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Senior leaders assert that innovation continues to be the strategic imperative for the US military to prevail in 21st century conflicts. However, the DoD's current approach to innovation is inadequate. The US military must innovate to maintain a competitive advantage in future conflicts. To create and foster an innovative culture, commanders must understand innovation's terminology, recognize the strategic imperative for all service members to innovate based on changes in the global security environment, and promote a permissive culture that encourages prudent risk decisions and eliminates the zero-defect mentality.

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MASTER OF MILITARY STUDIES

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INNOVATION IN THE US MILITARY: HOW COMMANDERS CAN FOSTER AN
INNOVATIVE CULTURE

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

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Executive Summary

Title: Innovation in the US Military: How Commanders Can Develop an Innovative Culture

Author: Major Jonathan S. Smith, United States Marine Corps

Thesis: In order to foster an innovative culture, commanders must understand the terminology of innovation, recognize that global security environment demands innovation, promote prudent risk taking, and eliminate the zero-defect mentality.

Discussion: Innovation is not a new topic within the Department of Defense (DoD). Throughout American history, the US military has developed and implemented innovative concepts and capabilities to provide competitive advantages over adversaries. Indeed, senior leaders assert that innovation continues to be the strategic imperative for the US military to prevail in 21st century conflicts. However, the DoD's current approach to innovation is inadequate. Although the Services have established institutional structures intended to foster innovation, they have not addressed the fundamental obstacles that hinder it: the risk-averse culture and zero-defect mentality that permeate the armed forces. Additionally, many DoD leaders and commanders fail to comprehend innovation's terminology, thus inducing confusion and miscommunication with their peers, subordinates and leaders alike.

Conclusion: The US military must innovate to maintain a competitive advantage in future conflicts. To create and foster an innovative culture, commanders must understand innovation's terminology, recognize the strategic imperative for all service members to innovate based on changes in the global security environment, and promote a permissive culture that encourages prudent risk decisions and eliminates the zero-defect mentality.

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Introduction

Senior Department of Defense (DoD) leaders and the recent publications of the *National Security Strategy (NSS)*, the *National Defense Strategy (NDS)*, and numerous other strategic guiding documents have called for an increased emphasis on innovation within the US military. Published in 2017, the *NSS* states that in response to the simultaneous threats that America faces from different actors throughout the world, “[t]he United States must develop new concepts and capabilities to protect our homeland, advance our prosperity, and preserve peace.”¹ James Mattis, then-Secretary of Defense (SecDef) and renowned Marine Corps general, asserts in the 2018 *NDS* executive summary that the DoD and the Joint Force must “out-innovate” to maintain the competitive mindset necessary to “...succeed in the emerging security environment.”² Former Chairman of the Joint Chiefs of Staff, Marine Corps General Joseph Dunford, also posits that “[w]hile America’s joint force is [currently] the best in the world, it must continue to innovate to stay ahead of potential foes and to adapt to constantly changing strategies.”³ Clearly, senior leaders believe innovation to be the strategic imperative for all DoD entities in the 21st century.

The US military’s current approach to innovation is, however, insufficient to meet the intent prescribed by senior leaders and strategic documents. Although the DoD has formed numerous organizations to pursue innovation, its current organizational culture of risk-aversion and zero-defect discourages creativity and experimentation. Additionally, ambiguous terminology and an infatuation with cutting-edge technologies also hinder and restrain servicemembers from innovating. Due to the unprecedented challenges posed to the US military’s dominance by near-peer adversaries, commanders must establish and cultivate an innovative culture that embraces new tactics, capabilities, and concepts.

Innovative cultures do not just happen or occur by chance, though. Williamson Murray, an American historian and notable author of numerous military works, suggests that innovations—and innovative cultures—are not natural but are instead "...resisted by the very military institutions that would benefit from [them]." ⁴ Stephen Rosen, a Harvard and Naval War College professor argues in his work *Winning the Next War: Innovation and the Modern Military* that military organizations are not only difficult to change, but they are designed not to change. ⁵ He states, "This inflexibility and bureaucracy often leads to stifled innovation efforts and [a] lack of creativity throughout the force." ⁶ What must military commanders do, then, to foster a culture of innovation? In order to foster an innovative culture, commanders must understand the terminology of innovation, recognize that global security environment demands innovation, promote prudent risk taking, and eliminate the zero-defect mentality.

