方網路攻擊。

How the MDEBs perform security operations.

While it is easy to see how the MDEBs perform reconnaissance and surveillance, visualizing how they perform security operations is a little more abstract. As previously pointed out, security operations differ from reconnaissance in that they orient on the protected force. The MDEB's ability to conduct security operations provides the commander with reaction time and maneuver space through a combination of defensive cyber operations and defensive electromagnetic attack capabilities. These teams and assets can perform a variety of support and protection functions in cyber and the EMS buying the commander decision space to react to the enemy's disposition, unanticipated actions, and further developments in the strategic deep. The MDEB's Information Defense company executes security operations in the cyber domain and EMS through the defensive electromagnetic attack platoon and three defensive cyber operations (DCO) mission elements. The defensive electromagnetic attack element enables the MDEB to perform counter reconnaissance and electromagnetic counter measure tasks to prevent the enemy from determining friendly locations, strengths, and weaknesses by protecting and screening the electromagnetic signature of friendly forces. They provide early warning to the protected force and allows for additional force protection and emission control measures to be put in place reducing the threat of enemy contact and observation in the EMS. Limited electromagnetic attack capabilities also allow for counter reconnaissance to defeat or disrupt enemy EMS reconnaissance elements and capabilities. Likewise, the DCO mission elements screen the key cyber terrain of organic and theater level network and cyber assets providing early warning of compromise and coordinating and synchronizing cyber effects to neutralize or defeat enemy cyber elements.

圖 2-多領域效應營職能示意圖



圖片來源：本刊物及作者自行整理。

結論：

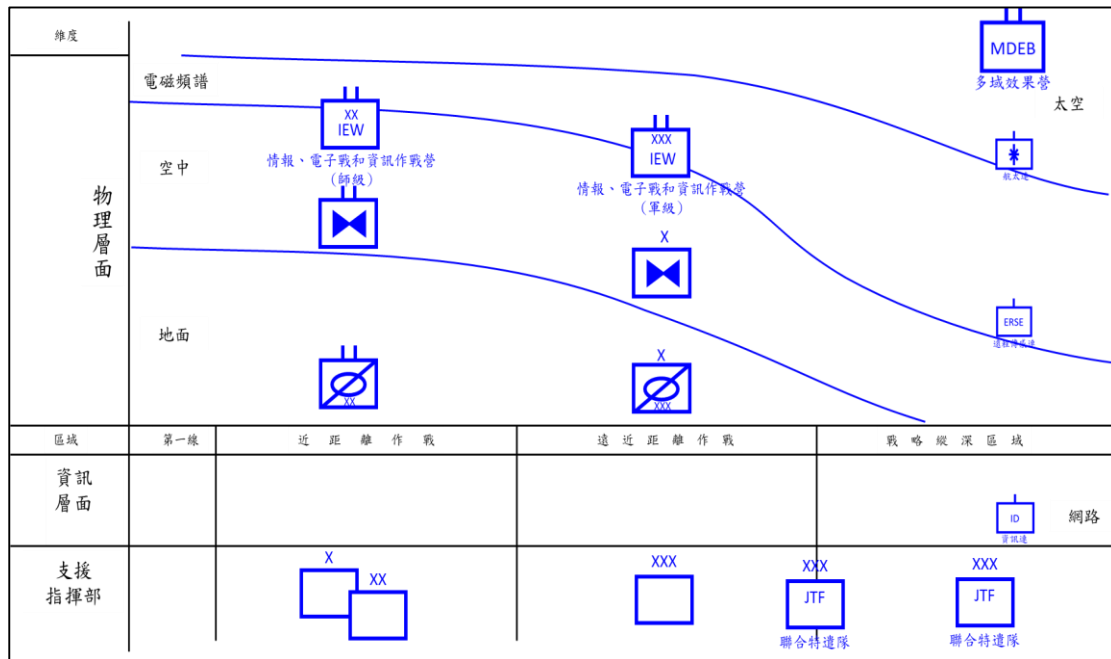
多領域效應果營具有獨特的職能，偵搜維、深度示意，(如圖 3)，通過強化聯合部隊地面部隊，指揮官通過電磁頻譜獲得和保持聯繫能力並快速掌握戰場局勢，並將資訊投入作戰行動和目標，從而成為未來的裝騎部隊，其能力遠不止通過情報和監控提供支援，雖然發現與追蹤敵人是其中很大一部分任務，但多域效應營還可以確定敵人的優勢、劣勢和作戰企圖，並提供有關敵人的早期且準確預警，多領域效應營應被視為一支機動部隊，衝突中積極開展偵察和安全行動，以幫助指揮官確定對手獲得戰場主動權，並最終為對手帶來困境。

