軍事創新與軍隊文化
Military Innovation and Military Culture

譯者簡介

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For modern militaries, innovation is not a scientific or technical problem; it is an organizational challenge. Some observers of innovation speak of "revolutionary" versus "evolutionary," or "radical" versus "incremental" innovation.[1] These approaches to innovation predict the success or failure of an organization's adoption of something new based on how difficult the technology is to adopt. Such constructs are flawed, because they treat as an independent variable (the organization's difficulty in adopting whatever it is that is new) the very thing we chasing its tail. Furthermore, the magnitude of a technological advance is not a good predictor of whether an organization will struggle with it. Militaries may succeed at rapidly adopting new platforms that involve major technological change, yet fail (or be

1 Williamson Murray, "Innovation: Past and Future," in Military Innovation in the Interwar Period, ed. Williamson Murray and Allan Millett (Cambridge: Cambridge University Press, 1996), p.306- 310. Michael Tushman and Charles O'Reilly III, "The Ambidextrous Organization: Managing Evolutionary and Revolutionary Change," in Managing Strategic Innovation and Change: A Collection of Readings, 2nd ed., Michael Tushman and Philip Anderson (Oxford: Oxford University Press, 2004),p.278-82.

unforgivably slow)to adopt innovations that are incremental improvements. Terms like "radical" and "revolutionary" have little use when applied to predicting the organizational response to an innovation.

現代軍隊的創新並非科學或技術問題，而是在於組織方面的挑戰。若干創新的觀察家有「革命」與「演進」，或是「激進」與「漸進」之說。[1]這種思維是依照組織接受科技的難易程度來斷其成敗。此種思維建構是有缺陷的，因為只圍繞一項變數(組織接受所有新事物的難易度)原地打轉。何況，科技進步的幅度並不是一項組織追求的良好觀察點，軍隊透過快速採用具有重大科技變革的新平台或許可以得到成功，漸進式(或極其緩慢地)改進則導致失敗，所以像「激進」和「革命」這類用語，很少用來判斷組織創新的未來。

Bureaucracies thrive on consistent, standard approaches to resolving familiar problems. Militaries are bureaucracies that depend on standardization of tools, training, methods, and organization. Innovation subverts this standardization and consistency, first, in the exploration of a new approach (the introduction of variance into the system), and then (if the innovation is successful enough)in the eventual replacement of the existing approach throughout the organization. The generalization of an innovation requires organizational change, which in turn may require cultural change. "Culture" is a notoriously vague term, sometimes used as a catch-all to account for behavior in organizations that is not otherwise explained. It is difficult to describe in practical, tangible terms.

官僚體系不斷壯大，習慣以標準方法來解決熟悉的問題。軍隊同樣也是依賴標準化器具、訓練、方法和組織的官僚機構。創新常顛覆這種標準化，先是新方法(將新變數引進系統內)的探索，進而(如果創新相當成功)改變整個組織的現存思維。創新的推廣需要組織的變革，這就需要文化的改變。「文化」是出了名的模糊用語，是一個很難實際、具體描述的名詞，有時用來解釋包羅萬象的組織行為。

Organizational researcher Edgar Schein has proposed a compelling description of organizational culture:

A pattern of basic assumptions-invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration-that has worked

well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to these problems.[2]

組織研究學者艾格・許恩對組織文化有深刻的描述如下：

一組基本假設－某一特定群組經由外部適應與內部整合，學習解決問題時，所產生的發明、發現或開發－當其長期運作順利，足以被認為確為有效，就會教導給新進成員，當他們面對類似問題時作為認知、思考和感受的正確方法。[2]

Schein's great insight is to focus attention on aspects of organizational behavior strongly associated with problem-solving and adaptation. To understand an organization's culture, Schein invites us to focus on things associated with what has worked in the past, and to examine the symbols, norms, values, behaviors, etc., that constitute these things. In other words, culture is a theory of what works. This definition has great significance for understanding innovation.

許恩帶來最大的啟示，是把注意力集中在與問題解決和調適上有關的組織行為方面。要瞭解一個組織的文化，許恩叫我們注意過去行之有效的相關事情，並檢視構成這些事物的符號、規範、價值觀、行為等。換句話說，「文化」乃是如何使其行之有效的理論。這個定義對理解創新具有重要的意義。

Militaries are societies unto themselves, with their own sociology, history, values and beliefs. Military culture is built on these principles of shared history and values. Operational and strategic concepts of "what works" in the military context are entwined with principles of social status and individual identity; consider the Air Force's difficulties in reconciling the increasing operational capabilities of unmanned aircraft with its pilot-centric values, or the tortured logic of the Navy's continued reliance on the aircraft carrier as its central offensive asset, or the Army's continued devotion to the heavy fight. Innovation is not simply-or even mostly-a question of capabilities and resources. Military innovation not only affects the way wars are prosecuted, but also changes the order of military society, altering the relationship between the soldier, sailor, marine, or airman and the organization. Elting Morison writes,

軍隊是一個獨特的社會，有他們自己的社會學、歷史、價值觀和信念。軍事文化

2 Edgar Schein, Organizational Culture and Leadership, 4th ed. (New York: Jossey Bass, 2010), p.17.

建立在這些共同的歷史與價值觀的原則上。在軍事領域中要讓作戰與戰略構想「行得通」，就與其社會狀態與個別認同等原則密切相關。在空軍要讓飛行員接受日益重要的無人機，或扭轉海軍將航母作為其攻勢戰力核心，或改變陸軍鍾情於大規模作戰，都是極其困難的。創新並非單純－或甚至可以說－尋求戰力與資源，更不只是改變戰爭方式，更要改變軍隊社會的秩序，改變士兵、水手、陸戰隊員、空勤人員及組織間的關係。伊亭・莫瑞森有如下撰述。

The opposition, where it occurs, of the soldier and sailor to [innovation] springs from the normal human instinct to protect oneself, and, more especially, one's way of life. Military organizations are societies built around and upon the prevailing weapons systems. Intuitively and quite correctly the military man feels that a change in weapons portends a change in the arrangements of his society.[3]

官兵們對創新的反彈，來自於一般人自我保護，特別是維護他們生活方式的本能反應。軍隊組織是一個與其使用之武器系統息息相關的社會，當武器改變時，軍人就會直覺地認為他們的社會在改變。[3]

This article examines the individual element of military culture as it relates to innovation. This perspective is necessarily incomplete. Military culture is not just about individuals. It also exists at the strategic level (what Carl Builder ably termed concepts of war), and even at the national level.[4] The focus of this essay is the "cultural concept of the ideal combatant," that is, assumptions underlying the role of a human being in warfare-what makes an effective commander or subordinate, and what the proper basis of the relationship is between the two. When innovations align with a military organization's concept of the ideal combatant, the natural tendencies of the organization can be trusted to succeed in developing and implementing the change. However, when the innovation does not align with the concept of war, or when it undermines assumptions about what makes an effective commander or subordinate, leaders

3 Elting Morison, "A Case Study of Innovation," Engineering and Science 13, no. 7 (1950): p.8.

4 Carl H. Builder, The Masks of War: American Military Styles in Strategy and Analysis (Baltimore: Johns Hopkins University Press, 1989), p.127.

should expect that the innovation will be resisted.

本文檢視軍隊文化各項組成內涵對創新的影響，其中觀點容或不夠完整，軍隊文化並不針對某一特定對象，它也同時存在於戰略層次(卡爾・比德爾稱之為「戰爭理念」)，甚至是國家層次。[4]本文重點放在「理想戰鬥員的文化理念」，將重點放在「人」在作戰中的角色，亦即有效能的指揮官與部屬的本質為何？兩者之間正確的關係為何？當創新與軍隊組織中理想戰鬥員的理念一致，組織發展的方向就會被信賴，變革才能推動。但是當創新與戰爭理念不符，或破壞指揮官與其幕僚產生效能的假設時，領導者就該預期創新會遭到抗拒。

This article helps leaders anticipate resistance to innovation rooted in a misalignment between the current concept of the ideal combatant and the new concept underlying an innovation. If leaders understand the nature of this resistance, they will be better positioned to develop appropriate responses to it.