Understand Innovation's Terminology

To create and foster an innovative culture, commanders must first understand the terminology: its definition and types. They must be able to answer the foundational question, "What is innovation?" Is it a process or an outcome? Is it creating something new or merely refining something already in existence? Is it technology-driven, technology-supported, or devoid of any technological component? Gary Pisano, a professor at Harvard Business School and author of *Creative Construction: the DNA of Sustained Innovation*, argues that many organizations set out to become more innovative without comprehending what the term means. He asserts that without defining the term, "[i]nnovation' can mean anything—and, as a result, on its own it means nothing." ⁷ Dennis Gleason Jr. elaborates on this point in his article "Contemplating Military Innovation" and posits that "[p]erhaps the most difficult aspect of military innovation is describing it." ⁸ Gleason contends that senior DoD leaders and institutional

documents frequently rely on intuitive or implied definitions that confuse rather than assist their subordinates.⁹ He further argues that the military's lack of—or rather, the failure to use—a standard institutional definition “...results in miscommunication and misinterpretation of ideas. This miscommunication is typically a source of frustration for all parties involved in the decision making process.”¹⁰ Thus, commanders need to analyze and understand the terminology to form a conceptual foundation for building an innovative culture.

Definitions

Establishing a definition for innovation is not as easy as it may seem. In fact, many notable scholars and experts who have written on the topic of military innovation forgo offering a clear or explicit definition at all. US Army Colonel Liam Collins (Ret), former Director of the Modern War Institute at West Point, highlights this fact in his doctoral dissertation “Military Innovation in War: The Criticality of the Senior Military Leader.” He asserts that authors such as Barry Posen, Dima Adamsky, and Williamson Murray fail to define innovation effectively—even though they include the word in their publication titles.¹¹ Instead, they divert their readers’ attention to historical examples “...that are universally recognized as representing major innovations” to avoid proposing a definition.¹²

There are three essential components of innovation's definition that one should note. First, innovation is a process. Major Michael Siegl, USA, Director of the US Army Material Commanding General's Initiatives Group, posits that “[i]nnovation is a complex process that is neither linear nor always apparent.”¹³ Colonel John Price Jr. echoes this point in his article "US Military Innovation: Fostering Creativity in a Culture of Compliance" and contends that senior military leaders' now perceive innovation to be a "...point instead of a process..." due to the emphasis that modern culture places on technological change.¹⁴ Price claims that this is a

"dangerous error" and argues that commanders must not view innovations as isolated culminating events, but they should instead consider them "...consequence[s] of creativity and effort applied over time."¹⁵ Michael Horowitz and Shira Pindyck also posit that innovation is a process in their publication "What is a Military Innovation and Why it Matters." As the basis for their argument, Horowitz and Pindyck analyze numerous historical military examples that generally follow the same sequential stages: invention, incubation, implementation, and diffusion. (Figure 1)¹⁶

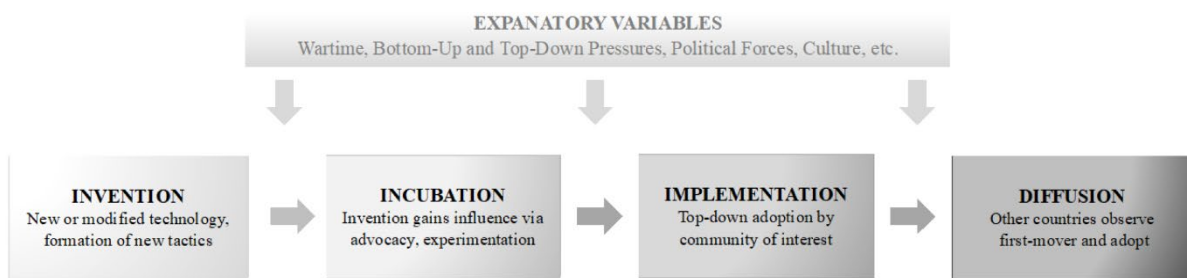


Figure 1. Military Innovation Process

Innovation is also an outcome. While Horowitz and Pindyck elaborate on the stages of the innovation process, they also state that innovation is "...both a process and an outcome."¹⁷ Focusing on the outcome aspect of innovation, they offer the following definition: "military innovations [are] changes in the conduct of warfare designed to increase the ability of a military community to generate power."¹⁸ Terry Pierce, a retired Navy Captain and the former director of the Center of Innovation at the United States Air Force Academy, borrows the Henderson and Clark model and defines four distinct types—or categories—of military innovations.¹⁹ Pierce provides the examples of weapon systems, ships' steering systems (analog to digital), the tank, and amphibious warfare to illustrate his point that innovations are undoubtedly outcomes.

