Convergence at Corps Level: Bringing it all together to Win

A Monograph

by

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The US Army has transitioned from a Cold War-era 1980s doctrine of AirLand battle, an Army/Air Force focused tactical concept, to one that embraces all domains of combat (land, air, maritime, space, and cyber) now known as Multi-Domain Operations (MDO). This new tactical approach provides opportunities and challenges for the corps headquarters. US Army MDO doctrine replaces AirLand Battle in order to compete and win against current and future threats. Exercise REFORGER (1983) and Operation Desert Storm (1991) provide both an exercise and real-world example for how corps synchronized land and air power, and what lessons can be learned from that era of "synchronization" of corps assets. This concept of synchronization is expanded under MDO under t

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Abstract

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The US Army has transitioned from a Cold War-era 1980s doctrine of AirLand battle, an Army/Air Force focused tactical concept, to one that embraces all domains of combat (land, air, maritime, space, and cyber) now known as Multi-Domain Operations (MDO). This new tactical approach provides opportunities and challenges for the corps headquarters. US Army MDO doctrine replaces AirLand Battle in order to compete and win against current and future threats. Exercise REFORGER (1983) and Operation Desert Storm (1991) provide both an exercise and real-world example for how corps synchronized land and air power, and what lessons can be learned from that era of "synchronization" of corps assets. This concept of synchronization is expanded under MDO under the concept of "convergence," a multi-domain approach of synchronizing effects. Corps-level targeting is crucial in the multi-domain fight, and the Joint Targeting process allows for a holistic lethal and non-lethal approach when converging effects. Doctrinal updates, training events, and leader education can help the Army and joint community implement multi-domain operations effectively.

Contents

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Abbreviations

AAR	After Action Review
ADP	Army Doctrine Publication
AIRCOM	NATO Air Command
ARFOR	Army Forces
BCT	Brigade Combat Team
COIN	Counter Insurgency
CONPLAN	Concept Plan
D3A	Decide, Detect, Deliver and Assess
DA PAM	Department of the Army Pamphlet
EAB	Echelon Above Brigade
EW	Electronic Warfare
FM	Field Manual
HPT	High Priority Targets
HVT	High Value Targets
IADS	Integrated Air Defense System
JP	Joint Publication
JSEAD	Joint Suppression of Enemy Air Defense
JTF	Joint Task Force
LRSU	Long Range Surveillance Unit (also known as LRS)
LSCO	Large Scale Combat Operations
MDO	Multi-Domain Operations
MLRS	Multiple Launch Rocket System
NATO	North Atlantic Treaty Organization
OPLAN	Operations Plan
REFORGER	REturn of FORces to GERmany

S-3	Operations Officer
TRADOC	Training and Doctrine Command
UAS	Unmanned Aerial Surveillance
USAF	United States Air Force
USAREUR	US Army Europe

Figures

Tables

Introduction

Near Future, Poland

The Squadron Operations Officer (S-3) studied the digital map on the wall of his mission command-variant Stryker nervously. Major Tim Davis was still getting to know the staff, and his mind raced to think of what he needed to focus on in the hours to come. Secure feeds from low-earth orbit satellites were supplying real-time information to his rolling operations center on T-14 Armata movements from Minsk, though the satellite constellation was increasingly being jammed by Russian ground-based assets. As his squadron was the most forward North Atlantic Treaty Organization (NATO) element oriented on the Russian force in Belarus and the division main effort at this point, the corps had allocated them precious time on the satellite.

The 2D Cavalry Regiment had been in screening positions since the annexation of Belarus following a Russian snap exercise two weeks earlier. The newly elected President of Belarus, Ivan Samazvaniec, had unwisely reached out to NATO seeking a Membership Action Plan following the latest rounds of Gazprom fuel price increases. The obsolescent Belarussian forces had no chance, especially after modern equipment sales from Moscow were shut off in the early 2020s. Second Cavalry had been in an exercise in the Hohenfels Training Area (HTA) at the time, and the exercise was abruptly stopped while 16th Sustainment Brigade scrambled to deliver war stock ammunition to them an-route. All of NATO stood on edge as the rest of the EU tried impotently to talk Russia into returning eastward.

Their higher headquarters had been busy. The Third Infantry Division, in its role as the division headquarters in Poland, continuously sent FRAGOs regarding “be prepared” missions in light of possible combat in a matter of days and had assisted with coordination with NATO entities for the road march into Poland. V Corps’ forward headquarters had been in a constant battle since before the first T-14 rolled into Belarus, but in the cyber domain. Russia was consistently attacking the tactical mission command network since 2nd Cavalry left Rose Barracks in Germany, and the only the redundant, self-healing networks had allowed them to conduct their tactical road march while operating under encrypted communications. The rotational armored force, now based around an armored division’s worth of equipment, was being prepared

for combat by contracted civilians alongside armored brigade combat team personnel from stateside who had just arrived in Nuremburg.

Temporary networks on the encrypted "6G" network that debuted in the early 2030s were provided by autonomous communications balloons moving slowly over the battlefield. These temporary wartime networks were integrated with the host nation cellular networks, but also backed up with Iridium satellite constellation communications, secure HF radios, and satellite-based mission command systems that helped maintain a complex, anti-fragile communications architecture that was difficult to jam in its entirety.

The rest of the six hundred-plus Corps staff had fallen in on hardened command and control bunkers in Germany, using warm-based mission command equipment kept serviced and operational by the 200-person forward element. This greatly sped up the ability of the corps to react to a *fait accompli* attack, as it appeared the usual sea route of moving the corps would have made them late to the party, especially with Russian submarines expected to attack US surface vessels at any moment.

Long-range precision fires from the 41st Fires Brigade were trained on the eastern border with Belarus along likely avenues of approach. While the days of multiple launch rocket systems (MLRS) dropping dud-producing bomblets were gone, the new kinetic-energy penetrator warheads were said to be nearly as effective without causing the human toll of cluster munitions and international outrage. Thanks to unmanned ground sensors near the international border, infiltration of the cyber networks of the Russian Western Military district system and corps-owned drones using side-looking aperture radar, the 41st Fires Brigade staff believed they had the likely avenues of approach covered with fires.

Back in the squadron mission command vehicle, the secure wireless communication came to life from the S2 Stryker. "Sir, we have reports that the Division main has been hit by SS-26 Iskander missiles. No word on any casualties at this time."

The Squadron S-3 realized that the dreaded scenario was finally coming to fruition. Would V Corps be able to help them survive long enough for the Polish divisions to fully mobilize, let alone link-up with follow-on US forces from Germany?

Background

The unclassified abstract of the 2019 National Defense Strategy depicts an "increasingly complex global security environment" that requires the United States to acknowledge an era of increased competition between certain key nations and non-state actors, including a resurgent Russia.[1] The US Army is transitioning its Doctrine, Organization, Training, Materiel, Leadership Education, Personnel, Facilities and Policy (DOTMLPF-P) to rise to this challenge. Russia has conducted destabilizing attacks on the periphery of NATO (invasion of the nations of Georgia in 2008 and Crimea in 2014) that has made the Army re-evaluate how to deter and, if required, defend against a possible attack against NATO members or partners on the periphery of NATO.

The concept of Multi-Domain Operations (MDO) is one of the ways that the Army seeks to address the problem of overmatch against the Russian threat.[2] The geography of the vulnerable Baltic nations (Estonia, Latvia, Lithuania) and the complications presented by Russian anti-access and area denial (A2/AD) capabilities in the exclave of Kaliningrad present significant challenges for US forces.[3]

Multi-Domain Operations are based on three central tenets, which are calibrated force posture, multi-domain formations, and convergence.[4] These three tenets represent the US Army's plan to achieve overmatch against initial local superiority. The third tenet, convergence, provides an opportunity to defeat the enemy through combined effects. Multi-Domain Operations defines convergence as shown below.

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[1] US Department of Defense, Joint Staff, "Description of the 2018 National Military Strategy" (Washington, DC: Government Publishing Directorate, July 12, 2019), 7, accessed December 4, 2019, https://www.jcs.mil/Media/News/News-Display/Article/1903669/description-of-the-2018-national-military-strategy-released/.

[2] US Army, Training and Doctrine Command Pamphlet (TRADOC PAM) 525-3-1. *The US Army in Multi-Domain Operations 2028*. Washington, DC: Government Publishing Directorate, 2018. 1, vi.

[3] Luis Simon, *Demystifying the A2/AD Buzz,* January 4, 2017, accessed 2 April 2020, https://warontherocks.com/2017/01/demystifying-the-a2ad-buzz/.

[4] US Army, TRADOC PAM 525-3-1, vii. The other two tenets of MDO (aside from covergence) are explained in depth throughout the TRADOC document, but a quick explanation is as follows "Calibrated force posture is the combination of position and the ability to maneuver across strategic distances. Multi-domain formations possess the capacity, capability, and endurance necessary to operate across multiple domains in contested spaces against a near-peer adversary."

Definition of Convergence in Multi-Domain Operations

Convergence: Convergence is the rapid and continuous integration of capabilities in all domains, the electromagnetic spectrum, and the information environment that optimizes effects to overmatch the enemy through cross-domain synergy and multiple forms of attack all enabled by mission command and disciplined initiative. The Joint Force currently converges capabilities through episodic synchronization of domain-federated solutions. Future operations against a near-peer threat, however, will require the Joint Force to conduct continuous and rapid integration of multidomain capabilities to gain cross-domain overmatch at decisive spaces. Decisive spaces are locations in time and space (physical, virtual, and cognitive) where the full optimization of the employment of cross-domain capabilities generates a marked advantage over an enemy and greatly influences the outcome of an operation. Convergence complicates the enemy's attempts to conceal and defend its center of gravity by providing the Joint Force with multiple options for attacking the enemy's vulnerabilities at decisive spaces. Multi-domain formations, at echelon, utilize convergence during competition and conflict to apply capabilities against vulnerabilities in an adversary's or enemy's systems.[5]

The Corps in Multi-Domain Operations

The Army is committed to the idea that it needs to prepare for future conflicts that will involve contested operations in all domains (Land, Sea, Air, Space, Cyber). The MDO concept depicts the corps as the lowest echelon where convergence will be generated, although it sets the conditions for these effects for its subordinate divisions and other units under its command.[6] The current goal for multi-domain operational capability throughout the Army is 2028 (initial operational capability), but operations happen in these

[5] US Army, TRADOC PAM 525-3-1, vii.

[6] US Army, TRADOC PAM 525-3-1, 22. "It(the corps) is responsible for converging capabilities against all enemy long-range systems (air defense, anti-ship, and long-range ground fires) within areas designated by the Joint Force Commander and providing Army capabilities to assist other components when the corps is responsible for multi-domain command and control. A corps converges capabilities against enemy mid-range fires formations within its areas of operations. The corps is the Army echelon responsible for converging large amounts of joint fires, whether against enemy mid-range systems or in support of division or brigade maneuver. The corps also converges national- and theater-level offensive cyberspace with other capabilities to achieve operational and tactical objectives. The corps creates conditions for convergence at lower echelons by allocating resources, sequencing division maneuver, and incorporating it with deception."

domains every day as nations (i.e., Russia, China) compete for advantage.[7] This new MDO concept is rooted in the legacy concepts of AirLand battle (synchronizing air and land power) but enhances these capabilities with convergence. But how does the corps do them now as the Joint Force?