本文在幫助各級領導者判斷當理想戰士們現行的理念與新理念不一致時，為抗拒創新的根源。如果領導者瞭解這個抗拒的本質，就能設法找到更適切的應對方法。

Military Culture and Innovation
The Conservative Culture Hypothesis

Some explanations for military resistance to innovation claim there is something in the essence of the military milieu or the military mind that is antithetical to change. Williamson Murray describes this view, "Military institutions exist in a culture of disciplined obedience in which soldiers, sailors and airmen must remain steadfast in the face of terrifying conditions... But disciplined organizations rarely place a high value on new and untried ideas, concepts and innovations."[5] This can be termed the "conservative culture hypothesis." Samuel Huntington employs this hypothesis when he describes the "military mind" as one that views the world

5 Murray, "Innovation: Past and Future," p.301. 雖然筆者作此引述，但莫瑞本人並非此一觀點的支持者，他對軍隊組織對創新的觀察詳見論文〈Innovation in the Interwar Period〉及最近出版的〈Military Adaptation in War: With Fear of Change〉(Cambridge: Cambridge University Press, 2011).

through the lens of "conservative realism."[6] An effective military emphasizes order, obedience, hierarchy, division of function, and the supremacy of the society over the individual. "Society" can mean both the micro-society of the military and the society of the state the military man or woman is sworn to protect. Military organizations are constantly reinforcing their ties to the past, which serves two purposes. First, military organizations value ceremony and tradition, emphasizing the distinctness of the military community and imbuing its members with a stronger sense of collective identity. Second, militaries value the knowledge of history, which, as Moltke said, is "the most effective method of teaching war during peace."[7] One can learn valuable lessons from the experiences of others, using it to develop principles and concepts for potential future application. Therefore, military organizations are hyper-attentive to what has worked in the past, further strengthening the military's culture. According to the conservative culture hypothesis, the classic military virtues of obedience, self-sacrifice, collectivism, devotion to tradition and knowledge of history are strengths in preparing for and fighting war, but liabilities when the organization is seeking to change.

軍隊文化與創新
保守型文化

有人認為軍事的環境與思維，基本上就是抗拒創新的。威廉遜・莫瑞就此一觀點的陳述：「軍隊體制存有一種紀律與服從的文化，任何陸、海、空三軍人員，面對任何恐怖的環境時，必須堅定不移……然而，紀律嚴明的組織往往都不會重視未經考驗的新想法、新觀念及創新。」[5]這可以稱之為「保守文化的假設」。山繆爾・杭廷頓透過「保守主義」角度觀察世界時，他用這個假設來說明「軍事思維」。[6]一個有效率的軍隊強調命令、服從、層級、職能分工，以及團隊高於個人的觀念。「團隊」可以意指微觀的軍事團隊，也可以代表軍人宣誓捍衛的國家。軍事組織不斷地強化與過去的連結，其目的有兩個：首先，軍事組織重視儀式和傳統，強調軍事社群的獨特性，灌輸其成員強烈的集體認同感。其次，軍隊珍視歷史知識，正如老毛奇所說「是和平時期傳授戰爭的最有效方法。」[7]人們可以利用他人的經驗學到寶貴的教訓，從中發展出未來可以運用的

6 Samuel Huntington, The Soldier and the State (Cambridge, MA: Belknap Press, 1957), p.79.

7 Quoted in Huntington, The Soldier and the State, p.64.

原則和概念。因此，軍事組織對過去成功經驗特別重視，從而更強化了軍隊文化。根據保守文化的假設，服從、自我犧牲精神、集體主義，及對傳統的忠誠和歷史認知等美德，卻往往成為組織尋求變革時的不利條件。

The conservative culture hypothesis of military resistance to innovation is supported by some findings from broader studies of innovation in other organizations.[8] The hypothesis appropriately focuses not on the strength of the military culture, but on its content. It is incorrect to suggest a strong culture necessarily inhibits innovation. We must know something about the content of the culture to make that claim. Organizations with strong cultures may be innovative if their cultures encourage behaviors supporting innovation. For the military, the conservative culture hypothesis posits that its cultural content stifles, innovation. For example, militaries emphasize the good of the group over the individual, which discourages individual departures from group norms. Military norms tend to be task-oriented and convergent (focused on narrowing options and meeting mission requirements)as opposed to idea-oriented and divergent (focused on developing good ideas and expanding the range of ideas under consideration). Finally, militaries value uniformity over diversity. Members of the military may come from diverse backgrounds, but diversity is suppressed because personnel must be substitutable, a necessary condition in an organization whose members are subject to sudden and violent death. The conservative culture hypothesis suggests all of these characteristics (collectivism, convergent thinking, uniformity, etc.)militate against effective innovation in military organizations.

軍隊抗拒改革的保守文化假設，可以從其他組織所做的廣泛研究中得到支持。[8]此一假設重點不在於軍事文化的力量，而在其內涵。強大的文化並不一定不利創新，即使非要如此說，也一定要先瞭解該文化的內涵才行。若組織文化本來就鼓勵創新的行為，強烈的組織文化也可能傾向創新。在保守文化假設下，軍隊被認定其文化內涵就在扼殺創新。例如，軍方強調團體高於個人，不鼓勵個人悖離團體的規範。軍隊規範往往是以任

8 Francis Flynn and Jennifer Chatman, "Strong Cultures and Innovation: Oxymoron or Opportunity?" in Managing Strategic Innovation and Change: A Collection of Readings, 2nd ed., ed. Michael Tushman and Philip Anderson (Oxford: Oxford University Press, 2004), p.234-251.

務導向並具有趨同性(著重狹隘的選擇與滿足任務需求)，而不是理念導向與多元性(重視研擬更好的想法並擴大思考範圍)。最後，軍隊的價值觀中，一致性重於多元性。軍隊的成員可能來自不同的背景，但多元性必須予以抑制，因為人員必須可以被替代，這是一個成員經常會突然戰死的組織所必須。保守的文化假設認為這些特質(集體主義、單一思維、一致性等)妨礙軍事組織有效的創新。

However, the conservative culture hypothesis has two problems. First, it treats innovation as a monolithic phenomenon, when in fact successful innovation is a process during which a given aspect of the culture may be both a strength and a weakness, albeit at different stages. The conservative culture hypothesis focuses on the content of military culture that inhibits the generation of innovative ideas, but it does not consider that the same characteristics that may hinder the emergence of ideas (for example, a strong deference to authority)would facilitate their implementation. The military is an execution-oriented culture, and military organizations will effectively implement innovations that receive organizational endorsement. Thus, the notion innovation will improve if the group's norms for uniformity and convergence are diminished is true only if that attenuation affects the organization during idea generation and not implementation.

然而，保守文化假設有兩個問題。首先，它把創新作為一個單一的現象，但實際上成功的創新是一個過程，某一特定的文化觀點，在不同階段可能既是優勢也是劣勢。保守文化的假設，著重於抑制創新理念的軍隊文化之內容，但沒有思考到這種阻礙新想法的特性(例如，強烈的威權順服)卻也可能有助於新理念的實踐。軍隊是一個以行動為導向的文化，只要經過認可的創新必能落實。因此，如果在新想法的發想過程中，能淡化組織規範的一致性和趨同性，而在實踐過程中仍加以保留，則對創新觀念有利。

The second, more significant, problem with the conservative culture hypothesis is that it offers no explanation as to why militaries have different responses to different innovations. As mentioned above, many good ideas do emerge in military organizations, with the responses ranging from enthusiastic acceptance to fanatical rejection. To understand this difference within the military context, it is not enough to say the military has an anti-innovation culture.

