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**A CONCEPT OF OPERATIONAL ART FOR 2030: BREAKING THROUGH A
MODERN DEFENSE IN DEPTH**

By:

Christopher McArthur

Lieutenant Colonel, U.S. Marine Corps

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the author

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MODERN DEFENSE IN DEPTH**

by Christopher McArthur

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A paper submitted to the Faculty of the Joint Advanced Warfighting School in partial satisfaction of the requirements of a Master of Science Degree in Joint Campaign Planning Strategy. The contents of this paper reflect my own personal views and are not necessarily endorsed by the Joint Forces Staff College or the Department of Defense.

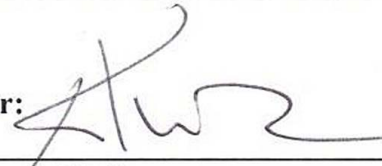
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ABSTRACT

Our nations operational center of gravity is our ability to project combat power globally. Our adversaries have adopted defensive strategies that seek to restrict or challenge our access to global commons through anti-access and area-denial systems. Technological advances in detection systems, precision weapons, and weapon speed are coming faster than ever and give the defense immense strategic depth that challenges current operational art for breakthrough operations. This study provides much needed analysis of modern warfare and thinking on operational art required for future breakthrough operations. The joint force does not possess a coherent modern operating concept that enables commanders to visualize operations across time and space against a technologically equivalent force arrayed in a layered defense in depth which is intended to shatter an attack by a superior force. This study analysis the historical and ongoing evolution of the defense in depth to identify three critical elements of future operational art: distributed operations, speed, and all domain integration. It then shows how these elements combine to defeat a future defense in depth. This study is intended to inform the development of a joint operational concept for modern breakthrough operations which would provide the intellectual foundation for modernization and development of supporting service concepts. Only force employment can solve the fundamental problem of modern warfare. Technology can help reduce casualties but cannot alone produce a decisive result.

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Dedication

This paper is dedicated to Dr. Bradley Myers, former professor at the United States Marine Corps School of Advanced Warfighting. It was Dr. Myers who first sparked my interest in the subject of defense in depth and breakthrough operations. The professionalism, knowledge, and total dedication to student development shown by Dr. Myers profoundly shaped not just me, but the next generation of warfighters.

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INTRODUCTION

The fundamental problem of modern warfare is how to conduct decisive military operations against an enemy employing effective lethal firepower.¹ A technologically advanced joint force that has no concept of modern operational art will not survive long on the battlefield of the twenty-first century. History indicates that success will be the result of force employment more than technological advantage or numbers. The current joint force does not possess a coherent modern operating concept that enables commanders to visualize operations across time and space against a technologically equivalent force arrayed in a layered defense in depth which is intended to shatter an attack by a superior force. Without a modern operating concept, the continued development and employment of technologies such as unmanned vehicles, hypersonics, and precision weapons that are supported by enhanced sensors for target identification, will have an effect on future battlefields much in the same way technology made the defense the stronger form of warfare during the First World War. A lack of a new joint operating concept for breakthrough operations that neutralize or eliminate the advantages of the defense will result in a protracted battle ending in stalemate or culmination.

The question a new joint operating concept must answer is how will the joint force defeat a technologically capable opponent arrayed in a modern defense while avoiding a costly war of attrition?² Although the services are attempting both to

¹ Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton University Press, 2006), 28, 30.

² Antulio Echevarria, "Operational Concepts and Military Strength," in *2017 Index of U.S. Military Strength: Assessing America's Ability to Provide for the Common Defense*, ed. Dakota Wood (Washington, DC: The Heritage Foundation, 2016), <https://www.heritage.org/military-strength-topical-essays/2017-essays/operational-concepts-and-military-strength>.

modernize, and to develop service-specific concepts, they are largely tactical approaches. There is no unifying operational concept to address new battlefield conditions at the operational level. Instead of establishing a common operational concept for offensive joint operations, services are being allowed to pursue independent concepts. The U.S. Army published “The U.S. Army in Multi-Domain Operations 2028” in 2018. The Marine Corps published “The Marine Corps Operating Concept in 2016” and is currently working on a combined Navy and Marine Corps operating concept formerly known as Expeditionary Advanced Bases Operations. Finally, the Air Force published “The Air Force Future Operating Concept in 2015.” Not surprisingly, the services are pursuing concepts that promote their own interests and procurement priorities. A common theme, however, is the shared assumption that technological superiority is the means to victory on the future battlefield. Each service is now pursuing a strategy of modernization intended to outpace likely peer competitors. Joint Vision 2020 reflects the ongoing approach: “If our Armed Forces are to be faster, more lethal, and more precise in 2020 than they are today, we must continue to invest in and develop new military capabilities.” Similarly, “Technological innovation [is] a vital component of the transformation of the joint force.”³ Technology is not a predictor of success. A study of recent warfare shows that of sixteen conflicts where data was available, only eight were won by the technologically superior side.⁴ Operational joint warfighting concepts should provide the basis for procurement and modernization.

³ U.S. Joint Chiefs of Staff, *Joint Vision 2020* (Washington, DC: Joint Chiefs of Staff, 2000), 1-2, <https://www.hsdl.org/?abstract&did=446826>.

⁴ Biddle, *Military Power*, 24.

This thesis will provide much needed analysis of modern warfare and thinking on operational art required for future breakthrough operations. Understanding that operational art is the employment of forces in time and space to achieve a decisive effect, this paper will answer the question: what does operational art look like in 2030 against a modern defense? The consequences of technological innovation will make warfare far different from that which was experienced during the twentieth century; new technologies require new thinking and a new operational joint warfighting concept. For the joint force to conduct decisive operations in a future battlespace, modern operational art must plan operations throughout a defense in depth on the principles of dispersion, speed, and all domain integration.

The working concept this paper proposes provides a possible solution to the National Defense Strategy (NDS) goal of producing a more lethal force and can be used to guide joint force modernization. The 2018 NDS offers nothing in the way of how these modernization requirements are to be met.⁵ Most of the current conceptual work being done by the Services do not address the development of major warfighting concepts; instead, the focus is on integrating new technologies to help improve performance or reduce casualties. This is a serious problem. A joint force operational warfighting concept is the first essential step before pursuing modernization. Services must first understand how they will fight together before each modernizes and equips its force for the future. The challenge today is that service chiefs write the doctrine, equip the forces and then combatant commanders have to figure out how to integrate them. Disconnects between individual service solutions to the defense in depth challenge create

⁵ U.S. Department of Defense, *Summary of the 2018 National Defense Strategy: Sharpening the American Military's Competitive Edge* (Washington, DC: Department of Defense, 2018), 7.

risk for the joint force. A joint approach to overcome defense capabilities of future US adversaries is crucial to mitigating this risk. This operational joint warfighting concept will ensure the U.S. has realistic means and ways to achieve decisive results against a modern defense.⁶

This paper will apply a three-step approach for examining the characteristics of future defense in depth and breakthrough operations: examining the historical context of defense in depth and breakthrough operations; reviewing technological advances from 2010 to the present, and reviewing how Russian and China are using new technology to evolve the concept of defense in depth in new ways. From this analysis will emerge three components of operational art for the future, specifically, dispersion, speed, and all domain integration. Finally, from this analysis, the thesis will present the significant implications on modernization.

⁶ Echevarria, "Operational Concepts and Military Strength."

CHAPTER 1: BACKGROUND TO CURRENT OPERATIONS

*The operational art of the era turned out to be powerless for solving the new problems inherent in the nature of contemporary armed conflict.*¹

- Georgii Isserson

The purpose of this chapter is to review how technology in the early twentieth century changed high-intensity conventional warfare and how western militaries responded in order to conduct decisive offensive operations against lethal firepower. This background will aid in understanding the ongoing evolution of a modern defense. Section I describes why the defense in depth evolved and the operational art that developed in response. Section II reviews the development of AirLand Battle doctrine which was the U.S. response to Soviet numerical superiority during the Cold War. Sections III and IV examine two successful breakthrough operations against a modern defense. Finally, Section V provides an overview of current doctrine for breakthrough operations.

Historical Evolution of Defense in Depth

The roots of modern operations can be traced back to World War I. Advances in industry, science, and technology made it possible to mass-produce weapons with greater range, accuracy, and lethality.² The result was new tools of war such as the airplane, motorized vehicles, and radio. These technological advances changed the character of warfare to one in which machines dominated and operations spread out over a battlefield of immense depth and width.³

¹ Georgii Isserson, *The Evolution of Operational Art*, trans. Bruce Menning (Fort Leavenworth, KS: Combat Studies Institute Press, 2013), 38.

² Walter Zapotoczny, "The Impact of the Industrial Revolution on Warfare," last modified 2006, http://www.wzaponline.com/yahoo_site_admin/assets/docs/IndustrialRevolution.292125935.pdf, 1.

³ David Zabecki, "Military Developments of World War I," International Encyclopedia of the First World War, last modified May 7, 2015, https://encyclopedia.1914-1918-online.net/article/military_developments_of_world_war_i.

Prior to World War I, offensive doctrine was based on Napoleonic-era tactics of the meeting engagement where massed formations of infantry attacked along a line of contact a few hundred yards apart. Limits in the range and rate of fire of weapons meant that an attacking infantry unit would be exposed to approximately 2000 rounds or two rounds per soldier before the attacking force reached the enemy line.⁴ By 1916, as a result of advances in weapon rates of fire, a comparable assault was exposed to 210,000 rounds or 200 rounds per soldier at a range that increased by a factor of ten.⁵ German and Allied forces underestimated the effect weapons with a higher rate of fire would have against attacking forces which made it impossible to close with an enemy using traditional offensive tactics.⁶ The lethality of these weapons and the lack of understanding of the operational art needed to overcome them resulted in attrition and stalemate.

Because the extended front made envelopments impossible, the only way to achieve victory was through a penetration of enemy defenses. Defenders responded by increasing the depth of the defense in order to allow for counterattack forces to meet an attack. The new defense in depth consisted of three successive zones: the outpost zone, the battle zone, and the rearward zone.⁷ Throughout the war, attacking forces lacked the striking power to overcome defensive firepower arrayed in depth and designed to wear down an attacking force first, then by counterattack, eliminate any penetration of the

⁴ Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton University Press, 2006), 29.

⁵ Biddle, *Military Power*, 29.

⁶ Timothy Lupfer, "The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War," *Leavenworth Papers*, no. 4 (July 1981): 1, <https://www.armyupress.army.mil/Portals/7/combat-studies-institute/csi-books/leavenworth-papers-4-the-dynamics-of-doctrine.pdf>.

⁷ Lupfer, "The Dynamics of Doctrine," 13.

defensive line before an attacker could fully penetrate the defense.⁸ By the end of the war the key elements of the modern defensive system were understood by both sides: cover, concealment, depth, reserves, and counterattack.

The solution to the defense in depth started at the tactical level. The key tactical elements were: cover, concealment, dispersion, small-unit independent maneuver, suppression, and combined arms.⁹ Cover and concealment reduced the attackers' exposure while advancing, while suppressive fire kept the defenders' heads down while the attackers were exposed.¹⁰ Dispersion and small-unit maneuver reduced the attackers' vulnerability to artillery and small arms fire by placing fewer targets in the killing zone of a weapon.¹¹ Finally, combined arms integrated multiple weapons systems to allow maneuver, while another element suppressed targets on the flanks.¹²

The tactical elements provided the basis for an operational solution for defeating a defense in depth. The solution assumed modern defensive systems would have extended depth, and that future offensive operations would require a continuous effort of uninterrupted operations against the entire depth of the defense.¹³ The purpose of the breakthrough operations was to gain access to the rear area of a defender and destroy the supporting structure, thus subjecting the enemy to defeat in detail.¹⁴ To overcome the lethality of modern weapons, offensive operational art was characterized by three principles. First, bring as much of the depth of the defense under attack utilizing aircraft and long range artillery fire, while maintaining the element of surprise for the main

⁸ Isserson, *The Evolution of Operational Art*, 33.

⁹ Biddle, *Military Power*, 35.

¹⁰ Biddle, *Military Power*, 31.

¹¹ Biddle, *Military Power*, 35-36.

¹² Biddle, *Military Power*, 35-36.

¹³ Isserson, *The Evolution of Operational Art*, 47-48.

