Army Futures Command Concept for Brigade Combat Team Cross-Domain Maneuver 2028

14 August 2020

This page intentionally left blank

Foreword

From the Director,
Futures and Concepts Center, U.S. Army Futures Command

Our near-peer competitors, leveraging emerging trends in science, technology, and the information environment, have invested in strategies and capabilities to challenge the U.S. and remake the global order. They employ innovative approaches to contest U.S. and allies' interests in all domains, the electromagnetic spectrum, and the information environment. They often seek to attain their goals through ambiguous actions taken below the threshold of armed conflict. In armed conflict, advances in weapons technology, sensors, communications, and information processing allow these adversaries to generate stand-off intended to separate the Joint Force in time, space, and function. To address these challenges and fulfill the U.S. Army's landpower roles in protecting the Nation and securing its vital interests, the Army is adapting the way it organizes, trains, educates, mans, and equips to fight these future threats structured around the Multi-Domain Operations (MDO) Concept.

The Army relies on Brigade Combat Teams (BCT) as the division's primary combined arms, close combat force. BCTs provide the Army's main capability to compel, persuade, or deter enemy decisions or actions; destroy or defeat enemy forces; control land areas and resources; and protect populations. Maintaining overmatch for BCTs through improvements in operational approaches and capabilities is critical to success in MDO.

This document describes the changes necessary for BCTs to support MDO. It expands upon current maneuver and combined arms principles, describing how BCTs operate with Army echelons above brigade conducting MDO as part of the Joint Force. It describes cross-domain maneuver as the tactical application of MDO executed by the BCTs to compete and shape the security environment, deter adversaries, and, when necessary, dominate and win in armed conflict and return to competition on favorable terms. Cross-domain maneuver creates synergistic effects in the physical, temporal, virtual, and cognitive realms that increase relative combat power and provide the necessary overmatch. The approaches and capabilities described in this document will enable the BCTs to better support MDO through cross-domain maneuver.

This concept serves as a basis for modernization actions for the BCTs. It also identifies implications for other supporting and enabling formations. It will inform development of Army functional and supporting concepts, experimentation, capabilities development activities, and other future force modernization efforts to achieve the MDO AimPoint Force.

EDMOND M. BROWN
Brigadier General, U.S. Army
Acting Director, Futures and
Concepts Center

This page intentionally left blank

Preface

From the Commanding General
U.S. Army Maneuver Center of Excellence

The Brigade Combat Team Cross-Domain Maneuver Concept describes ideas and approaches for BCT operations in 2028. It explains how BCTs acting in concert with divisions and corps conduct cross-domain maneuver to compete and shape the security environment, deter adversaries, and, when necessary, dominate and win in armed conflict to enable the U.S. to return to competition on favorable terms. It is intended to serve as the foundational document for BCT force modernization and be the basis for experimentation on conducting future BCT operations. The innovative ideas it describes acknowledge past experiences, but are derived from extensive experimentation, including the complex challenges of the future operational environment and the changing character of war.

The principal audience for the BCT Concept is all members of the profession of arms; it is nested and conceptually linked with the *U.S. Army in Multi-Domain Operations 2028* and the *U.S. Army Concept: Multi-Domain Combined Arms Operations at Echelons Above Brigade 2025-2045*. To comprehend the ideas contained in this publication, readers must first understand these Army concept framework documents, and must have a firm understanding of Army doctrine and how it fits into the body of professional knowledge. This concept uses joint and Army terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and the text. Terms for which this document proposes new definitions are marked with an asterisk (*) in the glossary.

This concept is sufficiently broad to permit room for changes as MDO matures, and it will evolve as Army Futures Command publishes other Army operating, functional, and supporting concepts. This document establishes a common framework for force development and modernization within which to develop the specific capabilities required to fully enable BCT cross-domain maneuver, and field the MDO AimPoint Force. With your input, we will continue to refine it as we learn through our operations, exercises, experiments, and other learning venues. Welcome your comments.