The Joint Force (Army, Navy, Marine Corps, Air Force, and Space Force) currently converges capabilities through episodic synchronization of domain-federated solutions. This methodology has proven to be predictable and adversaries are developing solutions to combat our current sequenced way of using combat power across the domains.[8] Future operations against a near-peer threat will be more likely to succeed if the Joint Force can conduct continuous and rapid integration of multi-domain capabilities to gain cross-domain overmatch at decisive spaces.[9] Convergence complicates the enemy's attempts to conceal and defend its center of gravity by providing the Joint Force with multiple options for attacking the enemy's vulnerabilities at decisive spaces.

Multi-domain formations utilize convergence during competition and conflict to apply capabilities against vulnerabilities in an adversary's or enemy's systems. The corps faces these enemy threats like layered standoff and attempts to mitigate them with convergence. But to fully understand MDO, it is necessary to look at AirLand Battle, its doctrinal forefather.

AirLand Battle vs. Multi-Domain Operations

The US doctrine of AirLand Battle was the Cold War predecessor of MDO. The reforms of the 1970s Army under General William DePuy (founder of TRADOC) and General Donn Starry (designer of the "Active Defense" concept) led to AirLand Battle in 1981.[10] This doctrine established the need and a

[7] US Army, TRADOC PAM 525-3-1, 5.

[8] US Army, TRADOC PAM 525-3-1, vii.

[9] US Army, TRADOC PAM 525-3-1, 20. "Decisive spaces are locations in time and space (physical, virtual, and cognitive) where the full optimization of the employment of cross-domain capabilities generates a marked advantage over an enemy and greatly influences the outcome of an operation."

[10] John L. Romjue, *From Active Defense to AirLand Battle: The development of Army doctrine from 1973-1982*, US Army Training and Doctrine Command monograph, 44-49. AirLand Battle was the Army's 1981 solution to how to defeat the Soviet Union in depth against a multi-echelon attack in Europe. It stressed offense against fragmented Soviet Forces on the offense and close integration of the air domain with ground forces, along with planning for chemical and nuclear warfare.

means to synchronize land (US Army) and air power (US Air Force) for success on the plains of central Europe over a numerically superior Soviet force.[11]

AirLand Battle placed an emphasis on synchronization to achieve deep effects on the battlefield.[12] However, it did not address full convergence of all domains. Computer technology was still in its infancy and space technology, while fully functional, did not have the speed or ubiquity it has today in military operations and civilian life. While Soviet and US armies never collided in Europe, Operation Desert Storm in 1991 provided a test bed for the synchronization of land and air power under the AirLand Battle construct.[13] In a stunning victory, the US Army, employing two corps of land power, successfully coordinated air and ground operations beyond all expectations. This will be examined in a later section for lessons in the application of MDO.

While AirLand Battle was superseded by MDO, it is informative for future corps level development. The basic concepts of synchronizing land and air operations are retained, while new domains (Space and Cyber) are now incorporated into tactical, operational, and strategic planning. To gain better understanding of AirLand Battle, an examination of V Corps in a Cold War exercise (REFORGER 83) and VII Corps in Operation Desert Storm will help illustrate the basic concepts of AirLand Battle and how MDO doctrine builds on them. Particular attention to planning for joint capabilities and synchronizing these effects can help highlight how MDO can improve on AirLand Battle thinking.

V Corps in the Cold War

The US Army V Corps was stationed in Germany from 1951-2014.[14] Until the fall of the Berlin Wall in 1989 and later the fall of the Soviet Union in 1991, it stood guard against the forces of the Warsaw Pact.[15] V Corps was not tested in its assigned role as a tactical headquarters against Warsaw Pact, but it was

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[11] Thomas Cardwell III, *Airland Combat: An Organization for Joint Warfare* (Maxwell Air Force Base, AL: Air University Press, 1992), 34.

[12] Cardwell, *Airland Combat*, 99.

[13] Charles Edward. Kirkpatrick, "*Ruck It up!": The Post-Cold War Transformation of V Corps, 1990-2001* (Washington, DC: US Army Center of Military History, 2006), X.

[14] Daniel Cole, "V Corps inactivates after nearly a century of service to U.S. Army," US Army Europe, June 12, 2013, accessed January 23, 2020, https://web.archive.org/web/20130620202804/http://www.eur.army.mil/news/2013/20130612_V-Corps_inactivation.html.

[15] Kirkpatrick, "*Ruck It up*," X.

tested through military exercises such as the exercises REFORGER (REturn of FORces to GERmany) and Able Archer in 1983, a massive NATO exercise conducted to model a full Soviet invasion of Europe and a global battle between NATO and Soviet forces in all domains. These exercises allowed commanders and staffs to envision how conflict against the Warsaw Pact could unfold, and some of the inherent issues in winning that conflict. The V Corps staff faced a daunting real-world problem. How could the United States (alongside NATO allies) defeat numerically superior Soviet and Warsaw Pact forces (including those from the East Germany, Poland, and other Soviet satellites) in a very limited operational depth (approximately 240 kilometers from Fulda to Frankfurt am Main) quickly? The US CONPLANS and OPLANS, as well of those of the Russians, accounted for tactical nuclear weapons to defeat large armored forces.[16]These weapons were issued down to the tactical level, unlike current US Army units, which do not have nuclear weapons.

Understanding the challenges of the US Army problem-set came through conducting exercises throughout Western Europe. The corps has four roles in current doctrine: to provide the ARFOR within a joint force for campaigns and major operations, serve as the joint or multinational land component command headquarters (with augmentation) in campaigns and major operations, serve as a JTF headquarters (with augmentation) for crisis response and limited contingency operations, and to serve as a tactical headquarters commanding two to five Army divisions, together with supporting brigades and commands in campaigns and major operations.[17] Large-scale exercises were the means through which the corps was exercised at this time along with command post exercises. One of the more significant exercises that involved the V Corps staff and forces was the REFORGER (Return of Forces to Germany) series that simulated full-scale combat operations with the Soviet Union, and it is useful in examining the corps in its multi-division tactical headquarters role.

[16] Kirkpatrick, "*Ruck It up*," 36.

[17] US Department of the Army, Field Manual (FM) 3-94, *Theater Army, Corps, and Division Operations* (Washington, DC: Government Publishing Directorate, April 2014), 1-7. This monograph does not cover the corps in the role as a JTF headquarters or as a land component command headquarters.

Exercise REFORGER 83

The US Army conducted a series of deployment and readiness exercises known as REFORGER from 1969 to 1993 to test the ability of the Army to react to Soviet aggression.[18] The 1983 iteration of the exercise, "REFORGER 83" was a part of a larger joint and NATO exercise known as Able Archer 83, a realistic series of deployment and nuclear readiness sub-exercises.[19] REFORGER 83 provided a test-bed to see how V Corps would execute the synchronization of rear, close-in, and deep area fights.[20]

REFORGER 83 took place from 25 August to 28 November 1983.[21] The exercise involved significant movements to test the speed of assembly and the capability to conduct reception, staging, and onward integration to support US Army Europe (USAREUR) Concept Plans (CONPLAN)[22].Continental United States (CONUS) forces moved select equipment and personnel by sea and air through a variety of ports and airports. US forces made heavy use of prepositioned material configured in mission sets (POMCUS) equipment that was already in Europe, while an additional 711 wheeled and fifty tracked vehicles were brought to the continent from other parts of the United States.[23]

As a subset of REFORGER 83, V Corps (US) conducted exercise Confident Enterprise, which pitted the US 8th Infantry Division (Mechanized) as Opposing Forces against the 3rd Armored Division

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[18] Peter R. Mansoor, "Return of US Forces to Europe: Back to the Future," Hoover Institute, February 11, 2016, accessed March 17, 2020, https://www.hoover.org/research/return-us-forces-europe-back-future.

[19] Sean Gallagher, "WarGames for real: How one 1983 exercise nearly triggered WWIII," ARS Technica, November 25, 2015, accessed March 16, 2020, https://arstechnica.com/information-technology/2015/11/wargames-for-real-how-one-1983-exercise-nearly-triggered-wwiii/3/. The level of secrecy surrounding Exercise Able Archer 83 and the larger scope of the deployment caught the Soviet Union by surprise. This led to a significant heightening of nuclear tensions.

[20] Cardwell, *Air Land Combat*, 49.

[21] US Army Command and General Staff College, "TRADOC After Action Report to Observations Noted during REFORGER 83 and JTX BOLD EAGLE 84," Defense Technical Information Center, January 25, 1984, I-2, accessed March 20, 2020, https://apps.dtic.mil/dtic/tr/fulltext/u2/a164157.pdf.

[22] Joint reception, staging, and onward integration consists of reception operations (personnel and equipment being brought into theater), staging (preparing personnel and equipment to move), onward movement (movement from staging areas to tactical assembly areas or other forward locations), and integration (transfer of capabilities to an operational commander prior to the mission). US Department of Defense, Joint Staff, Joint Publication (JP) 3-35, *Deployment and Redeployment Operations* (Washington, DC: Government Publishing Directorate, January 10, 2018), vii, xiv.

[23] Commander in Chief US Army Europe (CINCUSAEUR), "REFORGER 83 After Action Report (4019X)," The National Security Archives, March 6, 1984, I-2, accessed March 19, 2020, https://nsarchive2.gwu.edu/NSAEBB/NSAEBB427/docs/10-CINCUSAREUR.pdf.

(3AD).[24] Employing large-scale mechanized forces in a head-to-head exercise gave the opportunity to test doctrine, staff processes, and equipment in a realistic environment. The training event was observed by the USAREUR staff and a team from the Training and Doctrine Command (TRADOC) specializing in AirLand Battle from the Command and General Staff College at Fort Leavenworth, Kansas.[25] Their observations during the exercise were collected in an effort to improve US forces across the DOTMLPF (Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities).

Joint Suppression of Enemy Air Defense (JSEAD) was identified as a shortfall in the exercise at the corps and division level. The AAR reads, "no one was checking target requests for JSEAD."[26] This is a significant shortfall, as disintegration of the enemy-integrated air defense system (IADS) is essential to maximize shaping operations at the corps level.[27] Without significant reduction of enemy air defenses in LSCO, it becomes difficult to employ fixed and rotary wing assets forward to achieve effects in support of the divisions in the close fight or corps-level targets.[28]

EW capabilities were employed by the United States and Royal Netherlands Army forces in the exercise, but the targeting and coordination of these capabilities was not clearly understood at the corps level down to divisions and below.[29] Similarly to cyber warfare in the modern era, EW is an important capability for units attempting to disrupt enemy command and control. Along with SEAD, EW relies on joint capabilities and needs to be synchronized for mutually beneficial effects. The AAR recommended that the corps fire support element act as the lead headquarters to conduct targeting of enemy command nodes, JSEAD, and EW coordination.[30]

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[24] Opposing Forces, or "OPFOR" are forces portraying enemy forces in military exercises.

[25] CINCUSAEUR, "REFORGER 83 After Action Report (4019X)," I-3. The exercise was designed as a thorough test of US forces and a rehearsal of a possible wartime deployment in Europe.

[26] CINCUSAEUR, "REFORGER 83 After Action Report (4019X)," III-66

[27] Mike Pietrucha, "The Myth of High-Threat Close Air Support, War on the Rocks," June 30, 2016, accessed March 19, 2020, https://warontherocks.com/2016/06/the-myth-of-high-threat-close-air-support/.

[28] Brian Payne, interview by author, School of Advanced Military Studies, Fort Leavenworth, KS, January 10, 2020.

