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The ongoing process of Marine armor divestment is incorrectly rooted in the limitations of past platform capability, method of employment, and force-structure. Allowing self-imposed limitations of thought define our future course prevents a necessary and fundamental re-evaluation of how armor can provide nested value to the Marine Corps' future fight. Conceptual changes outlined in the CPG combined with the inherent uncertainty of current peer competition require the systematic divesture of the M1A1, the development of a new platform with rebalanced capabilities to match concept and environment driven requirements, and a force-structure that is conducive to adaptations in the function, role, and employment of expeditionary armor. Accepting the surrender of some current M1A1 capabilities, a relatively light-weight platform employed in a more dispersed manner could offer resilient and responsive combat power by expanding the contributions of network-protected close-in fire support through the use of modular weapons components, integrated and open-architecture protection systems, and platform-launched multi-purpose UAS. This redefined expeditionary armor platform could adapt the concepts of mobile protected firepower to effectively support both emerging concepts and the unplanned actions required for global prevention and deterrence.

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Re-Thinking Marine Armor

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Executive Summary

Title: Re-Thinking Marine Armor

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Thesis: Conceptual changes outlined in the CPG combined with the inherent uncertainty of current peer competition necessitate a fundamental re-evaluation of Marine armor and its method of employment. Correcting the currently unaddressed armor *equipment-concept* mismatch requires the systematic divesture of the M1A1, the development of a new platform with rebalanced capabilities to match concept and environment driven requirements, and a force-structure that is conducive to adaptations in the function, role, and employment of expeditionary armor.

Discussion: While the continuously modified Marine M1A1 has repeatedly proved itself effective in past conflict scenarios, its incremental updates have failed to adjust materiel relevance to match the breadth of conceptual change occurring within the organization. The Marine Corps has aggressively embraced change with the introduction of novel operational concepts, but has allowed previous roles, capabilities, and employment of its armor community to limit the thought process regarding future armor contributions. As the Commandant has called for the "divesting of legacy capabilities…that are only associated with the least-likely, worst-case scenario," the discussion of how innovations in armor can support the Corps' new concepts has been prematurely disconnected from future force development. However, tomorrow's "force of choice" must still grapple with the uncertainties of a diverse threat environment. Varying assessments of future conflict challenge many of the threat assumptions laid out in the CPG and question its unhedged realignment of effort towards direct great-power conflict. Despite conflicting evaluations of the future threats to US national interests, advanced all-domain adversaries and increased network denial are widely accepted aspects of certainty. In this environment, an integrated ground-based armor asset offers a viable method of immediate and responsive fire support that can minimize network reliance and force signature, limit collateral damage in sensitive areas, and fill the gap left by environmental or enemy impediments to required C4ISR targeting functions. Accepting the surrender of some current M1A1 capabilities, a relatively light-weight platform employed in a more dispersed manner could offer resilient and responsive combat power by expanding the contributions of network-protected close-in fire support through the use of modular weapons components, integrated and open-architecture protection systems, and platform-launched multi-purpose UAS. Ongoing technological advancements present the opportunity for these expanded contributions of close-in fire support which could be provided through an armored platform that rebalances updated battlefield requirements with increased strategic and operational mobility.

Conclusion: The ongoing process of Marine armor divestment is incorrectly rooted in the limitations of *past* platform capability, method of employment, and force-structure. Allowing self-imposed limitations of thought define our future course prevents a necessary and fundamental re-evaluation of *how* armor can provide nested value to the Marine Corps' future fight. Maintaining a relevant and flexible armor capability amidst current operational and organizational change would enable future distributed operations while preserving credible combat power in a forward-postured force. This must include a fundamental re-evaluation of Marine armor that is unhindered by past perceptions, and simultaneously addresses force-structure, operational role, and platform capabilities needed in the future fight. A redefined expeditionary armor platform could adapt the concepts of mobile protected firepower to effectively support both emerging concepts and the unplanned actions required for global prevention and deterrence.

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

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Chapter 1

INTRODUCTION

When assessing the role of tanks in future Marine Corps conflict scenarios, it is commonly perceived that they are once again a legacy and unfeasible contributor to the changing expeditionary environment.[1] Surfacing well before the recent shift in focus to peer adversaries and adaptive operational concepts, the impending 'death of the tank' has been a regular and cyclical argument that has challenged the platform's use both in the Army's larger mechanized formations and in the execution of Marine Corps expeditionary combined-arms operations.[2] These arguments most recently and most frequently refer to the increased capability of anti-armor weapons, improved targeting cycles and payload of long-range indirect fires and air-delivered ordnance, and the tank's own limitations as a result of its size, weight, poor strategic mobility, and extensive support requirements; all combining to threaten the platform's effectiveness on a future battlefield.[3] These perspectives are compounded further in the context of expeditionary forces, in which roles of crisis prevention and response require the Marine Corps to "be first on scene,…first to contain a brewing crisis, and first to fight if required to do so."[4] As a result of recent changes in the U.S. assessment of future conflict and the resulting operational changes for the Marine Corps laid out in the 38th Commandant's Planning Guidance (CPG), this paper strives to historically root and instigate a rethinking of Marine armor in order to achieve value-added to emerging concepts while also retaining flexible, credible, and responsive combat power in a future network-challenged threat environment.