Finally, innovation is different from adaptation. Although senior leaders frequently use these terms interchangeably, there are clear distinctions that one can identify. Glenn Grothe offers insightful definitions that clearly distinguish the terms from each other in *Innovation Versus Adaptability: Seizing the Initiative Through Creative Thinking Versus Reacting to the Enemy*. He suggests that innovation is “the introduction of something new, a new idea, method, or device” while adaptation is “adjust[ing] to different conditions or the environment.”²⁰ Theo Farrell and Terry Terriff also posit in *The Sources of Military Change* that innovation involves developing "new military technologies, tactics, strategies, and structures." In contrast, adaptation is adjusting "existing military means and methods."²¹ Collins uses a table to explain the differences between adaptation, invention, and innovation. (Table 1)²²

	Adaptation	Invention	Innovation
Definition	An adjustment to environmental conditions ⁴⁹	A new product or idea; bringing something new into being ⁵⁰	The introduction of something new; a new idea, method, or device; bringing something new into use ⁵¹
Example	A furniture company changing its crib design in response to new laws mandating closer bar spacing	Telephone Television Cotton Gin Light bulb Phonograph Concrete	Assembly line Agricultural mechanization Space flight Interstate highways Paper currency Domestication of the horse
Military Definition	Adjusting existing military means and methods to a change in the environment; the refinement of traditional routines; the grafting of new missions, techniques or tactics onto the old ⁵²	A new product or idea (related to warfare); bringing something new into being (related to warfare) ⁵³	The adoption of a change related to the goals; tactics, strategies or doctrine; and/or structure which is perceived as new to the organization
Military Example	During Operation Anaconda the U.S. military switched from its original hammer-and-anvil focus to a new plan that emphasized the massing of air fires in support of Army positions on the valley's eastern sides. ⁵⁴ Sandbagging the sides of Humvees for protection from IEDs	GPS technology Atomic bomb Radar Jet engine Tank Helicopter Mustard gas	AirLand Battle doctrine Counterinsurgency doctrine Carrier aviation Amphibious warfare Armored warfare Air mobile warfare Stormtroop tactics

Table 1. Adaptation, Invention, Innovation

Presently, the US military does not have a doctrinal definition for innovation. While the term is likely one of the most overused words at senior leadership summits and in senior leaders' presentations, few within the ranks possess a comprehensive understanding of the expression. This knowledge gap frequently leads to miscommunication and frustration throughout the force. Given the three vital components, and based on the literature reviewed, the following definition is offered for military innovation: it is both a process and an outcome that changes the conduct of warfare through the implementation or integration of new tactics, strategies, doctrines, materials,

technologies, or organizational structures to increase the effectiveness and enhance a military community's ability to generate power.²³

Types

The types of innovation are another vital component of the terminology. In recent decades, innovation has become conceptually synonymous with "emerging," "cutting-edge," or "break-through" technologies. Although advanced technology is a crucial component of military innovation and is one of the primary categories, it is not the only innovation type that one must consider as a potential offset to adversarial threats.

Illustrated in figure 2, Pierce suggests that there are four types of innovations based on changes in the core physical components or linkages in the system architecture: incremental, modular, radical, and architectural.²⁴ Additionally, he claims that innovations can either be sustaining or disruptive, depending on how they are employed.²⁵ Close

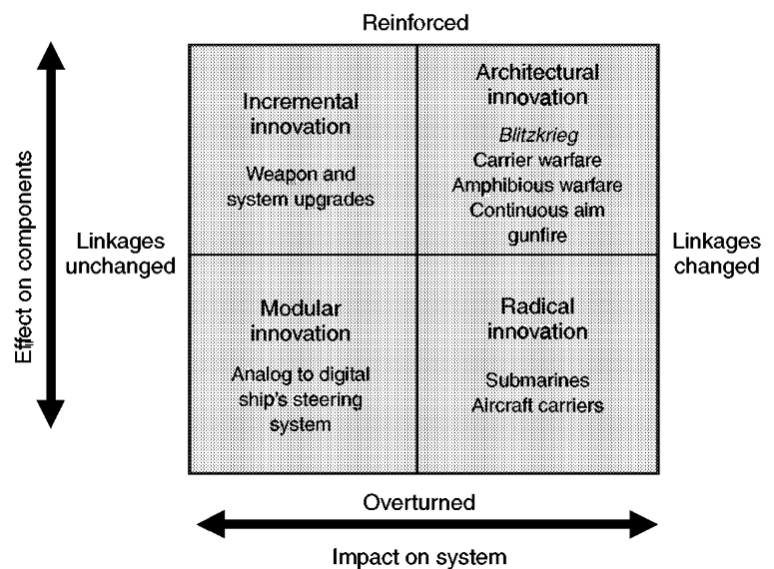


Figure 2. Innovation Types

examination of the four types clarifies the significance of innovation in the military context.