Conclusion

The MDEBs are uniquely postured to become the cavalry of the future by adding additional depth to the Joint Force Land Component Commander's ability to gain and maintain contact through the electromagnetic spectrum, developing the situation rapidly, and feed information into the operations process and targeting cycle. The MDEB is capable of far more than support through just intelligence and surveillance. While finding, fixing, and tracking the enemy is a large part of that, the MDEB can also determine enemy strengths, weaknesses, disposition, and intentions and provide early and accurate warning about the enemy. Viewed as a maneuver force, the MDEB actively conducts reconnaissance and security operations in conflict to help commanders ascertain adversary aims, gain initiative and ultimately present dilemmas for the adversary.



圖 3-多領域效應營偵搜維度及深度示意圖



圖片來源：本刊物及作者自行整理。

參、譯文二：未來陸軍戰場與裝甲部隊

自烏克蘭戰爭爆發以來，我們聽到了很多關於徹底改變戰爭新技術的消息：各種類型與大小的無人機，包括了戰術、偵察及自殺式無人機，人工智慧與大數據運用，通信網路、武器裝備自動化與機器人等等新技術，上述技術在俄烏戰爭中都是那麼令人熟悉的，然而，目前尚不清楚這些技術是否已經掀起戰爭型態革命在，塑造一場新型陸戰武裝力量與武器系統的革命，1980 年代已經創造的「軍事革命」一詞，卻並沒有說明這場革命的原因和性質，本文提出了一個廣泛的「概念史」框架，在該框架內可以理解上述所有發展，並概述了它們可能的影響後果。

Since the outbreak of war in Ukraine, we have heard a lot about the new technologies that have revolutionized warfare: drones of all types and sizes – armed, loitering and self-destructing; artificial intelligence and big data; cyber; automation and robotics. All this is familiar enough. And still, it is unclear whether the full meaning of the revolution in shaping the armed forces and weapon systems in land warfare has been grasped. The term “revolution in military affairs,” already coined by 1980, says nothing about the causes and nature of this revolution. This article proposes a broad historical-conceptual framework within which all the above developments can be understood, and outlines what their practical consequences are likely to be.



人類正在經歷第 3 次工業技術革命：繼 19 世紀的蒸汽和鋼鐵革命以及 20 世紀上半葉主要由內燃機產生的革命，兩者均深深地影響了戰爭型態，有些人將我們今天所經歷的變化稱為第 4 次工業革命，但上述所有變化都是自 20 世紀中葉以來一直在進步的基礎技術產物，促成電子計算機運算速度大幅提升。

Humanity is going through the third industrial-technological revolution – after the steam and iron revolution of the 19th Century and the revolution generated mainly by the internal-combustion engine during the first half of the 20th Century – both of which also deeply affected warfare. Some call the changes we are living through today a fourth industrial revolution, but all the preceding changes are products of the same fundamental technology that has been advancing since the middle of the 20th Century: the exponential growth in electronic computational power.

轉型

注意這場技術革命如何改變了海戰和空戰。在海上，重裝甲的大口徑艦砲主力艦已經退出戰爭舞台，透過電子制導導彈進行進攻，並通過電子干擾和攔截系統進行防禦；同樣，空戰曾經基於戰機及其武器的能量，而現在主要依賴於電子導引武器與防禦系統。無論是在海上還是在空中，戰爭勝利都取決於哪個國家在這些關鍵技術戰術領域運用領先於其他對手，而陸戰發生改變的媒介遠比海上與空戰複雜得多，因為所涉及的人數和地面複雜的地形特徵。但至少從 1980 年代初開始，那些掌握更戰場環境變數的人早已瞭解，陸戰正在經歷的變革，其深遠程度不亞於機械化革命以及戰車和其他裝甲車引入所產生的衝擊；正是「約翰·弗雷德里克·查爾斯·富勒」機械化戰爭理論的先驅，他堅定地將機械化革命置於第二次工業革命的背景，從而幫助人們認識到其全部意義和影響範圍。令人難以置信的是，早在 1928 年，他就已經把目光放得更遠，並預示著未來的第 3 次革命浪潮，技術將像生活的所有和其他領域一樣塑造戰爭，這將是「電子和機器人」的戰爭。（「電子」這個詞在當時還不存在）。