GARY M. BRITO
Major General, U.S. Army
Commanding General, Maneuver Center of Excellence

This page intentionally left blank

Executive Summary

a. This *Brigade Combat Team (BCT) Cross-Domain Maneuver* Concept (BCT Concept) describes how BCTs conduct operations to deter or defeat near-peer threats in 2028. The innovative ideas described in this concept remain tied to past experiences, but are derived from extensive experimentation, including the complex challenges described in the future operational environment (OE) and the changing character of war. This concept expands upon current maneuver and combined arms principles, describing how BCTs, operating as part of the Joint Force conducting Multi-Domain Operations (MDO), execute cross-domain maneuver to compete and shape the security environment, deter adversaries, and, when necessary, dominate and win in armed conflict and return to competition on favorable terms.

b. The central idea expands upon maneuver and combined arms principles, describing cross-domain maneuver as the nested, tactical application of MDO. Cross-domain maneuver is the synchronization and employment of forces and capabilities through movement in combination with converged lethal and nonlethal capabilities across multiple domains, the electromagnetic spectrum (EMS), and the information environment (IE). Cross-domain maneuver creates synergistic effects in the physical, temporal, virtual, and cognitive realms that increase relative combat power and provide the overmatch necessary to destroy or defeat enemy forces, control land areas and resources, and protect populations (see the logic chart at figure 1).

c. Successful application of this concept relies upon the BCT's ability to apply four components of the solution for cross-domain maneuver, and possessing the necessary capabilities, capacities, and authorities to:

(1) Execute command and control (C2) by enabling subordinate leaders to seize, retain, and exploit the initiative consistent with the commander's intent regardless of the condition of the information network or other cross-domain enablers;

(2) Integrate cross-domain reconnaissance and security (R&S) operations by synchronizing and employing R&S formations and capabilities across multiple domains and environments to satisfy information requirements that support decision making and enable freedom of maneuver and action;

(3) Operate semi-independently by conducting dispersed operations at maximum supporting range, and sustaining operations at extended supporting distance to achieve a position of relative advantage; and

(4) Integrate enabling support from corps and divisions, which continuously converge and synchronize lethal and nonlethal effects across multiple domains, the EMS, and IE to enable BCTs to conduct cross-domain maneuver.

d. With the emergence of capable near-peer threats and a rapidly evolving, increasingly complex OE, the BCT's organizational structure will continue to evolve. No matter the type or its composition, the BCT will remain the division's primary combined arms, close combat force and tactical fighting formation in 2028. The BCT will be employed as an interdependent, task-

organized, multi-domain formation. The BCT's essential and enduring capabilities are the basic building blocks of military operations necessary to field the MDO AimPoint Force 2028 while setting conditions for fielding MDO AimPoint Force 2035.