Background

A historical waxing and waning of applicability amidst changing conflict experience has regularly prompted attempts to update the relevancy of armor capabilities. Initiatives like the Army's 1996 Future Combat System program (FCS) and the Marine Corps' 2001 Expeditionary

Fighting Vehicle (EFV) promised "futuristic conceptual weapon system[s]…[that] required formidable technological breakthroughs"[5] in hopes of better supporting the future force. However, snow-balling design requirements, shortfalls in developing technology, and shifts of funding to support growing combat requirements drove these projects to cancellation, leaving behind only frustration at what was accomplished with billions of dollars invested.[6] More recently, a 2018 U.S. Army Command and General Staff College thesis suggested the development of a new joint armor platform to meet the challenges of a future operating environment marked by global littorals and their inherent megacities.[7] Analyzing the historical strengths and weaknesses of mobility, protection, and firepower for tanks operating in densely populated urban-littorals, Major Jeremy Zollin argued for the Army and Marine Corps to jointly field a lighter weight tank specifically designed for these foreseen operating environments that maximizes urban mobility, achieves all around protection, decreases current weapons engagement restrictions (elevation, depression, traverse-ability), and improves rapid projection to key locations across the world.[8]

In contrast to these long-range development initiatives, over the last two decades the Marine Corps has chosen to implement tested technologies to achieve sustained improvements to the M1Abrams Main Battle Tank (MBT). Incremental projects effectively increased protection against top-down and underbelly attack, added battlefield management assets, and continuously improved target acquisition, engagement range, and kill-power.[9] A 2018 Marine Corps Command and Staff thesis challenged the focus of this modification framework for the Abrams, assessing that it unnecessarily prioritized continued firepower improvements instead of improving necessary "communication, digital, surveillance and networking capabilities…[in order to] bring the focus back to how best to enable the infantry"[10] on a future battlefield. Major

Harry P. Consaul cited the tank's armored command and control capabilities and argued that future effectiveness in battlefield support needed to be achieved through a larger complement of capabilities to include updated communications architectures.[11] Despite a nearly constant stream of modifications for the Marine M1A1, advancements have continued to largely support and sustain traditional means of tank employment (outlined in Marine Corps Warfighting Publication 3-12, *Marine Corps Tank Employment*), which proved effective during multiple campaigns in Iraq, and again when later modified and adapted for use in southern Afghanistan. [12]

The Problem

All the above attempts to shape the future of armor have either modified previously developed material capabilities to mitigate adapting threats, or have applied technological advancements on top of engrained thought-frameworks and force structures to deliver updated functionality. Both methods of advancement fatefully limit the means in which an armor asset could support Marine Corps concepts in the future fight by overlaying previously identified requirements onto fundamentally different concepts and environments. While the updated Marine M1A1 has repeatedly proved itself effective in past conflict scenarios, its incremental updates have failed to adjust materiel relevance to match the breadth of conceptual change that is currently occurring within the organization.

Suggested in 2017 by Lieutenant Colonel Ben Adams, "the prudence of promoting an acquisition strategy that continues to modify a vehicle platform designed for the Cold War could result in a tank that no longer meets the [adapting] requirements"[13] of a forward-looking organization. Unfortunately, this previously predicted possibility is today's current reality. As the CPG has called for the "divesting of legacy capabilities…that are only associated with the least-likely, worst-case scenario,"[14] the discussion of how armor can support the Corps' new concepts

has been quickly disconnected from future force development as a result of preconceived limitations in its role, capability, and employment.

Changing assessments of future threats and the resulting need to adjust military equipment and employment are not novel occurrences. The National Defense Strategy (NDS) and CPG identify surprisingly similar environmental factors and challenges to those faced by Soviet military leaders in the 1920s, paralleling the struggle of the Red Army to properly develop, structure, and operationally employ a modern force against novel post-World War I (WWI) threats. Today, ongoing assessments of future adversaries and an adapting character of conflict similarly challenge the fundamental assumptions that previously constituted the bedrock of force and concept development. While currently immersed in a greatly different strategic context, reviewing Soviet interwar efforts in adapting to and effectively confronting disruptive shifts in the threat environment can help inform today's process of change initiated by the CPG. Simultaneously rethinking the structure, equipment, and employment of their forces, Soviet leaders attempted to marry capability and concept development in order to operationalize adaptive theories with relevant technological advancements.