¹⁴ Biddle, *Military Power*, 40.

attack. Second, use motorized or mechanized infantry to concentrate against a small portion of the defender's line in order to achieve a rapid penetration. Finally, once a gap had been created, rush mobile combined arms reserve elements forward to destroy and disrupt defensive infrastructure and seize key terrain. These principles, in short, are still the basis of modern offensive warfare.

Development of AirLand Battle Doctrine

AirLand Battle was adopted as the operational approach of US joint forces in the 1980s to address the perceived character of future warfare: greater destruction and increased tempo of operations. AirLand Battle enabled outnumbered US forces to prevail against Soviet forces in Europe.¹⁵ It combined the two concepts of the extended battlefield and the integrated battlefield into one operational doctrine. Factors leading to the development of AirLand Battle included rapid developments in technology since World War II and the need to offset Soviet quantitative advantages.¹⁶

In the post-Vietnam era, the U.S. Army realized that NATO forces would be vastly outnumbered if the Soviet Union and Warsaw Pact forces invaded Western Europe.¹⁷ The US began to view emerging technology as a possible means to offset inferior NATO numbers and provide an effective conventional capability to attack reinforcing echelons of Soviet breakthrough forces. With technological advances providing the capability to use conventional weapons in strategic roles, the U.S. moved to develop a new operational concept to defeat a conventional breakthrough attack

¹⁵ Carter Malkasian, "AirLand Battle and Modern Warfare," *National Institute for Defense Studies* (September 2014): 115, <http://www.nids.mod.go.jp/english/event/forum/e2014.html>.

¹⁶ Douglas Skinner, *Airland Battle Doctrine* (Alexandria, VA: Center for Naval Analyses, 1988), 26.

¹⁷ Malkasian, "AirLand Battle and Modern Warfare," 116.

decisively.¹⁸ The result was the AirLand Battle concept, which exploited weaknesses in Soviet breakthrough operations: tactical rigidity, predictable echelonment, and technological inferiority.¹⁹

AirLand Battle is very similar to German and Soviet operational art developed prior to the start of World War II. The basic principles of AirLand Battle are: operational level perspective, maneuver warfare, decentralized execution, integrated battle (joint operations and combined arms), deep attack, and reliance on new technology.²⁰ The doctrine recognized that the modern battlefield was multi-dimensional and the traditional linear battleline would be replaced by a nonlinear battlefield.²¹ AirLand Battle divided the battlefield into four areas: rear, close, deep, and strategic.²² It envisioned integrated air and ground operations to attack enemy forces throughout their depth with fire and maneuver. The 1982 version of the U.S. Army FM 100-5 *Operations* stated:

In the offense, the deep battle initially isolates, immobilizes, and weakens defenders in depth. As the attack continues, it sustains momentum by preventing the reorganization of coherent defenses, by blocking the movement of enemy reserves, and by preventing the escape of defending units. In the defense, the deep battle prevents the enemy from concentrating overwhelming combat power. Its major objectives are to separate and to disrupt attacking echelons, to protect the defender's maneuver, and to degrade the enemy's fire support, command and control, communications, combat support, and combat service support.²³

¹⁸ Roger Facer, *Conventional Forces and the NATO Strategy of Flexible Response: Issues and Approaches*, R-3209-FF (Santa Monica, CA: RAND, 1985), <https://www.rand.org/pubs/reports/R3209.html>, 49.

¹⁹ Skinner, "Airland Battle Doctrine," 6.

²⁰ Skinner, "Airland Battle Doctrine," 11.

²¹ Skinner, "Airland Battle Doctrine," 10. A linear battlefield is characterized by clearly defined continuous lines of contact separating well defined areas under either friendly and enemy control. A non-linear battlefield is characterized by the absence of clearly defined lines on the battlefield (no flanks or fronts).

²² Skinner, "Airland Battle Doctrine," 19.

²³ Department of the Army, *Operations*, FM 100-5 (Washington, DC: Department of the Army, 1982), <https://cgsc.contentdm.oclc.org/digital/collection/p4013coll9/id/976/>, 1-2.

Thus, AirLand Battle is both a defensive concept for defeating a breakthrough as well as an offensive concept for breakthrough operations by using deep strikes to disrupt an attacker's reserves or assault echelons along with other critical elements. With AirLand Battle the deep, close, rear and strategic battlefield were no longer separate but closely linked in a way that was not envisioned prior to 1982.

AirLand Battle countered Soviet offensive doctrine by integrating new weapons capabilities to attack Soviet reinforcing echelons. Soviet breakthrough operations required rapid penetration and exploitation of a defense before NATO reserves arrived in order to be successful. Deep battle prevented Soviet forces from massing and achieving a rapid penetration of a defense. Though developed for a specific threat, AirLand battle was never used against the Soviet Union. It was used with great effect, however, by coalition forces against Iraqi in 1991, and again in 2003.

AirLand Battle and Desert Storm

The 1991 Gulf War demonstrated a successful modern breakthrough operation following the conceptual framework of AirLand Battle. Following the invasion of Kuwait on August 2, 1990, Iraqi forces setup a defense in depth with 26 infantry divisions deployed in a forward defensive belt with nine Republican Guard mechanized divisions located to their rear.²⁴ The Iraqi defense concept consisted of three defensive belts: the first defensive belt forces were tasked with slowing down and weakening attacking forces; the tactical and operational reserves in the second defensive belt would reinforce and block penetrations, and the Republican Guard divisions of the third

²⁴ Department of Defense, *Conduct of the Persian Gulf War: Final Report to Congress* (Washington, DC: Department of the Army, 1992), <https://apps.dtic.mil/dtic/tr/fulltext/u2/a249270.pdf>, 251-258.

defensive belt were the operational reserve tasked with counterattacking and defeating the main enemy attack.²⁵ Up to seventy percent of Iraqi forces were assigned to mobile reserve units.²⁶

Though Iraqi forces employed a defense in depth at the operational level, they failed to implement it correctly at the tactical level. First, the defense lacked forward security elements to provide early warning of a coalition attack which would have allowed Iraqi forces to slow coalition forces down by attacking those forces with indirect fire before they reached the first defensive belt.²⁷ Second, Iraqi forces failed to integrate combined arms, which exposed them to the lethality of modern weapons.²⁸ Finally, Iraqi forces employed a rigid command and control system that did not allow lower echelon leaders to take independent action as the battle unfolded to include ordering local counterattacks.²⁹

US forces successfully applied the principles of breakthrough operations during Operation DESERT STORM. Contributing to a successful breakthrough, coalition forces had a 2:1 force ratio over Iraqi forces, their equipment was on average 12 years newer than what was possessed by Iraqi forces, and coalition forces employed modern means to reduce exposure, such as the use of combined-arms, decentralized maneuver, dispersion, cover, and concealment.³⁰ In line with the AirLand Battle framework, coalition forces preceded breakthrough operations with a six-week air campaign that targeted command

²⁵ Department of the Air Force, *Gulf War Air Power Survey: Operations and Effects and Effectiveness*, Vol. II (Washington, DC: Department of the Air Force, 1993), <https://apps.dtic.mil/dtic/tr/fulltext/u2/a279742.pdf>, 163.

²⁶ Biddle, *Military Power*, 137.

²⁷ Biddle, *Military Power*, 138.

²⁸ Biddle, *Military Power*, 132.

²⁹ Biddle, *Military Power*, 139.

³⁰ Biddle, *Military Power*, 135-140.

and control facilities, logistical nodes, and counterattack forces which crippled the Iraqi defensive system.³¹

The breakthrough attack began on February 24 with a conventional penetration of prepared Iraqi defensive lines. In accordance with historical principles, the initial breakthrough was conducted on a narrow portion of the Iraqi defensive frontage that was approximately 6 kilometer wide, while simultaneous fires were conducted against the depth of the defense.³² Following the initial breach, armored forces rapidly attacked Iraqi forces by the flank in order to widen the gap and allow exploitation forces to maneuver forward.³³ Breakthrough forces eventually linked up with the main effort, an envelopment force to the west, which caused the collapse of the Iraqi defensive system in about 100 hours.

The main lesson that the US took away from Desert Storm was that technology was decisive.³⁴ The reality is that Iraqi forces failed to implement a modern defense in depth properly at the tactical level, thus exposing them to the increasingly lethal effects of modern weapons. The lack of sufficient forward security elements, failure to fully employ cover and concealment, failure to employ combined arms effectively, and a rigid command and control system undermined the effectiveness of a defense in depth. In contrast, coalition forces attacked Iraqi defenses in depth and employed combined arms operations to reduce exposure to enemy weapons. The outcome of Desert Storm reflected the result of a modern system of force employment against a non-modern

³¹ *Gulf War Air Power Survey*, 249-326.

³² Robert Scales, *Certain Victory: The US Army in the Gulf War* (Fort Leavenworth, Kansas: US Army Command and General Staff College Press, 1994), 229.

³³ Biddle, *Military Power*, 139.

³⁴ Biddle, *Military Power*, 132.

defense.³⁵ A defense in depth that fails to employ modern means has little chance of success against a modern breakthrough force. U.S. forces redeployed from Kuwait confident that AirLand Battle was an effective doctrine.

AirLand Battle and OIF 2003

The 2003 US invasion of Iraq provides a second case study of a successful breakthrough operation. On March 19, 2003, coalition forces initiated Operation IRAQI FREEDOM (OIF) with the strategic objective of ridding Iraq of its weapons of mass destruction and replacing Saddam Hussein's regime with a democratic government.³⁶ The result of the 21-day operations was a decisive victory over the Iraqi military leading to the collapse of the Saddam regime. The coalition's breakthrough of Iraqi defenses took significantly less time than the Gulf War, covered more area with a smaller attacking force, and resulted in a low number of casualties for a major mechanized campaign. Although Iraqi forces had the capability to mount a tenacious defense, the technological inferiority of the Iraqi Army relative to US forces and more importantly, their failure to organize a modern defense in depth, facilitated the speed of US breakthrough operations.³⁷

Iraqi defenses were poorly implemented at the strategic, operational and tactical levels, which exposed Iraqi forces to the full lethality of modern weapons systems. At the strategic level, Iraq's defenses were primarily oriented against the Kurds to the north

³⁵ Biddle, *Military Power*, 146-149.

³⁶ Walter Perry, Richard Darilek, Laurinda Rohn, and Jerry Sollinger, eds, *Operations Iraqi Freedom: Decisive War, Elusive Peace*, RR-1214-A (Santa Monica, California: RAND, 2015), https://www.rand.org/pubs/research_reports/RR1214.html, xix.

³⁷ Defending Iraqi forces numbered in excess of 350,000 troops and included 17 regular army divisions (three of which were armored and three mechanized), six Republican Guard divisions (three of which were armored and one mechanized), one Special Republican Guard division, special operations and reserve forces, and numerous militia units. The force was equipped with over 2,200 tanks, 2,400 armored personnel carriers (APCs) and 4,000 artillery pieces.

and east along the Iranian border. Iraq failed to establish a coordinated defense in depth oriented south along the Tigris-Euphrates Valley, the most likely coalition invasion route.³⁸ At the operational level, two Iraqi army corps with seven regular army divisions were arrayed in two defensive belts south along the Tigris-Euphrates Valley. The southern defenses however, lacked the necessary depth to slow an attack, did not have mutually supporting defensive positions between defending units, which coalition forces exploited, and they failed to position and employ counterattack forces effectively. Command and control heavily depended on orders from a centralized higher headquarters, a system that quickly broke down during the fast-paced maneuver conflict and prevented effective counterattacks or employment of reserve forces.³⁹ At the tactical level, Iraqi defenses failed to take advantage of cover and concealment, which would have limited the ability of coalition forces to concentrate firepower on known enemy locations; they failed to disperse defensive units to reduce losses; they failed to employ small unit maneuver, especially local counterattacks; or employ combined arms. Had Iraq used the significant capabilities they had available in accordance with the elements of a modern defensive system, they likely would have made a coalition breakthrough vastly more difficult and costly. Instead, coalition forces were easily able to break through Iraqi defenses and occupy Baghdad.

U.S. forces executed breakthrough operations using the principles of AirLand Battle to great effect at the operational and tactical levels. AirLand Battle was revised

³⁸ Perry, *Operations Iraqi Freedom*, xxiv.