其次，也是最重要的，保守文化的假設無法解釋，何以軍隊對不同的創新會有不同

反應的問題。如前所述，很多新觀念本來就是出自軍隊本身，其反應有熱情擁抱，也有激烈反對。瞭解其中的差異，並不足以論斷軍隊有「反創新」的文化。

Cultural Resistance to Innovation

To understand whether a military will struggle with an innovation, we must look beyond the technological challenges and examine the relationship between an innovation and the culture. How does the innovation align with the organizational concept of an ideal combatant? How does the innovation align with current cultural assumptions in terms of honor, the delegation of authority, and the tolerance for variation and the desired degree of uniformity? How does an innovation affect how commanders lead, how subordinates obey, or how individual combatants prepare for and fight wars? This link between an innovation and the social structure of the military is the "cultural concept of the ideal combatant." While the content of this concept is complex, this article highlights three characteristics especially relevant to innovation:

抗拒創新的文化

要瞭解一個軍隊是否致力於創新，必須先超越科技挑戰之問題，從創新與文化兩者的關係去探討。創新如何與理想戰士們對組織的看法相結合？創新如何與榮譽、授權、偏離一致性的容忍度等當前的文化假設相結合？創新如何對指揮官的領導、部屬的服從、個別戰士們對作戰之準備與遂行等，產生影響？創新與軍隊社會結構的連結，就是所謂「理想戰士們的文化概念」。此一概念的內涵相當複雜，本文僅舉出三項與創新有關的特性如下：

1. The conduct of honorable warfare: how the organization values physical courage in the context of war, and how it views the morality, justice and fairness of various weapons and effects; e.g., the use of submarines or landmines, or the acceptability of civilian casualties.

2. The delegation of decision-making authority: how much the organization delegates or centralizes the decisions to use force, modify a military asset, alter a plan, or call on supporting assets, for example.

3. The degree of regularity in military assets, and the tolerance for differences among

those assets: how much a leader accepts variation in equipment, training, effects, etc.

1.榮譽戰爭之行為：組織對戰爭環境下實體勇氣之價值觀為何？對各種武器及產生效果(例如潛艦、地雷，或民眾傷亡等)之道德、正義、公平的看法為何？

2.決策權之下授：組織在用兵、裝備改良、計畫修改，或要求支援等方面，對下級授權或採取統一管制的程度為何？

3.軍用裝備的統一程度，採用不同裝備的容忍度，以及幹部對裝備、訓練、效能的改變其接受程度為何？

Honorable Warfare and Resistance to Innovation

The first element considered in this analysis is the organization's idea of honorable warfare. Honor is an inextricable component of the military profession. It is an expression of many characteristics of military culture-obedience, courage, duty, self-sacrifice, tradition, fairness and justice, and treatment of non-combatants. How does an innovation align with ideas of honorable war? Consider three components: courage, justice, and violence against civilians.

光榮戰爭與抗拒創新

首先加以分析的是組織對光榮戰爭的理念。榮譽乃是軍隊專業不可或缺的要素。軍隊文化之表徵包括服從、勇氣、責任、自我犧牲、傳統、公平正義，以及對非戰鬥員之處置等。創新如何與光榮戰爭的理念相配合？要考慮勇氣、正義，與對平民施以暴力三方面。

For the first seven thousand years of civilization, physical courage was an inherent characteristic of all warfare. To kill, a combatant had to be in a position of some vulnerability. Yet the nature of this courage evolved over time in response to changes in warfare. The courage of a pilot in the Second World War differed from that of a soldier in the United States Civil War, which differed from that of a knight in the Hundred Years' War. One is not necessarily more courageous than the other, but the value of each type of courage is highly dependent on context. Continuous-aim gunnery revolutionized the accuracy of naval gunfire; Elting Morison describes how these improvements changed the nature of physical courage required

for naval warfare: "The fourteen inch rifle, which could place a shell upon a possible target six miles away, had long ago annihilated the Nelsonian doctrine... [It was] not that men were no longer brave, but that 100 years after the battle of the Nile they had to reveal their bravery in a different way."[9]

人類文明出現後的前7,000年，實質的勇敢是所有戰爭的天性。戰士們殺敵之同時，自身也必然會同時處於某些不利。然而，隨時間的演變這種勇氣特性產生變化。第二次世界大戰期間飛行員的勇氣，就和南北戰爭的士兵不同，而它又和百年戰爭期間的騎士迥異。不同類型的勇敢並不代表何者比較厲害，勇敢的價值與當時的環境高度相關。持續瞄準射擊法，徹底改變了艦砲的準確度；伊亭・莫瑞森描述這些改進，如何改變了海軍作戰中身體勇敢的特性：「14吋砲可以將砲彈射往6浬外的目標，早就顛覆納爾遜的海軍準則.....。這並不表示這些人不再勇敢，而是尼羅河之役100年後的海戰展現了不同類型的勇敢。」[9]

Every generation in a military organization develops a unique sense of the courage required in war. What was courageous behavior in a prior conflict may be reckless or futile in a later one. Yet military cultures will try to resist an innovation that upends their principles of honorable warfare before succumbing to the logic of a new weapon. Courage and recklessness are contextual, and the technology of war is crucial to that context. A Royal Navy commander with the "disposition to close" during the Napoleonic wars might perform well in battle, but such behavior would be suicidal in engagements with German battleships during the First World War. An innovation that alters the calculus of courage also changes the social context of war, and will therefore be resisted by the organization.

每一世代的軍隊組織，都會發展出獨特的戰爭所望之勇氣感。一次戰爭的所謂勇氣，到了下一次戰爭可能成為魯莽或愚蠢。在新武器顛覆其原有邏輯，而軍隊文化卻試圖抗拒可能顛覆其光榮戰爭原則的創新。拿破崙戰爭時代英國皇家海軍行之有效的「抵近部署」，到了一次大戰面對德國主力艦時，無異於自殺行為。創新改變了勇氣，改變了戰爭的社會環境，也因而受到組織的抗拒。

9 Elting Morison, "Gunfire at Sea: A Case Study of Innovation," in Managing Strategic Innovationand Change: A Collection of Readings, ed. Michael Tushman and Philip Anderson (Oxford: OxfordUniversity Press, 2004), p.66.

Unmanned aircraft provide a striking illustration of this dynamic. As discussed above, the character of aerial combat changed dramatically in the decades following the Second World War, but because every generation of pilot remained susceptible to a sudden and violent death in the air, they shared a common identity. The operators of a remotely piloted UAV remain conspicuously outside of that fraternity, despite the fact the machines they pilot have more in common with modern piloted attack aircraft than do first and second-generation fighters. What is different about operators of UAVs? They attack from positions of relative safety. In many cases, the ground crews supporting the drones are at greater risk than the drone pilots. UAVs undermine one of the core assumptions of the community of attack pilots-to be an effective pilot, you must face danger. The initial response of that community-ridicule and rejection of drone operators-was entirely predictable.[10]

無人機就是一個鮮明的例子。如上所述，第二次大戰以後數十年間，空戰的特性產生巨大變化，但是由於不同世代飛行員都仍有可能突然碧血長空的影響，造就他們之間彼此的認同。而一名無人機的操作員儘管他們操作的裝備，堪與現代化有人駕駛的戰鬥機，或第一、二代戰鬥機不相上下，但仍然很難與飛行員水乳交融。無人機的操作員有何不同？他們從相對安全的位置實施攻擊。在許多情況下，支援的地勤人員承擔的風險，甚至比操作員大。無人機破壞了戰鬥機飛行員社群的核心假設：一個優秀的飛行員，要能冒險犯難，飛行員社群一開始奚落和排斥的反應，完全可預測。[10]