This paper will discuss how the conceptual changes outlined in the CPG combined with the inherent uncertainty of current peer competition necessitate a fundamental re-evaluation of Marine armor and its method of employment. Correcting the currently unaddressed armor *equipment-concept* mismatch requires the systematic divesture of the M1A1, the development of a new platform with rebalanced capabilities to match concept and environment driven requirements, and a force-structure that is conducive to adaptations in the function, role, and employment of expeditionary armor. Accepting the surrender of some current M1A1 capabilities, a relatively light-weight platform employed in a more dispersed manner could offer

resilient and responsive combat power by expanding the contributions of network-protected close-in fire support through the use of modular weapons components, integrated and open-architecture protection systems, and platform-launched multi-purpose UAS.

Chapter 2

HISTORICAL FOUNDATION FOR CHANGE

The Soviet Interwar Experience

Following WWI, new technologies and their associated challenges introduced heavily debated arguments over the methods of employing mechanized assets, in particular tanks, and their associated roles, tactics, and supporting organizational structure.[15] Analyzing the painful stalemate of WWI and the somewhat contradictory lessons of their following Civil War, Soviet military leaders rejected the stalemate of positional warfare while accepting that the uncertainties of future war could still force portions of this undesirable type of battle.[16] The Soviets recognized that new technologies of the industrialized world had changed the face of modern military operations in a manner that required a new order of thought and approach. Reform-minded military leaders synthesized the lasting certainties of past combat-experience and combined these lessons with forecasted uncertainties of likely future conflict, catapulting an interwar process of conceptual and materiel innovation to better posture the Red Army for the next fight.[17] A developing and dramatically different understanding of modern warfare challenged the status quo, defined new roles for armor, and drove substantial change in Soviet military equipment, strategy, and force design.[18]

A novel assessment of how to address future threats was solidified in an organized study initiated by Mikhail Tukhachevsky in 1926 while serving as the Red Army's Deputy Chief of Staff. The two year study identified three different regionally and internationally based conflict scenarios most likely to be faced by the growing Soviet Union, officially recognizing that the Red Army was not properly trained or equipped for the future environment due to a lack of

technologically advanced assets and supporting force structure.[19] Tukhachevsky's assessment presented two major challenges for the still relatively backward Soviet Union; how to develop and structure a modern force that could compete on a new battlefield, and how to operationally employ this force in a means to overcome an enemy with advanced capabilities. He argued that modern warfare, now expanded in operational length, depth, and complexity, would require a "whole new approach to the planning of procurement, …force structure, tactics, and training."[20]

Individuals like Tukhachevsky, Alexsandr Svechin, Georgii Isserson, and Vladimir Triandafillov believed that the growing complexities of modern war negated previously held definitions and assumptions, marking a paradigm shift in "the very essence of the evolving modern operation."[21] The growing Soviet consensus that future war would require the achievement of new linkages over time, place, and intent, provided a logical stepping stone to the formation of new '*deepening'* concepts.[22] Combining the increased battlefield mobility of tanks with the extended range of improved artillery, the concept of D*eep Battle* began shifting Soviet thought away from previous broad-front strategies and suggested that yet-to-be developed mechanized assets and formations could achieve strategic depth to more effectively exploit the enemy's entire warfighting system.[23]

The *1929 Soviet Field Service Manual (PU-29)* served as the first official statement of Soviet doctrine reflecting the new methods of war developing within Red Army leadership.[24] It was an expression of what was to come; a forward-looking statement that introduced the dilemma of devising methods and forces to counter newly defined threats.[25] Its vision required Soviet military leaders to solve specific practical problems associated with emerging *Deep Battle* concepts, including necessary changes to the army's "operational make-up and operational role of various arms," as well as the crucial marriage between asset development and operational

requirements.[26] The emerging concepts worked to exploit the tank's advancing operational characteristics of "high mobility, great firepower, and enormous offensive capability"[27] by re-envisioning the functionality of mechanized assets supported by newly maturing technologies.[28]

While simultaneously testing iterative changes in force structure that employed tanks in multiple capacities,[1] a newly invigorated Soviet tank-fulfillment program worked to balance and satisfy the concept-based materiel requirements of *Deep Operations*.[29] Achieving an integrative development process that actively sought equilibrium between doctrine and technology, the Directorate for Mechanization and Motorization effectively designed and produced new and relevant capabilities, like the BT series high-speed tank, that would further operationalize the Red Army's emerging concepts.[30]