³⁹ Michael Groen, "With the 1st Marine Division in Iraq, 2003: No Greater Friend, No Worse Enemy" (Occasional Paper, History Division Marine Corps University, 2006), 9.

following the Gulf War in order to place a greater emphasis on joint integration.⁴⁰ Coalition forces displayed skillful use of the key principles of AirLand Battle. Though US forces maintained the same skill level as during Desert Storm, it had access to more advanced technology in 2003. New technologies provided unparalleled situational awareness of Iraqi defenses which supported targeting throughout the depth of the battlefield.⁴¹ For example, in support of a two division attack along parallel corridors, coalition forces integrated airpower and long range fires to disrupt Iraqi formations in the deep battlespace, while employing combined arms using attack helicopters, close air support, artillery, multi-rocket launcher systems, and mechanized forces to destroy or rapidly bypass enemy forces in the close battlespace. In short, the application of AirLand Battle principles coupled with the combination of speed, precision, and situation awareness provided by new technologies, resulted in the destruction of Iraq's combat power before it could be brought to bear, and prevented remaining Iraqi forces from responding meaningfully to coalition movements.

Potential adversaries have indicated that they have much to fear based on what they observed during OIF.⁴² For many, the level of joint integration coupled with advanced technologies changed the character of military operations. First, OIF reinforced the relevance of the basic lessons of breakthrough operations from 1918. Secondly, OIF indicated that technology magnified the effect of modern offensive operations against defenders who fail to implement a modern defense. Third, the amount of sensor coverage (e.g., Global Hawk, JSTARS, Predator, and tactical unmanned aerial

⁴⁰ Gregory Fontenot, E.J. Degen, and David Tohn, *On Point: The United States Army in Operation Iraqi Freedom* (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2004), 8.

⁴¹ Perry, *Operations Iraqi Freedom*, xxxi.

⁴² Fontenot, *On Point*, 8.

vehicles) greatly enhanced targeting throughout the depth of the battlefield.⁴³ Fourth, air supremacy was a necessary condition for successful breakthrough operations. Two-thirds of air-delivered munitions were precision guided, which facilitated the rapid destruction of enemy forces and enhanced the rate of ground maneuver.⁴⁴ Adversaries recognized that ground forces, even if modernized, cannot effectively defeat attacking US ground forces as long as the US has air supremacy.⁴⁵ Adversaries will likely place a priority on devising ways to deny U.S. forces air supremacy or, at least, to reduce the adverse effects of that supremacy.

Current Doctrinal Principles

The Joint Chiefs of Staff define military doctrine as a set of fundamental principles by which military forces guide their actions in support of national objectives. The US military continues to operate using concepts and structures developed during the Cold War. While the joint force continues to modernize, joint doctrine for breakthrough operations has remained stagnant. AirLand Battle was the last multi-service warfighting doctrine developed for high-end conventional conflict. Over two decades of counterinsurgency operations in Iraq and Afghanistan, joint and service level doctrine for large scale conventional operations against peer competitors has undergone limited if any revision.

Although services agree that AirLand Battle is unsuited to the modern strategic environment, there is currently no joint force replacement for AirLand Battle. Joint

⁴³ Perry, *Operations Iraqi Freedom*, xxxi.

⁴⁴ Perry, *Operations Iraqi Freedom*, xxxi.

⁴⁵ Stephen Hosmer, *Why the Iraqi Resistance to the Coalition Invasion Was So Weak*, MG-544-AF (Santa Monica, CA: RAND, 2007), <https://www.rand.org/pubs/monographs/MG544.html>, 141-142.

Publication 3-0, *Joint Operations*, provides twelve principles for joint operations but lacks specifics on a joint warfighting approach to conventional operations. Joint Publication 3-31, *Joint Land Operations*, dedicates only two pages to offensive operations. The current joint operating concept is called All-Domain Operations. The intent of All-Domain Operations is to combine “space, cyber, deterrent, transportation, electromagnetic spectrum operations, missile defense — all of these global capabilities together ... to compete with a global competitor and at all levels of conflict.”⁴⁶ General John Hyten, the current Vice Chairman of the Joint Chiefs of Staff, stated that if the joint force can figure out All-Domain Operations, “We’ll have a significant advantage over everybody in the world.” But, he added significantly, “We don’t know how to do that. Nobody knows how to do that.”⁴⁷

In 2017 the U.S. Army introduced its new operating concept Multi-Domain Operations. While AirLand Battle was geared toward conventional conflict, Multi-Domain battle is the Army’s concept for fighting multiple layers of standoff in all domains against near-peer competitors like Russia and China. In creating the concept, the Army studied Russian military operations in Ukraine. It found that along with conventional artillery, Russian forces were employing information operations, electronic warfare, and using Unmanned Aerial Vehicles (UAV) to dominate the operational environment.⁴⁸ As a concept, Multi-Domain Operations envisions how the joint force

⁴⁶ Colin Clark, “Gen. Hyten On the New American Way of War: All-Domain Operations,” *Breaking Defense*, last modified February 18, 2020, <https://breakingdefense.com/2020/02/gen-hyten-on-the-new-american-way-of-war-all-domain-operations/>.

⁴⁷ Clark, “Gen. Hyten On the New American Way of War: All-Domain Operations.”

⁴⁸ Scott King, and Dennis Boykin, “Distinctly Different Doctrine: Why Multi-Domain Operations Isn’t AirLand Battle 2.0,” *Association of the United States Army*, last modified February 20, 2019, <https://www.ausa.org/articles/distinctly-different-doctrine-why-multi-domain-operations-isn%E2%80%99t-airland-battle-20>.

can integrate all warfighting domains by bringing together kinetic and non-kinetic capabilities to secure certain domains or create space for another service or capability in an anti-access environment.⁴⁹ The conceptual solution to the problem of layered standoff is the rapid and continuous integration of all domains of warfare allowing the joint force to penetrate, dis-integrate, and exploit enemy anti-access and area denial systems.⁵⁰ In many ways Multi-Domain Operations shares many of the traits of AirLand Battle, such as initiative, depth, unified action, flexibility, but seeks to integrate all five warfighting domains. The challenge for Multi-Domain Operations, like all joint solutions, will be getting services to subordinate their individual warfighting cultures to a joint warfighting approach.

⁴⁹ Todd South, “This 3-Star Army General Explains What Multi-Domain Operations Mean for You,” *Army Times*, last modified August 11, 2019, <https://www.armytimes.com/news/your-army/2019/08/11/this-3-star-army-general-explains-what-multi-domain-operations-mean-for-you/>.

⁵⁰ Department of the Army, *The U.S. Army in Multi-Domain Operations 2028*, TRADOC Pamphlet 525-3-1 (Washington, DC: Department of the Army, 2018), <https://adminpubs.tradoc.army.mil/pamphlets/TP525-3-1.pdf>, iii. Dis-integrate means to disrupt the enemy's command and control system, degrading its ability to conduct operations. This action leads to a rapid collapse of the enemy's capabilities or will to fight.

CHAPTER 2: KEY TECHNOLOGICAL INNOVATIONS 2010-2020

The character of future wars will be determined by their technological means. Technological advances are coming faster than ever and adversaries are using these advances to strengthen defensive capabilities. The distribution of technology is eroding the advantage the U.S. military has maintained since the end of the Cold War. The decisive military victories in Operation DESERT STORM and Operation IRAQI FREEDOM led several countries to accelerate modernization programs intended to counter U.S. military capabilities asymmetrically.¹ Russia and China both seek to gain a technological advantage to challenge the United States in all domains. The destructive technologies that will shape the next war are already here and being used in conflicts today. The purpose of this chapter is to provide a general review of key technological advances from 2010 to the present. Technological advances have a direct bearing on our understanding of the evolution of the defense in depth and the challenges this poses for current operational art.

Technological Advances in Detection Systems

One of the key requirements of modern warfare is concealment. In order to survive against modern weapons a defender or attacker must remain undetected for as long as possible. The problem of concealment is much harder for the attacker who must expose himself in order to maneuver. The development of detection systems that are increasingly integrated will have significant tactical and operational implications for joint forces. In the past decade two systems have come of age, the Unmanned Aerial Vehicles (UAV) and Electronic Warfare (EW).

¹ Joseph Dunford, "The Character of War and Strategic Landscape Have Changed," *Joint Force Quarterly* 89 (2nd Quarter 2018), 2, <https://apps.dtic.mil/dtic/tr/fulltext/u2/1056962.pdf>.

UAVs have revolutionized the battlefield in the post-9/11 period. Today, UAVs saturate the battlefield at tactical and operational ranges, providing persistent surveillance for commanders. UAVs can track and identify targets day or night using various sensors. While fast moving aircraft struggle to identify targets on the ground in high threat environments, the slower speed and persistent nature of UAVs make it much easier to identify enemy units. Russia has demonstrated the lethality of UAV technology in Ukraine and Syria by flying various types of UAVs at different altitudes to enhance the speed of targeting for indirect fires.² By using UAVs, Russian forces have been able to identify Ukrainian positions and quickly deliver indirect fires within minutes, often before the Ukrainians realized they had been observed.³ Unlike manned aircraft, UAVs can stay in the air for dozens of hours, or even days. Furthermore, they are low cost compared to manned aircraft and far more expendable. What revolutionized UAVs in combat was the combining of real time video capabilities, enhanced command and control systems that can use that information to make quick battlefield decisions, and precision fired weapons that can be loaded aboard UAVs. Add stealth technology and the military has a persistent sniper overhead that can both deliver or coordinate lethal effects deep into enemy battlespace. Offensive maneuver forces today will have to contend with persistent UAVs throughout the depth of the battlespace that can locate and target them.

² Robert Angevine, John Warden, Russell Keller, and Clark Frye, *Learning Lessons from the Ukraine Conflict*, NS D-10367 (Alexandria, VA: Institute for Defense Analyses, 2019), <https://nsiteam.com/social/wp-content/uploads/2019/07/NS-D-10367-Learning-Lessons-from-Ukraine-Conflict-Final.pdf>, 8.

³ Angevine, *Learning Lessons from the Ukraine Conflict*, 9.

Modern military forces are reliant on equipment that uses the electromagnetic spectrum to communicate, transmit data, provide navigation, and to command and control forces. Technological advances in EW have improved the ability of an adversary to locate enemy forces based on their electronic emissions, and disrupt enemy command and control. During an exercise at Ft. Irwin in 2020, the electronic footprint of a battalion sized unit, even though employing modern concealment techniques and under cover of darkness, was easily detected by EW assets at a range of 12 kilometers.⁴ The unit was unaware it had been detected and in actual combat could have been easily destroyed. If an enemy can see a unit's electronic footprint, traditional methods of camouflage are pointless.⁵

Ironically, the very assets that support execution of the US current warfighting doctrine make joint forces vulnerable to enemy detection technologies. Active protection systems being installing on numerous ground vehicles have sensors to detect incoming threats. These sensors, however, are detectable and make the vehicle vulnerable to EW targeting.⁶ Electronic warfare advances allow enemy forces to monitor friendly movements and launch both electronic and kinetic attacks.⁷ Russia has demonstrated the effectiveness of EW in Ukraine. Russian forces have used jammers to disrupt communications and GPS signals, conceal maneuver units, locate Ukrainian command and control headquarters, and generate targeting information for artillery strikes based on electromagnetic emissions.⁸ Russian use of EW has been so effective that Ukrainian

⁴ Joseph Trevithick, "This Is What Ground Forces Look Like to An Electronic Warfare System and Why It's A Big Deal," The Drive, last modified May 11, 2020, <https://www.thedrive.com/the-war-zone/33401/this-is-what-ground-forces-look-like-to-an-electronic-warfare-system-and-why-its-a-big-deal>.

⁵ Trevithick, "This Is What Ground Forces Look Like."

⁶ Trevithick, "This Is What Ground Forces Look Like."

⁷ Trevithick, "This Is What Ground Forces Look Like."

⁸ Angevine, *Learning Lessons from the Ukraine Conflict*, 9-10.

forces view all emissions as targetable and have been forced to significantly reduce communications.⁹

Technological Advances in Precision Weapons

Continued advances in precision weapons, and a growing number of adversaries acquiring precision capabilities, has the potential to shift the pendulum in favor of the defender by denying offensive forces the ability to maneuver.¹⁰ On the modern battlefield, precision strike mean that if a target can be located it can be destroyed from afar.¹¹ Precision weapons offer a defender the opportunity to establish wide anti-access defenses that dramatically increase the difficulty and cost of offensive maneuver. Where the United States sees precision through a tactical lens, “as a means to improve the effectiveness of existing ways of placing a kinetic effect on target,” adversaries are using precision weapons to create changes at the strategic and operational levels of war.¹² For example, China has made significant investment in precision technologies aimed at denying access to its maritime approaches.¹³ Today, control of sea and air domains can easily be challenged by land-based precision weapons.