Since innovations often change the nature of courage required of combatants, they also change the conditions of susceptibility of a combatant to violence. Note that the innovation may increase or decrease a combatant's susceptibility. The issue is how the innovation affects a generation's concept of justice in conflict-how much risk combatants should assume and whether they have the ability to fight back. The advent of submarines created a fundamental problem for naval strategists: how to exploit the capabilities of the platform while adhering to the rules of surface warfare. The ultimate answer-one cannot-was preceded by several attempts to control the use of submarines. The London Naval Treaty (1930)was an attempt by

10 P. W. Singer, Wired for War: The Robotics Revolution and Conflict in the 21st Century (New York: Penguin Books, 2009), p.253-254, p.367-368.

the United Kingdom, the United States, Italy, France and Japan to regulate submarine warfare, forcing submarines to abide by "prize rules," requiring crews of merchant vessels be placed in safety before their ships may be sunk.[11] Such exercises in restraint are usually overcome by the expediencies of war, but in the meantime they hinder exploration of affected technologies and the integration of those technologies into broader operational concepts. It is probably not coincidental that militaries had fewer qualms about unrestricted submarine warfare after advances in antisubmarine defenses (sonar, depth charges, aerial surveillance)improved the odds for the surface combatants.

由於創新往往改變戰鬥所需的勇氣本質，也使得戰鬥人員改變了對暴力的感受。當然，這種感受會增加，也會被降低。問題是創新對當代身處衝突對正義的概念，產生什麼影響 ── 戰鬥人員將承擔何種程度風險，以及他們是否有能力加以反擊。潛艇的出現，為海軍戰略家製造了一個根本性的問題：如何一面遵從水面作戰規則，一方面又能充分發揮此一平台的功能。歷經嘗試後，最終的答案，是不能。於1930年由英國、美國、義大利、法國和日本共同制訂的「倫敦海軍條約」，試圖規範潛艦作戰，潛艦必須遵守「捕獲法則」，要求商船船員被安置後，方可予以擊沉。[11]該法則的運作常被戰時權宜所凌駕，同時也阻礙了相關科技的探索，以及將其整合到更全面的作戰構想上。或許並非巧合，當反潛作戰獲得進展(聲納、深水炸彈、空中監偵)，軍隊對無限制潛艦作戰的顧慮就減低了。

To the degree that innovations undermine existing assumptions about fairness in war, they are likely to be resisted. The reaction to innovations that reduce risk in the defensive or the offensive is more ambiguous. It seems a military's response to such changes largely depends on whether it enjoys an advantage under the prevailing way of war. An innovation that significantly increases risk in the offensive (machine guns, for example)is likely to be resisted by militaries with favorable offensive capabilities under the existing competitive system.

因創新而削弱戰爭公平的程度，也很可能會受到抗拒。無論攻防，因革新而降低的「風險」相當模糊。軍隊對任何改變的反應，很大程度上取決於它是否能在戰爭中享有

11 Zara Steiner, The Lights that Failed: European International History (New York: Oxford University Press, 2005), p.589-592.

優勢。一項會增加攻擊風險的創新(如機槍)，很可能因已經擁有對攻擊有利的系統，而受到抗拒。

The ideal combatant does not kill indiscriminately. Innovations may change the degree to which the effects of war are felt by non-combatants. Military organizations develop rules or procedures to determine acceptable civilian losses in pursuit of a military goal, yet technology changes the variables in this calculation. Militaries seek to limit civilian casualties, and innovations that allow for greater precision in effects (such as guided munitions or improved surveillance)are likely to be embraced. However, some innovations decrease military control over collateral damage, and in such cases, militaries may struggle to adapt.

戰鬥人員不得濫殺無辜。創新或許改變非戰鬥人員對戰爭的感受，軍隊組織追求軍事目的前提下，以各種規定及程序決定能接受的平民傷亡率，但科技改變了計算的變數。軍隊設法降低平民傷亡率，讓武器產生更為精準效果的創新(如導引彈藥或更強大的監偵力)，似乎受到青睞。但是某些無法控制附帶傷害的創新，軍隊也得被迫接受。

The great challenge is that resistance to innovation on moral grounds is often appropriate. (Consider the United States military's abandonment of offensive chemical and biological weapons.)The military profession is not simply tasked with executing humanity's wars; it also helps to determine what kinds of wars humanity will accept. Nuclear weapons are history's most powerful example of this task. But "the bomb" remains a fact of the global military environment, despite its grotesque character; until that changes, nuclear weapons should be susceptible to innovation. However, from the moment of the Trinity test on July 16, 1945, the military profession has struggled with how to think about them. The condition of US nuclear strategy almost seventy years after Trinity attests to these challenges.

創新最大的困難，在於道德正當性層面(請回想美軍之所以放棄攻擊性生化武器)。軍事專業並不受制於人道戰爭，而是要解決究竟何類型戰爭，是人道所能接受。核子武器是最好的例子。「核彈」一直是全球軍事環境中既存的事實，除非其醜惡的特性改變，核武仍可創新。從1945年7月16日「三位一體」測試那一刻起，軍事專家就一直在思考此一問題，但是迄今已歷70年，美國核子戰略條件依然如故，證明了箇中的難處。

More often, innovations that run afoul of a military's concept of honorable warfare are not such stark moral challenges, but more subtle deviations (such as Morison's example of naval gunnery). In such cases, it is not at all clear that the resistance to such innovations is good for the future effectiveness of the organization. In general, innovations that reduce military control over the effects on civilians are resisted.

絕大部分光榮戰爭的軍事概念與創新，在道德層面上並沒有完全背道而馳，而只有微妙的偏離(如莫瑞森所舉的海軍艦砲射擊的例子)。此時，對創新的抗拒，對組織的未來孰優孰劣，甚難定論。一般來說，如果創新無法控制對平民的影響，通常會受到抗拒。

The Shifting Balance of Control over Decision-Making

The second aspect of the concept of a combatant is the optimal delegation of authority to make decisions. What is the appropriate balance between detailed orders, procedures, etc., and the exercise of individual initiative? In war, it is necessary for commanders to exercise control over their forces, but it is also necessary for subordinate units to interpret orders in light of changing conditions on the battlefield. Carl von Clausewitz captured this tension when he wrote, "Everything is very simple in war, but the simplest thing is difficult."[12] Worded less poetically, simplicity in conception and simplicity in execution are not the same. The optimal balance between a commander's tight control and a subordinate's freedom to adapt is not fixed, but changes over time as the context of war changes. Innovation can alter the balance in either direction.

改變決策控制權的平衡

戰鬥人員的第二個概念，是決策權適當之下授。命令、程序的詳細程度，與執行人之主動積極性，彼此之間的平衡點究竟為何？在戰爭中，指揮官必須掌控其部隊，但其部屬也必須根據戰況解讀其命令。卡爾・馮・克勞塞維茨描述這種緊張關係，他寫道：「戰爭中一切都很簡單，但最簡單的事情往往最困難。」[12]措辭不太有詩意，構想的簡

12 Carl von Clausewitz, On War, trans. by J.J. Graham (London: N. Trubner, 1873), p.40.

單化與執行的簡單性是不一樣的。指揮官的嚴格掌控與部屬的行動自由，兩者的最佳平衡並非一成不變，而是隨戰況改變的。創新可以朝任一方向改變其平衡。

Consider the authority to decide whether to attack hostile ground forces from the air, particularly when the enemy is in close proximity to friendly units. In the absence of communications technology, the pilot must have the authority to decide on his or her own whether (and where)to attack. However, when communications put a pilot within reach of an air controller or some other coordinating mechanism, the pilot must cede some of that authority. In that case, innovation nudges the balance of authority in favor of greater command and control.