Incremental innovations are extensions or refinements to an existing design over time that gradually improve the quality or value of the product or process.²⁶ "Routine" or "evolutionary" are conceptually equivalent terms other scholars use to define these types of innovations. Ernest Wong and Nicholas Sambaluk, in their article "Disruptive Innovations to Help Protect against Future Threats," use the specific example of the M16 service rifle to illustrate this type of

innovation.²⁷ Barry Scott et al. argues that although some senior leaders may consider incremental innovations to be of little worth, they are essential due to the bureaucratic nature of the services' organizational culture.²⁸ He postulates that they are likely the “overwhelming majority” of innovations in the US military.²⁹ Gleeson also contends that any innovation that increases a military entity’s warfighting ability or changes the characteristics of war must not be perceived as inferior or dismissed as undesirable.³⁰

Modular Innovations are technologically-based improvements on existing components that maintain the same system architecture.³¹ In other words, these innovations incorporate new technologies to perform the same tasks.³² Pierce uses the example of a ship’s steering system (analog to digital) to illustrate this category.³³ Although modular innovations are less common than incremental, they are vital to improving the US military's current processes or warfighting abilities.

Radical innovations, also referred to as revolutionary by some experts, result from combining new technologies in novel ways to produce original objects.³⁴ The tank, aircraft carrier, and submarine are prime historical examples that illustrate this innovation type.³⁵ Gleeson posits that many political and military leaders consider these innovations to be the principal means for the US military to gain or maintain its competitive advantage.³⁶ Indeed, Elon Musk, Chief Executive Officer of SpaceX and world-famous engineer and entrepreneur, posited that “[i]n the absence of radical innovation, the US will be militarily second.”³⁷ Although some experts contend that radical innovations are extremely rare and challenging to produce based on the technological complexity and exorbitant cost,³⁸ all US military services apportion sizeable amounts of their budgets to research, development, testing, and evaluation programs in hope of producing radical innovations.

Pierce's model's final category, architectural innovations, are produced when existing technologies or components are employed in new ways.³⁹ These innovations frequently incorporate one of the previous innovation types within an organization's existing framework to create a new doctrine, process, or tactic. Pierce offers the historical examples of blitzkrieg, amphibious warfare, and carrier warfare.⁴⁰ These cases show that full exploitation of new technologies requires new doctrines and tactics. In their article "Finding the Right Innovation," authors Joe Mariani and Isaac Jenkins provide a simple equation to illustrate this point: tech + architecture = strategic edge.⁴¹ They argue that "...the most important question facing the military today—and the heart of military innovation—is not 'where will we find more technologies like Artificial Intelligence, hypersonics, or quantum computing' but rather 'how are we going to use those technologies to do something truly new.'"⁴²

Commanders must avoid restricting the term "innovation" to only refer to radical innovations comprised of advanced or cutting-edge technologies. Although technology plays a critical role in the design and experimentation process and is likely incorporated into the final concept or capability, it must not become the focal point for DoD innovative efforts. Ash Carter, former SecDef and notable physicist, contended that technological innovation is just one part of the US military's Third Offset Strategy. Created and promulgated by the previous SecDef, Chuck Hagel, the DoD's Third Offset Strategy is designed around next-generation technologies and concepts.⁴³ Carter argued that:

[o]f course, how we use technology is just as important as the technology itself, if not more, which is why we're also investing aggressively in operational innovation. Our plans and operations must account not only for the evolving challenges we face from our competitors, but also the opportunities afforded by new capabilities as they come on line—so technological and operational innovation must go hand-in-glove.

Now, innovation in technology and in operations are necessary for us, but they're not sufficient – because at the pace today's world demands, we can only succeed in these by being an agile organization that nurtures innovation in all its forms.⁴⁴

Understanding innovation's terminology—its definition and types—is foundational for commanders to create an innovative culture. Establishing an institutional definition will not inherently produce any tangible solutions to DoD problems; however, it would provide a common framework and baseline to use when discussing the topic with senior leaders, peers, and subordinates to decrease miscommunication and mitigate confusion. Additionally, recognizing the various types of military innovation is essential to avoid overemphasizing one over another. Commanders must consider all innovation types that increase the US military's efficiency, combat lethality, or warfighting ability as potential innovations that may provide the competitive edge senior leaders seek. While technology will continue to contribute to innovative tactics and strategies, senior leaders must not perceive it as the sole solution to every challenge. By starting with the basics of definitions and types, commanders can create a culture that recognizes the facets of innovation (both a process and outcome) and the importance of each type (incremental, modular, radical, and architectural).