[29] CINCUSAEUR, "REFORGER 83 After Action Report (4019X)," III-53. The corps fire support element did not coordinate division and below EW efforts.

[30] CINCUSAEUR, "REFORGER 83 After Action Report (4019X)," III-53.

In 1983, V Corps had no organic manned long-range reconnaissance (LRS) capability. During REFORGER 83, NATO allies provided LRS capability as a part of Field Training Exercise Confident Endeavor.[31] The USAREUR assessment team noted that LRS capabilities were very effective, but badly needed at the corps level. In 1986, V Corps received Company Echo, 51st Infantry (Long Range Surveillance), an organic LRS company under a military intelligence battalion.[32]

Corps support operations were contested during the REFORGER exercise. 1st Battalion, 75 Ranger Regiment (acting as Opposing Forces) conducted "rear area" (now called support area) attacks against V Corps to simulate Soviet *spetznaz* attacks.[33] V Corps dedicated howitzer support to assist in rear area defense, highlighting the importance of allocating combat power to vulnerable support operations.[34] Rear area operations were not frequently exercised in this era to this scale, and simulating attacks on vulnerable sustainment units helped inform tactics for future standard operating procedures.[35]

US officers showed poor knowledge and understanding of the US role in NATO and the NATO forces structure in REFORGER 83.[36] The United States employed assets from the NATO alliance in support of US corps (EW support and the manned reconnaissance mentioned previously) and definitely needed

[31] CINCUSAEUR, "REFORGER 83 After Action Report (4019X)," III-149. V Corps did not receive Echo Company, 51st LRS until 1986, years after the exercise.

[32] Nicholas P. O'Dawe*, Long-Range Surveillance Units (LRSU): The Past, Present and Future*. US Army War College. Carlisle, PA: March 27, 1990, 1. Following the Vietnam War, long range surveillance units in the Army went unmanned from 1974 to 1986.

[33] US Army Command and General Staff College, "TRADOC After Action Report," 7.

[34] US Army Command and General Staff College, "TRADOC After Action Report," 7.

[35] CINCUSAEUR, "REFORGER 83 After Action Report (4019X)," III-57. Sustainment units based in the continental US got a rare opportunity to practice rear area security in REFORGER 83. FM 90-14, *Rear Battle*, was published in 1985 following the exercise.

[36] US Army Command and General Staff College, "TRADOC After Action Report," 10.

allied support to win any sort of ground war in Europe against the Soviet Union.[37] The ability to bring together capabilities from other nations is an enduring challenge in the twenty-first-century.[38]

Gaining and Losing Reconnaissance Capability After REFORGER 83

Some changes followed in the years after REFORGER 83. The Army in Europe was still arrayed in two corps (V Corps and VII Corps) against numerically superior armored and mechanized forces.[39] The corps were ready to respond to Soviet aggression with multiple infantry and armored divisions as well as tactical nuclear weapons to shape the battlefield. These capabilities remained relatively unchanged. In terms of reconnaissance capability, however, these corps gained the ability to see deep into the enemy battlefield with US long range surveillance (LRSU) units that could identify enemy armored formations well in advance of their arrival.[40] This capability, coupled with the OV-1 Mohawk aircraft that employed radar and other sensors, led to increased awareness of enemy movements on the battlefield and allowed the corps' opportunities to conduct tactical shaping operations.[41][42]

These reconnaissance capabilities became less important with the fall of the Berlin Wall in 1989 and the dissolution of the Soviet Union in 1991. The post-Cold War period and the Global War on Terror and its focus on COIN in the early 2000s saw the US Army divest many corps capabilities, including tube artillery

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[37] Phillip Breedlove, "Depends on European Allies and Partners to 'Fully Defend Our National Security Interests,'" February 25, 2015, accessed March 19, 2020. https://www.atlanticcouncil.org/blogs/natosource/gen-breedlove-us-depends-on-european-allies-and-partners-to-fully-defend-our-national-security-interests/. General Breedlove spoke to the need for partners and allies to secure the flanks of NATO.

[38] Jen Judson, "Fighting the bureaucracy: For NATO, the Defender 2020 exercise in Europe will test interoperability," Defense News, October 14, 2019, accessed March 19, 2020. https://www.defensenews.com/digital-show-dailies/ausa/2019/10/11/fighting-the-bureaucracy-for-nato-the-defender-2020-exercise-in-europe-will-test-interoperability/. LTG Christopher Cavoli spoke to the need for interoperability in NATO: "From a land forces standpoint, the demonstration of collective defense is our best deterrent."

[39] Kirkpatrick, "*Ruck It up*," 17.

[40] James F. Gebhardt, *Eyes Behind the Lines: US Army Long-Range Reconnaissance and Surveillance Units: Global War on Terrorism*, Occasional Paper 10," rev. ed. (Fort Leavenworth, KS: Combat Studies Institute Press, 1948), 8, accessed January 21, 2020, https://www.armyupress.army.mil/Portals/7/combat-studies-institute/csi-books/gebhardt_LRRP.pdf.

[41] US Department of the Army, *Corps Deep Operations Handbook* (Washington, DC: Government Publishing Directorate, 1990), 4-29.

[42] John Sotham, "The Last of the Mohawks," *Air and Space Magazine*, March 1997, 1, accessed March 19, 2020, https://www.airspacemag.com/military-aviation/the-last-of-the-mohawks-1649/.

above 155mm, nuclear weapons, and LRSU.[43] The Corps also lost dedicated aviation support when the Army retired the OV-1 Mohawk aircraft, which stripped the corps of a manned aerial surveillance capability.[44]

Recommendations from REFORGER 83

Modern US Army long range surveillance units (LRSU) have been deactivated in both the active duty and the National Guard.[45] Despite the loss of this capability to corps commanders, there is an enduring need for persistent surveillance that may not be possible to rely on space and air assets alone. The MDO concept highlights that all domains will be contested, and this includes air and space assets. Without dedicated unmanned aerial surveillance (UAS) to conduct reconnaissance missions, the corps commander may be operating largely unaware of enemy forces in the deep fight, thus limiting their ability to achieve convergence to shape the battlefield. US corps would benefit heavily from a ground-based reconnaissance capability as a part of the land domain. This may include manned ground vehicles, sensors, or other technology that provide near-real time information on enemy activities. While manned reconnaissance forward can be extremely risky, the corps can also use reports from SOF. Irregular units (such as militia forces), host-nation civilians, or some form of organic LRSU-type organization that does not currently exist but may in future Army force structures as the Army continues to transform.[46]

US corps planners will have to account for convergence in the support area before and during conflict. Russia still has very capable *Spetznaz* forces and the permissive borders of NATO countries will likely allow Russian special operations forces early access to support areas deep within NATO boundaries.[47]

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[43] Alex Horton, "Army Quietly Deactivates Its Small-Team Reconnaissance Units," *Stars and Stripes*, January 23, 2017, accessed March 17, 2020, https://www.stripes.com/news/army-quietly-deactivates-its-small-team-reconnaissance-units-1.450392.

[44] Sotham, "The Last of the Mohawks," 1.

[45] Horton, "Army Quietly Deactivates."

[46] Siddhartha Mahanta, "These Baltic Militias Are Readying for War with Russia," *The Atlantic*, November 26, 2017, https://www.theatlantic.com/photo/2017/11/baltic-anti-russian-militia/545465/.

[47] Martin Hurt, "Russia Continues to Test Western Resolve – Spetsnaz Units Operating in Norwegian Territory," International Centre for Defence and Security, October 3, 2019, accessed March 18, 2020, https://icds.ee/russia-continues-to-test-western-resolve-spetsnaz-units-operating-in-norwegian-territory/. Spetnaz forces have conducted attacks on former citizens in the UK and Germany, as well as made their presence known on Norwegian islands.

Army and joint forces in the support area which face physical threats as well as those in the other domains. The MDO concept states that adversaries may attack in all areas (support, close, deep, and consolidation), and the corps staff will need to account for all of these areas in targeting.[48]

While the US Army continues to operate alongside NATO allies and partners, there is limited education on NATO matters in the Command and General Staff College or School of Advanced Military Studies curriculums to educate field grade officers on NATO member capabilities or doctrine. This may prove problematic in future conflicts, as officers stationed in the continental United States (such as all three current corps headquarters) and nearly all division headquarters will not be operating habitually with NATO divisions or corps. This could result in a lack of shared understanding between NATO and US staffs in a crisis and likely missed opportunities for corps-level convergence. For example, NATO Air Command (AIRCOM) assets may be requested in a US corps operation; but without habitual communication and understanding of NATO doctrine, there may be a loss of opportunity to share information and receive air-to-ground effects in a crisis.

One comment by the USAREUR staff following the exercise highlights the need for a common joint targeting methodology to achieve convergence across the domains:

> Although improvement is needed in the NATO arena, Air-Land force application is moving toward more joint and combined solutions and a willingness to discuss problems and propose solutions. Targeting and intelligence, Tactical Air Control Systems (TACS), airspace management, Electronic Warfare (EW), Joint Suppression of Enemy Air Defense (JSEAD) and Command, Control and Communications Countermeasures (C3CM) are the focus of Air-Land Battle lessons learned.[49]

Exercise REFORGER 83 and the sub-exercises within the exercise construct significantly contributed to the body of knowledge on Corps operation under AirLand Battle doctrine. Although MDO have more technology associated with them (especially in the space and cyber domains), many of the lessons from this exercise are directly applicable to US Army corps operations in the present day, and can inform doctrinal and force structure improvements to better prepare for large-scale combat operations.[50]

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[48] US Army, DA PAM 525-3-1, 8. The MDO framework shows that effects in all domains will be relevant from the strategic support area to deep operations.

[49] CINCUSAEUR, "REFORGER 83 After Action Report (4019X)," I-5.

[50] Scott King and Dennis B. Boykin IV, "Distinctly Different Doctrine: Why Multi-Domain Operations Isn't AirLand Battle 2.0," Association of the United States Army, accessed March 18, 2020, https://www.ausa.org/articles/distinctly-different-doctrine-why-multi-domain-operations-isn't-airland-battle-20.

As the Cold War wound down, a new conflict lay on the horizon that challenged US forces to synchronize a multi-corps armored force combat. Years passed since the US had faced significant combined arms opposition. Operation Desert Storm took the Army that had been developed during the Cold War in large exercises such as REFORGER 83 and put it to the test.

VII Corps in Operation Desert Storm (1991)

Operation Desert Storm was the definitive US ground war of the AirLand Battle era. The US plan to defeat the Iraqi army was crafted following the ideas of FM 100-5, *Operations* (May 1986), and emphasized the synchronization of air and ground firepower.[51] As an operational-level victory for the US Army, it was a tour-de-force of LSCO that highlighted the speed of armored and mechanized forces. As an exercise of "jointness" (Army and Air Force collaboration in this case), it revealed issues of inter-service parochialism and disagreement about the use of air power in combat.[52]

Saddam's seizure of Kuwait in 1990 with sizeable armored forces (3,600 tanks, 2,300 armored personnel carriers, and 1,300 artillery pieces) presented a significant challenge to US planners.[53] At the time of the invasion of Kuwait, the Iraqi Army was the fourth largest army in the world.[54] Saddam Hussein believed he could defeat the United States in a long duration conflict.[55] He had a false sense of military mastery after years of defensive operations following a disastrous invasion of Iran in 1980, and believed he could prevail in a long war.[56] His army would face a US Army that had been practicing combined arms for decades against the anticipated Russian threat that was only beginning to diminish.