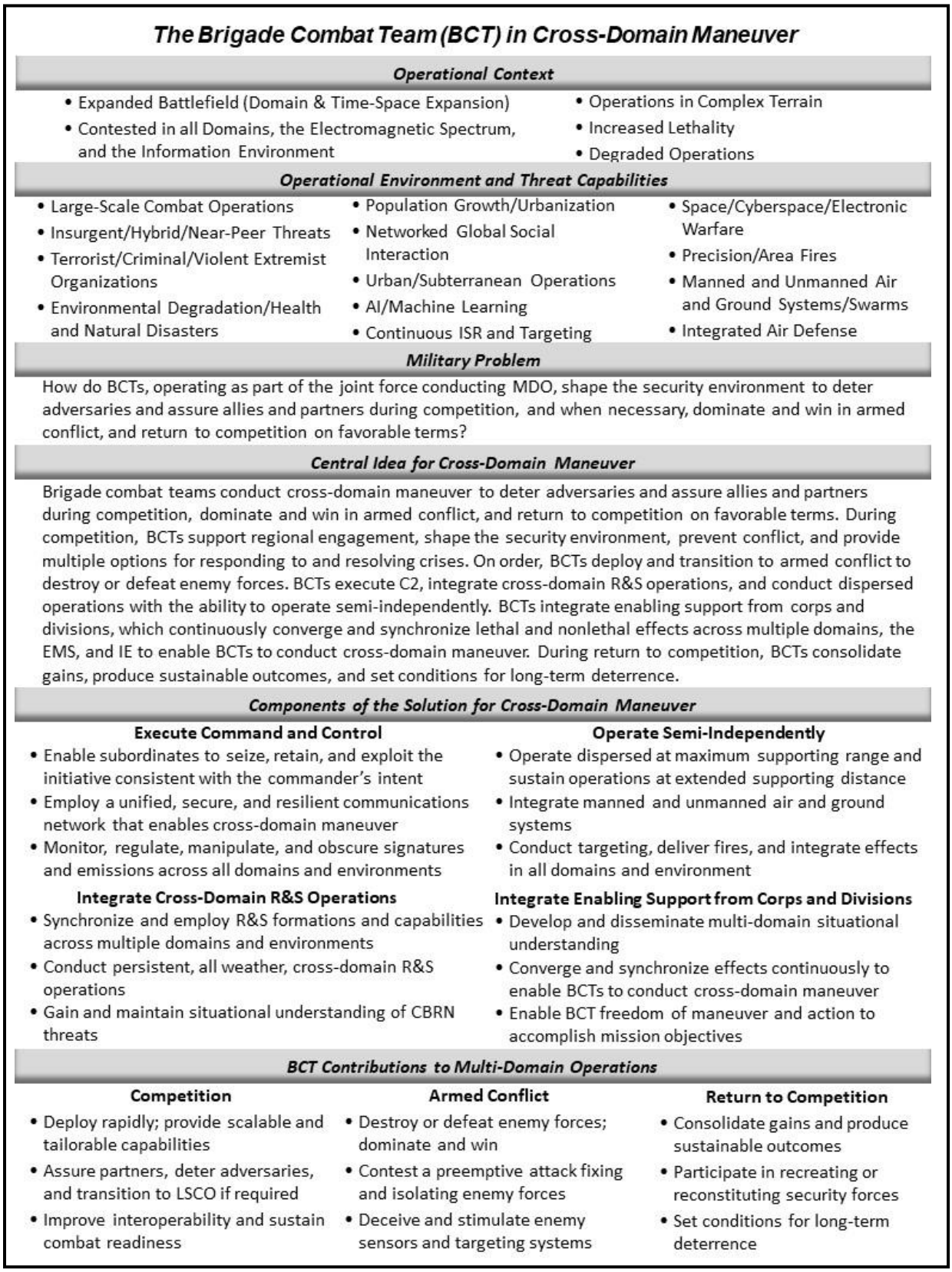

Figure 1. Logic chart

This page intentionally left blank

U.S. Army Futures Command
Future and Concepts Center
Fort Eustis, VA 23604

14 August 2020

Force Management

ARMY FUTURES COMMAND CONCEPT: BRIGADE COMBAT TEAM CROSS-DOMAIN MANEUVER 2028

FOR THE COMMANDER:

OFFICIAL:

EDMOND M. BROWN
Brigadier General, U.S. Army
Acting Director, Futures and
Concepts Center

JONATHAN PHILLIPS
IT Resources Chief, G6

History. This document is a new U.S. Army Futures Command (AFC) pamphlet which introduces a Department of the Army concept.

Summary. This concept describes how BCTs conduct cross-domain maneuver to deter adversaries and assure allies and partners during competition, dominate and win in armed conflict, and return to competition on favorable terms. During competition, BCTs support regional engagement and compete to shape the security environment. On order, BCTs deploy and transition to armed conflict to destroy or defeat enemy forces. During return to competition, BCTs consolidate gains, produce sustainable outcomes, and set conditions for long-term deterrence. This concept establishes a common framework for force development and modernization within which to develop the specific capabilities required to fully enable BCT cross-domain maneuver in 2028.

Applicability. This concept applies to all Department of the Army (DA) activities that develop doctrine, organizations, training, materiel, leadership and education, personnel, facilities, and policy capabilities. This concept guides force development and supports the Joint Capabilities Integration and Development System process. It also supports Army capabilities development processes described in the Army Futures Command Concepts and Capabilities Guidance.

Proponent and supplementation authority. The proponent of this pamphlet is the Director, Directorate of Concepts (FCFC-CE), 950 Jefferson Avenue, Fort Eustis, VA 23604-5763.

Suggested improvements. Users are invited to submit comments and suggested improvements via DA Form 2028 (Recommended Changes to Publications and Blank Forms) to Director, Futures and Concept Center (FCFC-CE), 950 Jefferson Avenue, Fort Eustis, VA 23604-5763.

Availability. This pamphlet is available on the FCC homepage at https://fcc.army.mil/resource-library.