Recognize the Strategic Imperative to Innovate

Having established a comprehensive definition for innovation and examined the different types, commanders must next recognize why innovation has become the US military's strategic imperative. After all, innovation is not a new concept in the DoD. Illustrated by the historical examples of the telegraph, the atomic bomb, aircraft carrier warfare, and counterinsurgency doctrine, US forces have demonstrated a superb ability throughout history to develop and employ new technologies, tactics, and strategies to gain and maintain a competitive advantage against adversaries on the battlefield. Why, then, have senior leaders demanded a more innovative force

and proclaimed that innovation is the primary means by which the US military will maintain its dominance? What has changed that has prompted this sense of urgency and necessity?

The return to Great Power Competition (GPC) with near-peer adversaries is the primary factor that demands an increased emphasis on innovation. The former Trump administration identifies this significant paradigm shift in its release of the updated *NSS*. Whereas many of the previous administrations focused their security strategies on combatting global terrorism, the Trump administration argues that China and Russia have become great power states and are the primary challengers to America's power, influence, and interests worldwide.⁴⁵ The *NSS* states that "...after being dismissed as a phenomenon of an earlier century, great power competition [has] returned. China and Russia began to reassert their influence regionally and globally...[and] they are [now] contesting [the United States'] geopolitical advantages and trying to change the international order in their favor."⁴⁶ In the *2018 NDS Executive Summary*, SecDef Mattis builds on this point and asserts that "[w]e are facing increased global disorder, characterized by a decline in the long-standing rules-based international order—creating a security environment more complex and volatile than any we have experienced in recent memory. Inter-state strategic competition, not terrorism, is now the primary concern [and central challenge] to U.S. national security."⁴⁷

A second notable change that necessitates a more innovative force is the erosion of the US military's dominance. Since the end of the Cold War, the US military has maintained considerable advantages in all domains. This superiority has enabled the US to establish military bases throughout the world and develop partnerships and alliances that have been critical to maintain the balance of powers and permit freedom of movement for the last several decades. As SecDef Mattis states in the *NDS Executive Summary*, "[w]e could generally deploy our forces

when we wanted, assemble them where we wanted, and operate how we wanted.”⁴⁸ However, China and Russia have radically modernized militarily, economically, and technologically and have decreased or eliminated the US's once-large competitive edge. In a study entitled *Providing for the Common Defense* published in 2018, the National Defense Strategy Commission posit that “[t]he security and wellbeing of the United States are at greater risk than at any time in decades. America’s military superiority—the hard-power backbone of its global influence and national security—has eroded to a dangerous degree.”⁴⁹ The *NSS* also contends that “[while] America’s military remains the strongest in the world [currently]...US advantages are shrinking as rival states modernize and build up their conventional and nuclear forces.”⁵⁰ General Dunford elaborates on this point and posits that China and Russia’s “...maritime capabilities, offensive cyber capabilities, electromagnetic spectrum, anti-space capabilities, and modernization of the nuclear enterprise and strike capabilities” have markedly eroded the US military’s dominance and threaten the security of the current international order.⁵¹ He asserts that today’s capabilities must be balanced with tomorrow’s capabilities to regain the competitive advantage and prepare for future conflicts across the multi-domain spectrum.⁵² The US cannot maintain military superiority without innovation.

US military leaders also contend that a basis for an increase in innovation is advancements in cutting-edge technologies that are rapidly changing the character of war.⁵³ The current Chairman of the Joint Chiefs of Staff, Army General Mark Milley, posits that robotics, hypersonic weapons, and artificial intelligence are just a few of the many emerging technologies driving a change in how militaries will fight future wars.⁵⁴ He claims that “It’s...theoretically conceivable that in some point in the future, you could have entire tank units without crews, or entire squadrons of airplanes without pilots, or ships or carrier strike groups without sailors.”⁵⁵

Although General Milley notes that these examples are hypothetical at this point, he believes that several critical technologies will change the conduct of military operations significantly. Milley argues that "...the country that masters [the use of] all of those technologies and develops the proper military documents with the proper organizations and the proper leader development will have a decisive advantage in the next conflict."⁵⁶