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[51] Richard Swain. *Lucky War: The Third Army in Desert Storm* (Fort Leavenworth, KS: US Army Command and General Staff College Press, 1997), 72.

[52] "Jointness" is an unofficial term describing operations between Services (i.e., Army/Air Force) which entails the use of liaisons, habitual relationships, and joint exercises to ensure interoperability.

[53] Stephen A. Bourque, *Jayhawk! The VII Corps in the Persian Gulf War* (Washington, DC: The Center for Military History, 2002), 74.

[54] US Department of the Army, *Into the Breach: Historical Case Studies of Mobility Operations in Large-Scale Combat Operations,* Fort Leavenworth, KS: Army University Press, 2018, 192.

[55] Kevin M. Woods, *Mother of All Battles: Saddam Hussein's Strategic Plan for the Persian Gulf War* (Naval Institute Press: Annapolis, MD, 2008), 163.

[56] Woods, *Mother of All Battles*, 163.

The US Central Command planned a two-corps attack (XVIII Airborne Corps into the western Iraqi desert, VII Corps as the main effort to the east). This attack was based around a joint planning team's assumption that the main Iraqi ground forces could be attrited (reduced) to 50 percent combat power prior to "G-Day", the start of the ground war.[57] The joint planners believed that heavy attrition from the air was required due to the sheer number of Iraqi forces in the defense.

The then-current doctrine of AirLand Battle touted synchronized air and ground effects to defeat the enemy. The doctrine explained the need for deep attack as a means to destroy uncommitted forces behind enemy lines through envelopment in the tradition of J. F. C. Fuller.[58] It also spoke to the indirect approach of B. H. Liddell-Hart, who postulated that achieving an advantageous position may result in the enemy surrendering or being influenced by psychological factors.[59] As Desert Storm was actually executed, many of the effects employed were in keeping with the realist "destruction" ideas of J. F. C. Fuller, although maneuver and deception were used to keep the Iraqis off balance.[60]

US Army combat power was organized under two headquarters, VII Corps and XVIII Airborne Corps. VII Corps was task-organized with the majority of heavy combat power.[61] The US 1st Infantry Division (Mechanized), the US 1st Armored Division, 3d Armored Division, 1st Cavalry Division (-), US 2d Armored Cavalry Regiment, and UK (GBR) 1st Armored Division all represented an enormous amount of mechanized and armored vehicles (M113, M2 Bradley, M1 Abrams, UK Challenger tanks, a UK Warrior Infantry Fighting Vehicles); 42nd and 142nd Field Artillery Brigades provided corps-level fires; and VII

[57] Swain, *Lucky War*, 78.

[58] Swain, *Lucky War*, 72. Richard Swain compares the "realist" idea of destroying smaller portions of the enemy in details (Jominian theory) and mechanized envelopment theory from J.F.C Fuller. VII Corps maneuver incorporated both; while VII Corps took part in a larger envelopment at the operational level, at the tactical level, Iraqi forces were defeated in detail.

[59] Swain, *Lucky War*, 72; B. H. Liddell-Hart, *Strategy* (London, UK: Faber and Faber, 1991), 49.

[60] J. F. C. Fuller, *Armored Warfare* (Westport, CT. Greenwood Press, 1983), 110. Fuller spoke of the ability of armored forces to "annihilate" enemy forces, and the importance of fighting enemies from a well-supported logistical area, but also addressed the ability to defeat them with "gasoline starvation" following cutting their supply lines.

[61] Bourque, *Jayhawk!*, 88; Swain, *Lucky War*, 103. XVIII Airborne Corps received the 3d Armored Cavalry Regiment and 24th Infantry Division (Mechanized) but this was outweighed by nearly four armored divisions, a mechanized infantry division, and an armored cavalry regiment.

Corps had 142,661 soldiers, 8,501 tracked vehicles, and 27,652 wheeled vehicles.[62] While the ground forces of the VII Corps were formidable, it took the "air" side of AirLand Battle to properly shape the battlefield for their assault against Iraqi forces.

Close air support (CAS) and battlefield air interdiction (BAI) were complicated by a complex arrangement of forces and responsibilities.[63] This led to less efficient support for the maneuver of VII corps once the ground war began, although the Air Force had significantly shaped the battlefield prior to the beginning of the ground war.

GEN (Army) Norman Schwarzkopf, as the commander of US Central Command, and the joint and combined commander of all forces in theater set the following priorities for the Air Force: First was "Instant Thunder", an operation of six to nine-day duration with five hundred aircraft. The next priority was the suppression of enemy air defenses (SEAD). The third priority was attrition of enemy forces by 50 percent through air power. Finally, support to the ground attack.

Notably, the actual ground campaign was the lowest in priority for Air Force planning. General Schwarzkopf foresaw an operational-level bombing campaign that left Iraqi command and control in disarray, followed by a ground campaign of short duration.[64] AirLand Battle stressed the need for CAS and BAI.[65] The focus of most sorties in the air war went to strategic bombing and BAI due to the wants of Air Force planners to avoid the challenges of close integration with maneuver forces.[66]

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[62] Swain, *Lucky War*, 354, Appendix F.

[63] US Department of Defense, Joint Staff, Joint Publication (JP) 3-03, *Joint Interdiction* (Washington, DC: Government Publishing Directorate, September 9, 2016), GL-4; Bourque, *Jayhawk!*, 368. Battlefield Air Interdiction is an obsolete doctrinal term for what is now termed "air interdiction" by the Air Force. Air interdiction is "Air operations conducted to destroy, neutralize, or delay the enemy's military surface capabilities before it can be brought to bear effectively against friendly forces, or to otherwise achieve objectives that are conducted at such distance from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required.

[64] Swain, *Lucky War*, 113.

[65] US Department of the Army, Army Field Manual (FM) 100-5, *Operations* (Washington, DC: Government Publishing Directorate, 1993), 49.

[66] Swain, *Lucky War*, 184-191.

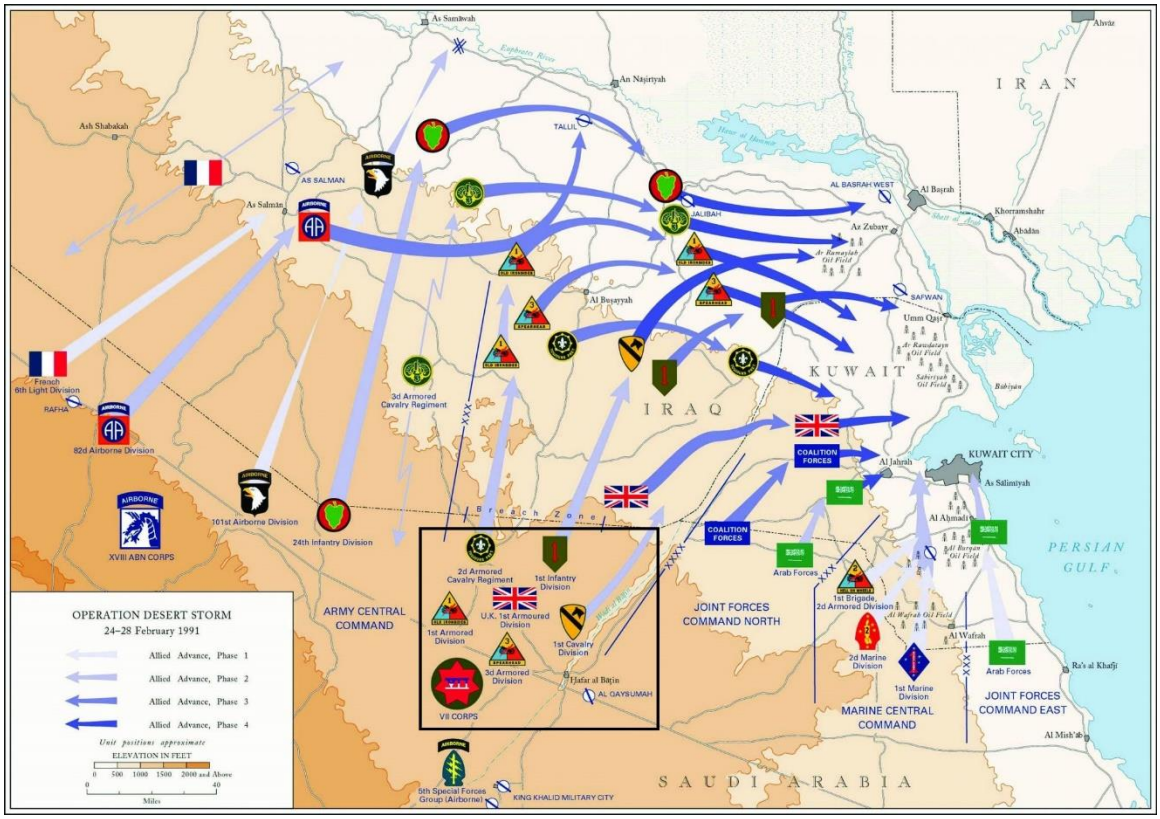

Figure 1. Desert Storm Operational Map
Source: Peter S. Kindsvatter, "Jayhawk Goes to War: VII Corps in Operation DESERT STORM," Army Historical Foundation, 2020, accessed March 15, 2020. https://armyhistory.org/jayhawk-goes-to-war-vii-corps-in-operation-desert-storm/. (Graphic courtesy of the Department of Defense). VII Corps (highlighted by the black box) commanded most of the ground combat power during offensive operations in Desert Storm While VII Corps had a well-synchronized attack into formidable Iraqi defenses, the Air Force had set the conditions for a successful ground assault through a brutally effective air campaign.

The Ground War Begins

At the dawn of the ground war, VII Corps was tasked with the destruction of the Iraqi Republican Guard on the ground. At the same time, XVIII Airborne Corps, to the east, was oriented on the Western desert and preventing the escape of Iraqi forces. VII Corps would be attacking the enemy in its defensive zones, following a breach by the 1st Infantry Division (Mechanized).[67]

VII Corps conducted artillery raids on Iraqi defenses before G-day, the start of the main ground war in Desert Storm. These artillery raids were synchronized with the employment of AH-64 Apache helicopter units to ensure that the helicopters would maximize effects by attacking already disrupted defenders. Ground forces located near the Saudi Border would also conduct long-distance fires from direct fire

[67] Swain, *Lucky War*, 210.

weapons systems to give yet another dilemma to the beleaguered Iraqi defenders.[68] The Q37 "Firefinder" counterfire radar and MLRS helped VII Corps disrupt Iraqi defenses prior to the main ground assault. The satellite phone, a relatively new invention at the time, and EW capabilities helped synchronize and permit these raids. 14,000 artillery rounds and 4,900 MLRS rounds were delivered into the enemy corps deep area, depriving them of much of their artillery.[69] Although these efforts to employ aviation, new fire control, MLRS, AH-64 Apaches, and conventional direct and indirect fires were referred to as "synchronization" in the lexicon of FM 100-5, it approaches the intent of convergence in MDO, where capabilities are maximized through simultaneity or phased attacks.