Since the Gulf War, precision weapons have been associated with bombs dropped from aircraft or missiles fired from long ranges that can hit a target with pinpoint accuracy. Over the past decade, technological advances have expanded precision capabilities to artillery, mortars, and even small arms weapons. Artillery, historically considered an area fire weapon best suited to suppress an enemy position, is now capable

⁹ Angevine, *Learning Lessons from the Ukraine Conflict*, 10.

¹⁰ Albert Palazoo, “Precision and the Consequences for the Modern Battlefield,” *Small Wars Journal*, last modified August 19, 2016, https://smallwarsjournal.com/jrnl/art/precision-and-the-consequences-for-the-modern-battlefield#_edn1.

¹¹ Palazoo, “Precision and the Consequences for the Modern Battlefield.”

¹² Palazoo, “Precision and the Consequences for the Modern Battlefield.”

¹³ Palazoo, “Precision and the Consequences for the Modern Battlefield.”

of firing a single round and destroying a target at maximum range. Having to fire fewer rounds increases the survivability of weapons against counter-fire defenses. As precision weapons potentially expand to small arms, soldiers on the battlefield will be able to hit anything they aim at, at far greater distances than today's soldier. Much like the machine gun in World War I, precision weapons are establishing a kill zone for attacking units. Today that zone is potentially thousands of kilometers in depth. In Ukraine, Russian forces have used precision munitions fired from long range Multiple Launch Rocket Systems to inflict significant losses in Ukrainian mechanized forces, both stationary and moving.¹⁴ The single kill probability of modern precision weapons is increasing from sixty percent to ninety percent giving them a destructive capability similar to low-yield nuclear weapons.¹⁵ In short, precision strike capabilities dramatically reduce the time required to target thousands of aim points while simultaneously extending the depth that destruction is possible.

Technological Advances in Conventional Weapon Speed

Hypersonic weapons are changing the speed of combat and could potentially be decisive at the onset of combat. Their very speed (hypersonic weapons are weapons that travel faster than Mach 5) is changing the character of war by introducing new threats that have regional and strategic implications. There are two types of hypersonic weapons: glide vehicles which are launched from a rocket before gliding to a target, and cruise missiles. Unlike ballistic missiles, hypersonic weapons do not follow a ballistic path and can change their trajectory en route. Their lower trajectory compared to ballistic

¹⁴ Angevine, "Learning Lessons from the Ukraine Conflict," 9.

¹⁵ Barry Watts, *The Evolution of Precision Strike* (Washington, DC: Center for Strategic and Budgetary Assessment, 2013), <https://csbaonline.org/research/publications/the-evolution-of-precision-strike#:~:text=In%20The%20Evolution%20of%20the,affect%20vital%20U.S.%20Security%20interests,5>.

missiles makes them difficult to detect until they are much closer to the target thereby compressing the timeline for decision-makers to respond.¹⁶ Because of their speed and maneuverability, hypersonic weapons can penetrate the most sophisticated air defense system in order to strike high-value targets. At the outset of a conflict, hypersonic weapons could be used to promptly strike high-value targets whose destruction would make follow-on attacks by conventional forces easier.¹⁷ Hypersonic weapons offer the capability to deliver a conventional warhead anywhere in the world within one hour and can avoid air defenses through speed and maneuverability. For example, a weapon launched in the Baltics or South China Sea at a regional target 1,200 miles distant could theoretically impact in under ten minutes.¹⁸

Advances in weapon technology increase the tempo, lethality, and depth of warfare. In 2018 Admiral Harris, Commander USINDOPACOM, said that China could fire hypersonic missiles and hit U.S. aircraft carriers and land bases in the Pacific almost before American radars could pick them up.¹⁹ The loss of command and control centers, air defense systems, military bases, and warships would significantly disrupt the ability of the U.S. to sustain an attack.²⁰ Hypersonics both expand the depth of the defense due to their maximum effective range, and compress this depth through speed allowing both the

¹⁶ Kelley Saylor, *Hypersonic Weapons: Background and Issues for Congress*, CRS Report No. R45811 (Washington, DC: Congressional Research Service, 2020), 2-3, <https://crsreports.congress.gov/product/pdf/R/R45811>.

¹⁷ Michael Klare, "An 'Arms Race in Speed': Hypersonic Weapons and the Changing Calculus of Battle," Arms Control Association, last modified June 2019, <https://www.armscontrol.org/act/2019-06/features/arms-race-speed-hypersonic-weapons-changing-calculus-battle>.

¹⁸ Klare, "An Arms Race in Speed."

¹⁹ Paul McLeary, "PACOM Harris: U.S. Needs to Develop Hypersonic Weapons, Criticizes 'Self-Limiting' Missile Treaties," USNI News, last modified February 14, 2018, <https://news.usni.org/2018/02/14/pacom-harris-u-s-needs-develop-hypersonic-weapons-criticizes-self-limiting-missile-treaties>.

²⁰ Klare, "An Arms Race in Speed."

attacker and defender to strike targets along a similar timeline as conventional artillery. US forces rely on Patriot, Terminal High Altitude Area Defense and Aegis defenses to protect American naval and ground forces against ballistic missile attacks. Hypersonic weapons enable the defender to strike targets due to their ability to penetrate these defenses making the principle of mass risky to the attacker. Finally, due to the speed at which they travel, hypersonics compress the decision space military leaders have to respond to an attack.

CHAPTER 3: THE DEFENSE IN DEPTH: AN OLD IDEA MADE NEW

The modern defense in depth is a response to the technological advancements that have increased the power of the offense. This chapter will discuss the evolution of defense strategy into the Anti-Access and Area-Denial (A2/AD) system. The purpose of this chapter is to show how peer adversaries are using both traditional weapons and emerging capabilities in all domains to remake the concept of defense in depth and the challenge this poses to offensive military operations. This chapter will demonstrate that the current ongoing evolution of the defense demands a shift in our thinking about operational art and the doctrine, modernization, and tactics needed to win in this environment.

A2/AD Defined

A2/AD is designed to counter US power projection. The defense in depth as we know it is no longer a viable defense strategy. It ended with the decisive US military victory over Iraq in 2003. Realizing the challenge of winning a force-on-force conflict with the US, adversaries are leveraging advanced technologies and weapons to prevent the US from projecting combat power into a theater of operations.¹ The result is the modern A2/AD system. The Department of Defense defines anti-access as “those actions and capabilities, usually long-range, designed to prevent an opposing force from entering an operational area,” and defines area-denial as “those actions and capabilities, usually of shorter range, designed not to keep an opposing force out, but to limit its freedom of

¹ Mike Benitez, “A2/AD: Translating for the Warfighter Using Operational Art,” *Over The Horizon*, last modified January 19, 2017, <https://othjournal.com/2017/01/19/a2ad-translating-for-the-warfighter-using-operational-art/>.

action within the operational area.”² The aim of A2/AD is to prevent a stronger offensive force from gaining access to a contested area and maneuvering towards an objective.³

There are five common elements of an A2/AD system. The first element is that the defender must believe that the attacker has a superior force.⁴ Because the defender believes it cannot defeat the attacker in a force-on-force conflict, it adopts an A2/AD strategy to deny the attacker the ability to enter a theater of operations.⁵ The second element is the primacy of geography as the element that most influences the attrition of the enemy.⁶ Geography has an impact on the direction and scale of offensive operations. The third element is predominance of the maritime domain.⁷ The ability to use the sea to move from one region to another gives the attacker a significant advantage.⁸ As such, long-range anti-access capabilities are aimed at preventing or inhibiting an attacking force from using the maritime domain to move from one geographic area into the theater of operations. Adversaries realized that during the Gulf War Saddam Hussein made a strategic mistake allowing coalition forces to build combat power within the theater of operations unopposed. The fourth element of A2/AD strategies is the importance of information and intelligence.⁹ The defender attempts to deny or disrupt information and intelligence that the attacker can use to plan operations and target enemy forces. The

² Joint Chiefs of Staff, *Joint Operational Access Concept* (Washington, DC: Joint Chiefs of Staff, 2012), i, https://www.jcs.mil/Portals/36/Documents/Doctrine/concepts/joac_2012.pdf?ver=2017-12-28-162010-227.

³ Sam Tangredi, *Anti-Access Warfare: Countering A2/AD Strategies* (Annapolis, MD: Naval Institute Press, 2013), 1-2.

⁴ Tangredi, *Anti-Access Warfare*, 13.

⁵ Tangredi, *Anti-Access Warfare*, 14.

⁶ Tangredi, *Anti-Access Warfare*, 13.

⁷ Tangredi, *Anti-Access Warfare*, 13.

⁸ Tangredi, *Anti-Access Warfare*, 18.

⁹ Tangredi, *Anti-Access Warfare*, 13.

final element is determinative impact of extrinsic events.¹⁰ A2/AD does not by itself defeat an enemy, instead, it aims to slow an attacker's advance long enough that other events shake the determination of the attacker to attain its aims.¹¹

A2/AD requires certain technologies in order to deny access to a theater of operations. The Department of Defense *Joint Operational Access Concept* states that important anti-access capabilities include: surface, air and submarine-launched ballistic and cruise missiles able to accurately attack forward bases and deploying US forces; long-range reconnaissance and surveillance systems that provide necessary targeting information; antisatellite weapons; Submarine forces able to interdict sea lines of communications; and cyber-attack capabilities designed to disrupt command and control systems.¹² Important area-denial capabilities include air forces and air defense systems designed to deny local US air superiority, anti-ship missiles and submarines to deny maritime superiority in the objective area, precision munitions to attack surface targets, land and naval mines capable of denying access to key terrain, and unmanned systems to provide intelligence collection and support targeting.¹³ Both China and Russia have access to all of these capabilities.

Russian and Chinese Concepts of Defense in Depth

The Gulf War had a profound influence on the leadership of the Chinese People's Liberation Army (PLA). The leaders observed the effect precision munitions, jointness, and advanced command and control systems had on warfare when synchronized with an effective offensive doctrine. The catalyst for the development of an A2/AD system

¹⁰ Tangredi, *Anti-Access Warfare*, 13.

¹¹ Tangredi, *Anti-Access Warfare*, 20.

¹² Joint Chiefs of Staff, *Joint Operational Access Concept*, 9-10.

¹³ Joint Chiefs of Staff, *Joint Operational Access Concept*, 10.

started in 1996 when the US deployed two aircraft carriers to the South China Sea in response to rising tensions between China and Taiwan.¹⁴ China realized it was unable to prevent the arrival of carrier strike groups. As such, China began developing an A2/AD system as a way to deter or prevent US power projection into the region. China has focused on acquiring weapon systems optimized for an anti-access strategy, which include short and intermediate range ballistic missiles, antisatellite weapons, cyberattack capabilities, advanced aircraft, submarines, and a network of radars capable of detecting ships beyond the normal radar horizon.¹⁵ China's A2/AD system is designed to provide strategic depth by keeping US forces as far away as possible from mainland China and outside key maritime areas of influence.¹⁶

At the strategic level, China's A2/AD strategy is defensive, but at the operational level it assumes an offensive character.¹⁷ The current extent of China's A2/AD systems, provides China over 3,000 miles of strategic depth, covering an area out to Guam. In the event of a crisis, China would likely attempt to achieve surprise by striking at forward deployed U.S. forces throughout the Pacific theater. Simultaneously, China would employ anti-satellite weapons, cyberattacks, electronic warfare, and long-range precision fires to degrade the ability of the U.S. to collect intelligence and command and control forces. Using radar and other sensors deployed on man-made island throughout the Pacific, as well as airborne and space-based surveillance technologies, China would

¹⁴ Stephen Kuper, "The Teeth in China's Anti-Access/Area Denial Defenses," Defense Connect News, last modified April 24, 2019, <https://www.defenceconnect.com.au/key-enablers/3927-the-teeth-in-china-s-anti-access-area-denial-defences>.

¹⁵ Tangredi, *Anti-Access Warfare*, 163-164.

¹⁶ Paul Natulya, "On Chinese Strategy: "Counter intervention in substance but not in name is still "Counter intervention," Strategic Depth (blog), August 21, 2015, <https://strategicdepth.org/tag/a2ad/>.