Summary of changes

AFC Pamphlet 71-20-2
U.S. Army Concept: Brigade Combat Team Cross-Domain Maneuver 2028

This concept, dated 14 August 2020:

o Expands upon maneuver and combined arms principles, describing cross-domain maneuver as the tactical application of MDO.

o Recognizes the requirement for corps and divisions to continuously converge and synchronize lethal and nonlethal effects to enable BCT cross-domain maneuver.

o Recognizes the need for multi-domain R&S capabilities at corps and division.

o Highlights the need for BCTs to leverage and integrate capabilities across multiple domains, the EMS, and IE to create synergistic effects in the physical, temporal, virtual, and cognitive realms.

o Describes the need for BCTs to rapidly deploy combat-configured and task-organized with the capabilities necessary to transition to cross-domain maneuver immediately upon arrival.

o Recognizes the need for BCTs to integrate efforts with joint, interorganizational, and multinational (JIM) partners to achieve mission objectives.

o Recognizes the role of manned and unmanned air and ground systems in support of cross-domain maneuver.

o Emphasizes the need for unified, secure, and resilient communications network while operating dispersed in degraded conditions to enable cross-domain maneuver.

Contents

Figure List

Chapter 1
Introduction

1-1. Purpose

This document, United States Army Futures Command (AFC) Pamphlet 71-20-2, Army Futures Command Concept: Brigade Combat Team Cross-Domain Maneuver 2028 (BCT Concept), describes how brigade combat teams (BCT) conduct operations against threats in 2028 timeframe. It proposes tactical concepts and the required capabilities necessary to provide commanders with multiple options across the competition continuum. During competition, BCTs support regional engagement, shape the security environment, deter adversaries, prevent conflict, and provide multiple options for responding to and resolving crises. During armed conflict, BCTs destroy or defeat enemy forces, stabilize areas, and gain and maintain a position of relative advantage that enables BCTs to accomplish mission objectives and return to competition on favorable terms.

1-2. References

Appendix A lists required and related publications.

1-3. Explanations of abbreviations and terms

The glossary explains abbreviations and special terms used in this pamphlet.

1-4. Background

a. Army doctrine defines maneuver as movement in conjunction with fires.[1] Commanders use maneuver for massing effects to achieve surprise, shock, and momentum. Effective maneuver requires close coordination of fires and movement.[2] Over time, maneuver has evolved to include other capabilities that increase relative combat power–combined arms–which is the synchronized and simultaneous application of arms to achieve an effect greater than if each element was used separately or sequentially.[3] Doctrine maintains combined arms as the application of arms that multiplies Army forces' effectiveness in all operations. However, it expands combined arms to include joint and multinational capabilities as integral to combined arms and discusses how the Army conducts these operations across multiple domains.[4]

b. Direct fire and close combat are inherent in maneuver. Maneuver directly gains or exploits positions of relative advantage. A position of relative advantage is a location or the establishment of a favorable condition within the area of operations that provides the commander with temporary freedom of action to enhance combat power over an enemy or influence the enemy to accept risk and move to a position of disadvantage. Positions of relative advantage may extend across multiple domains to provide opportunities for units to compel, persuade, or deter enemy decisions or actions.[5]

c. Cross-domain maneuver recognizes that a commander must visualize and exploit the physical, temporal, virtual, and cognitive realms of maneuver in multiple domains and environments. For example, a ground tactical formation must operate in (and potentially affect, if it contains appropriate cross-domain capabilities) the relevant air and maritime domains above or adjacent to its land-based area of operations, as well as understand and/or influence cyberspace, EMS, information environment (IE), and space activities that can impact friendly operations.[6] The

physical, temporal, virtual, and cognitive realms of maneuver will vary in terms of focus and priority depending upon the echelon, force capabilities, and the OE. Physical considerations include geography, terrain, infrastructure, populations, distance, weapons ranges and effects, and known enemy locations. Temporal considerations relate to time, including when capabilities can be used, how long they take to generate and employ, and how long they must be used to achieve desired effects. Virtual considerations pertain to activities, capabilities, and effects relevant to the layers of cyberspace. Cognitive considerations relate to people and their behavior. They include unit morale and cohesiveness, as well as perspectives and decision making.[7]

d. Cross-domain maneuver also recognizes that the adversary's ability to sense, observe, and employ effects across all domains and environments against U.S. formations is persistent and will occur across the MDO operational framework throughout the competition continuum. Sanctuary no longer exists to include activities conducted in the homeland.