AH-64 Apaches from the Corps aviation were very effective in destroying Iraqi armored formations.[70] The Apache was developed to provide an effective aerial, anti-armor capability in the Army following decades of varying support from the Air Force regarding the CAS mission; and proved its worth in Desert Storm.[71] The ability of the VII Corps commander to employ AH-64 fires in support of ground troops gave him the ability to synchronize effects outside of the Air Force tasking order timeline. The ability to "own" his own aviation gave General Franks much-needed ability to engage and destroy Iraqi vehicles that may have otherwise gone un-serviced by Air Force assets.[72] The effect of the AH-64 aircraft went beyond just the destruction of vehicles once its capabilities became known; just the initiation of an attack could lead Iraqi soldiers to abandon equipment and quit the field of battle.[73]

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[68] Bourque, *Jayhawk!*, 160-161.

[69] Bourque, *Jayhawk!*, 164.

[70] Bourque, *Jayhawk!*, 244.

[71] Frank C. Conahan, Report to the Chairman, Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, House of Representatives, *Apache Helicopter Was Considered Effective in Combat, but Reliability Problems Persist* (Washington, DC: General Accounting Office, April 1992), 15, Accessed March 15, 2020, http://archive.gao.gov/d32t10/146441.pdf; Rebecca Grant, "The Clash about CAS," *The Air Force Magazine*, January 2003, 56, accessed March 15, 2020, https://www.air forcemag.com/PDF/MagazineArchive/Documents/2003/January%202003/0103CAS.pdf.

[72] Swain, *Lucky War,* 228. The Air Force and Army struggled to coordinated fires within the Fire Support Coordination Line (FSCL) during offensive operations, leading to a lack of support to VII Corps maneuver. Despite this coordination shortfall, the immense success of air interdiction significantly shaped the battlefield ahead of the FSCL.

[73] Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey: Summary Report* (Washington, DC: Government Publishing Directorate, 1993), 117.

VII Corps was more reliant on sensor-enabled reconnaissance than manned surveillance. Corps had LRSU available during the ground war but did not employ them in a deep reconnaissance role.[74] The LRS teams were sent near the forward line of troops prior to the ground invasion, which negated their unique capabilities. This was based on a deliberate risk decision made by LTG Franks, the corps commander.[75] VII corps benefited from intelligence provided by the USAF E-8 Joint Surveillance Target Attack Radar System (Joint STARS) aircraft, a ground surveillance aircraft that could provide rapid information on the locations of enemy vehicles.[76] This capability provided a lower-risk alternative to forward manned reconnaissance.

Satellite-provided intelligence and positioning information was in high demand before and during the ground war.[77] Despite the United States having significant satellite assets available during the conflict, the post-war space command AAR identified the need for better multi-spectral imagery for the joint force.[78] Additionally, the new technology of Global Positioning Systems (GPS) conferred a unique advantage on the battlefield and was crucial in synchronizing massive armored formations and minimizing fratricide.[79] The Air Force also noted the need for additional reserve satellites for major conflicts.[80]

The joint command Desert Storm used a non-standard targeting cell known as the "Black Hole" to synchronize air and land power.[81] The planning cell had representatives from all services, although the Air Force had the preponderance of personnel on the staff.[82] The planners made a detailed plan that destroyed 39

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[74] Jack D. Kem, *Deep Maneuver: Historical Case Studies of Maneuver in Large-Scale Combat Operations* (Fort Leavenworth, KS: Army University Press, 2018), 213.

[75] Kem, *Deep Maneuver*, 212.

[76] Robert M. Citino. *Blitzkrieg to Desert Storm: The Evolution of Operational Warfare* (Lawrence, KS: University Press of Kansas, 2004), 290.

[77] Swain, *Lucky War*, 59, 149, 155. The demand for satellite imagery outstripped the ability of strategic satellites to provide it to tactical commanders, while Global Positioning Systems (GPS) transformed the ability of US commanders to maneuver forces in the desert.

[78] US Department of the Air Force, *AFSPACECOM DESERT SHIELD/DESERT STORM LESSONS LEARNED* (Peterson Air Force Base, CO: Space Command, 1991), 6, accessed March 15, 2020, https://nsarchive2.gwu.edu/NSAEBB/NSAEBB39/document7.pdf.

[79] Sharon Watkins Lang, "SMDC History: 25 years since first 'Space War,'" US Army, January 20, 2016, accessed February 23, 2020. https://www.army.mil/article/161173/smdc_history_25_years_since_first_space_war.

[80] US Department of the Air Force, *AFSPACECOM*, 8.

[81] John T. Correll, "The Air Defense of Desert Storm," *Air Force Magazine*, May 10, 2008, accessed February 17, 2020. https://www.airforcemag.com/article/0106storm/.

[82] Keaney and Cohen, *Gulf War Air Power Survey*, 38.

percent of the Iraqi tanks, 32 percent of the armored personnel carriers, and 47 percent of the artillery within the first thirty-eight days of the bombing campaign. Due to the high amount of sorties and the relatively short ground war, only 6 percent of all air sorties went to CAS.[83] Iraqi ground forces were not only destroyed on the ground, but many had retreated in the face of the deadly air campaign, and left many vehicles unmanned and useless, if not destroyed outright.[84]

Desert Storm Lessons Learned

The AirLand Battle concept was not fully implemented in support of VII Corps.[85] Although the air war before "G-day" had heavily "attrited" (reduced) Iraqi ground forces as well as command and control, expected Close Air Support (CAS) sorties were not allocated in a manner that met expectations of the FM 100-5 doctrine:

> *Air Dimension.* The airspace of a theater is as important a dimension of ground operations as the terrain itself. This airspace is used for various purposes including maneuver, delivery of fires, reconnaissance and surveillance, transportation, and command and control. The control and use of the air will always affect operations; the effectiveness of air operations in fact can decide the outcome of campaigns and battles. Commanders must consider the airspace to include the apportionment of air power in planning and supporting their operations. They must protect their own forces from observation, attack, and interdiction by the enemy and expect the enemy to contest use of the airspace.[86]

Targeting Iraqi command and control through strategic bombing and BAI set favorable conditions for the single-envelopment conducted by VII Corps as a part of the larger force.[87] The air superiority enjoyed by the US and its allies in Desert Storm cannot be counted on as a given in future conflicts. Future scenarios involving near-peer forces would likely require a significant amount of time to achieve air parity at first, and then moving to air superiority. This period of time represents an excellent window to employ converging effects in all domains to ensure enemy air defenses are neutralized as much as possible (joint SEAD) and that conditions are set for the ground forces, even if significant air interdiction missions are not possible at that point in the campaign.

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[83] Grant, "The Clash about CAS."

[84] Keaney and Cohen, *Gulf War Air Power Survey*, 111.

[85] Bourque, *Jayhawk!*, 460.

[86] US Army, FM 100-5, 1-4.

[87] Citino, *Blitzkrieg to Desert Storm*, 289.

The tenets of AirLand Battle doctrine—initiative, agility, depth, and synchronization—all survive into today's US doctrine and the MDO construct.[88] It is the skillful use of all available assets, across the domains, which makes MDO more powerful than AirLand Battle. The space domain significantly enabled VII Corps. The demand for secure GPS capabilities and rapid or real-time satellite imagery and sensor data has only increased in the years since 1991 to the present as space becomes a contested domain.[89] Corps planners will increasingly have to account for space operations, both to maneuver their subordinate units, provide timely intelligence updates, and to employ offensive space effects when possible.

VII Corps coordinated a stunning defeat on the battlefield. In less than 96 hours, LTG Frank's forces destroyed a dozen Iraqi divisions.[90] Air power set the conditions for an extraordinarily successful ground assault. Air Force operations and Army forces working in parallel managed to defeat the Iraqi Army in the field. However, the ad hoc nature of targeting in the conflict was more of a potential point of failure and would likely be unsuccessful in the MDO construct. The doctrine of the era reflected this cavalier approach to targeting. Targeting is only mentioned three times in FM 100-5, *Operations*, from 1986 – it should be significantly more important in MDO doctrine. While the manual directs that "Commanders must understand the techniques of integrating Air Force, Naval, and Army firepower effectively in the conduct of campaigns and major operations," it takes targeting to understand how to prioritize and converge all available forces and assets.[91]

While the manual directs that "Commanders must understand the techniques of integrating Air Force, Naval, and Army firepower effectively in the conduct of campaigns and major operations," it takes targeting to understand how to prioritize and converge all available forces and assets.[92]

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[88] US Army, FM 100-5, 134.

[89] Charles Pope, "Air Force's proposed $169 billion budget focuses on 'great power competition,' readiness, establishing Space Force," Space Force, February 10, 2020, accessed February 23, 2020, https://www.spaceforce.mil/News/Article/2080145/air-forces-proposed-169-billion-budget-focuses-on-great-power-competition-readi/.

[90] Frank N. Schubert and Theresa L. Kraus, ed. *The Whirlwind War: The United States Army in Operations DESERT SHIELD and DESERT STORM* (Washington, DC: Center of Military History, United States Army, 2001), 201, accessed February 23, 2020, https://history.army.mil/books/www/www8.htm.

[91] US Army, FM 100-5, 13.

[92] US Army, FM 100-5, 13.

Using Joint Targeting to Achieve Convergence

The historical examples of REFORGER 83 and Operation Desert Storm both highlighted shortcomings in corps-level integration of Air Force assets. Future conflicts will be demanding on the Army's ability to leverage joint capabilities to achieve convergence, as the Army does not have access to all of the capabilities required in MDO.[93] For example, the Army does not have sensors at corps level or below (manned or unmanned) that can detect targets to 500-700 kilometers (possible ranges of future missiles) away that can affect the area of operations.[94] This type of shortcoming means the Army corps must leverage the detection capabilities of other services to employ its longest-range surface fires.[95] The DoD manual for joint targeting, Joint Publication 3-60, states that the "primary purpose of joint targeting is to integrate and synchronize all weapon systems and capabilities."[96] It is this synchronization across services and domains that is the heart of convergence in the MDO concept. Thus, joint targeting is what creates the effect of convergence.

Targeting allows planners to see how to synchronize effects against enemy capabilities in time and space. Careful targeting can achieve "cross-domain synergy," an effect where capabilities enabled by joint intelligence can overwhelm the enemy.[97] Cross-domain synergy creates a dynamic increase in effects rather

[93] MEDCoE, "U.S. Army Futures Command Presentation on Multi-Domain Operations," June 6, 2019, accessed March 31, 2020, video of lecture, 1:56:44, https://www.youtube.com/watch?v=Nbke Q1UJNPw&t=6072s. COL Stephen C. (Chris) Rogers explains the MDO concept and how joint force capabilities can defeat layered standoff, using the example of Russian SS-26 missiles in one example.

[94] Scott Neuman, "U.S. Tests Missile With A Range Prohibited By Now-Abandoned Treaty," National Public Radio, August 20, 2019, accessed March 26, 2020, https://www.npr.org/2019/08/20/752657167/u-s-tests-missile-with-a-range-prohibited-by-now-abandoned-treaty. The US is testing ground to ground missiles with ranges beyond 500 km which would enable Army corps to conduct the deep fight at greater ranges.

[95] British Broadcasting Corporation, "INF nuclear treaty: US tests medium-range cruise missile," August 20, 2019, accessed March 23, 2020, https://www.bbc.com/news/world-us-canada-49405499. As of August 2019, the United States may purchase ground-based missiles with ranges beyond 500 KM, which were previously banned by Intermediate-Range Nuclear Forces (INF) treaty. This may lead to increased ranges for Army missiles in the future.

[96] US Department of Defense, Joint Staff. Joint Publication (JP) 3-60, *Joint Targeting* (Washington, DC: Government Publishing Directorate, 2013), vii.