Marriage of Concept and Capability

Despite the eventual stagnation of *Deep Operations* as a result of Stalin's military purges and misinterpretations of the Spanish Civil War, the unrestricted thought involved in the concept's development and the associated acceptance of new assumptions, requirements, and force-structure are historically noteworthy.[31] The Soviet interwar process of adapting a force to confront the assessed uncertainties of a drastically changing future battlefield can help inform today's leaders that currently face similarly disruptive shifts in the global threat environment. Soviet innovation resulted in the development of novel materiel capabilities in support of new operational concepts that leveraged maturing technologies, while simultaneously modifying force structure and methods of employment to address the challenges of future conflict. The NDS and CPG similarly identify substantial shifts in the nation's assessment of future threats, for

[1] Concepts put forth in PU-36 identified three functionally-separate tank groups that would employ armor assets: (1) shortly ahead of the forward line to soften enemy resistance ***(DPP*** – '*Dais hey Poddierzhki Piechoty'* - long range support)*; (2)* in direct support of the infantry-centric main advance ***(NPP*** '*Nieposredstviennoy Poddierzhki Piechoty' – immediate infantry support)*; and (3) deep in the enemy rear area supported by artillery and air assets ***(DD*** *– Dalno go Dieystviya - long range action).*

many of which current military forces are not well prepared. Mirroring the novel ideas of interwar Soviet military theorists, the Commandant has challenged the Marine Corps to acknowledge, define, and accept fundamentally new assumptions in order to escape self-imposed limitations of historically and organizationally rooted thought. This process must include an equally unbiased re-evaluation of Marine armor that is unhindered by past perceptions, and simultaneously addresses force-structure, operational role, and platform capabilities needed in the future fight.[32]

Chapter 3

CONNECTION TO TODAY

Assessing Future Conflict

Within a general military context, the United States currently shares multiple parallel experiences with that of the interwar USSR. Similar to the Soviet Union's position after its Civil War, the 2018 NDS assesses that the U.S. is currently "emerging from a period of strategic atrophy…[within] an environment defined by rapid technological change…[that requires] investment to restore readiness and modernization of [the] military."[33] Like Tukhachevsky's 1928 Soviet Future War Study, changing assessments of modern conflict laid out in the NDS present two major challenges that must be addressed; how to properly develop and structure the modern force, and how to develop the means and assets to operationally employ that force. Regardless of 90 years of separation, the foundations of advancing military theory still rest on a continuous and adaptive assessment of future conflict.[34] In the post-WWI Soviet Union, this dedicated study of future war initiated the reformation of an outdated military organization while simultaneously re-defining the structure and doctrine with which its forces would fight. Similar shifting paradigms surface again today within a drastically extended operational environment that requires continuous strategic deployment of U.S. forces via land, air, and sea to address varying degrees of adversarial behavior. Current evolving threats including improved Anti-Access Aerial Denial (A2/AD) systems, continuous grey zone competition, technologically advanced non-state actors, and increased challenges to strategic mobility again necessitate a re-evaluation of the fundamental assumptions and concepts for future military employment.[35]

Within the Marine Corps, these adaptive and modernized threats have identified that the nation's expeditionary force in-readiness "is not organized, trained, equipped, or postured to

meet the demands of the rapidly evolving future operating environment."[36] As a result, the Commandant has reinvigorated the Marine Corps' focus on integration with the Naval Fleets, adapting operational concepts and dedicating effort to Indo-Pacific deterrence through *'Stand-In'* capabilities via a lighter, more technologically equipped, and lower signature force.[37] Despite this focus, the NDS still recognizes Russia, North Korea, Iran, transnational terrorism, and the threat of externally supported proxy wars as other major national security concerns. [38] This exposes a dichotomy in the assessment of future conflict; *certainty* of an advanced all-domain adversary that requires a relevant and forward-postured deterring force, juxtaposed with *uncertainty* driven by a multiplicity of future threats and growing ambiguity over how and where great power competition will emerge on the spectrum of conflict. These competing issues require the Marine Corps to re-assess the functional requirements and implementation of its armor force. "The desire and need to create mobility, firepower, and protection on the battlefield, combined in one vehicle, will remain"[39] during modern peer-on-peer conflict. However, the challenges of the future threat environment demand rethinking the manner in which Marine armor is supportively employed to enable new operational concepts, while also retaining the ability to provide high volumes of immediately responsive, survivable, and mobile fires on the enemy within an increasingly denied environment.