Transformation

Note how this technological revolution has transformed naval and air warfare. At sea, the heavily armored, big-gun capital ships have vacated the scene, and warfare is carried out offensively by electronic guided missiles and defensively by electronic disruption and interception systems. Similarly, air warfare, once based on the kinetic capabilities of planes and their armament, now relies primarily on electronically guided weapons and electronic defensive systems. Both at sea and in the air, victory now depends on which nation is a step ahead of its rivals in these crucial techno-tactical spheres. The medium in which land warfare



takes place is far more complex than those of the sea and air, because of both the numbers involved and land's complex topographical features. But at least since the early 1980s the direction has been clear to those who grasp the broader context. The revolution that land warfare is undergoing is no less profound and far-reaching than that generated by the mechanization revolution and the introduction of the tank and other armored fighting vehicles. It was J.F.C. Fuller, the leading, pioneering theorist of mechanized warfare, who firmly placed the mechanization revolution in war within the context of the second industrial revolution and thereby helped people understand its full significance and scope. Incredibly, as early as 1928, he had already looked farther ahead, predicting that the third revolutionary wave of the future – which would shape war, as all other fields of life – would be “electric and robotic” (the word “electronic” did not yet exist).

陸戰的支柱

讓我們關注戰車，它是第二次機械化革命的產物也是大約 100 年來陸戰的支柱，自二戰以來戰車主要經過性能提升以對抗其他戰車，其次是承受反裝甲彈藥之錐孔成形裝藥技術，它們主要武器是一門能發射高速穿甲彈的戰車砲，在大多數軍隊中戰車部隊由 60 到 70 噸重量之重型裝甲組成，而重型裝甲又需要 1,500 馬力的發動機，然而戰車將無法再達到彼此交互掩護之火砲射程，它們將在更遠的距離被發現並被捕獲，這與第二次世界大戰的太平洋戰區強大的戰列艦沒有什麼不同，它們從未進入彼此的射程內，適應新戰爭形式的裝配新式主砲並調整戰車發射機構以發射砲射導引飛彈，超越戰車砲高速動能穿甲彈射程，當前武器效能投入作戰並無有效解決方案，戰車重型裝甲同樣達到了其能力極限，故精準導引、縱列式彈頭及以戰車頂部為目標的頂攻反裝甲彈藥成為研發重點。而在 2020 年第二次納戈爾諾-卡拉巴赫戰爭中，倒楣的亞美尼亞軍隊被大規模摧毀，諸如前往烏克蘭在基輔的部隊受到拘束、俄羅斯裝甲部隊遭到襲擾，裝甲營在烏克蘭頓巴斯試圖渡河時遭熾盛火力殲滅的畫面，戰場景況赤裸裸地呈現於當前現實影像，但這並不意味著裝甲部隊已成為歷史，答案並不在於進一步加強重型裝甲或履行改進後裝甲戰術，正如俄羅斯戰術被證明的那樣笨拙，相反地答案在於對陸軍戰車進行全面調整以適應正在進行電子革命，首先是採用主動防禦系統，例如現在由美國、德國和英國軍隊購買和安裝的以色列戰利品和鐵拳，主動防禦意味著對來襲的彈藥進行電子保護、破壞和攔截，這與海戰和空戰近迫防禦相同，隨著這些系統成為世界各國戰車標準配備，當然推展到全世界只是時間問題，戰場上的成功將取決於任一方在攻擊及防禦電子與反制系統方面，具有優勢則將擁有最終的勝利，電子時代的空戰和海戰一樣，可以預見當一方在這些

系統中佔據決定性優勢時，我們將看到常規陸戰中幾乎會是一面倒的勝利，此類系統目前作為額外裝備安裝在重裝裝甲車上，而實際上它們注定要取代重裝甲，而重型裝甲的有效性在任何情況下都是急劇下降的，因此，當前裝甲部隊是結合了新時代與舊時代兩個時代的中間型號，諸如美國艾布蘭、德國豹式和以色列梅卡瓦的最新車型也是如此，重型裝甲對於陸地戰車來說並不是必需，就像過去350至400mm裝甲對於今天的戰艦而言是不需要。