1-5. Assumptions

a. The assumptions from TP 525-3-1, *The U.S. Army in Multi-Domain Operations 2028*, (MDO Concept) and TP 525-3-8, *U.S. Army Concept: Multi-Domain Combined Arms Operations at Echelons Above Brigade 2025-2045*, (EAB Concept) apply to this concept.

b. The following assumptions also apply:

(1) The BCT will remain the division's primary combined arms, close combat, tactical fighting formation. When employed, it will operate as an interdependent, task-organized, multi-domain formation.

(2) Corps and divisions will need to continuously converge lethal and nonlethal effects across multiple domains, the EMS, and IE to enable BCTs to conduct cross-domain maneuver.

(3) Threat forces will employ a mix of traditional, unconventional, and hybrid strategies creating a complex, uncertain OE for BCTs.

(4) Threat forces will exploit anti-access (A2) and area denial (AD) capabilities contesting all domains and environments, challenging joint entry operations and freedom of maneuver and action.

(5) Threat forces will disrupt BCT communications, observation, sensing, precision fires, and position, navigation, and timing (PNT), and selectively deny domains and environments.

(6) Threat forces will employ increasingly sophisticated manned and unmanned air and ground systems to provide freedom of maneuver and action.

(7) BCTs will become vulnerable to threat anti-armor, anti-personnel, anti-air, electronic warfare (EW), space, and cyberspace capabilities, exceeding the BCT's ability to protect critical capabilities, assets, and activities in multiple domains and environments.

(8) BCTs will become vulnerable to threat fixed-wing (FW) aircraft, rotary-wing (RW) aircraft, rockets, artillery, mortars, target acquisition, cruise missiles, and ballistic missiles.

(9) Vehicle protection systems will mature, but will not protect BCTs against the full range of kinetic energy threats.

(10) BCTs will continually modernize to account for the changing OE.

1-6. Linkages to the Army Concept Framework

a. This concept nests and links with the MDO and EAB Concepts. In a new era of great power competition, adversaries seek to achieve their strategic aims, short of conflict, by the use of layered stand-off in the diplomatic, information, military, and economic realms to separate the U.S. from its partners. Should armed conflict occur, enemies will employ multiple layers of stand-off in all domains–air, land, maritime, space, cyberspace, and all environments – EMS and IE – to separate U.S. forces and its allies in time, space, and function to achieve their goals.[8]

b. Figure 1-1 serves to depict how MDO, EAB, and BCT link based on the *Joint Concept for Integrated Campaigning* (JCIC) competition continuum. The three elements of the continuum (cooperation, competition below armed conflict, and armed conflict) are not exclusive of each other but can coexist at the same point in time. The elements serve to describe the character of relations between state and non-state actors. For example, if two state actors are using proxies to advance their interests, the state actors are in competition below armed conflict and the proxies are in armed conflict.[9] The MDO Concept nests within the JCIC competition continuum construct, focusing on the competition below armed conflict and armed conflict elements. The return to competition reflected in the MDO Concept remains within the JCIC competition continuum – transitioning from armed conflict back to competition – but it is a distinction described in the MDO Concept due the Army's unique requirements based on historical examples. Both the EAB Concept and the BCT Concept are consistent with the MDO Concept in this regard.

c. Within the backdrop of the JCIC competition continuum, the MDO Concept proposes a multi-domain, operational-level approach that describes how Army forces contribute to deterring and defeating Chinese and Russian aggression. The EAB Concept operationalizes the MDO Concept at the operational and tactical echelons for the corps and division, describing the need for interdependent, echeloned, multi-domain warfighting formations.[10] The BCT Concept operationalizes the MDO Concept at the tactical echelon, proposing the notion of cross-domain maneuver as the nested, tactical application of MDO. Together, the MDO and EAB Concepts, and the BCT Concept provide the foundation and underlying operational logic necessary to develop the required capabilities to achieve the MDO AimPoint Force at all Army echelons.

d. Both MDO and cross-domain maneuver may produce strategic, operational, and tactical effects, which can be generated by any echelon, or even individuals. The fact that an echelon or individual generates a strategic effect does not mean that the echelon or individual is operating at the strategic level of war. Rather, the levels of warfare correlate to specific levels of responsibility. The strategic level of war employs the instruments of national power and is primarily the province

of national leadership and geographic combatant commanders. The operational level of warfare links the tactical employment of forces to national and strategic objectives through the design of campaigns and major operations. The tactical level of warfare is about the conduct of tactical actions, battles, engagements, and other tactical tasks to achieve military objectives assigned to tactical units or task forces.[11]