DoD's Inadequate Response: Innovation Organizations

In response to these challenges, senior DoD leaders directed the establishment of several organizations in an attempt to foster an innovative culture. These institutions' mission is to modernize the force by identifying, rapidly acquiring, and successfully delivering advanced technologies and materiel to the operating forces. The Defense Innovation Unit Experimental (DIUx) was the first organization formed for this purpose. In 2015, former SecDef Ash Carter announced the creation of DIUx in Silicon Valley to serve as a bridge between the military services and commercial companies leading in technological innovation.⁵⁷ DIUx's mission was to identify and rapidly procure cutting-edge technologies to enable military servicemembers to capitalize on the latest industry solutions available and employ them in combat.⁵⁸ Although the organization faced initial structural and personnel challenges that necessitated its "rebranding" to a 2.0 version,⁵⁹ the DoD eventually dropped the "experimentation" from the name in 2018 and established DIU as an enduring entity.⁶⁰ A second organization that the DoD established in 2018 in Austin, Texas, to meet this intent is Army Futures Command (AFC). The Army created and tasked AFC to "[m]odernize the Army for the future [by] integrat[ing] the future operational environment, threat, and technologies to develop and deliver future force requirements, designing future force organizations, and delivering materiel capabilities."⁶¹ The AFC focuses on six primary categories: long-range precision fires, next-generation combat vehicle, future vertical

lift, the network, air and missile defense, and soldier lethality.⁶² Like DIU, AFC is not located on a military installation to facilitate frequent and easy interaction between AFC leadership and civilian companies and research institutions in the local region. AFWERX is another entity that the DoD formed to facilitate creativity and innovation. In 2017, former Air Force Secretary Heather Wilson stated that "[w]e must be able to innovate faster" and announced that the Air Force would create a new organization to "...streamline military aircraft maintenance, address software problems, and find better ways to perform other tasks."⁶³ Initially based in Las Vegas, the Air Force has since opened additional locations in Arlington, Virginia and Austin, Texas that include "maker spaces" and technical centers to support innovators with basic manufacturing tools and design areas.⁶⁴ AFWERX's principal program, Spark, is designed to connect airmen of all ranks with industry developers and academic institutions. In just the four years since its inception, AFWERX has matured into one of the leading DoD innovation organizations.

Although these commands have made great strides to facilitate better communication between the DoD and the commercial industry sector, they are inadequate by themselves to produce or implement the concepts and capabilities necessary for the US military to regain dominance in the current global environment. Daniel Gerstein, senior RAND policy researcher and former Undersecretary (acting) and Deputy Undersecretary in the Science and Technology Directorate of the Department of Homeland Security, argues in "The Military's Search for Innovation" that establishing entities such as DIU and AFC does not necessarily guarantee a more innovative force.⁶⁵ He posits that history has proven that widespread military innovation is not a result of dedicated innovation centers or close relationships with scientists, academia, engineers, and industry.⁶⁶ On the contrary, innovation is about "...novel ideas and outside-the-

box thinking [that] can come from any part of the organization, its stakeholders, or even externally.”⁶⁷

DIU, AFC, AFWERX, and other DoD "innovation organizations" play an essential role in enhancing the US military's acquisition abilities and expanding the military-industrial base. Additionally, they afford servicemembers unique opportunities to explore and experiment with advanced technologies and materiel that would otherwise be unavailable or inaccessible. However, these entities ultimately fail to influence or alter the most critical obstacle to innovation in the US military: its culture.

The Crux of the Issue: Organizational Culture

Organizational culture often determines whether institutions facilitate or stifle innovation. Gary Pisano defines organizational culture as the “...shared values and social behaviors of members of an organization” and asserts that it is a “powerful driver” that can either “...lubricate or block the intentions of formal systems and processes.”⁶⁸ Then Major Michael Siegl expands on Pisano’s definition and describes military culture as the “...attitudes, values, goals, beliefs, and behaviors characteristic of the institution that are rooted in traditions, customs, and practices and influenced by leadership.”⁶⁹ He asserts:

[m]ilitary culture is the linchpin that helps determine the ability to transform because it influences how innovation and change are dealt with. Its implications for U.S. military transformation are thus profound. The ability to harness and integrate technological advances with complementary developments in doctrine, organization, and tactics is dependent on the propensity of military culture to accept and experiment with new ideas. Therefore, focusing on developing and shaping a military culture amiable to innovation and continuous change will help create the conditions for current transformation efforts to be effective and successful.⁷⁰

Gleeson also recognizes this critical point and posits that “[f]or a military institution to innovate successfully, it must be willing to explore new ideas without bias or prejudice and examine and learn from prior experiences. Its culture can either facilitate or impede this process.”⁷¹