¹⁷ Matthew Jamison, "Countering Chinas Counter Intervention Strategy," The Strategy Bridge, last modified August 11, 2020, <https://thestategybridge.org/the-bridge/2020/8/11/countering-chinas-counter-intervention-strategy>.

target and destroy U.S. forces attempting to deploy to the theater of operations or reaching China's outer defensive belt. Within the contested zone covered by China's A2/AD systems, U.S. forces would face a network of surface-to-air missiles for targeting aircraft and anti-ship missiles fired from land, sea, or air platforms. Air-to-air missiles fired from aircraft, land based coastal defenses, and submarine launched torpedoes, and mines would further challenge offensive forces attempting to maneuver in range to attack mainland China. In short, China's A2/AD defenses would allow it to defend its territory at a significantly lower cost than the US would face trying to challenge China's A2/AD network.

Russia has also adopted an A2/AD strategy to counter US warfighting capabilities. Russia's military has limited power projection capabilities and is significantly weaker than the military of the former Soviet Union which is one reason why Russia has pursued an A2/AD strategy.¹⁸ Russia's development of an A2/AD capability aims to ensure a strategic buffer between NATO and Russian territory by denying the west freedom of movement through Baltic states.¹⁹ Russia's A2/AD system includes state-of-the-art air defense systems, antisatellite capabilities, cyberwarfare and electronic warfare capabilities, advanced fighter aircraft, a large stockpile of naval mines, and capable submarine forces. Though Russia's A2/AD systems are not on the scale of China, Russia is working toward increasing capacity and improving the capability of its systems.

¹⁸ Tangredi, *Anti-Access Warfare*, 217.

¹⁹ Aziz Erdogan, "Russian A2AD Strategy and Its Implications for NATO," *Beyond the Horizon*, last modified December 6, 2018, <https://behorizon.org/russian-a2ad-strategy-and-its-implications-for-nato/>.

Russia's current anti-access capabilities extend over 1,800 miles into Britain and North Africa. Soviet area-denial medium range ballistic missiles and integrated air defense systems extend into Germany and cover most of Turkey to the south.²⁰ During a crisis, Russia's A2/AD strategy would likely employ preemptive cyber and electronic warfare attacks to degrade the effectiveness of NATO logistics, command and control, fires, and Intelligence Surveillance and Reconnaissance (ISR) assets. Simultaneously, Russia would attempt to isolate the theater of operations to prevent reinforcement of forces close to Russia or force deployments to the theater of operations by attacking NATO bases, staging locations, and maritime assets. Russia would also use naval surface and subsurface capabilities along with land-based assets to prevent maritime forces from maneuvering close enough to target Russian forces. Finally, Russia's integrated air and missile defense system would limit NATO air operations. The A2/AD bubble would severely limit NATO freedom of maneuver and provide Russia a significant advantage in shaping the battlefield.

Challenge to US-Allied Forces and Current Operational Art

Technology has modified the current operational paradigm and is foreshadowing warfare of the future. A2/AD is the form of warfare the US is most likely to encounter in a future conventional conflict, and the form of warfare the US is most unprepared for. Future adversaries will not fight like Iraq. Iraq's strategy was largely inept, its forces outdated, and air superiority was lightly contested. In the event of war, adversaries will employ multiple layers of stand-off in all domains—land, sea, air, space and cyberspace—with technology on par with US forces, to separate US forces and allies in

²⁰ Erdogan, "Russian A2AD Strategy and Its Implications for NATO."

time, space, and function in order to bring about culmination through heavy casualties.²¹ Without a new concept for the new threat environment, the joint force will face a defensive system with forces designed around different assumptions and a different threat. This is an historical parallel to the same situation European armies faced in 1915-1916.

A2/AD presents joint forces with a new challenge, a layered, multi-domain, system-of-systems that gives adversaries a new dimension of strategic depth not encountered in prior breakthrough operations.²² Replacing historic operational depth of a few hundred kilometers is a new strategic depth of thousands of miles. Joint forces have always expected adversaries to contest maneuver in the close battlespace when they come within range of adversary organic capabilities. What is new is that A2/AD will ensure that the movement and sustainment of forces from safe havens or deep rear areas are potentially contested as well.²³ In future conflicts the defender will be able to strike the attacker in these areas with speed and precision. In short, anti-access capabilities increase the difficulty of projecting combat power into a theater of operations.

The challenge for current operational art is that A2/AD is not the same type of defense in depth that US forces have faced throughout the twentieth century. The aim of A2/AD is to prevent the attacker from massing combat power for the close-fight, thereby giving the defender the numerical advantage by the time the attacker reaches the close battlespace. A2/AD does not rely on counterattack forces to stop a penetration, instead it

²¹ Scott King, and Dennis Boykin, “Distinctly Different Doctrine: Why Multi-Domain Operations Isn’t AirLand Battle 2.0,” Association of the United States Army, last modified February 20, 2019, <https://www.ausa.org/articles/distinctly-different-doctrine-why-multi-domain-operations-isn%E2%80%99t-airland-battle-20>.

²² John Callaway, “The Operational Art of Air-Sea Battle,” Center for International Maritime Security, last updated July 18, 2014, <https://cimsec.org/operational-art-air-sea-battle/11913>.

²³ Callaway, “The Operational Art of Air-Sea Battle.”

relies on a multi-domain network of sensors and shooters to target offensive and sustainment forces while simultaneously disrupting friendly communications and decision-making architecture. It is a type of warfare that will be fought beyond the visual range of humans. Though there are numerous operational concepts for fighting in an A2/AD environment to include Air-Sea Battle and the Joint Operational Access Concept, the U.S. has not bridged the gap between concept and doctrine in an A2/AD environment, which limits the joint forces ability to translate the concept into tactical actions. In short, A2/AD challenges joint forces traditional understanding of the phases of a conflict, ideas of battlefield framework, access and ability to maneuver within all domains, and operational tempo.

CHAPTER 4: OPERATIONAL ART FOR THE MODERN BREAKTHROUGH

If the US operational center of gravity is our ability to project combat power globally, then development of the operational art necessary to breakthrough a modern defense in depth is crucial. Modern operational art for breakthrough operations must enable the US to project military force into an operational area with sufficient freedom of action to accomplish the required mission. The defense in depth is evolving along two lines: in depth and into new domains. The modern defense in depth provides a defender immense depth in which to affect the attrition and culmination of an attacker. New strategic depth is achieved by integrating the anti-access, area-denial, and rear areas into a seamless defensive strategy. The purpose of this chapter is to describe the proposed operational concept and its elements, and show how they can combine to defeat a future defense in depth. This chapter will build upon the analysis conducted thus far and propose principles for modern breakthrough operations that will provide the intellectual foundation for modernization efforts.

Modern Operational Art

Operational art must account for the nature and character of future warfare. The character of future breakthrough operations will exhibit elements of speed, global reach, networked forces, precision, all conducted and understood within an understanding of all domain operations. The challenge for modern breakthrough forces is that the possibility of a decisive military defeat makes the use of nuclear weapons plausible by the defender. In modern offensive operations against a nuclear power, there is a point where the attacker is close to reaching its aim of a breakthrough that potentially will result in the defender using nuclear weapons. A2/AD is designed to prevent the attacker from getting

to that point. Breakthrough operations have never been conducted against a nuclear armed state. Operational art must account for this risk. During the 2003 invasion of Iraq, US military commanders identified a geographic boundary where Iraqi forces were likely to employ chemical weapons in order to stop the attack. The line roughly coincided with the point in time when the breakthrough had been assured and forces were rapidly transitioning to exploitation. In an A2/AD environment, there will likely be a similar line between the anti-access belt and the area-denial belt where an adversary might choose to employ nuclear weapons. Operations in the anti-access belt allow political leaders to manage risk of escalation because those operations are based on enemy attrition and not decisive maneuver leading to military defeat. Once operations enter the area-denial belt, the ability to manage risk decreases as those operations are based on annihilation. Thus, our operational art for future warfare must be based on a strategy of single-direction attrition conducted through a breakthrough that places the enemy in a no win situation and can lead to negotiations.

The modern A2/AD defense places a significant demand on the defender. For the defender, the battlespace must remain transparent once the battle is joined in order to effectively find and target attacking forces. Similarly, an integrated A2/AD system must be controlled in such a way that the defender can deal with multiple threats. Unlike historical breakthrough operations that relied upon mass at a central point, modern offensive forces will penetrate the defense at multiple points and in all domains. Finally, the command-and-control requirements for a modern defense in depth are significant. Even with a degraded command and control system, a defense in depth would still rely on

the layered belts to conduct an individual defense intended to impose maximum attrition and force culmination of the attacker.

Our analysis of both the history and evolution of the defense in depth reveals a way of accomplishing an operational breakthrough against a modern defense in depth. Unlike the historical AirLand Battle model, the modern requirement is not to prevent the enemy from reacting in depth. Instead, modern operational art requires that the attacker first degrade the transparency of battlespace in order to create blind spots, then isolate defensive belts by neutralizing A2/AD systems in depth to allow maneuver. This will allow US forces to project military force into the operational area with sufficient freedom of action to seize key terrain and create exploitable gaps in the defense. As forces maneuver into the anti-access and subsequent area-denial belts they must block the flanks of their penetration(s). This will require the neutralization of A2/AD systems that might be repositioned to threaten the penetrating force. Finally, offensive forces must be postured to exploit the breakthrough if required. This concept would be achieved through a series of operations in all domains, first against the anti-access belt, and then against the area-denial belt.

The decisive point in the operational breakthrough will be the penetration of the anti-access defensive belt, which will allow the U.S. to project combat power that directly threatens an adversary's battlespace. The outer anti-access ring extends out to the maximum engagement range an adversary's anti-access system can see and attack targets. The anti-access belt differs from a traditional defense in that it does not rely on counterattacks to prevent penetration. In the anti-access belt, there is no linear or non-linear front, only multiple integrated bubbles of sensors and firing systems supported by a

robust command and control network designed to enable the rapid destruction of any forces entering this belt. For both the defender and attacker, this belt signifies deep battlespace. The anti-access belt can extend out to a depth of 3,000 miles. Closer to a country's territory is the inner area-denial belt. The area-denial belt signifies the traditional defense in depth with its multiple land based defensive belts, counterattack forces, and the use of combined arms. For both the defender and attacker this belt represents close battlespace. Access to this belt means the attacker can more easily and consistently strike the defender's rear area. The area-denial belt covers a depth of 100 to 300 miles. Penetration of this belt by the attacker leads to exploitation and decisive military defeat of an adversary.

Elements of Modern Operational Art

A2/AD threats will present US forces with a very different challenge than they have faced previously. Standoff must be maintained and power projection will be restricted until the anti-access threat is reduced. Long range precision-strike missiles, hypersonic weapons, and air-defense systems provide the defender with deep coverage of an attacker's avenues of approach thereby giving the defender the ability to destroy platforms that can deliver precision strikes long before they come within range of the defender's territory. The chief threat to a modern breakthrough is the ability of an adversary to attack offensive forces at significant range. Required components that allow offensive forces to degrade the transparency of the battlefield and isolate defensive belts are distributed operations, speed, and multi-domain integration.

Breakthrough operations require that forces must be protected from devastating attack, while simultaneously striking effectively at the enemy defensive systems.

Distributed operations reduce the effectiveness of precision munitions, and provides a degree of force protection for the attacker. Distributed operations are the ability to disperse, reposition, and use a variety of bases and operation locations while retaining the ability to maneuver and concentrate combat power.¹ Distributed operations reduce transparency of the battlefield by degrading the defender's the ability to locate and target platforms and forces quickly and accurately providing the attacker time and space to locate and target enemy anti-access nodes. While conventional breakthrough doctrine dictates massing at the point of penetration, in an anti-access environment this would prove deadly. Modern warfare requires the joint force commander to disperse his forces to the required level that facilities survivability and tempo. First echelon forces will operate and sustain themselves in a distributed and networked posture. Dispersed forces will enter the anti-access belt at numerous locations, thereby creating uncertainty and hesitation into the enemy decision and targeting process. Smaller and dispersed forces will be supported by deep fires to create the effect of mass without concentration of forces. To reduce the risk of detection, dispersed forces will use various means of stealth to include signature reduction and cover, concealment, and deception. This will further degrade enemy command and control by preventing a commander to see the battlefield and make decisions.