[97] US Army, TRADOC PAM 525-3-1, ix. "Army forces employ deception and convergence with other domains to dislocate the enemy defense by physically, virtually, and cognitively isolating its subordinate elements, allowing friendly forces to achieve overmatch and favorable force ratios."

than merely being additive.[98] In MDO, planners create plans that maximize the use of lethal and non-lethal combat power, creating a "kill web" of multiple options and possibilities.[99] Knowing where, when, and how to attack the enemy is crucial to any effective plan.

The Army of REFORGER 83 and Operation Desert Storm relied on an Army and Marine Corps process known as "Decide, Detect, Deliver, and Assess" to achieve this purpose. While effective in the Cold War during training exercises and successful in Operation Desert Storm, it is not detailed enough to tease out all potential ways to attack the enemy and is less compatible with staff processes in the sister services.

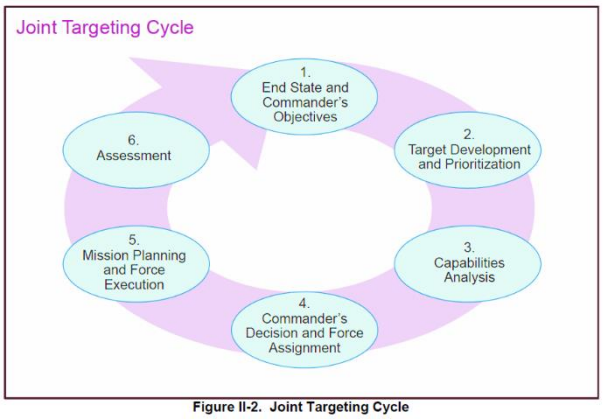

Figure II-2. Joint Targeting Cycle

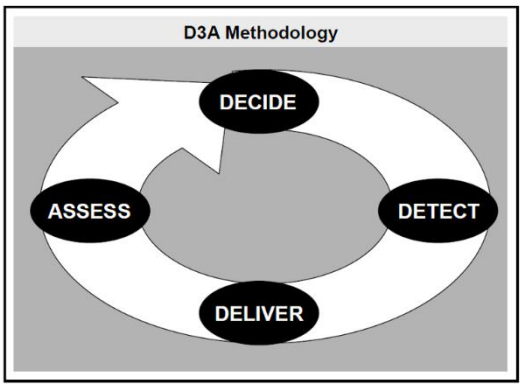

Figure 2-1, D3A methodology cycle

Figure 2. The Joint Targeting Cycle/D3A Methodology Comparison (graphic comparison created by author). The simplicity of the Army targeting methodology (four steps vs. six steps) makes it suited for division and below tactical targeting, while the additional systems analysis of the joint targeting cycle requires more analysis and opportunities to apply effects from the joint force against components and elements of enemy systems.
Source: US Department of Defense, Joint Staff. Joint Publication (JP) 3-60, *Targeting* (Washington, DC: Government Publishing Directorate, 2016), II-23; US Department of the Army, Army Techniques Publication (ATP 3-60) *Targeting* (Washington, DC: Government Publishing Directorate, 2015), 2-1.

In the years following Operation Desert Storm, the US military used service-specific targeting methodologies, each tailored for their own needs. The Army's May 1996 publication of Field Manual 6-20-10, *Tactics, Techniques, and Procedures for the Targeting Process*, highlighted the variety of targeting methods in the Joint Force:

> Each service has established unique doctrine and tactics, techniques, and procedures for targeting. Several emerging joint doctrinal publications also address joint targeting procedures. Where the

[98] US Army, TRADOC PAM 525-3-1, 20. "The combination of complementary effects complicates an enemy's ability to act, producing an overall effect greater than the sum of the individual parts."

[99] MEDCoE, "U.S. Army Futures Command Presentation on Multi-Domain Operations," COL Stephen C. (Chris) Rogers begins talking on the use of convergence against integrated air defense and long-range fires after 59:50 of the 1:56 hour video.

habitual integration of resources from one or more services support the targeting requirements of another service, multiservice arrangements have been developed.[100]

This service-specific approach worked well during the pre-MDO era, as seen in the Desert Storm case study. However, there is a benefit to a common joint process. Why does the Army use a domain-specific process currently? The answer is speed and simplicity. When the Army was primarily managing organic assets (direct and indirect fire, Army attack aviation) and reaching out only to the Joint Force to request CAS from the Air Force, a very simple means of targeting and requesting support was ideal. But how does the Army legacy process work?

The current Army targeting process of Decide, Detect, Deliver and Assess (D3A) is intended for rapid servicing of high priority targets (HPT) and high value targets (HVT) with Army "owned" capabilities.[101] This cycle of activities operates as follows:

Decide: The commander, based on targeting staff inputs, selects or approves an HPT and HVT list.

Detect: The unit establishes where the target is in time and space using organic reconnaissance, Army attack aviation, UAS, or fire direction radar.

Deliver: The target is serviced with Army artillery, rockets, Army Attack Aviation (AAA), or mortars (among other possibilities, to include snipers or other ground-based assets) in accordance with the attack guidance matrix.[102]

Assess: Battle Damage Assessment (BDA) is conducted, and the headquarters notes how many systems have been destroyed, degraded, or neutralized.[103] This assessment drives possible changes to the HPT and HVT list in the next targeting cycle, as the targeting process is continuous.

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[100] US Department of the Army, Field Manual (FM) 6-20-10, *Tactics, Techniques and Procedures for the Targeting Process*, (Washington, DC: Government Publishing Directorate, May 1996) 1-7.

[101] A *high-value target* is a target the enemy commander requires for the successful completion of the mission A high-payoff target (HPT) is a high value target (HVT) that must be acquired and successfully engaged for the success of the friendly commander's mission.. US Department of the Army, ATP 3-60, 2-2. These definitions are aligned with the joint definitions.

[102] US Department of the Army, ATP 3-60, 2-2. The *attack guidance matrix* is a targeting product approved by the commander, which addresses the how and when targets are engaged and the desired effects.

[103] Department of Defense, Joint Staff, CJCSI 3162.02, *Methodology for Combat Assessment* (Washington, DC: Government Publishing Directorate, March 2019), D1. Battle Damage Assessment (BDA) is BDA is the estimate of damage composed of the physical damage assessment (PDA) and functional damage assessment (FDA), as well as target system assessment, resulting from the application of lethal or nonlethal military force.

Army targeting is designed to be tailorable for the staffs that are employing it – it is not an inflexible process, as seen in ATP 3-60, *Army Targeting*:

> The formats for the HPTL, target selection standards, and AGM presented in the preceding paragraphs are examples only. Targeting personnel must understand all the considerations that are involved in building these targeting tools. However, experienced staffs may prefer to develop their own formats tailored for their situation.[104]

While this flexibility makes D3A easy to use and flexible for lower echelon staffs (especially brigades and battalions), it is not conducive to requesting joint assets. There are specific steps in the joint targeting process that help maximize the use of certain assets and ensure apportionment and allocation meet the joint force commander's intent.[105] Electronic target packets with specific formatting that are part of the joint targeting cycle (i.e. the Cyber Effects Request Form, or CERF) require additional staffing and analysis.[106]

Historically, the only joint targeting requirement for the corps staff, when not operating as a corps JTF but as a multi-division tactical headquarters, has been to nominate air targets and request support from the Air Force, as seen in the case studies. Generally, this would come in the form of requests sent through the battlefield coordination detachment (BCD), a small Army fires element co-located with the Air Force to ensure Army force requests are processed under the joint headquarters.[107] In the MDO concept, the corps

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[104] US Department of the Army, ATP 3-60, 2-7.

[105] US Department of the Air Force, Curtis E. LeMay Center for Doctrine Development and Education, Planning and Executing Joint Air Operations, *The Joint Operation Planning Process for Air* (Washington, DC: Government Publishing Directorate, last updated November 4, 2016), III-23, III-24, accessed March 20, 2020, https://www.doctrine.af.mil/Portals/61/documents/Annex_3-0/3-0-D29-G-OPS-JOPPA.pdf. Air apportionment is a process that "enables the JFC to ensure the priority of the joint air effort is consistent with campaign or operation phases and objectives." Air allocation: the translation of the air apportionment decision into a total number of sorties by weapon system type available for each objective and task.

[106] The Cyber Effects Request Form (CERF) is an example of an external targeting product that is generated by Army staffs to request a joint effect. Similar to the Department of Defense (DD) Form 1972 for requesting Close Air Support, it is an external product that must be accounted for separately in targeting, on a different time horizon than a rapidly-fired asset like mortars or artillery. Once generated, it must be sent through the first joint command (JTF or Combatant Command, depending on the situation) for further processing at US CYBERCOM. US Department of Defense, Joint Publication (JP) 3-12, *Cyberspace Operations* (Washington, DC: Government Publishing Directorate, June 8, 2018), Appendix C, 1, 2, 4.

[107] US Army Europe, 19th Battlefield Coordination Detachment, May 25, 2018, accessed March 31, 2020. https://www.eur.army.mil/Newsroom/Fact-Sheets-Infographics/Fact-Sheet-Article-View/Article/1532504/19th-battlefield-coordination-detachment/ The BCD is tasked to "coordinate and integrate Army Forces/land component requirements into the Air Tasking Order process."

will ask for more joint assets, rather than formatting one request in a separate manner for the Air Force and the air domain alone.

By 2002, Joint Publication 3-60, *Joint Doctrine for Targeting*, recognized the separation of land forces from the rest of the services in targeting: "Surface force commanders normally use a four-phase process (decide, detect, deliver, and assess) to enhance joint fire support planning and interface with the joint targeting process."[108] The US Marine Corps and Army still used a land domain-specific targeting process.[109] But why did the Army and Marine Corps retain this methodology up to this point, when their sister services had moved to a joint process?

The D3A philosophy emphasizes speed and simplicity. It works well from the battalion level to the division level, as it leverages a limited number of assets (i.e., 155mm artillery) against set targets (i.e., troops in the open) in scenarios where detailed target analysis is unneeded or would slow fires. As the level of headquarters increases from battalion, brigade, division, and higher, the complexity and depth of the battlefield also increases.[110] This is where D3A begins to taper off in its effectiveness.

The Air Force uses joint targeting to plan air operations, and the Marine Corps uses it for amphibious planning (air, ground, and maritime, though it retains D3A in some ground applications). Tactical cyber targeting requires a joint approach as well, as all services request it using joint methodology. The XVIII Airborne Corps, acting in a Joint Task Force headquarters role, has used the Joint Targeting process in Operation Inherent Resolve in Syria to bring together national assets alongside ground forces to achieve convergence.[111] As tactical corps become future multi-domain headquarters using joint capabilities,

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[108] US Army, JP 3-60, *Joint Doctrine for Targeting*, January 17, 2002, viii.

[109] US Marine Corps, FM 3-09.12 (MCRP 3-16.1A), *Tactics, Techniques, and Procedures for Field Artillery Target Acquisition*, June 21, 2002, accessed March 31, 2020, https://www.trngcmd.marines.mil/Portals/207/Docs/TBS/MCRP%20316.1A%20TTPs%20for%20Field%20Artillery%20Target%20Acquisition.pdf?ver=2015-06-08-144125-603 The US Army and Marines were still sharing targeting manuals.

[110] TRADOC PAM 525-3-1, 22, 23. The corps will have to consider joint timelines, not only for the traditional Air Tasking Orders (ATOs) for Air Force requests, but also timeline for Space, Cyber, and possibly Maritime requests.