當考量是否對敵地面部隊實施空中攻擊，特別是當敵我犬牙交錯時，在通信不通時，飛行員必須有權決定是否予以攻擊(以及攻擊何目標)。然而，當通信能讓飛行員接受管制或協調，飛行員就必須放棄這種權力。在這種情況下，為了增進指揮管制能力，創新就觸及權力的平衡。

The evolution of infantry tactics in response to rapid-firing artillery and machine guns offers an example of the opposite effect-innovations prompting greater delegation of authority to subordinates. The slaughter of infantry advancing in close order over open ground required that armies adopt a different means of assault, advancing by small groups, using protective fire and moving in and out of cover. This tactic puts infantry units out of contact with their commanders during crucial moments of battle, and requires that junior non-commissioned officers assume more authority in directing others and making tactical decisions.

速射砲與機槍出現後，步兵戰術也出現相對演變 ── 下級單位被授予更多權力。在開闊地以密集隊形前進的步兵，改採小群組在火力掩護下衝鋒。這種戰術使得步兵在作戰最緊要關頭，卻與其指揮官脫離，低階士官就須得到更大的權力，帶領部隊並下達戰術決心。

Whichever direction the innovation pushes the balance, any alteration is likely to cause some social upheaval. However, the eternal and abiding desire of commanders is to reduce the fog and friction of war. Innovations that shift the balance in favor of greater transparency

and more direct control of their forces are therefore likely to be viewed more favorably than those that shift greater responsibility to subordinates, however necessary the transition of authority. The historian Michael Howard, in an account of the evolution of European military strategy leading up to the First World War, described how the French high command initially embraced fire-and-maneuver tactics (based on the experience of the British in the Boer War), only to reverse itself. Howard wrote, "Such tactics demanded of the ordinary soldier a degree of skill and self-reliance such as neither the French nor any other European army (with the possible exception of the Germans)had hitherto expected, or done anything to inculcate, either in their junior officers or in their other ranks."[13] The conviction that turned the French high command back to close-order assault was its belief in the absolute necessity of maintaining contact between officers and infantry comprised mostly of conscripts in the event of general mobilization. Howard imagined the question leaders posed to themselves, "How could these lonely, frightened men, deprived of the intoxication of drums and trumpets, the support of their comrades, the inspiration of their leaders, find within themselves the courage to die?"[14] Innovations that shift greater responsibility to subordinates will be resisted more strongly than those that do the opposite.

無論創新的平衡往那個方向移動，任何變動都很可能引起某些社會動盪。然而，指揮官永遠都期望減少戰爭的迷霧和摩擦。雖然權力下放有其必要，創新的平衡傾向於更透明，以及對部隊更直接的管制，似乎遠較賦予下級更多責任的轉變更受到重視。歷史學家麥可・霍華德，在敘述一次大戰歐洲軍事戰略的演變時，描述法國最高統帥部改變了原先接受的「射擊與運動結合」的戰術(從英國在波爾戰爭中學習到的經驗)。霍華德寫道：「這種戰術要求一般士兵必須具備法國，甚至歐洲其他國家，無論軍官或是士兵都從來沒有過的戰技與獨立戰鬥的技能(或許德國除外)。」[13]法國統帥部之所以回到密集隊形衝鋒的戰術，是因為他們認為在絕大部分兵員都是經由徵召而來，軍官必須與士兵緊密接觸。霍華德想像當時的幹部問自己的問題：「當這些孤獨、害怕的男人，失去戰鼓隆隆，號角震天的麻醉，又沒有同伴扶持及幹部的鼓勵，如何能讓他們鼓起赴死的勇氣？」[14]將更多的責任轉移給下屬的創新，受到抗拒的力道比什麼都強烈。

13 Michael Howard, "Men Against Fire: Expectations of War in 1914," International Security 9, no. 1 (1984): p.52.

14 Ibid., p.50.

The Desire for Uniformity and the Need for Differences

The preference of military organizations for greater predictability on the battlefield also informs the third and final variable in this discussion of the concept of an ideal combatant: the desired degree of regularity and the tolerance for differences. How much does a military organization value consistency in equipment, training, and procedure for similar personnel and units? Military organizations value predictability (knowing what effects can be achieved by a given military asset, for example)and substitutability (knowing that a replacement asset can achieve those same effects). Both are improved by standardization. Commanders are comforted by the idea that the choice of unit A or unit B is not a choice between two units with meaningful differences in equipment and training-when commanders articulate their intent, units will execute that intent with similar means and methods. This uniformity improves predictability. It is also necessary for substitutability. A unit whose deployment ends or is rotated out due to losses can be replaced by a unit with similar capabilities. Of course, there is no such thing as perfect predictability and substitutability, but militaries do what they can to reduce uncertainty in these areas. At the extreme, the ideal combatant, whether a commander or a subordinate, is replicable across the entire organization. How tolerant is the organization of variations in equipment, training and procedure? Meaningful innovations may require staged adoption, particularly if the employment of the innovation is not yet fully understood. That means the organization must introduce variation and diminish uniformity, not a prospect military leaders relish. Furthermore, there is great potential for learning from uncontrolled variance in member behaviors.

一致性的期望與差異性的必需

軍事組織追求戰場上可預測性的偏好，是我們討論一個理想戰鬥人員的第三項變數：正規性的期望與差異性的容忍程度。一個具有一致的裝備、訓練、程序的士兵與單位對軍事組織的重要性到底有多少？軍事組織很重視「可預測性」(例如知道配賦的裝備能產生什麼效果)，以及可替代性(知道替代的裝備可以產生相同的效果)。兩者都可以透過標準化加以提升。當企圖明確，指揮官無論選擇甲單位或乙單位，兩者都會採取相似手段與方法執行任務。這種一致性提高了可預測性。一個單位的部署結束或因傷亡而

須休整時，可以由具備相似功能的單位接替。當然，世界上並沒有完美的可預測性和可替代性這種東西，但軍隊盡一切力量去降低這些不確定性。在極端情況下，無論是指揮官或部屬，都應該在整個組織中複製成為一名理想的戰鬥人員。組織對裝備、訓練、程序的改變，其容忍程度為何？有意義的創新可能需要分階段採用，尤其是在創新還沒有被完全理解時，組織引進變化，逐步降低一致性，而不指望一蹴可及。此外，還要經常從組織內部行為者自發性的改變中學習。

During the first year of the United States Civil War, the Chief of Ordnance of the Army, General James Ripley received numerous reports regarding the effectiveness of Spencer and Henry rifles. These breechloading, repeating rifles, though less accurate than some muzzle-loaders at great distances, were accurate at ranges less than 200 yards and greatly increased the potential rate of fire for an infantryman using one-with the Henry, at least sixteen rounds before reloading, compared to two or three shots per minute for a competent soldier using a muzzle-loading weapon. The math was compelling, but not to Ripley, who, in a letter to the Secretary of the Army in December, 1861, explained his objection to purchasing more than a small number of the weapons for field trials:

美國南北戰爭第一年，陸軍兵工署長詹姆士・雷普利將軍接到無數有關史賓塞及亨利步槍(Spencer and Henry rifles)的報告。這支後膛裝填連發步槍雖然遠距離的精度不及槍口裝填步槍，能精準射擊的距離不到200碼，但至少打了16發後才要再裝填，然而槍口裝填者，不過2～3發。此一數學很簡單，但對雷普利而言卻不同，1861年12月在一封寫給陸軍部長的信裏，對採購一批為數不少的槍械進行實地測試，提出反對意見如下：

The multiplication of arms and ammunition of different kinds and patterns, and working on different principles is decidedly objectionable, and should, in my opinion, be stopped by the refusal to introduce any more unless upon the most full and complete evidence of their great superiority.[15]

混合採用不同特性的武器與彈藥一事，萬萬不可。依愚見，應該拒絕引進新品，除非該新品的優越性具有全面且完整的證據。[15]

15　於下頁。

For General Ripley, the repeating rifles introduced an unacceptable degree of variation in ammunition and arms, as well as the requirement to issue much more ammunition to soldiers using Henrys and Spencers. His response captures the way the military virtue of uniformity becomes an impediment to adopting significant innovations. What advantage would the Union have gained through the broad fielding of Henrys and Spencers, coupled with training in controlled rates of aimed fire (for Ripley's concerns about ammunition were not entirely baseless-a panicked soldier could exhaust his ammunition in minutes)?