Aspects of Certainty: A Starting Point

Joint publications identify the realities of a "denied, degraded, intermittent, and limited (DDIL)" future network environment, either due to self-imposed signature control or as a result of enemy interference, disruption, and attack.[40] As a result, the growing force reliance on (and increased targetability of) networks and signatures undoubtedly threatens to slow the modern targeting chain, debilitate communications, and disrupt command, control, computer,

communications, intelligence, surveillance and reconnaissance (C4ISR) functions. Today's systems and weapons are increasingly cyber-centric, making them prone to hacking that can render them useless or greatly diminish their functionality on the modern battlefield. It is widely recognized that our current systems "depend on communications, logistics, and satellite networks that… were designed under the premise that no adversary would ever be able to attack them."[41] The Marine Corps Intelligence Activity *2015-2025 Future Operating Environment* further identifies that the current network of U.S. weapons will fail if DoD systems are compromised.[42] With this type of network degradation perceived to be an aspect of environmental certainty, the future functionality of ground-based armor is found in its reliability, immediacy, and redundancy. It offers a method of immediate and responsive fire support that minimizes network reliance and force signature, limits collateral damage in sensitive areas, and can fill the gap left by environmental or enemy impediments to C4ISR functions that are now a requirement for the employment of other supporting arms. The contributions of less-network dependent, weather-immune, point-accurate, and closely integrated fires will only increase in importance when facing future expeditionary environments marked by increased aviation and technological parody.[43]

The Marine Corps' reinvigorated focus on a navally-integrated forward-posture certainly places the force in an operational environment marked by urbanized littorals and their inherent increased threat to strategic and operational mobility.[44] The CPG repeatedly discusses the impact of friendly and enemy long-range precision fires, noting substantial questions in the viability of previous theater entry options like large Navy formations or the Maritime Prepositioning Force to support future conflicts.[45] As a major element responsible for the function of timely contact and blunt layer operations outlined in the NDS, the Marine Corps must maintain assets that have

less reliance on large-scale and targetable theater mobilization efforts. Defining 3d Marine Expeditionary Force (III MEF) as the "main focus-of-effort" for credibly deterring regional aggression, the CPG describes Distributed Operations (DO) in urban littorals that will necessitate rapid concentration and dispersion to address changing threats.[46] In order to support this operational environment and the concepts of DO that are inherent to it, Marine Corps armor must be a III MEF capable asset with a smaller footprint and increased strategic mobility. This departs from many long-held characteristics of recent armor operations, but would force the development of a new platform with employment through new force structures that better supports and expands the tactical options available to Marine Corps leaders operating in this future environment.

Aspects of Uncertainty: A Planning Consideration

Along with these forecasted aspects of certainty, there is a growing level of uncertainty regarding the character and type of conflict that today's great power competition will instigate. As previous Secretary of Defense Robert Gates and Chairman of the Joint Chiefs of Staff Admiral Michael Mullen openly acknowledged, the nation historically miscalculates the global issues that will expand into future armed conflict, and is thus required to flexibly adapt.[47] Despite the CPG describing a future environment of direct great power competition that harnesses the revolutionary impacts of advancing technologies, there are conflicting assessments throughout the national security community regarding most likely conflict scenarios.[48] Studies like that conducted by the Army's Future Study Group suggest a different future threat environment; one defined by a slowing of U.S. technological invention where large developmental costs and minimal significant gains promote a substantial "second mover advantage."[49] Enabling innovative competitors to increasingly offset superior capabilities, the study suggests that current

and nearly matured technologies may continue to dominate the battlefield due to challenges with "the future ability to rely on ground and space-based information networks," and a growing uncertainty regarding the timeline for "the transition of…military functions to artificial intelligence-based autonomous systems."[50] The Marine Corps Intelligence Activity *2015-2025 Future Operating Environment* also attests to the impact of increasingly commercialized technology, suggesting that its impact on growing modernized proxy-wars will define an environment of technologically-advanced and persistent conflict that alters the dynamics of strategic competition.[51] These varying assessments of future conflict question the most likely threat laid out in the CPG, challenge the plausibility of its call to expand conceptual reliance on unmanned assets, and oppose its unhedged realignment of effort towards direct military conflict with China, which is elsewhere commonly identified as a "preventable contingency."[52]

Balancing Certainty of Change and Uncertainty of Threat

Regardless of conflicting claims over the future, state and non-state actors with growing capabilities continue to challenge today's global order through the use of asymmetric operations that jeopardize Western ways of war. These efforts purposefully irritate thresholds, test and adapt based on U.S. responses, and maintain the escalation of conflict at a level that is beneficial to adversarial strategies.[53] The uncertainty of these asymmetric actions is not limited to a geographic region or specific technique, requiring flexibility in the forms and methods of combat power applied to actively deter and quickly respond to their varying facets of aggression. The U.S. employs consistent power projection to address some of this threat uncertainty, attempting to shape the environment and adversarial decision making prior to the spark of conflict.[54] Forward presence deters, but the capacity and credibility of that deterring force is a huge factor in its overall effectiveness. Despite the Commandant's claim that the Marine Corps "will not

seek to hedge or balance investments to account for…contingencies,"[55] a responsive deterring force must maintain the adaptability to address the breadth of apparent threats, which requires a prudent balance in available capability.