Land warfare's backbone

Let us focus on the tank, a product of the second mechanization revolution and the backbone of land warfare for about 100 years. Ever since World War II, tanks have primarily been optimized to fight other tanks and, secondly, to withstand hollow charges. Their main armament is a high-velocity gun firing kinetic projectiles. Half their 60- to 70ton weight in most armies consists of heavy armor, which in turn requires a 1,500-horsepower engine. However, tanks will no longer be able to reach kinetic gun range from each other. They will be discovered and attacked at much longer ranges. This is no different than with the mighty battleships of World War II's Pacific Theatre, which never came within firing range of each other. New gun munitions adapted to the new forms of warfare, as well as the adjustment of the tank's gun to launch guided missiles, are merely intermediate solutions that bypass the question of what the current utility of the heavy kinetic gun itself is. The tank's heavy armor has similarly reached the limits of its ability to withstand precision, tandem hollow-charge, fire-and-forget munitions, which target the tank's top. The wholesale destruction of the hapless Armenian army in the 2020 war against Azerbaijan – like the stranded and harassed Russian convoy enroute to Kyiv, Ukraine, and the image of the Russian armored battalion massacred during its attempted river crossing in the Donbas, Ukraine, with the shattered bridge in the middle – starkly expresses current reality. This does not mean that the tank and other fighting vehicles are history. But the answer is not to be found in further reinforcing heavy armor or in improved tactical practices, clumsy as Russian tactics proved to be. Rather, the answer lies in a full-scale adjustment of land fighting vehicles to the ongoing electronic revolution – above all in adopting active defense systems, such as the Israeli Trophy and Iron Fist, now purchased and installed by the United States, German and British armies. Active defense means electronic detection, disruption and interception of incoming projectiles – the same revolution that sea and air warfare have already undergone. As these systems become standard everywhere – and this is only a matter of time – battlefield success will depend on the question of which side possesses the last word in terms of



offensive and defensive electronic systems and countersystems. As in air and sea warfare during the electronic age, it can be expected that when one side holds a decisive advantage in these systems, we shall see crushing, almost one-sided victories in regular conventional land warfare. Such systems are currently installed on heavily armored fighting vehicles as something extra, whereas they are in fact destined to replace heavy armor, whose effectiveness has in any case been nosediving. Current fighting vehicles are thus intermediate breeds which combine two eras – the old and the new. This is true for the latest models of the Abrams, Leopard and Israeli Merkava alike. The heavy armor is no more necessary for land fighting vehicles than the 350-400mm steel armor of the past is necessary for warships today. It is a disadvantage.

少即是多

事實上，依靠電子探測和攔截系統可以大大減少戰鬥車輛的裝甲依賴，以對抗小型武器、彈片與爆炸，因此可以預期戰車的重量將減輕到大約 10 至 25 噸，發動機形式和重量亦將同等減少，並且重新設計定義電子制導防禦和防禦系統，筆者認為電子化就是電子計算機時代主導陸戰和陸戰武器系統的潮流。

Less can be more

Indeed, relying on electronic detection and interception systems enables a drastic reduction in the armor of fighting vehicles for what is necessary against small arms, shrapnel and blast. Hence an expected reduction in their weight to about 10 to 25 tons; a parallel reduction in engine size and weight; and design re-orientation to electronically guided defensive and offensive systems. This, I submit, is the direction land warfare and land weapon systems are heading in the electronic-computerized age.

肆、心得體認

「多領域作戰」概念已深植當代戰場景況，由俄烏戰爭經驗便可窺知一二，「多領域作戰」可解讀為多維戰場環境，其中包括陸、海、空、太空、網絡及電磁頻譜等，在傳統作戰環境，陸軍會假定敵軍主要「接近路線」或我軍主要「攻擊軸線」而在「多領域作戰」環境中，因為主要攻擊可能為遠程火力甚至網路或電磁頻譜攻擊，故對敵我來說，作戰環境已非單純的地面作戰。⁴而作戰中多領域效應營有助於在潛在的危機或衝突中創造有利條件，透過衛星、空中、網路、電磁頻譜平台、搜索敵方通訊和網路等平台的情報為該營和指揮官提供保持有利態勢所需資訊，在資訊數據的幫助下，指揮官可以對正在發展的危機做出快速