While traditional breakthrough operations are a race against the arrival of enemy counterattack forces, speed in an A2/AD environment is a race between attrition and will. The A2/AD strategy is not designed to defeat an adversary, but instead to neutralize a

¹ Michael Hutchens, William Dries, Jason Perdue, Vincent Bryant, and Kerry E. Moores, "Joint Concept for Access and Maneuver in the Global Commons: A New Joint Operational Concept," *Joint Force Quarterly* 84 (1st Quarter 2017), 137.

stronger force until time, attrition, or other events break their resolve.² Speed is achieved by networking ISR, command and control nodes, and platforms across time and space to rapidly identify and strike A2/AD nodes. The speed of the detect-to-kill chain can have a significant impact on attrition of enemy forces in the initial stages of the operation. In modern breakthrough operations, artificial intelligence will increase the speed that intelligence information is processed to identify targets, and then help decision makers identify the right weapon or platform to attack the target. In many cases this will occur without a human decision maker. Distributed forces will maneuver within the anti-access belt in order to gain a position of advantage from which to attack enemy A2/AD systems. Speed also refers to the speed that weapons travel giving hypersonic weapons a decisive edge over traditional munitions especially against high value targets. Finally, speed will depend on sustainment. Resupply of fuel and ammunition will be critical to maintaining the tempo of offensive operations. In order to sustain a distributed force that seeks to maintain cover and concealment, the current logistical sustainment structure will have to evolve. In a war that seeks heavy attrition of the enemy and not decisive defeat, speed is a critical component of operational art.

Future joint force breakthrough operations against a sophisticated A2/AD threat will require integration of capabilities across all domains-land, air, sea, space, and cyber-simultaneously. Adversary A2/AD defenses rely on a series of overlapping capabilities across all domains to ensure maximum attrition of attacking forces.³ AirLand Battle was

² Sam Tangredi, *Anti-Access Warfare: Countering A2/AD Strategies* (Annapolis, MD: Naval Institute Press, 2013), 242.

³ Sameer Joshi, "Demystifying the Anti-Access/Area Denial (A2/AD) Threat," Sameer Joshi, last updated April 10, 2019, <https://sameerjoshi73.medium.com/demystifying-the-anti-access-area-denial-a2-ad-threat-d0ed26ae8b9e>.

the first US multi-domain joint doctrine that understood the synergistic effect integration of air and land domains could produce against a defense in depth. Multi-domain operations are combined arms at the operational level presenting adversary's with multiple dilemmas. In breakthrough operations, services will provide effects from their domain that support operational actions by another service in a separate domain.⁴ An example of a cross domain effect in modern breakthrough operations is the use of cyber and space capabilities to disrupt enemy command and control systems to the degree that a warship can maneuver and launch a cruise missile strike against air defense assets ashore, thereby enhancing freedom of movement for aircraft. Another example would be a C-130 transporting a High-Mobility Artillery Rocket System that then fires an anti-ship missile. Multi-domain operations will enhance tempo of offensive operations, while achieving the effects of mass from distributed locations. To achieve the desired effect, multi-domain operations will require true service integration. Only joint concepts can integrate the joint force in the necessary way. Multi-domain operations will require a new level of integration that must become central to the training of the joint force at tactical and operational levels.

How Operations Combine to Defeat a Future Defense in Depth

The previous section presented the elements of operational art required to successfully breakthrough a modern A2/AD defense. We conclude with a picture of how these elements combine to defeat a modern defense in depth. This section assumes a full breakthrough is necessary, but recognizes that as A2/AD capabilities are reduced the risk

⁴ Robert Brown, "The Indo-Asia Pacific and the Multi-Domain Battle Concept," *Military Review* 97, no. 5, (September 2017): 17-18, <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/September-October-2017/The-Indo-Asia-Pacific-and-the-Multi-Domain-Battle-Concept/>.

of nuclear escalation increases. The proposed concept can be applied in cases where military forces attack only the depth required to achieve the operational objective.

At the start of a conflict, US forces can expect to confront hundreds of short-range and long-range missiles, a vast network of radars that can see over the horizon, space based ISR, cyber and EW attacks, and a battlefield flooded with unmanned vehicles. The first challenge will be to ensure US forces forward deployed are ready for surprise attacks in the initial minutes of a conflict. Early warning systems, distributed force laydown, and cover and concealment will mitigate the threat, though these forces will remain highly vulnerable. Leveraging a fires network supported by surface, air, and space based ISR capabilities, US forces will immediately strike targets throughout the depth of an adversary's defenses at maximum range to disrupt the enemy's command and control system and degrade his ability to conduct effective operations. These initial strikes will allow US forces to regain the initiative, provide time and space for US forces to reorganize and reposition for deliberate breakthrough operations, and enhance survivability of military forces forward deployed within the operational area. Along with kinetic attacks, cyber, space and EW capabilities will further degrade transparency of the battlespace and isolate defensive belts thereby allowing small, distributed, and networked first echelon forces to penetrate the anti-access belt at numerous locations to seek out and destroy adversary weapon systems, sensors, and platforms in the air, land and sea domains.⁵ Though there will be numerous small expeditionary forces in the first echelon, the first echelon will primarily be platforms controlled by humans or operating autonomously. The operational purpose of the first echelon is to overwhelm the enemy

⁵ Tangredi, *Anti-Access Warfare*, 235.

defensive system forcing the defender to expend limited weapons against expendable assets while simultaneously revealing their locations to counterfire. Mass is achieved by massing fires from distributed locations throughout the battlefield vice traditional mass of maneuver forces against a central location. Success in this phase is the creation of multiple blind spots in the enemy A2/A2 system, providing second echelon forces required freedom of maneuver to seize decisive points.

As enemy anti-access systems are suppressed, a second echelon exploitation force comprised of dispersed ground forces, warships and aircraft (fast, light, stealthy, and can travel long distances without resupply) will enter the anti-access belt to seize decisive points that facilitates holding the flanks of the breakthrough attack. From these positions, breakthrough forces will eliminate counter actions by the enemy, strike key targets in the area-denial belt, and establish missile defense capabilities to protect the force. Success in this phase is achieved when gaps are created allowing larger military formations to move toward the area-denial belt without significant enemy resistance.

The final phase of breakthrough operations is similar to traditional AirLand or AirSea Battle doctrine. Third echelon forces composing the main body of US combat power will move forward to the edge of the area-denial belt in order to bring as much of the remaining depth of the defense under attack utilizing aircraft, surface delivered fires, and non-kinetic attacks while deceiving the enemy of the location of the main attack. The main attack will concentrate against a small portion of the defender's line in order to achieve a rapid penetration, and once a gap has been created, rush additional combined arms elements forward to impose maximum attrition and leave the defender at a complete disadvantage, lending to a cease-fire.

CHAPTER 5: IMPLICATIONS

The emphasis of this paper has been on understanding defense in depth with respect to history and emerging technology, and then applying that understanding to think about elements of operational art necessary to conduct modern breakthrough operations. The challenge has been drawing conclusions from something that has not occurred on a peer level since World War II. Chapter 2 identified three areas of technological advances that have the potential to increase the tempo, lethality, and depth of future warfare and shift the balance of military operations decisively in favor of the defender. Chapter 3 discussed how adversaries, specifically Russia and China, are using new technologies to evolve the concept of defense in depth in a manner that poses a challenge to US national security. Finally, Chapter 4 proposed an operational concept to provide the intellectual foundation for modernization efforts. This chapter will present the significant implications of this concept on modernization.

Adversary shift towards A2/AD strategies will make traditional means of breakthrough operations (tanks, artillery, infantry divisions) less important to the joint force. Joint force modernization for an A2/AD environment should focus on the continued exploitation of space for ISR, communications, and navigation, procurement of precision guided missiles in sufficient quantity to ensure neutralization of anti-access capabilities without requiring an operational pause (this will also produce a deterrent effect by ensuring an opponent has sufficient munitions to withstand an attack and significantly degrade an enemy's A2/AD system in response), incorporating stealth technology into traditionally platforms such as military transport aircraft and vessels and air refueling tankers, stealth helicopters for both for transport in theater and tactical strike

missions, development of aircraft with greater range, pursuit of highly mobile naval vessels which can both operate and sustain themselves in a highly distributed, highly networked posture, pursuit of autonomous vehicles that can deliver supplies, relay communications, detect, and strike targets, continued development and incorporation of signature reduction, cover and concealment, and deception into new and existing platforms and basing locations, and procurement of terminal defenses against enemy missiles.¹

Concept Must Precede Tactics

The reality of an increasingly observed and sensor saturated battlefield requires a necessary shift in operational art. While modern weapons are a prerequisite for solving operational problems, history reminds us that there are many instances when new technology failed to produce the desired effect.² Only when technology and new forms of force employment come together is a shift in the character of warfare possible. Effective joint force employment starts with a joint operational concept that broadly describes how the joint force will integrate to achieve success. The purpose of joint operational concepts is to offer “alternative operational methods and related capabilities to maintain military advantage against current and emerging threats.”³ Concepts bridge the gap between strategy and tactics by focusing at the operational level. They also provide the intellectual foundation for modernization. Services use the joint concept to

¹ Octavian Manea, “The A2/AD Predicament Challenges NATO’s Paradigm of Reassurance Through Readiness,” *Small Wars Journal*, last modified June 9, 2016, <https://smallwarsjournal.com/jrnl/art/the-a2ad-predicament-challenges-nato%E2%80%99s-paradigm-of-%E2%80%9Creassurance-through-readiness%E2%80%9D>.

² Georgii Isserson, *The Evolution of Operational Art*, trans. Bruce Menning (Fort Leavenworth, KS: Combat Studies Institute Press, 2013), 53.

³ Joint Chiefs of Staff, *Implementing Joint Force Development and Design*, Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3030.01 (Washington, DC: The Joint Staff, December 3, 2019), C-2.

develop supporting concepts and required tactics, and ultimately man, train, and equip their forces for joint operations. History has shown that technology can only solve the breakthrough challenge on a tactical scale.⁴ This paper has argued the need to develop a joint operational concept replacement for AirLand Battle. Service concepts that require the Joint Force Commander to figure out how to integrate them, is a dangerous and potentially fatal approach; a top down concept is required to drive modernization, force integration, and tactical development for the services, allowing them to transform into a multi-domain integrated joint force.

Investing in technology without a meaningful operational level concept to guide this investment is a strategic mistake. Recent US military operations in Iraq and Afghanistan demonstrate that operating on service doctrine without an applicable joint concept can have significant strategic implications even when military operations are conducted in accordance with joint principles.⁵ Military operations in Iraq and Afghanistan have demonstrated that technology does not replace the need for effective concepts of force employment to guide the application of military force. Doctrine is meaningless without the broader joint concept. Useful doctrine must be based on an assessment of enemy capabilities and force employment methods. It must also be based on the correct interpretation of technological change and its impact on warfare.⁶ In 1940, French forces invested in the technologically advanced Maginot Line based on a flawed

⁴ Isserson, *The Evolution of Operational Art*, 65.

⁵ Huba Wass de Czege, "Lessons from the Past: Making the Army's Doctrine 'Right Enough' Today," Association of the United States Army, last updated September 7, 2006. <https://www.ausa.org/publications/lessons-past-making-armys-doctrine-right-enough-today>.

⁶ Huba Wass de Czege, "Lessons from the Past."

interpretation of technology advancement during World War I.⁷ The result was catastrophic when French defensive doctrine faced the German blitzkrieg.

Conceptualize Then Modernize: Examples from History

An operational concept provided the vision for rebuilding the German army following World War I. Much of the German military's success in World War II can be attributed to development of the operational concept of Blitzkrieg, a solution to the stalemate of trench warfare in World War I. The effectiveness of Blitzkrieg demonstrates the power of developing concepts first, then building and equipping a force around that concept. General Heinz Guderian is the German officer credited for developing the revolutionary concept and introducing the world to modern mechanized forces that returned offensive mobility to the battlefield.

Guderian's book, *Achtung-Panzer!*, explains the thinking behind mechanized breakthrough operations and was the catalyst for German development of panzer forces during the interwar period. Starting in the 1920s, Guderian began an analysis of tactical and technological developments during World War I to draw out lessons for future warfare.⁸ He realized that defensive tactics increasingly favored a defense in depth that relied on quick counterattacks to stop enemy penetrations. He also correctly identified that tactical developments that emerged towards the end of World War I required initiative at the lowest level and the need to integrate infantry and artillery in a combined arms manner. After analyzing a number of battles during World War I, all of which resulted in a failure to breakthrough enemy defenses, Guderian came to believe that the

⁷ Huba Wass de Czege, "Lessons from the Past."