Despite the inevitable uncertainty of the future, a network challenged environment and the need for an expeditionary and forward-postured force to deter the escalation of malign behavior in the world's littorals will remain a constant. Inconsistent future conflict assessments offer a multitude of possible threats, resulting in the need to re-assess how Marine armor can help support seemingly conflicting interests. The result is the requirement for an asset that supports a navally integrated and forward-postured force, while also retaining the capacity to provide protected, mobile, and responsive ground-based fires that can credibly deter and respond to escalation within the range of military operations. This new requirement necessitates the development of a specifically developed expeditionary armor asset that is flexibly applied within new force structure to support the Marine Corps' emerging concepts, while also providing increased combat capacity to forward-postured forces in order to prevent an "exploitable gap in U.S. deterrence."[56]

Chapter 4

RECOMMENDATIONS FOR MARINE ARMOR

Overview

As stated by the Commandant himself, the Marine Corps cannot be married to a given platform, formation, or method.[57] Significant ongoing changes in operational concepts and continued uncertainties regarding great power competition require the systematic divesture of the M1A1, the development of a new expeditionary armor platform, and a new force-structure that is conducive to required adaptations in the function, role, and employment of future Marine armor. While intrinsically linked and in need of a synergetic development process, the new organizational structure and platform capability recommended below will be discussed separately for the sake of conceptual clarity.

Force Structure

The 2018 *Strategy for the Next Gen GCE* drafted by Marine Corp Tactics and Operations Group (MCTOG) provided a viable starting point for rethinking large changes in force structure and equipment needed to execute new concepts in the future threat environment. The paper furthered the discussion of a multi-variant family of vehicles in order to "enhance the mobility, survivability, and expeditionary power projection of [Marine] armored protected capabilities,"[58] and initiated the discussion of replacing the M1A1 with a vehicle-variant that leverages a turret-gun assembly from the Army Mobile Protected Firepower program to achieve a wheeled armor platform with increased direct fire support capability.[2] More importantly, the piece introduced the organizational employment of various armored assets through standing 'Amphibious

[2] *Despite this platform being misconstrued as a "tank killer," MCTOG's conceptual basis of the new platform moves the armor community in the right direction;* MCTOG, 1.

Mechanized Infantry Battalions' (AMIB) that could more effectively deploy, deter, and fight as lighter, all-domain, combined-arms teams at the contact and blunt layers of conflict.[59] This organic and dispersed structure is the only route forward for Marine armor's support of the future fight, as it will enable a future platform to more flexibly integrate into a smaller, lighter-weight, and forward projected force that is able to "accept new employment models" and support "a variety of deployment options."[60]

Reorganizing Marine Corps tank battalions has been discussed and partially attempted in the past, but previous efforts have focused primarily on stabilizing common armor-infantry task force constructs, or combining mechanized reconnaissance assets with armor.[61] With a modified platform to better support emerging concepts (discussed further in the following sections), a future expeditionary armor asset requires closer integration with the infantry at a smaller scale that necessitates regimental ownership. A newly defined tank company, applied organically within a reformatted Marine Regiment, could be operationally employed at the platoon level to support something akin to MCTOG's suggested AMIB, while providing the Regiment an organic armored maneuver element if reconstituted into a company formation when required. A modular weapons capability would provide multiple operational functions within a single armor platoon, requiring fewer platforms to achieve mission requirements of the AMIB, and increasing the capacity of armor formations to support "more than one tailored solution to ARG organization and employment."[62] This structure would better integrate a future tank asset into a smaller and more agile forward-force with a lighter overall footprint, consistent organic relationships, and expanded mission-oriented capabilities.

An obvious issue and counter argument to maintaining an armor force while dismantling the Marine Corps tank battalions is the resulting second and third order effects to long-term

community expertise, support, advocacy, and career progression. These are valid concerns that would require further study beyond the scope of this discussion; however, additional organizational changes to reduce self-imposed *community-isms,* such as mixed-MOS Commander assignments within the AMIB and the creation of a cross-platform Master Gunner qualification, could help resolve much of this foreseen friction while further unifying the ground combat element of the Corps' future force.