Senior leaders assert that the US military's current culture does not promote innovation due to its risk-aversion and zero-defect mentality. Former SecDef Mark Esper highlighted this point in a speech entitled "Maintaining the US National Security Innovation Base" delivered at the Center for Strategic & International Studies. He posited that to become more innovative, the DoD must eliminate its risk-averse culture that is not conducive to new ideas or concepts.⁷² He stated that "[t]he services are experimenting. That's good, and we encourage that, but the thing we've really got to get at—and it takes time, and it's probably the most difficult part and the hardest to change—is the culture."⁷³ General Milley also acknowledged this deficiency and stated that the US military has become "...overly centralized, overly bureaucratic, and overly risk averse."⁷⁴

Risk-aversion is the principal organizational culture factor that stifles innovation in any organization. In the article "Risk-Averse Culture Hindering Innovation," authors Tom Koponen et al. detailed the results of a survey they conducted to identify the systemic concerns, root causes, and barriers that hinder innovation, specifically regarding organizations' acquisition processes. They found in their research that although 75% of the respondents reported that their organizations encouraged innovation, 75% also responded that risk-averse barriers were present in their community that limited their organization's innovative potential.⁷⁵ Army Lieutenant General Susan Lawrence (retired) also notes the effect risk-aversion has on the US military's innovative efforts. She argues in her article "To Maintain Our Leading Military Edge, We Must Think Differently" that "[t]o bring emerging, game-shifting technologies to the field far faster than our rivals, the Defense Department will need to pivot its organizational culture from being risk averse to risk tolerant. That means understanding that some risk can be healthy so long as the risks are well understood, well managed and addressed early."⁷⁶

Organizations can develop a risk-averse culture due to a variety of reasons. In the article “Our Risk-Averse Army: How We Got Here and How to Overcome It,” Lieutenant Colonel Trent Lythgeo, a US Army aviation officer and instructor at the US Army Command and General Staff College, provides three likely sources that contribute to the risk-averse culture prevalent in the US military today. First, he suggests that commanders avoid risk due to “loss aversion.”⁷⁷ This theory teaches that losses—or the potential for loss—generally has a much greater psychological impact than the prospect for a gain of the same or slightly greater size.⁷⁸ Lythgeo posits that uncertainty also compounds to loss aversion and frequently results in commanders passing up good opportunities based on overestimating tactical risk to avoid potential loss.⁷⁹ The second reason Lythgeo offers to explain the risk-averse culture in the DoD is the social norms of the organization itself. He contends that commanders do not necessarily consider a risk decision against the likelihood of failure or success but rather through the current culture's lens.⁸⁰ Consequently, a risk-averse culture breeds risk-averse commanders, which in turn continue to cultivate a risk-averse culture. The final explanation Lythgeo claims is because risk is simply not natural or comfortable.⁸¹ For his justification, Lythgeo cites a personality study conducted of students at the US Army War College. He explains that most students, military officers who are prime candidates for senior leadership positions, generally score lower than the average civilian in openness—the primary category associated with low risk-taking propensity.⁸² Although this may be just another indicator of social norm or loss aversion influences, it certainly highlights that the US military's culture is, and will continue to be, risk-averse unless something changes.

Risk-aversion is the foremost impediment to innovation in the US military. Not only does it influence commanders' decisions when faced with new concepts or capabilities, but it also

affects subordinates' proclivity to even develop or introduce new concepts or capabilities for leadership review. Hence, innovation is stifled both from the top-down and bottom-up. To overcome this significant obstacle, leaders must develop and promote a permissive culture.

Promote A Permissive Culture

The final essential action commanders must execute to foster a culture of innovation is to promote a culture that encourages prudent risk decisions and eliminates the current military's zero-defect mentality. In his article "Creativity and Innovation: The Leadership Dynamics," Emmanuel Agbor argues that "...leadership is the catalyst and source of organizational creativity and innovation."⁸³ He contends that many organizations search for competitive advantages in all the wrong areas: their strategy, technology, culture, or organizational structure.⁸⁴ Although each of these factors influences the innovation process significantly, Agbor asserts that the most important source, often the most ignored or forgotten, is leadership.⁸⁵ Leaders, after all, "...are the catalyst[s] that create and manage the environment, organizational culture, and strategies that encourage and sustain innovation, effectiveness and success in the organization."⁸⁶ Colonel Collins echoes this idea and states that "...senior military leader[s] [have] a critical role, if not the decisive role, in determining the fate of an innovation."⁸⁷ He posits that through each phase of the innovation process, senior military leaders are the defining influence that determines whether an innovation is successfully implemented or not.⁸⁸