對雷普利將軍來說，很難接受連發步槍的引進造成的械彈改變，以及因使用該槍而產生彈藥需求的大幅增加。他的反應正是軍隊因「統一性」這項美德，阻礙創新的一例。如果北軍大量採用史賓賽與亨利步槍，加上射速管制訓練後會產生何種優勢(雷普利對彈藥消耗的顧慮並非沒有道理，一名驚慌失措的士兵可能在幾分鐘內就將彈藥消耗殆盡)？

Within the United States military, the degree of uniformity varies both across services and branches within services. The more interconnected a combatant or unit is with a broader system of resources, the less tolerant is the organization for departures from standard equipment and procedures. The Navy and the Air Force operate complex, interdependent platforms, and small deviations can result in significant displacements in their systems. This makes staged adoption much more challenging-requiring more central coordination. However, the Army, the Marine Corps, and Special Operations forces, in particular, have greater latitude for exploring the effects of innovations in the operational context. With small-scale or modular innovations, an organization can do partial fielding or field experimentation. The more novel a weapon or tactic, the more field experimentation is required. Yet even effective demonstrations may result in the rejection of the innovation if the organization deems the results cannot be generalized.

在美軍內部，對「統一性」堅持的程度，各軍、兵種各有不同。戰鬥員或單位在同一資源體系中彼此相互連接程度愈高，對偏離標準的裝備與程序，其容忍度就愈低。海軍和空軍操作複雜，相互依賴的平台，小的偏差可能導致整個系統的大位移。這使得適

15 US War Department, The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies, Series 3, Vol. 1 (Washington, DC: Government Printing Office, 1899).

應上更具挑戰性，需要更多的中央協調。然而，陸軍、陸戰隊和特種作戰部隊中，在探索作戰創新方面就具有更大的自由度。針對小規模或模組化創新，組織可以做局部的調整或進行實戰測試。愈是新穎的武器或戰術，愈需要更多的實戰測試。然而，即使是展示的成效不錯，也會因為組織認為無法加以普及，而可能加以剔退。

In war, military personnel try new things in response to operational challenges, and the organization tolerates this experimentation because it (usually)values tactical and operational success more than it does rigid adherence to standard procedure. During peace, this tolerance for uncontrolled experimentation (in the form of uncontrolled modifications of equipment, procedures, etc.)is much diminished, and hinders innovation.

戰時軍人針對作戰問題嘗試新事物，組織之所以容忍這種測試，是因為(通常)對戰術和作戰成功的重視，超過對標準程序的堅持。在和平時期，對未受控制的實驗(如在未報准情況下，對設備、程序等的修改)的容忍度就會降低，從而也阻礙了創新。

A military's ideal concept of a commander, a subordinate, and the proper relationship between them are partially determined by ideas about honorable war, of the proper delegation of authority, and the appropriate degree of uniformity in the organization. Innovations that challenge these ideas can be expected to encounter resistance. In summary, military organizations will tend to resist innovations that:

理想的指揮官、部屬，以及他們之間的適當關係，部分受到光榮戰爭、適切授權、適切的「統一性」等理念的影響。挑戰這些理念的創新，都可能遭遇阻力。簡單來說，軍隊組織都會在下列狀況下抗拒創新。

- Challenge existing notions of the nature and use of physical courage
- Unfavorably change the balance of risk in the offensive or the defensive
- Reduce control over the effects of military operations
- Decentralize decision-making
- Reduce the uniformity and substitutability of military assets
- 挑戰到現有實體勇氣的本質與運用。
- 在攻守風險平衡上產生不利的改變。
- 降低軍事行動之效果管控。

●決策權之下授。
●降低軍事裝備的統一性和可替代性。

Leaders who recognize the ways in which an innovation is misaligned with the dominant concepts of honorable warfare, decision-making control, and regularity in military assets will be better positioned to set the right conditions for change.

幹部如果預知某項創新不能與光榮戰爭、決策控制、軍事裝備正規性等主流概念一致，就應該先為這項創新建立條件。

Leading Cultural Change, or Managing It?

When an innovation is incompatible with dominant cultural concepts, successful innovation leadership involves three key tasks: (1)identifying the assumptions of the role of the ideal combatant that underlie an innovation, and the extent to which those new concepts align with the existing culture; (2)demonstrating that new assumptions that are misaligned with the prevailing culture will improve the organization's performance in the kinds of conflicts it anticipates; and (3)persuading the organization that the new concept of a combatant is not a rejection of the enduring values of the organization. This is a decidedly heroic view of the role of the leader in leading innovation, in the face of cultural resistance. But how realistic is it?

引領文化改變，或加以管理？

當創新與主流文化理念不相容時，成功的創新領導有三項主要任務：(1)明察創新背後設定的理想戰鬥員角色，以及這些新概念在何種程度上可以配合現有的文化；(2)展示出雖與主流文化不一致，卻足以在未來衝突上提高組織效能；(3)說服組織新的戰鬥概念，並不在於抗拒組織的永恆價值觀。這是領導者在引領創新，面對文化方面的阻力時，從英雄主義面向看應該扮演的角色。但是，現實面呢？

Innovation leadership in the military is constrained by three enduring characteristics of the military environment: (1)the need to innovate in peacetime, (2)the control of military leaders over the instruments of innovation; and (3)and the system of internal development and

promotion of officers.

軍隊領導創新受到軍事環境中，三項不變的特點所限制：(1)平時創新的需要；(2)軍隊領導人對創新機制的掌握；(3)對軍官的培養及升遷體系。

Although militaries exist for war, they operate more frequently (at least in the modern era) in times of relative peace. This means militaries need to imagine and to manufacture wartime conditions during times of peace. War is the most persuasive and unforgiving of all competitive contexts. As the saying goes, "the enemy gets a vote," and the enemy is very good at identifying and exploiting gaps between the full tactical, operational and strategic possibilities of war and the military's partial understanding of those possibilities. The organization's natural resistance to embracing an effective innovation will not alter an enemy's exploitation of a stubborn adherence to ineffective approaches. For example, when allied bombers lacking long-range fighter escorts suffered 20 percent losses in two raids against Schweinfurt in August and October, 1943, the notion bombers could protect themselves through mutually supporting fires seemed conclusively refuted. The allies suspended deep penetration raids, only resuming them when longer-range escorts became available.[16] But such stark facts are not naturally created in times of peace. The key is creating conditions in peacetime that reveal the essential qualities of a new problem, or the opportunities inherent in a new configuration of technology, procedure, or technique. This is a leadership responsibility. But engineering such conditions requires a willingness to challenge established concepts, bringing us to back to military leadership.

雖然軍隊因戰爭而存在，但有更長的時間處於相對和平狀態。也就是軍隊必須在平時想像或製造戰爭環境，戰爭是所有競爭環境最具有說服力，也是最無情的。正如俗話所說：「敵人擁有投票權」，敵人永遠最會在戰術、作戰、戰略的間隙中找到機會，而軍隊卻對這些機會一知半解。軍隊對有效的創新內在的抗拒，敵人卻不變的緊盯著我們的無效創新。例如1943年8～10月份盟軍對許溫堡(Schweinfurt)兩次大轟炸，因為缺乏長程護航戰鬥機，又拒絕了轟炸機彼此火力相互掩護的構想，因而蒙受20%損失。盟軍在獲得長程護航戰機前，停止了遠程滲透轟炸行動。[16]但是這種僵化的作法，絕不會發生

16 Donald Miller, Masters of the Air: America's Bomber Boys Who Fought the Air War Against Nazi Germany (New York: Simon and Schuster, 2007), p.195-205.