A more dispersed and integrated force structure for the tank community would better support how Marine armor will best contribute to both the organization's emerging concepts and its desire to be "a certain force for an uncertain world."[63] As a modified regimental asset that builds habitual platoon-level relationships as an integrated capability, this new structure would better enable forward integration of new and adapting armor capabilities as part of " an expeditionary, amphibious ground force, [where] weight and cube matter."[64]

Platform

The CPG correctly reiterates that "we are not a second land Army,"[65] and the Marine Corps requires an armor asset that lives up to this statement. The previous standards and accepted requirements for balancing the *tank triangle* of mobility, firepower, and protection must be smartly challenged. While this paper does not provide technical specificity in regards to asset development, it suggests ways of integrating maturing technologies, new operational concepts, and defining characteristics of the assessed threat environment to develop a platform that, if employed within a new force structure previously discussed, would more productively support the needs of the future force.

Re-Assessing Mobility, Firepower, and Protection

"The relevance of Marine armor in the future operating environment will be determined by the ability to transport its tanks to the area of operations."[66] The Commandant's vision of the force requires a lighter weight and smaller armor asset that is truly expeditionary in nature, capable of improved strategic and operational mobility, and able to integrate into a smaller naval footprint.[67] The ability to maximize space on current ship-to-shore connectors, support the use of forthcoming smaller signature (and possibly unmanned) connectors, and drastically improve air-transport options are all vital components to improving the ability of an armor platform to support forward and dispersed Marine operations. As available cube space aboard ship is reduced, a smaller and lighter platform would better integrate into a redefined ARG/MEU construct.[68] However, these increases in mobility would necessitate accepting risk in order to adjust aspects of firepower and protection (addressed below), requiring a needed departure from long-held capabilities of the MBT that are no longer priority requirements to support the expeditionary force.

Size and weight restrictions necessary to increase strategic mobility reinvigorate the controversial discussion of achieving tactical mobility via tracked or wheeled suspension. A definitive answer to this issue would require specific technical testing that combines all factors impacting platform design; however, implementing a wheeled or 'over-the-tire' wheel-track platform would inherently help enforce stricter weight limitations during development. These physical weight limitations during design could help prevent 'platform creep' which has doomed previous armor development projects.[69] Despite the fact that tracked-suspension enables increased weight capacity and still currently provides better overall mobility in rubble, sand, and wet environments, the technology and capacity of the civilian wheeled suspension industry is better structured to facilitate rapid development and long term platform support, and shows

considerably more potential for continued future advancement.[70] With a wheeled platform the Marine Corps could capitalize on the emerging logistic networks that will support the Amphibious Combat Vehicle (ACV) in order to reduce long term costs. Additionally, a wheeled suspension system could leverage industry to support a higher percentage of related maintenance parts that could be fabricated in a forward environment via growing additive manufacturing capabilities.[71]

Mobile armored firepower enables a smaller force the ability to concentrate credible combat power for immediate engagements, and then rapidly disperse to resume further distributed operations.[72] In 2017, The Ellis Group assessed that the future battlefield requires increases to the "maneuver unit's agility – its ability to transition quickly between concentration and dispersion…with a high tactical tempo and greater dispersion [that is] enabled by organic firepower."[73] To maintain and improve these types of operations, the mobile and responsive fire support provided by Marine armor must maintain rapid cannon and machine gun fires to achieve effective volumes of suppression, while expanding longer range and alternative fire capabilities through the implementation of mission-dependent modular systems.

A shorter barrel 105-millimeter cannon with auto-loader and coaxial machine gun would sustain direct fire support of infantry-maneuver in a lighter package that is more applicable in limiting urban terrain.[74] The addition of a modular weapons capability would facilitate the employment of interchangeable kinetic and non-kinetic systems through the use of open-architecture and common-control software systems.[75] This type of interchangeable capability could be developed from the foundation of "off-the-shelf…unique, exhaustive, and flexible weapon systems [already] designed to the requirements of defense agencies" that currently support a growing array of '*add-on'* armaments for light attack helicopters.[76] These mission-

oriented assets could leverage the previously assigned 'loader' crew-member as a certified on-board weapons specialist for individual system employment. This would organically provide added capabilities further forward within in a protected and flexible formation that is less reliant on network reach-back. The addition of a small platform-launched UAS would enable organic reconnaissance capability, improve situational awareness and communications, and provide protected targeting for non-line of sight modular weapon systems.[77] Built to support and integrate with future ground-to-ground and air-to-ground man-unmanned-teaming (MUM-T), a future relatively light-weight armored platform could offer the force an extremely adaptable means of delivering a growing array of kinetic and non-kinetic combat power.