⁸ Heinz Guderian, *Achtung-Panzer! The Development of Armoured Forces, Their Tactics and Operational Potential*, trans. Christopher Duffy (London, England: Arms and Armour Press, 1992), 8.

solution to the problem was mechanization. Guderian's analysis convinced him that success was only possible through the application of speed. He also realized that a new technology, the tank, offered the armored protection and cross-country mobility required to move and survive on the modern battlefield. By the early 1930s, Guderian's studies led him to conclude that tanks employed in mass and integrated in mechanized formations with infantry, artillery, and engineers, could breakthrough a defense in depth if they were concentrated at the point of main effort and employed in concentrated blows.⁹ With his understanding of the problem and conceptual solution complete, Guderian focused on creating the required concept to guide the training and equipping of this mechanized force. The operational potential of the breakthrough concept that Guderian developed was realized in 1935 with the creation of three Panzer armored divisions which proved highly effective in Poland and France.

Similar to Guderian, Georgii Isserson developed an operational concept that guided the building of the modern Soviet Army.¹⁰ Isserson's military foresight about what future war would look like, and his development of the Soviet concept of deep battle is detailed in his 1936 work, *The Evolution of Operational Art*. Through a study of military history, Isserson realized that World War I had discredited traditional ideas of warfare, and as such, he sought to understand contemporary war and military art in order to develop a concept that would lead to Soviet victory.¹¹ Isserson understood that new technologies would further deepen the defense, which would have an increasing number of fortified belts, and that a breakthrough was possible if the attacker attacked the

⁹ Guderian, *Achtung-Panzer!*, 10.

¹⁰ Isserson, *The Evolution of Operational Art*, iii.

¹¹ Isserson, *The Evolution of Operational Art*, viii.

defender in depth.¹² The operational art behind deep battle was the purposefully coordinated series of uninterrupted actions throughout the depths of an enemy's defense merging into a single whole.¹³ Isserson believed that a single decisive battle was no longer possible; success could only be achieved by linking multiple battles through operations and campaigns at a new operational level of war. The means transforming this concept into a new doctrine were the emerging technologies of the aircraft, tanks, and motor vehicles. Based on the concept, a doctrine was developed that leveraged these new technologies within new military organizations allowing the commander to develop and apply the concept of deep operations. Isserson teaches the modern military professional how to think about future warfare, and that new means of combat requires new ways of force employment. The creation of a new concept for force employment should then drive organization and modernization. In short, emerging technologies and tactics **do not** drive force employment, force employment gives purpose for the use of technology at the tactical and operational levels to accomplish the strategic objective.

¹² Isserson, *The Evolution of Operational Art*, xv.

¹³ Isserson, *The Evolution of Operational Art*, xviii-xix.

CONCLUSION

History all too often reinforces the familiar maxim that armies tend to fight the next war as they did the last. Only force employment can solve the fundamental problem of modern warfare which is how to survive long enough on the modern battlefield to accomplish the military objective. Technology can help reduce casualties but cannot alone produce a decisive result. The past century has seen the evolution of the defense come full circle. In 1914, military forces underestimated the impact of the industrial revolution on warfare and the effectiveness of modern weapons on tactics. As such, the defense became the stronger form of warfare preventing offensive forces from achieving a decisive military victory in World War I. During the inter-war period, Germany and Russia developed operational concepts for breakthrough operations and began modernizing their forces based on those concepts. German Blitzkrieg and Russian Deep Battle proved effective at the operational level during World War II returning the offense to the stronger form of warfare.

In response to Soviet numerical superiority during the Cold War, The US developed the AirLand Battle doctrine which aimed to defeat a numerically superior Soviet attack by leveraging emerging conventional weapons technology through joint integration to attack Soviet forces in depth. AirLand Battle was used decisively twice against Iraqi forces in 1991 and again in 2003. For adversaries, the combination of AirLand Battle and US technological superiority convinced them that they could not win a face-to-face conflict with the US. The defensive solution was an extension of the defense in depth to include an anti-access belt to prevented US forces from projecting combat power into a theater of operations where the defender would then be at a

disadvantage. Anti-access gave the defense strategic depth and undermined the effectiveness of AirLand Battle which required the ability to load up divisions and project them into a theater of operations. The distribution of technology over the past decade has further enhanced the effectiveness of an A2/AD defensive strategy. Thus, the defense has come full circle and we find ourselves in a similar situation as the days leading up to the commencement of World War I where operational art had fallen behind technology allowing the defense to assume the stronger form of warfare.

The depth of a modern defense and its use of multiple domains require an updated concept of joint warfighting within a renewed appreciation of operational art.

Recent military history shows that weapons, sensors, and communication advances strongly favor the defender and makes the close fight a pure killing zone.

Air Force, Navy, Marine Corps, and Army have responded to this emerging challenge with individual service concepts. What is absent is a truly joint approach and the operational art for penetrating the anti-access belt as well as competing in multiple domains simultaneously. The key tenets of modern operational art that enable offensive operations against an A2/AD defense include distributed operations, detect to kill chain speed, and multi-domain integration. A modern breakthrough requires three operational echelons: an initial attack echelon composed of small or unmanned platforms for penetrating the anti-access belt tactically in order to suppress defenses; a second attack echelon for neutralizing anti-access defenses, and a third breakthrough echelon that can attack the area-denial belt in depth and defeat the enemy will to resist offensive operations. The organization, structure, and equipment of a joint force that can do this

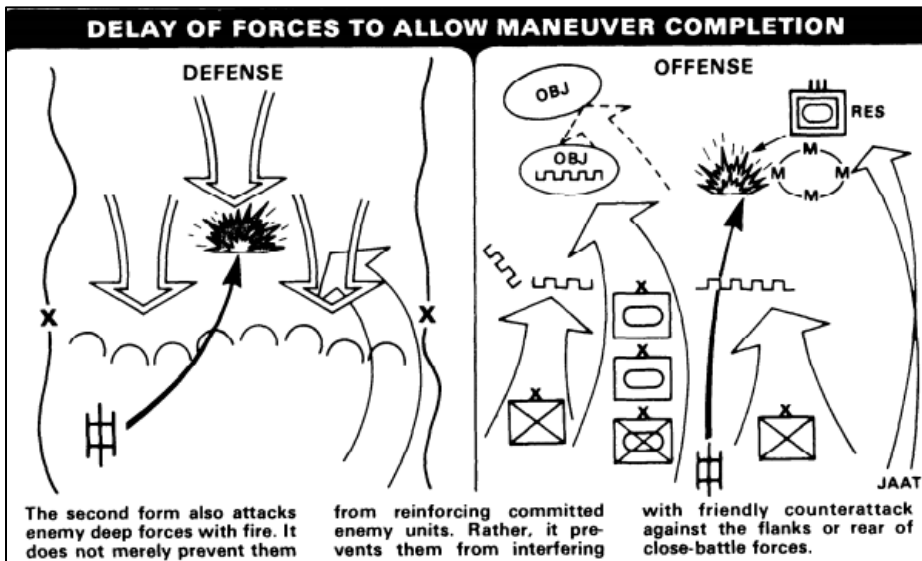
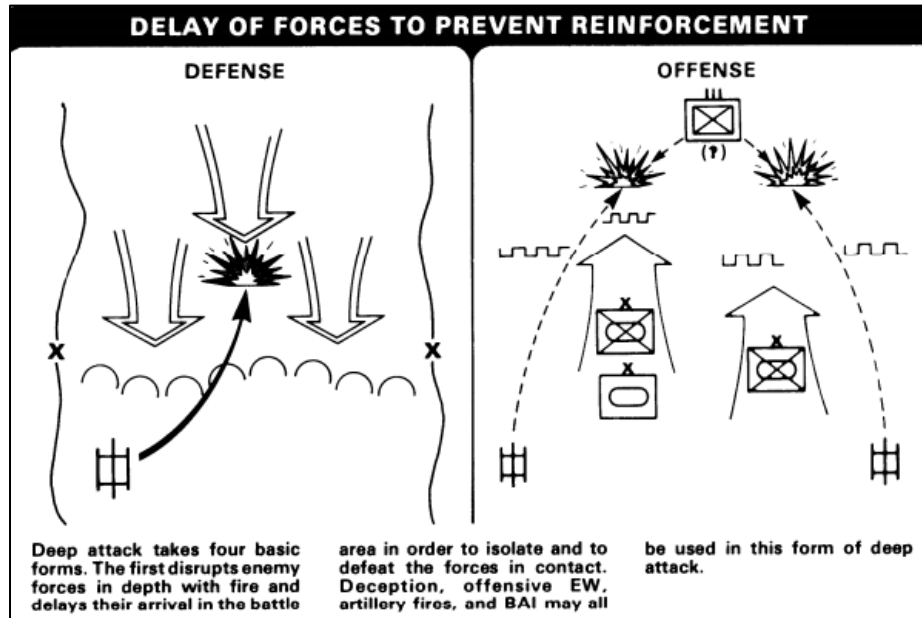
will look different than the joint force of today. Only a joint concept that enables doctrine development can mitigate the risk of service centric approaches.

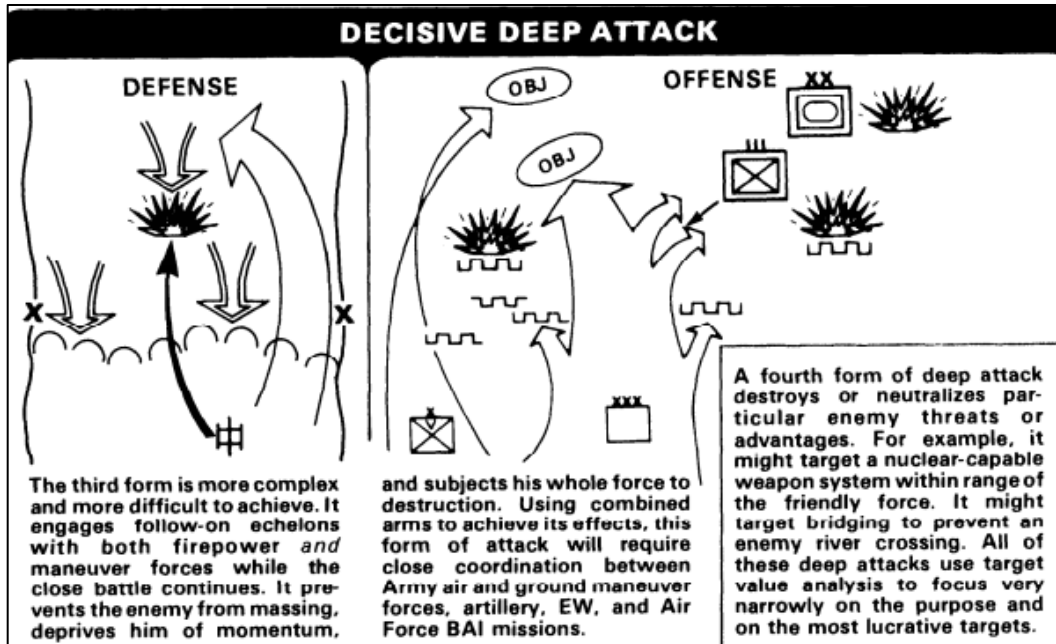
In conclusion, this paper offers a vision of operational art for breakthrough operations against a modern opponent. Further research and analysis is required in order to transform this vision into a joint concept which can guide tactical development and modernization. Concepts are the engine for change. The challenge today is the same challenge that has been faced multiple times over the past century, how to frame the operational problem well enough to produce a useful concept that can eventually be developed into doctrine.¹ The joint force must do more than simply restore its ability to maneuver in terrain contested by adversary's. While the joint force can employ modern weapons to neutralize an adversary's A2/AD system and thereby achieve maneuver, that is a success solely of tactical value. Instead, the joint force must innovate in ways that achieve more than just enhanced strike ability.² The U.S. needs to bridge the gap between concept and doctrine in an A2/AD environment.

¹ Huba Wass de Czege, "Lessons from the Past: Making the Army's Doctrine 'Right Enough' Today," Association of the United States Army, last updated September 7, 2006. <https://www.ausa.org/publications/lessons-past-making-armys-doctrine-right-enough-today>.