在平時，關鍵在於平時是否創造了發現新問題，以及科技、程序、技巧新組合的環境。這就是領導者的責任。但要擘劃這種環境，需要有挑戰現有觀念的意願，讓我們支持軍事領導人。

Military leaders control the use of resources for the purpose of exploration and innovation. Military innovation is deliberate and planned. The US military has units devoted to experimentation, but the experimentation tends to occur within an established framework, and, crucially, it focuses on resolving the problems presented by that framework, as opposed to discovering and solving problems unacknowledged by that framework.[17] In the decade before the First World War, the British Army struggled to incorporate the machine gun effectively into its operating concepts, largely because the Army's conceptual problems were framed in terms of offensive operations. The extraordinary and transformational character of the machine gun as a defensive weapon was therefore poorly understood.[18] Furthermore, because militaries are both public and authoritarian organizations, the entrepreneurial use of military resources for unplanned experimentation and innovation tends to be discouraged (to put it lightly) in peacetime. (Note that these constraints are relaxed in wartime, when the unsanctioned modification of government equipment is common.)

軍事領導人控制探索與創新所需的資源。軍事創新是精細並且縝密的。美軍有專職實驗的單位，但實驗往往根據一個既定的架構進行，主在解決結構上的問題，而不是發現並解決結構以外的問題。[17]第一次世界大戰之前的10年中，英國軍隊致力於將機槍納入其作戰構想中，主要是因為陸軍結構上，是放在攻勢理念的框架之內，也因而機槍在防衛及轉型方面的優異特性受到忽略。[18]此外，軍隊是屬於公眾且具有專制特質的組織，在平時並不鼓勵運用資源進行一些計畫外的創新實驗(請注意，戰時這些限制被放寬，在未受批准下裝備被修改，是常見的)。

17 This roughly corresponds to what the philosopher Thomas Kuhn termed "normal science." See Thomas Kuhn, The Structure of Scientific Revolutions: 50th Anniversary Edition (Chicago: University of Chicago Press, 2012), 24-27.

18 Tim Travers, The Killing Ground: The British Army, the Western Front and the Emergence of Modern Warfare, 1900-1918 (Winchester, MA: Allen and Unwin, 1987), p.62-70.

Finally, as a result of the modern system of officer development and promotion, senior officers tend to achieve their positions because they (1)have the individual characteristics the organization desires in its leaders, and (2)served as officers in the positions valued under the existing culture. Their careers are reflections of prevailing concepts of honorable war, the delegation of authority, or the degree of uniformity. If the prescription for overcoming resistance to innovation is that senior leaders undermine or abandon the strategic culture and values upon which they have built their careers, the organization is likely to be disappointed. This is the paradox of innovation leadership: senior military leaders are best positioned to create an environment that allows the organization to discover and validate new ways of doing things, but they are ill-suited to the tasks of identification, demonstration and persuasion that are core to innovation leadership.

最後，在現今軍官培養及晉升制度下，高階軍官之所以能晉升到今天的位階，是因為他們：(1)具備組織對其幹部所期望的個人特質；(2)受到現存的文化所重視。他們的事業反映出光榮戰爭、權力下授、一致性程度等主流觀念。如果克服創新阻力的方法，是高層領導人降低或放棄建立他們職涯的價值觀與戰略文化，組織很可能要失望了。這是領導創新高層幹部的矛盾：高階幹部位居可創造出讓組織能發現和驗證新做事方式之要津，但他們卻無法勝任將其加以鑑定、展示、說服等領導創新的核心使命。

Given these three conditions-the need to innovate in peacetime, control of leaders over the means to innovate, and the internal system of leader development and promotion-heroic leadership may not achieve the innovation results the military needs. Indeed, when an innovation is misaligned with the culture, leadership will more reliably stifle change than encourage it. Yet leaders lead directly and indirectly. In innovation, direct leadership involves the use of authority to validate problems and direct resources to the solution of those problems. It is deliberate. However, such deliberate approaches tend to reinforce, rather than challenge, existing cultural assumptions. The data and reasoning driving deliberate, top-down innovation leadership are themselves products of the existing culture. When an innovation is aligned with the culture, the organization can be trusted to manage the innovation well-whether it's managed from the top-down or the bottom-up. When the two are not aligned, however, the leader must create conditions in which the organization's culture can change.

鑑於上述三個條件：平時創新之必要、領導者對創新手段的控制、幹部培養與晉升之內部制度，使得具有英雄主義色彩的領導者很難達成軍隊所需要的創新成果。事實上，當創新未能與文化相配合，領導階層阻礙多於鼓勵。然而，領導者可以直接和間接領導創新。創新的直接領導，可以依據權責驗證問題，並投入資源來解決問題。這是經過深思熟慮的。但是，這種深思熟慮的作法是加強，而不是挑戰現有文化的假設。數據和推理支持深思熟慮的，自上而下的創新領導，他們本身也正是現有文化的產物。當創新與文化一致，組織就能自信無論是自上而下或由下而上，都能管理創新。如果兩者無法配合，領導者就必須創造條件，使組織文化改變。

Military innovations that solve problems not yet validated will be ignored or deprived of resources, more so during periods of fiscal constraint. Indeed, the most significant innovations may not solve validated problems, beginning on the periphery (or entirely outside)of the organization's dominant culture and strategy (e.g., carrier aviation), as solutions in search of problems. Strategic military leaders are uniquely positioned to create conditions such that organizations discover and validate new military problems.

尚未經過驗證的軍事創新，通常會被忽視或被剝奪資源，財政困窘時期尤然。實際上，最重大的創新，往往不能解決發生在組織主流文化與戰略周邊(或完全外部)(如艦載飛機)經過確認的問題。戰略軍事領導人擁有可以為組織發現和驗證新軍事問題，創造條件的得天獨厚優勢。

Recommendation 1: Engineer the Competitive Context of Innovation

In peacetime, leaders are responsible for engineering the organizational context to create conditions enabling inductive innovation-the discovery and validation of new military problems. Indirect or "emergent" innovation leadership involves the management of the competitive context for innovation. Whereas deliberate innovation leadership relies on the omniscience of the senior leader, emergent approaches use the full scope of the organization to explore and exploit new possibilities. The competitive context is the way in which the organization identifies the problems of competition it wishes to solve, and how it allocates resources across the set of potential solutions to those problems. The assumptions upon which a culture is based are changed through the demonstration of viable (and preferable)alternatives; the competitive environment in which a new approach is evaluated provides the context for this

demonstration. Every war game, every simulation, every conflict that involves other nations, every examination of strategy (even in fiction)is an opportunity to discover something new.