⁴ 陳鈞奎，美國陸軍發展「多領域作戰」之觀察，國防安全週報，第 43 期，頁 33-38，2019 年 4 月 19 日，財團法人國防安全研究院。

反應，防止其升級為衝突甚至做出反制，必要時其亦可積極塑造資訊製造虛假信息混淆對手；網路戰和電磁戰能力為軍事衝突提供了更多選擇，該營可以使用電子傳輸來偵測敵方雷達與干擾器，網路攻擊與防禦部隊以及地面部隊做出反應，以供多領域作戰部隊進行分析，在作戰期間，戰場中網路與電磁頻譜受到情報監控，並掃描在危機或衝突期間可利用的漏洞，多領域效應營可以故意向對手透露一些網路破綻，透過發出潛在訊號來展現認知和威懾效果。⁵

另在第二篇專文以探討俄烏戰爭所遇新型作戰技術之挑戰，我們可以依主戰武器不同劃分戰爭型態，諸如冷兵器、熱兵器、機械化甚至到當代資訊化戰爭，作戰方式也進入資訊戰、電子戰、系統對抗等模式，深度剖析俄羅斯隨著從俄烏戰爭的軍事失敗中吸取教訓，俄羅斯的策略正在發生變化，俄羅斯在 2022 年的損失規模，加上俄羅斯聯邦武裝部隊面對他們以前從未對抗過的北約系統，導致俄羅斯的行動嚴重偏離了該國戰略理論，首先，俄羅斯步兵戰術已經從試圖將統一的營戰術群部署轉變為聯合兵種行動單位，按功能分層分為前線、突擊、專業和一次性部隊，這些部隊又依任務組織分組，前線步兵主要用於地面守衛和防禦行動，一次性步兵用於連續性小規模戰鬥，最後由專業步兵實施精準攻堅或者尋找防禦薄弱處優先進行攻擊。其次，俄羅斯裝甲部隊很少用於突擊，相反地主要用於火力支援功能，以對烏克蘭陣地進行準確射擊，然而隨著烏克蘭投入大量無人機作戰，俄羅斯已開始在其裝甲車輛上採用熱偽裝，並使用一系列戰術及新型技術，大大降低戰車在遠距離的可探測性，此外，這些措施還降低了各種反戰車制導導彈在 1400 公尺以上射程內的殺傷概率，以提升裝甲部隊戰場生存率。最後，俄羅斯持續強化電子戰作戰能力，大約每 10 公里前線至少部署一個主要電子戰系，這些系統主要用於反制無人機，而烏克蘭無人機的損失保持在每月約 10000 架，俄羅斯電子戰還實現了對烏克蘭 256 位元加密戰術通信系統的實時攔截和解密。⁶

俄羅斯在俄烏戰爭期間的適應，揭示了一股能夠改進和發展其對關鍵系統的使用的作戰力量，儘管如此，這種適應在很大程度上是被動的，旨在彌補俄羅斯部隊在應對資訊戰爭的嚴重缺陷，隨著時間的推移，如果烏克蘭能夠破壞俄羅斯的防禦並對其導向更加多變複雜的作戰形態，那麼更將凸顯資訊化戰爭中混合戰的趨勢，那麼俄烏戰爭的結局仍值得密注。

⁵ 謝沛學，「多領域作戰概念」下的美軍作戰想定與準則發展方向，國防安全週報，第 91 期，頁 45-51，2020 年 3 月 27 日，財團法人國防安全研究院。

⁶ RUSI，< Meatgrinder: Russian Tactics in the Second Year of Its Invasion of Ukraine >，<https://www.rusi.org/explore-our-research/publications/special-resources/meatgrinder-russian-tactics-second-year-its-invasion-ukraine>，檢索日期：114 年 2 月 3 日。



面對戰爭型態的改變，多領域作戰與資訊化戰爭所帶來的軍事革命，中共亦體認到未來多維的戰爭是必然趨勢，「提高基於網絡訊息體系的聯合作戰能力、全域作戰能力，有效塑造態勢、管控危機、遏制戰爭、打贏戰爭」視為其軍事戰爭準備的最高目標，⁷雖不至於與任何國家有大衝突的意圖，但對於圍繞中國大陸周邊地區可能爆發局部戰爭，⁸在此目標下，中共積極發展監偵暨衛星、電子戰、資訊戰等多元軍事能力，對我國防安全產生嚴重威脅，我國軍面對戰爭型態的發展，應持恆人才培養、厚植武器裝備更新迭代，在建軍備戰方面，須建立非對稱作戰能力及創新軍事理論，以順應戰爭型態的發展。