² Albert Palazoo, "Precision and the Consequences for the Modern Battlefield," Small Wars Journal, last updated August 19, 2016, https://smallwarsjournal.com/jrnl/art/precision-and-the-consequences-for-the-modern-battlefield#_edn1.

Appendix 1: 1982 US Army Deep Battle overview (AirLand Battle Doctrine).





¹ Department of the Army, Operations, FM 100-5 (Washington, DC: Department of the Army, 1982), 7-16 – 7-17.

Appendix 2: Current Chinese and Russian A2/AD System.

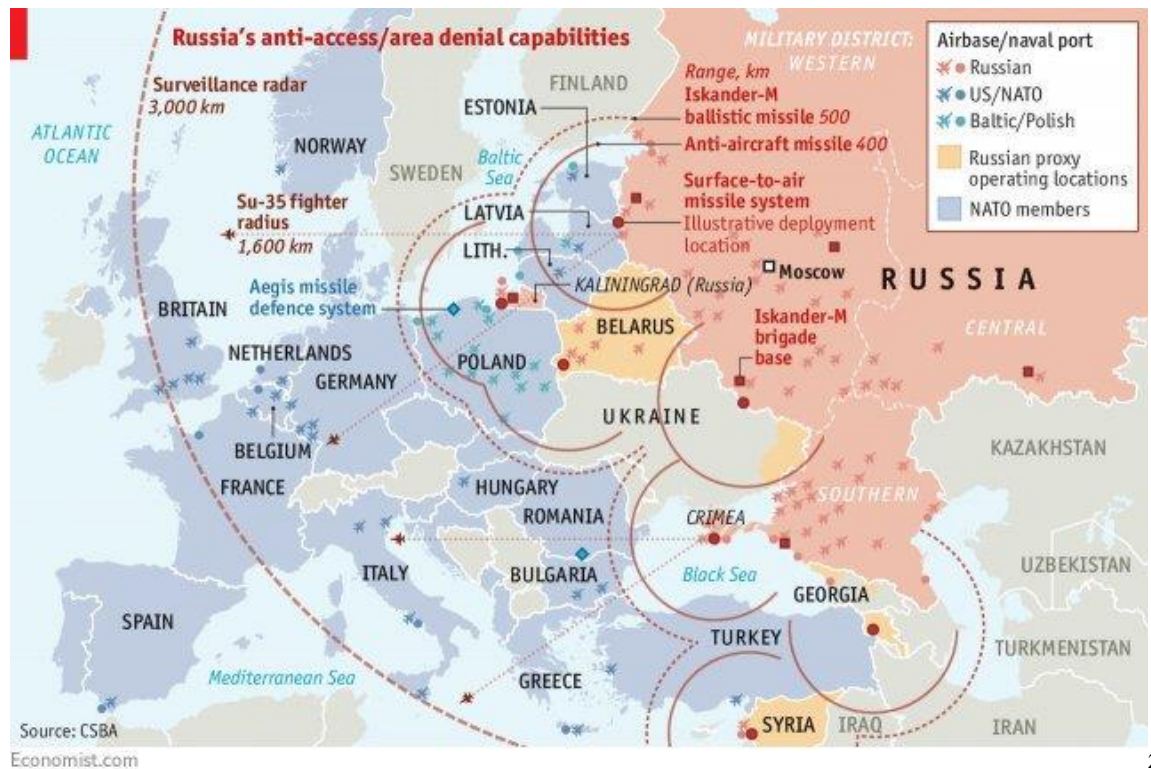
1. Chinese A2/AD systems overview.



1

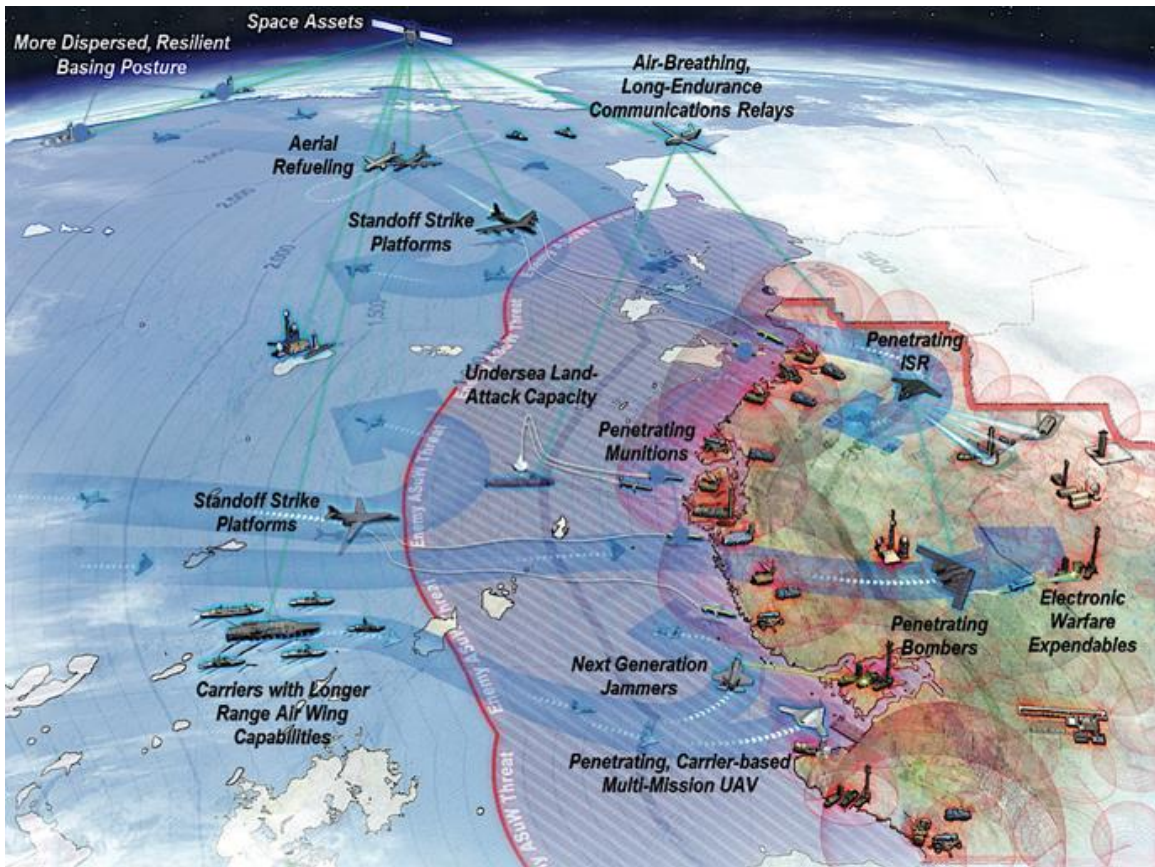
¹ V. Venugopal, "How Effective is China's A2/AD in the South China Sea," last updated October 21, 2020, <https://www.c3sindia.org/defence-security/how-effective-is-chinas-a2-ad-in-the-south-china-sea-by-commodore-v-venugopal-rettd/>

2. Russian A2/AD systems overview.



² Aziz Erdogan, "Russian A2AD Strategy and Its Implications for NATO," Beyond the Horizon, last updated December 6, 2018, <https://behorizon.org/russian-a2ad-strategy-and-its-implications-for-nato/>

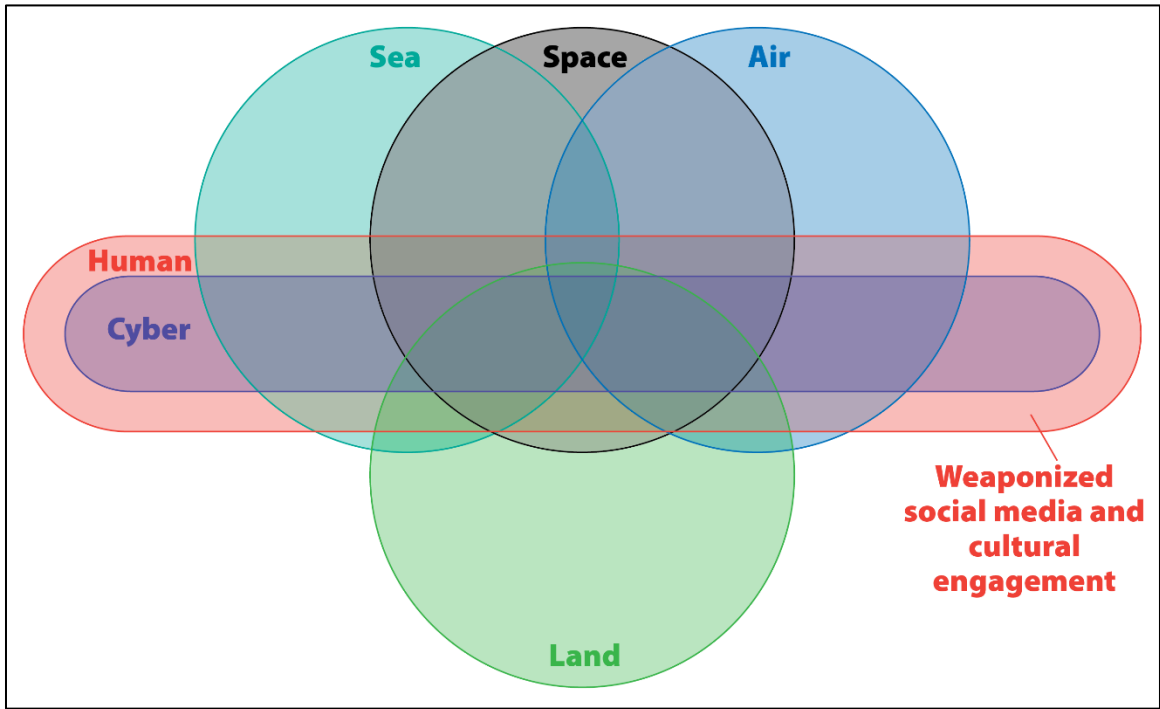
Appendix 3: Counter A2/AD Modernization Requirements.



Assets needed to Counter A2/ AD Capability¹

¹ Sameer Joshi, "Demystifying the Anti-Access/Area Denial (A2/AD) Threat," Sameer Joshi, last updated April 10, 2019, <https://sameerjoshi73.medium.com/demystifying-the-anti-access-area-denial-a2-ad-threat-d0ed26ae8b9e>.

Appendix 4: Multi-Domain Operations Graphic.



Multi-domain operations.¹

¹ Robert Brown, "The Indo-Asia Pacific and the Multi-Domain Battle Concept," *Military Review* 97, no. 5, (September 2017): 16, <https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/September-October-2017/The-Indo-Asia-Pacific-and-the-Multi-Domain-Battle-Concept/>.

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Vita

Prior to attending the Joint Advanced Warfighting School, Lieutenant Colonel Christopher McArthur was the Commanding Officer for 2nd Recruit Training Battalion, Recruit Training Regiment, Parris Island, South Carolina. Originally from Phoenix, AZ, LtCol McArthur enlisted in the United States Marine Corps in June 1993 serving with India Company and Lima Company 3/24 as a basic rifleman. During his enlisted service he supported two JTF-7 counterdrug missions and deployed to Guantanamo Bay Naval Base in support of Operation SEA SIGNAL in 1994. He was commissioned in May 1999 and subsequently attended The Basic School and Artillery Officers Basic Course. LtCol McArthur has served with 2nd Battalion 11th Marines as a forward observer and liaison officer where he deployed with the 31st MEU and in support of 3rd Battalion 5th Marines during Operation IRAQI FREEDOM, Marine Security Force Company Bangor, WA as a platoon commander and guard officer, the 27th Iraqi Brigade as an operations advisor in support of Operation IRAQI FREEDOM, 3rd Battalion 11th Marines as a Battery Commander and Operations Officer where he deployed in support of Operation ENDURING FREEDOM, Advisor Training Group as the Training Officer, and III MEF HQ G35 as a regional planner. His professional education assignments include Expeditionary Warfare School, Command and Staff College, and the School of Advanced Warfighting. LtCol McArthur holds a bachelor's degree in Political Science from East Tennessee State University (1999), a master's degree in Military Studies from the Marine Corps University Command and Staff College (2011), and a master's degree in Operational Studies from the Marine Corps University School of Advanced Warfighting (2016).