[111] [111] CW4 Jeremy Carlson, "Role of the Corps in Multi-Domain Operations," XVIII Airborne Corps Headquarters, Ridgeway Conference Room, Fort Bragg, NC, November 6, 2019. Phone conference with author.

the Army corps will be requesting effects across services and domains in each targeting cycle.[112] The joint process, through systems thinking and a more deliberate 6-step process, provides opportunities to leverage other service capabilities and domains.

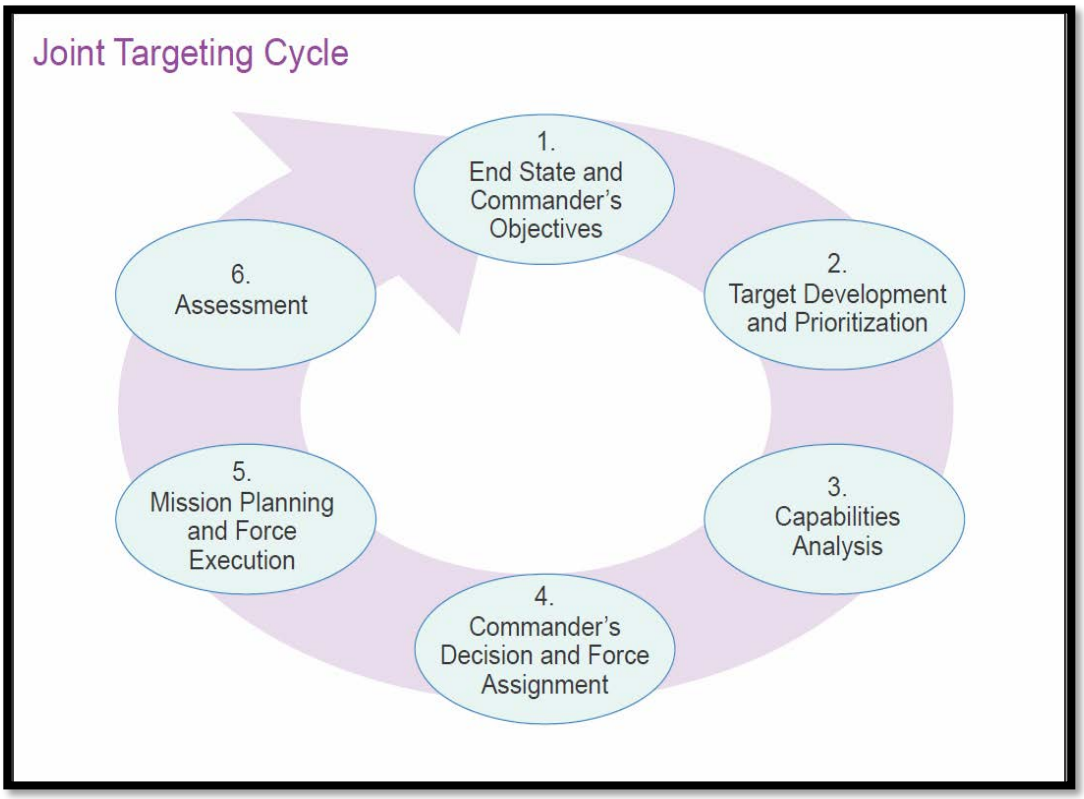

Figure 3. The Joint Targeting Cycle
Source: US Department of Defense, Joint Staff, Joint Publication 3-60 (Washington, DC: Government Publishing Directorate, 31 January 2013), II-2.

The Joint Targeting Cycle depicted in Figure 3, like D3A targeting, is continuous. A brief review of its phases will help highlight its value to corps staffs.

[112] DA PAM 525-3-1, vii.

The first phase, (Phase 1, End State and Commander's Objectives) reviews what the operation is trying to achieve. This ensures the targeting staff is aligned with what the commander is trying to achieve in terms of military end state and operational objectives.[113] This step can ensure the Corps staff is aware of joint priorities and how their requested and planned effects fit into the joint plan.

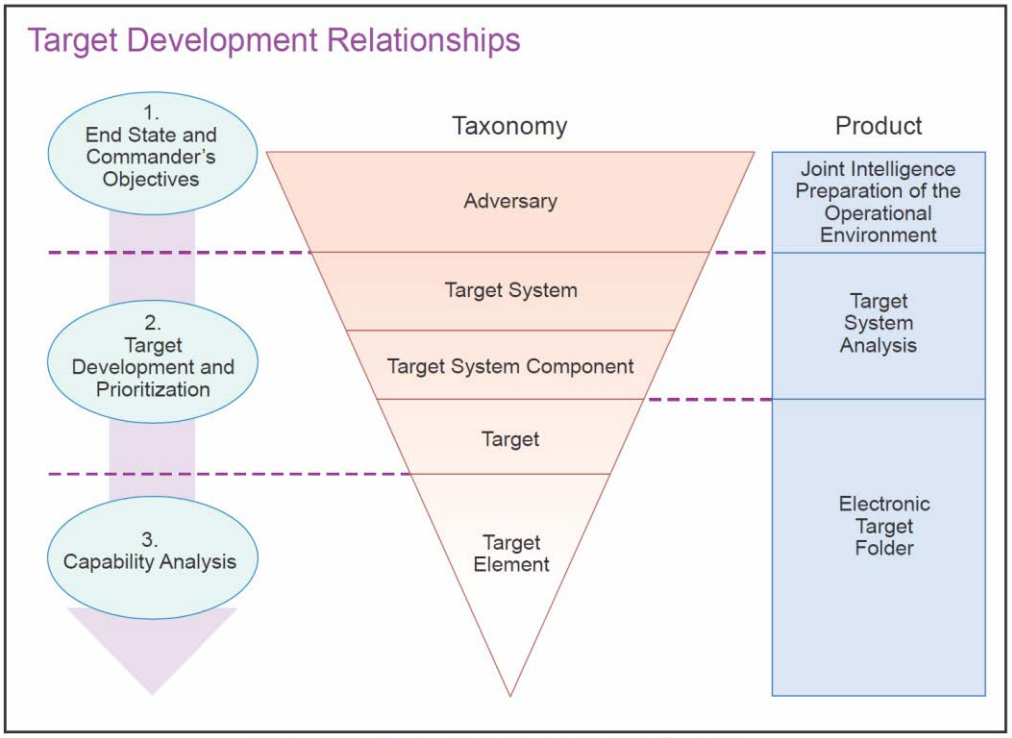

Figure II-3. Target Development Relationships

Figure 4. Target Development Relationships. This graphic highlights the development of targeting process during the critical first 3 phases of the Joint Targeting process, with Target System Analysis and the Electronic Target Folder (used for communicating requests across joint headquarters) being created in Phase 2 (Target Development and Prioritzation) into Phase 3 (Capability Analysis).
Source: JP 3-60, II-6.

Phase 2 (Target Development and Prioritization) is focused on identifying specific targets and their role in the system. It emphasizes the role of enemy targets in terms of the enemy as a system. This emphasis makes for deliberate targeting approach, using joint products, further aligning Army forces within the joint command when requesting effects.[114]

[113] US Department of the Army, ATP 3-60, II-4.

[114] US Department of the Army, ATP 3-60, II-6.

Target System Analysis begins in Phase 2 by identifying adversary target systems and reducing them to their components. By identifying target system components, and understanding their role within a particular enemy system, new vulnerabilities can be identified. For example, for a certain enemy IADS capability, there may be a battery of launchers, a radar, a command and control node, support area for additional missiles, etc. This "iterative process of inquiry" allows the targeteer to look at how the pieces of the system (components) combine to perform an enemy function.[115] By achieving this deeper understanding of enemy systems, corps targeteers can begin to plan based on the effects they require and plan complimentary effects. If they have sufficient information on the location of the launchers, they may use long-range artillery, rockets, or missiles from the corps. This information could be provided by the space domain or by joint (likely US Navy and US Air Force) capabilities.[116] If the corps staff doesn't have enough information on how to target the enemy launchers, the radar (detectable with a variety of different systems and platforms), C2 node, and resupply may all present options for attack. This allows for the opportunities to employ convergence, as more options are revealed to the planner using system analysis.[117]

The capabilities analysis step (Phase 3) is of special importance to the corps planner for convergence. This is where, after having identified what targets are of importance to the corps staff during Step 2 (Target Development and Prioritization), the targeting staff determines how targets will be serviced. This includes kinetic weaponry (i.e., bombs) and "physical, functional, cognitive, and environmental characteristics" to attack its vulnerabilities.[118] This holistic or systems approach to weaponeering (both kinetic and non-kinetic) capabilities is where the joint process shines. By forcing a systems approach to

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[115] Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity* (Burlington, MA: Elsievier, 2011), 93.

[116] John Gordon IV, et al. *Army Fires Capabilities for 2025 and Beyond.* RAND Corporation (Santa Monica, CA, 2019, accessed April 6, 2020, https://www.rand.org/pubs/research_reports/RR2124.html, 138-139. In the Baltic scenario, the Army would likely have to rely on USAF and USN sensors to track enemy capabilities, as the Army does not have enough sensors to adequately track Russian forces.

[117] US Department of the Navy, Headquarters, US Marine Corps, Marine Corps Warfighting Publication (MCWP) 3-31, *Marine Air-Ground Task Force Fires* (Washington, DC: Government Publishing Directorate, April 4, 2018), 3-12, accessed March 29, 2020, https://www.marines.mil/portals/1/Publications/MCWP%203-31.pdf?ver=2018-12-13-142022-170. "The cycle allows the targeting officer to test multiple solutions and refine both the understanding of the problem and the proposed solutions."

[118] US Department of Defense, *Joint Targeting School Student Guide* (Dam Neck, VA: Joint Targeting School, 2017), 136, accessed February 18, 2020, https://www.jcs.mil/Doctrine/Joint-Training/Joint-Functional-Schools/JTS/.

targeting, cross-domain fires and effects can be employed. Additionally, collateral damage estimation (CDE) is conducted in this phase.[119]

Phase 4, commander's decision and force assignment is where the joint headquarters assigns assets against nominated targets. For example, a corps request for air interdiction in the corps deep area would go up as a target packet for potential allocation of sorites through the BCD for the JFACC to consider based on the joint commander's priorities (in this case, through the apportionment decision found in the Air Tasking Order).

Phase 5, mission planning and force execution, is the execution of the mission (delivering ordnance or effects), and roughly equivalent to the "Deliver" phase of D3A. Phase 6 is Ta*rgeting Assessment*, where the effects generated by the targeting cycle are reviewed. As in the Army D3A process, targeting is an ongoing process, and the "assess" phase of D3A lines up with its joint counterpart here.

Phases 1-3 of joint targeting are where the corps staff create the conditions for convergence. If the joint commander prioritization doesn't support a certain form of attack and a requested asset is unavailable (i.e., joint EW or space effects), the systems thinking inherent in the joint system provides opportunities to use corps assets or alternate joint assets to attack target system components. This flexibility and joint thinking will help corps staffs enable their commanders to achieve converged effects as priorities shift throughout a campaign.

Joint Targeting can help provide additional options to corps planners that they may otherwise miss using the legacy D3A targeting philosophy. Additional options will result in better combat outcomes for the corps and its subordinate units.[120] Systems thinking, careful consideration of joint timelines and processes, and staff members who are trained and practiced on requesting joint effects will ensure rapid convergence and victory. For a more detailed comparison of the legacy D3A Army targeting process alongside Joint Targeting (along with the operations process), consult Table 1 below.