伍、結語

多領域效應營尚屬實驗性質之編裝組織部隊，該新概念使武器系統開發人員向士兵驗證系統以供在作戰環境中使用，以獲取持續發展的數據，在某些情況下，技術可能不夠成熟、穩定和可靠，無法供士兵在實際行動中使用，這可能會帶來災難性的後果，必須規範正式的流程來管理風險，以避免陸軍行動中出現災難性的失敗和傷亡。而美國空軍上校約翰·柏伊德提出的決策方法「OODA 循環」：觀察、調整、決定和行動。觀察或了解多域效應營實際運作中系統的缺陷，調整或專注於解決這些缺陷所需的解決方案，迅速下達決心採取行動，為陸軍和聯合部隊重新奪回決定性優勢。目前多域效應營正是美國陸軍轉型的一部份，惟有充分驗證全面完善，才能建置更加有利的作戰單位。

裝騎部隊長期以來三大職能：偵察、監控與安全行動，隨著武器裝備技術的更新迭代，需要考慮更加全面且多維度的偵搜手段，以提供指揮官更加全面且詳盡的情報作戰判斷，美軍多領域效應營開創一個範例，以利目前裝騎部隊可以仿效，強化其在多領域偵搜之效果，甚至及時提供網路戰及資訊戰之攻防效能。深研美軍多域效應營此一新作戰概念對國軍裝騎部隊轉型應有深遠之影響與價值未來國軍基於聯合作戰考量，可以借鏡美軍多域效應營組建經驗，我裝騎部隊積極強化網路戰、資訊戰與電磁頻譜的監偵與攻防能力，結合有形與無形之多維空間資訊容納於同一作戰圖像之下，提供指揮官更加全面的戰場情報，配合遠程打擊火力與完善情報指管，整合情報鏈、指揮鏈，最終建立擊殺鏈，以達「軍種聯合、兵種協同」作戰目標，形塑陸軍威懾力量。

另回顧軍事革命歷程，資訊戰已成為未來戰爭的決勝關鍵和主要技術，若以美軍在波灣戰爭所獲致的戰果而言，這場戰爭被視為資訊作戰的雛型，試想日後

⁷ 中央通信社，〈20 大要求打贏局部戰爭 分析稱中國無意全面大戰〉，
<https://www.cna.com.tw/news/acn/202210190366.aspx>，檢索日期：114 年 2 月 3 日。

⁸ 中央通信社，〈20 大要求打贏局部戰爭 分析稱中國無意全面大戰〉，
<https://www.cna.com.tw/news/acn/202210190366.aspx>，檢索日期：114 年 2 月 3 日。



的作戰，隨著科技的進步必將更勝於波灣戰爭，因此，未來戰爭以資訊戰為主要手段將大幅勝於傳統作戰；本世紀因資訊戰的來臨，維護國家安全及強化國防實力成為各國最關注的問題之一，資訊戰它不僅包括軍事層面，亦包括了政治、經濟、社會、心理和文化等非軍事武力的混合層面。

俄烏戰爭以無人機、大數據與人工智慧凸顯了多領域作戰與資訊戰的軍事變革，傳統機械化戰爭亟需因應反制才為俄羅斯有與其對抗的能力，武器裝備戰具的資訊化成為新型戰爭不可忽視的課題，以戰車為例，裝配主被動防禦系統強化防禦，降低裝甲厚度的需求，強化電子戰能力，比照海空、軍以增加反制電子戰夾艙以應對前線突擊電子干擾，協同無人機作戰，提升第一線偵蒐與預警能力，最後導向無人化載具研發，以降低第一線裝甲部隊人員傷損；資訊化戰爭是趨勢亦是未來建軍備戰必將獲得的技術，忽視以既定的軍事革命一旦戰事發生必將產生代間嚴重的損失及傷亡，調適武器裝備技術、應用科技甚至發揮新型武器裝備的最大效益，作為當前兩岸情勢緊張的我們不可忽視的一部份，如何在開發技術、資源分配與實際應用間取得最妥適的組合，將是強化國家安全與維繫國家利益必須研擬議處的重要關鍵。



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