With a lighter platform employed forward and fighting in smaller formations, protection is naturally where risk will be assumed without the possibility for total mitigation. However, protecting and maintaining the survivability of this integrated and expeditionary armor asset could be achieved by leveraging both traditional and non-traditional means. Improved scalable armor that is easily applied at the unit level depending on the threat environment, combined with the ground-up integration of a contemporary active-protection system (APS) would increase traditional aspects of survivability.[78] Improved electromagnetic spectrum (EMS) emission control, EMS deception capabilities, and the integration of a platform-launched UAS into the on-board APS would provide additional means of improving platform protection while also limiting additional weight. Built to support growing advances in MUM-T, the future platform could serve as an armored and mobile local hub, providing the type of 'legacy' manned system that newer autonomous systems are expected to be reliant on for the foreseeable future.[79] Its ability to locally develop situational awareness, support pass-through communications architecture, and provide battlefield management within a combat credible and survivable platform would

contribute to the overall force protection of its supported units operating in isolated and denied environments.[80]

Conclusion of Recommendations

The CPG has earmarked the future of the Marine Corps with the certainty of change. However, tomorrow's "force of choice"[81] must still grapple with the uncertainties of a diverse threat environment that promises to challenge the deterrence capability of contact and blunt layer defense, often below the thresholds of large-scale western response. In order to adapt to changing operational concepts while still balancing the need for mobile, protected, and advanced means of firepower in a domain-denied environment, the Marine Corps must re-assess the force structure and platform capabilities of its armor community. A lighter weight platform must freely break away from previous defining characteristics of legacy tank concepts, accepting a re-balancing of the *tank triangle* and future employment within a smaller, more applicable, and forward-oriented force structure. While requiring the acceptance of risk in the reduction of some aspects of previous tank capability, a new platform that leverages modular weapon system technologies, holistically integrates UAS capability, and combines an active-protection, multi-sensor, and MUM-T capable system-architecture could provide an applicable, adaptable, and resilient array of tactical options to the forward deployed force.

Chapter 5

CONCLUSION

"[Previous] operational forms are now obsolete, and any attempt to revive them under changed historical circumstances will be a grave mistake."

-G. S. Isserson, *The Evolution of Operational Art (1936)*

"Preserve the core, but stimulate progress…for without continual change and forward movement…[you] will fall behind in an ever-changing world."

-Jim Collins, *Built to Last*

The NDS again presents military leaders the dual-faceted challenge of how to properly structure the modern force, and how to develop the assets to operationally employ that force amidst a changing character of conflict. Citing surprisingly similar environmental factors to those faced by Soviet interwar military leaders as they grappled with transforming the Red Army to fight *Deep Operations*, today's national security assessments of future conflict challenge the fundamental assumptions of force and concept development. Sparking a Commandant-driven focus on redesigning the force to counter these threats, the Marine Corps has embraced this change with the introduction of novel operational concepts, but has allowed previous roles, capabilities, and employment of its armor community to limit the thought process regarding future armor contributions. The currently unaddressed armor *equipment-concept* mismatch identifies the fact that present adversarial challenges necessitate a complete re-assessment of Marine Corps armor in a manner that departs from long-held institutional experience, is rooted in emerging concepts, and remains responsive to the inherent uncertainties of the future threat environment.

While falling well short of a complete answer for the future of Marine armor, this paper attempts to identify, historically root, and proliferate the need to challenge the current

organizational understanding of armor capabilities. Paralleling the Soviet process of conceptual and materiel transformation of tanks to achieve operational depth, this paper suggests that the ongoing discussion of Marine armor divestment is incorrectly rooted in the limitations of *past* platform, capability, and force-structure. Allowing these self-imposed limitations of thought to define our future course prevents a necessary and fundamental re-evaluation of *how* armor can provide nested value to the Marine Corps' future fight. Maintaining a relevant and flexible armor capability amidst current operational and organizational change would enable future distributed operations while preserving credible combat power in a forward-postured force. This must include a fundamental re-evaluation of Marine armor that is unhindered by past perceptions, and simultaneously addresses force-structure, operational role, and platform capabilities needed in the future fight.

Ongoing technological advancements present the opportunity for expanded contributions of network-protected, close-in fire support provided by an armored platform with increased strategic and operational mobility. Enabling both distributed operations and the timely concentration of credible combat power required for contact and blunt layer forces, a redefined expeditionary armor platform could contribute in novel ways to support both emerging concepts and the unplanned actions necessary for global prevention and deterrence. Applied properly within new organizational structure to achieve competitive advantage for a smaller, more lethal, yet mobile and protected force, these emerging capabilities provide the material basis for rethinking Marine armor employment in a forward, flexible, and adaptable manner that meets tomorrow's environmental and threat-based requirements.

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