

Military Innovation and Military Culture

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ABSTRACT: This article examines the significance of culture as a moderator of innovation, and criticizes monolithic accounts of military resistance to innovation. It then describes a dimension of military culture focused on the concept of the ideal combatant, and how that concept relates to innovation. Military culture can be improved by: (1) engineering the competitive context for innovation, and (2) creating career paths in which new kinds of personnel have a means of advancing, while preserving enduring organizational values.

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 are trying to predict, the theoretical equivalent of a dog 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 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.

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

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1 Williamson Murray, “Innovation: Past and Future,” in *Military Innovation in the Interwar Period*, ed. Williamson Murray and Allan Millet (Cambridge: Cambridge University Press, 1996), 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), 278-82.

not otherwise explained. It is difficult to describe in practical, tangible terms.

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

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.

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,

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

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

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

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

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

assumptions about what makes an effective commander or subordinate, leaders should expect that the innovation will be resisted.

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.

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 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.

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

5 Murray, “Innovation: Past and Future,” 301. Although I cite Murray, he is not a proponent of this view. For his nuanced view of how military organizations respond to innovation, see his essays in *Innovation in the Interwar Period* and his more recent *Military Adaptation in War: With Fear of Change* (Cambridge: Cambridge University Press, 2011).

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

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

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), 234-251.

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.

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.

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.

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:

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.

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.

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

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.

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

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 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.

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.

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

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

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

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.

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.

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.

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.

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.

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

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

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.

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.

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

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

14 *Ibid.*, 50.

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.

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 breech-loading, 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:

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

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)?

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.

In war, military personnel try new things in response to operational challenges, and the organization tolerates this experimentation because

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).

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.

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:

- 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

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.

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?

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.

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 back to military leadership.

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.)

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.

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

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), 195-205.

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), 62-70.

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.

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.

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.

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.

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

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.

19 Schein, *Organizational Culture and Leadership*, 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 Millet (Cambridge: Cambridge University Press, 1996), 210-11. Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (London: Cornell University Press, 1991), 76-80.

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

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.