To change the current US military risk-averse culture, commanders must demonstrate the behavior they want and be willing to accept responsibility if a failure occurs. Jim Whitehurst, president and Chief Executive Officer of a leading open-source enterprise information technology company and author of *The Open Organization*, claims that "...culture change begins when leaders start to model the behavior they want the organization to emulate."⁸⁹ He asserts

that leaders must not only accept failure as part of the innovation process, but they should actually celebrate it as an opportunity to learn.⁹⁰ He claims that this encourages others within the organization to experiment and explore new ways or methods to accomplish tasks.⁹¹

Pisano provides an insightful illustration that highlights this point on leaders' criticality to change an organization's culture to produce a more innovative environment. Johnson & Johnson (J&J) is one of the largest and most successful companies in the world. For more than 130 years, J&J has maintained its relevance and vibrance by capitalizing on its innovative workforce's entrepreneurship and creativity and then subsequently through its operational marketing expertise.⁹² Nevertheless, Pisano notes that in the late 1990s and early 2000s, J&J's culture became incredibly risk-averse because its continuing success allowed the company to become complacent. Consequently, senior leadership discouraged significant risk-taking. In 2002, J&J hired Paul Stoffels as senior executive within the pharmaceutical division. Eventually, J&J promoted Stoffels to the role of worldwide chairman of J&J pharmaceuticals. During this time, Stoffels's division had a costly clinical program failure. Senior leadership demanded to know who was at fault for the program fiasco. In response, Stoffels responded, "I am accountable. If I let this go beyond me, and I point to people who took the risk to start and manage the program, then we create a risk-averse organization and are worse off. This stops with me."⁹³ Due in part to Stoffels's extraordinary leadership and mentorship, J&J returned to being one of the most dynamic and successful companies worldwide. In 2013, J&J launched an innovation branch as a result of Stoffel's passion and dedication to inspire other divisions within the company. It has been a driving force to guide the company's research and development strategy. In the years since Paul Stoffels's program failure, he has had the opportunity to retell his story numerous times to J&J senior executives and managers. In his conclusion, Stoffels leaves his audience with

a short but impactful statement that he has adopted to foster an innovative culture throughout the organization: “You take the risk. I will take the blame.”⁹⁴

The US military cannot innovate unless its leaders encourage prudent risk acceptance and encourage experimentation at the risk of failure. Commanders must not only exemplify the behavior they desire in their organizations, but they must also be willing to be a buffer when failure occurs to enable their subordinates to continue to take risks and act on initiative. Former SecDef Esper asserted that:

[t]o protect our hard-earned gains, [the DoD] must continue to promote a culture of innovation and risk taking. We must make the tough choices required to align our investments with our highest priorities, particularly by shedding legacy systems to advance new capabilities. In this rapidly changing security environment, we must adapt quickly and outpace our strategic competitors at every turn. In doing so, we will maintain our decisive advantage, now and into the future.”⁹⁵

Conclusion

Senior leaders and military strategists assert that the DoD must innovate in order to gain and maintain a competitive advantage in future conflicts. Due to the rapid advancement of technology and the return to GPC, America’s global military dominance has significantly eroded—or been eliminated—and US forces are now contested in every domain. The DoD’s current approach to innovation, however, is inadequate to meet the intent prescribed by senior leaders. Organizational risk aversion and fear of change, conceptual confusion, and overemphasis on technology hinder innovation in the US military.

To overcome these obstacles, commanders must create and foster an innovative culture that embraces new tactics, capabilities, and concepts. To do this, commanders must first understand innovation’s terminology. Without establishing a clear comprehension of its definition and various types, confusion and miscommunication will continue to abound and will

frustrate both decision-makers and innovators throughout the force. Commanders must also recognize the strategic imperative for all service members to innovate based on changes in the global security environment and the rapid evolution of technology. Although "innovation organizations" are essential to facilitate closer dialogue between the DoD and commercial industry sector and streamline acquisition processes, they are insufficient to affect the military's organizational culture that restrains and hinders innovative efforts. Finally, to change the current risk-averse and zero-defect culture, commanders must promote a permissive culture that encourages prudent risk decisions and eliminates the zero-defect mentality. They must model the behavior they want and be willing to accept responsibility if failure occurs. Innovating is vital for any organization to gain and maintain competitive advantages. Commanders at all levels of the force must foster an innovative culture to produce the solutions necessary to remain competitive in the 21st century and beyond.

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