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[119] US Department of Defense, JP 3-60, January 31, 2013, II-16. Collateral Damage Estimation assists planners understand desired and undesired effects of joint converged fires, as well as cyber and space effects against a civilian population.

[120] MEDCoE, "U.S. Army Futures Command Presentation on Multi-Domain Operations." Through wargaming, Army Futures Command has tested the MDO concept in simulations to test for increased effectiveness.

Table 1. Crosswalk of Operations, Joint Targeting Cycle, D3A, and MDMP

Operations Process		Joint Targeting Cycle	D3A	MDMP	Targeting Task
Continuous Assessment	Plan	1. The End State and Commanders Objectives 2. Target Development and Prioritization 3. Capabilities Analysis 4. Commander's Decision and Force Assignment	Decide	Mission Analysis	• Perform target value analysis to develop fire support (including cyber electromagnetic and information related capablitiies) high-value targets. • Provide fire support, information related capabilities, and cyber electromagnetic activities input to the commander's targeting guidance and desired effects.
				Course of Action Development	• Designate potential high-payoff targets. • Deconflict and coordinate potential high-payoff targets. • Develop high-payoff target list. • Establish target selection standards. • Develop attack guidance matrix. • Develop fire support and cyber electromagnetic activities tasks. • Develop associated measures of performance and measures of effectiveness.
				Course of Action Analysis	• Refine the high-payoff target list. • Refine target selection standards. • Refine the attack guidance matrix. • Refine fire support tasks. • Refine associated measures of performance and measures of effectiveness. • Develop the target synchronization matrix. • Draft airspace control means requests.
				Orders Production	• Finalize the high-payoff target list. • Finalize target selection standards. • Finalize the attack guidance matrix. • Finalize the targeting synchronization matrix. • Finalize fire support tasks. • Finalize associated measures of performance and measures of effectiveness. • Submit information requirements to battalion or brigade intelligence staff officer - S-2.
	Prepare	5. Mission Planning and Force Execution	Detect		• Execute Information Collection Plan. • Update information requirements as they are answered. • Update the high-payoff target list, attack guidance matrix, and targeting synchronization matrix. • Update fire support and cyber electromagnetic activities tasks. • Update associated measures of performance and measures of effectiveness.
	Execute	6. Assessment D3A – decide, detect, deliver and assess MDMP – military decisionmaking process	Deliver		• Execute fire support and electronic attacks in accordance with the attack guidance matrix and the targeting synchronization matrix.
	Assess		Assess		• Assess task accomplishment (as determined by measures of performance). • Assess effects (as determined by measures of effectiveness).

Source: US Department of the Army, Army Techniques Publication (ATP) 3-60, *Targeting* (Washington, DC: Government Publishing Directorate, 2015), 1-9.

Eastern Poland, Near Future

Major Tim Davis was beside himself. The Squadron commander's Stryker and Fire Support Stryker had both nearly been destroyed by a Russian Ka-50 Hokum that had made it up to the screen line a few hours ago. He realized that they would need to disperse the command post further and use better camouflage. Thankfully, the Ka-50 had aborted its attack when the Stinger-equipped short-range air defense (SHORAD) battery had fired on the helicopter with a missile, but he knew they might not get that lucky twice.

The tactical operations center, based out of a group of Strykers using computer screens and digitally encrypted communications, began relaying reports that Russian armored forces were no longer pushing forward to seek meeting engagements with NATO defenses. The squadron intelligence officer (S2) and squadron executive officer both opined in the tactical chat that this may be a result disastrous tactical defeat the Russians had suffered just a day prior.

A Russian brigade tactical group (BTG) had been mauled by a combination of Air Force F35 attacks, V Corps rocket artillery, and long-distance anti-armor cannon artillery as well as an integrated use of information operations and cyber-attack. Command and control appeared to be in disarray, based on decrypted transmissions from higher headquarters. Quantum computing had changed the speed of decryption in a way that the Russians could not compete against.

The Russian BTG in question had stopped its assault for the night due to their relative disadvantage in night operations. Following reforms of the Russian Army in the late 2020s, night vision and thermal goggles were more common, but short-term enlistees and conscripts fared poorly against US troops who trained extensively at night during exercises in garrison. US space assets had received near-real-time information on their positions and relayed them to V Corps through USAREUR, resulting in devastating effects from corps artillery and rockets.

Despite Russian attempts to control cell phone usage in the field, many of their troops were receiving messages from NATO information operations Soldiers about extensive losses of Russian troops in the latest attacks directly to their devices. State-controlled outlets *Russia Today* and *Sputnik* could only

attempt to staunch the flow of information, but it was getting increasingly difficult to get ahead of the narrative.

Cyber-attacks on mission command systems had resulted in a rough version of the Russian plan getting leaked to US intelligence. V Corps opted to conduct a spoiling attack with fires as a result. Now dozens of BMP-3s and a few T-14 Armatas lay burning, while the Russians tried frantically to regroup. Russia still had tremendous combat power available, but subtle hints of the Kremlin considering a diplomatic solution began to appear in the headlines.

Conclusions and Recommendations

MDOs are inherently joint and will require a significant shift in thinking, education, capabilities, and doctrine in the Army. Leveraging sister service capabilities will be essential to make the concept work. The corps staff will need to think and plan joint effects and request them through joint targeting to make effects converge in time and space to win tactical victories on the battlefield. The corps will need to think more holistically about targeting in MDO than it did in the Cold War era. The MDO concept envisions an era of future combat where the enemy will not only test US Army capabilities across all domains, but also in all areas (support, consolidation, close, and deep areas).[121] This will take a new mindset towards corps effects as the close and deep areas will not be the only areas to consider.

The Army should invest in capabilities that give the corps organic capabilities to execute target detection beyond the FSCL. New UAS platforms should be acquired and they should have the capability of executing joint "sensor to shooter" tactics and be capable of lethal effects themselves.[122] Advanced radar and other sensors can help to ensure reconnaissance capabilities exist in-house within the corps structure to

[121] US Department of the Army, Army Doctrine Publication (ADP) 3-0, *Operations* (Washington, DC: Government Publishing Directorate, 2019), 4-4, 4-5. The deep area is where the commander sets conditions for future success in close combat. The close area is the portion of the commander's area of operations where the majority of subordinate maneuver forces conduct close combat. A support area is the portion of the commander's area of operations that is designated to facilitate the positioning, employment, and protection of base sustainment assets required to sustain, enable, and control operations. The consolidation area is the portion of the land commander's area of operations that may be designated to facilitate freedom of action, consolidate gains through decisive action, and set conditions to transition the area of operations to follow on forces or other legitimate authorities.

[122] "Sensor to shooter" is a concept where human observers or sensors detect a target and send target information to a fires asset with the purpose of attacking it.

give corps commanders the ability to task their own reconnaissance without pulling capabilities from divisions or bolster joint capabilities (redundancy and mixing, in reconnaissance doctrine) when sharing information throughout the joint force.[123] This should include ground reconnaissance positioned to aid in executing deep operations.[124] This could be manned reconnaissance in the tradition, if not structure, of Long-Range Surveillance Units (LRSU) of the past or unmanned sensors that accomplish similar persistent surveillance.

The Army needs to be able to leverage space domain effects in combat. Currently, the Air Force and newly-generated Space Force have eighty or more satellites of varying capabilities aloft.[125] Competition against near-peer competitors in this domain and the possibility of having satellites jammed or destroyed poses a significant threat to US dominance in space, and resources will be limited. Army corps staff will need to be adequately trained on current and nascent space capabilities to understand what effects and products they can request, as well as ensure they can communicate how much of a scarce resource they should be apportioned in different phases of conflicts.

The use of the joint targeting methodology should be made a part of the corps doctrine. Corps headquarters could conduct regular classes on the joint methodology and maximize staff member attendance at joint targeting courses. Few Army officers receive training in joint targeting as it is not taught in depth at courses for company and field grade officers. For example, at the Command and General Staff College for majors at Fort Leavenworth, it is not included in the curriculum or exercises. MDO will increase the need for personnel trained to integrate effects from across the services and domains. The joint targeting process

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[123] US Department of the Army. Field Manual 3-98 *Reconnaissance and Security Operations*. (Washington, DC: Government Publishing Directorate, July 2015), 5-18. Mixing is using two or more different assets to collect on the same intelligence requirement. Redundancy is using two or more like assets for the same intelligence requirement. Both mixing and redundancy increase the chance of detection.

[124] US Department of the Army, Field Manual (FM) 3-94, *Theater Army, Corps, and Division Operations* (Washington, DC: Government Publishing Directorate, April 2014), 5-127. The corps deep operations begin beyond the division's forward boundary and extend to the limit of the corps assigned area of operations. Deep operations are normally those conducted against the enemy's forces, functions, or resources not engaged against the committed divisions. Commanders attack simultaneously across great depth and breadth in a manner that appears as one continuous operation to overwhelm and demoralize the enemy.

[125] David Vergun, "Multidomain Operations Rely on Partnerships to Succeed," US Department of Defense, February 12, 2019, accessed March 16, 2020, https://www.defense.gov/Explore/News/Article/Article/1755520/multidomain-operations-rely-on-partnerships-to-succeed/.

examines the enemy force as a system of systems; this methodology provides opportunities for trained staff to find new opportunities to attack the enemy in non-traditional ways. Incorporating joint targeting into emerging doctrinal publications associated with the MDO concept as capabilities and concepts mature will further ensure a widespread practice across the Army.

Achieving proficiency in the joint targeting cycle will require the use of realistic training that provides the opportunity to practice conversion of all domains, including space, EW, and cyber effects.[126] This will require deliberate exercise planning that leverages training areas with the capability to incorporate real effects from actual systems into large exercises where corps headquarters are involved and/or well-simulated effects in simulators and wargames.

The Army is looking to develop more space domain trained officers.[127] The expertise found in the functional area 40 Army officer career field (space operations) is essential to ensure space targets and effects are correctly nominated by the corps staff. The manning for these positions will be essential in MDO. As convergence at the corps level becomes a mature capability in years to come, corps should plan significant training in space capabilities across the battle staff to ensure depth of understanding.

The Army and Joint Force will benefit from converging effects from across the domains in future conflict as opposed to relying on two-service (Army and Air Force) tactics.[128] As US opponents continue to diversify their portfolio of options to attack the United States and allies, the United States must be vigilant to do the same to deter, and, if necessary, defeat them using all domains. Convergence in MDO, the full panoply of US capabilities across the domains, will give us our best chance of defeating them and accomplishing the defense of allies, partners, and our homeland.

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[126] Yi Se Gwon, "The Army Multi-Domain Targeting Center Increasing the rate and volume of cross-domain capabilities," Fires Bulletin, September 2018, accessed February 15, 2020, https://sill-www.army.mil/firesbulletin/archives/2018/sep-oct/articles/18-5_Sept-Oct_04_Gwon.pdf.

[127] Thomas Brading, "Army looks at cadets to bolster Army space force," accessed March 22, 2020, https://www.army.mil/article/225139/army_looks_at_cadets_to_bolster_army_space_force

[128] DA PAM 525-3-1, 20. "Convergence has two advantages over single-domain alternatives: the creation of cross-domain synergy and the layering of options across domains to enhance friendly operations and impose complexity on the enemy."

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