建議一：擘劃有利於創新的環境

在平時，幹部有責任擘劃組織環境，創造足以誘導創新的條件，也就是尋找並驗證新的軍事問題。間接的或「浮現的」創新領導力涉及到創新競爭環境的管理。而精細的創新領導力，有賴於高層幹部的全知，整體運用組織探索各種可能的新方法。競爭的環境是組織確認預期解決的問題，以及如何針對這些問題找尋答案而分配資源。文化所依據的假設，基於變數(或偏好)的改變而改變；接受評估的新方式，提供了競爭環境。每一場兵棋推演，每一次模擬，每一個涉及到其他國家的衝突，每一次對戰略的檢驗(即使事屬虛構)都是發現新東西的一次機會。

Recommendation 2: Teach Officers How to Challenge Their Assumptions

Exploration and experimentation is pointless if we have not determined what information would cause us to question our assumptions. Change happens when the old idea is invalidated by new facts, and a new idea replaces it. Although improving military education may be a commonplace recommendation for critics who have run out of ideas, it is nevertheless foundational to learning how to learn. This requires nothing less than a commitment to educating leaders about the character and sources of knowledge-epistemology. We are rarely aware of the typical, self-preserving, responses that we have to dissonant information. Our tools for gathering and analyzing data become more powerful every year, yet our understanding of the fundamental logic and methods of research is not keeping pace. Throughout the continuum of officer education, we must learn and re-learn the core principles of epistemology: logic, scientific reasoning, and research methods. In order to create conditions for this change, leaders should understand what constitutes a refutation of dominant concepts of war and the role of combatants in it. This is about teaching officers how to learn, how to change their minds, and how to embrace complexity.

建議二：教育軍官如何挑戰假設

如果我們還沒有確定什麼樣的資訊導致我們質疑假設，探索和實驗都是沒有意義的。當舊的觀念因新的事實出現而變得無效時，觀念就會改變，而為新的觀念所取代。雖然改進軍事教育可能是老生常談，它仍然是學習如何學習的基礎。這不外乎要求對領導者的品格和知識的源頭 ── 「認識論」施以教育。當我們接收到相互衝突的資訊時，

很少對典型與自我保護心態產生警覺。我們收集和分析數據的工具每年都變得更加強大，但是基本邏輯和研究方法的認識卻跟不上。軍官教育的連續性，我們必須學習，並且重新學習認識論的核心原則：邏輯、科學論證及研究法。為了創造這種改變的條件，領導者應該瞭解反駁當前主流戰爭概念與戰鬥員角色的內容。此即教育軍官如何學習，如何改變他們的想法，以及如何擁抱複雜性。

Recommendation 3: Give Officers Paths to Success

Two powerful mechanisms through which leaders change culture are (1)the allocation of rewards and status, and (2)the recruiting, selection, retention, and promotion of leaders.[19] Significant innovations present leaders with personnel management challenges. When a change in the way a military fights creates a new job, how does that job fit into the organization's existing framework for retention and promotion? Advanced militaries have elaborate systems for rewarding good officers, and for signaling to those officers (and to their peers)who in the organization has been identified as having potential for senior positions. In the 1920s, the US Navy successfully managed the addition of an entirely new (and large)part of the officer corps-naval aviators. This success rested on the astute decisions of Admiral William Moffett, who ensured aviators served in positions that required knowledge of surface warfare, and that non-aviators could command aviation units.[20] Thus, although naval aviation posed a serious challenge to the dominant concept of naval warfare, the naval aviation community came to be seen as a part of the broader community of naval officers, one that supported the core values of the US Navy. This delicate balance between revolution and conservation is exceedingly difficult to manage, and Admiral Moffett stands out because of how well he struck that balance. He was at various times opposed both by the traditional Navy community, and by the aviators. His core policies can be summarized as follows. First, he ensured naval aviators could achieve flag officer positions by requiring them to develop proficiency in the broader community of naval leadership. Second, he created conditions in which traditional naval officers interacted with and

19 Schein, Organizational Culture and Leadership, p.246.

20 Geoffrey Till, "Adopting the Aircraft Carrier: British, American and Japanese Case Studies," in Military Innovation in the Interwar Period, eds. Williamson Murray and Allan Millett (Cambridge: Cambridge University Press, 1996), p.210-211. Stephen Peter Rosen, Winning the Next War: Innovation and the Modern Military (London: Cornell University Press, 1991), p.76-80.

led aviation units, enabling them to see the new capability within a broadened framework of naval warfare.

建議三：讓軍官有其成功之道

領導人改變文化擁有兩項強大的機制：(1)獎勵和待遇之分配；(2)幹部之招募、甄選、留營與晉升。[19]重大創新的幹部都呈現出人事管理的挑戰。當軍隊致力於改變而新增某些新職位時，這些新職位如何融入組織現存的留營及晉升體系？先進的軍隊有一套精密的系統獎勵優秀軍官，及告訴其他軍官在組織裏他已經被認定具有晉升高階的潛力。在上一世紀20年代，美國海軍成功地管理另外一批新型態的軍官 ── 海軍飛行員。這一成功完全仰賴威廉・莫菲特將軍充滿智慧的決心，他規定飛行員必須具備水面艦知識，以及非飛行員可以指揮飛行部隊。[20]雖然飛行員要理解海軍主要作戰理念有點困難，卻讓海軍飛行員社群成為以捍衛海軍核心價值為職志的海軍軍官社群的一部分。這場革新與保守之間微妙的平衡，是非常難以管理的，莫菲特將軍很技巧的撥動其間的平衡。他經常受到傳統海軍社群與飛行員社群雙方的反對。他的核心政策可歸納為：第一、要求海軍飛行員能具備海軍應有條件，確保飛行員也能晉升到將級軍官；第二、他創造傳統海軍軍官與飛行部隊互動及領導的條件，讓他們能夠看到更開闊的海戰中的新戰力。

Admiral Moffett's achievement was built on a simple principle: he remained focused on the idea that naval aviation was an instrument of naval power; this helped him avoid the trap of confusing technology with identity. One of the greatest challenges to military innovation is the way that military professionals over time derive their professional identity from the technologies with which they interact, as opposed to the effects those technologies are intended to achieve. Significant military innovation often requires professional identity be divorced from platforms, and tied to higher-level concepts of operations.[21] Yet such disruption must preserve the organization's enduring values. No new military community will survive if it is seen to be opposed to these beliefs and values.

莫菲特將軍的成就，建立在一個簡單的原則：他始終專注於海軍航空兵乃是海軍發揚戰力的理念，這有助於他避免技術與認同相互混淆的陷阱。軍事創新的最大挑戰之

21 Morison, "Gunfire at Sea: A Case Study of Innovation," p.11.

一，是軍事專業人士經常從運用的科技中取得認同，而不是從這些科技意圖達到的效果中取得認同。重大的軍事創新往往必須將專業認同從平台中脫離，然後與更高階的作戰理念相連接。[21]然而，這樣的擾動，必須保留組織的長期價值觀。如果悖離這些信念和價值觀，沒有一個新的軍隊社群能夠存活。

Conclusion

Courage, honor, authority, control, predictability-these are powerful military concepts. Innovations that appear to subvert them stand little chance of success. In peacetime, significant military innovations inevitably run up against the dominant concepts of the role of the combatant, and provoke organizational responses that range from simple resistance to deliberate deception. Leaders who understand the culture of the organization will be able to anticipate such responses. Furthermore, through officer development and education, fostering informal experimentation, organizational design, and systems of officer promotion and retention, leaders can build structures and career paths that protect new approaches when they are most vulnerable to the dominant paradigm. One of the greatest responsibilities of strategic military leadership is fostering a context in which good ideas have a chance to develop into effective means and methods of war. The future depends on it.

結　　語

勇氣、榮譽、權力，控制、可預測性，這些都是有力的軍事理念。顛覆這些理念的創新，能夠成功的機會並不大。在平時，重大的軍事創新不可避免地要碰撞到主流戰鬥角色，並挑起組織反應，其範圍從單純的阻礙，到精細的欺瞞。瞭解組織的文化的領導幹部，可以預判這些反應。此外，經由人員培養與教育，促進了非正規的實驗、組織設計，以及軍官晉升和留營系統。在新的方法與主流之間關係特別脆弱之際，領導者可以建立職涯管道加以維護。軍事戰略領導人最大的職責之一，乃在於孕育一個讓好的觀念有機會成長，成為使戰爭更有效率的手段與方法的環境。凡此未來之所繫。

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