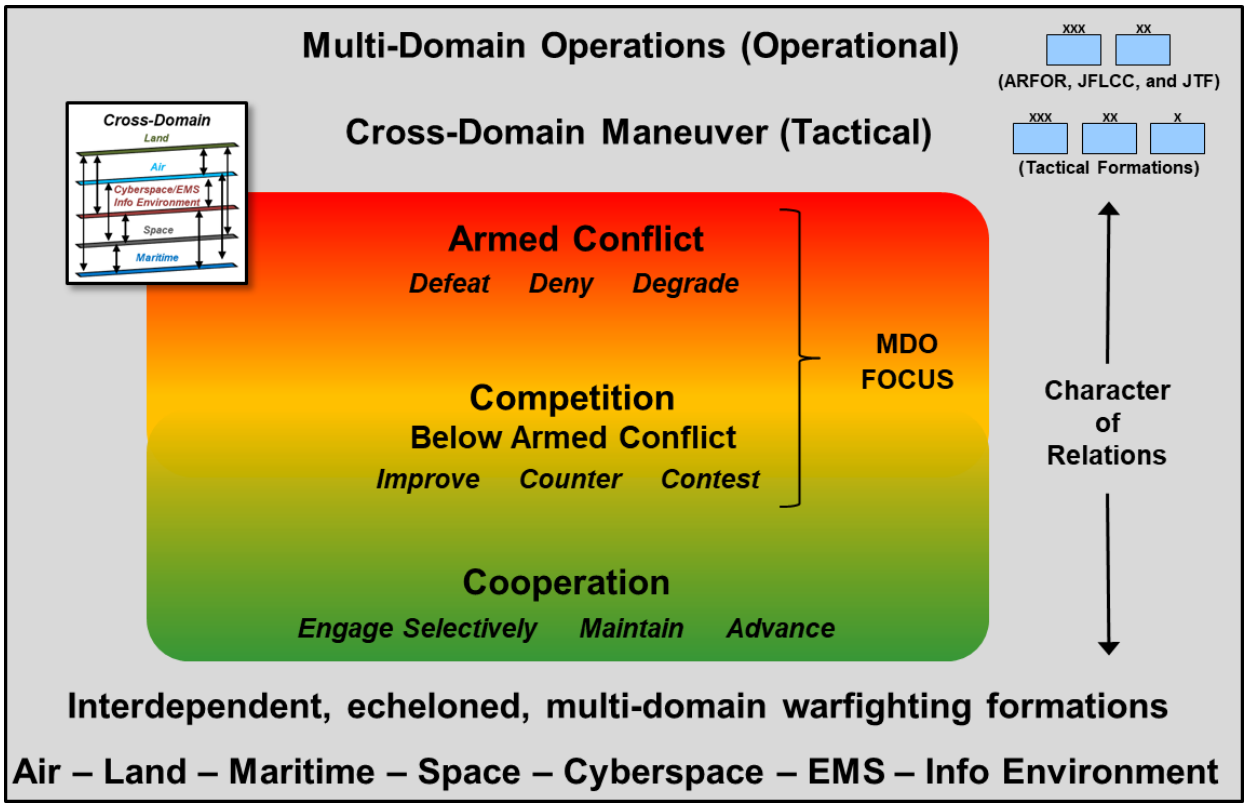

Figure 1-1. Competition continuum and MDO focus[12]

e. For the corps and division, the determining factor in whether they operate at the operational or tactical level of warfare depends upon their role. The corps and division operate at the operational level when operating as an Army forces (ARFOR), joint force land component commander (JFLCC), or joint task force (JTF), and they operate at the tactical level when operating as a tactical formation.[13] Similarly, the corps and division's role also determines whether it is conducting MDO or cross-domain maneuver. When operating as an ARFOR, JFLCC, or JTF, the corps and division are conducting MDO; when operating as a tactical formation, they are conducting cross-domain maneuver. BCTs operate exclusively at the tactical level of warfare, and therefore only conduct cross-domain maneuver.

f. The MDO Concept proposes solutions to solve the problem of layered stand-off. The central idea in solving this problem is the rapid and continuous integration of multi-domain, EMS, and IE capabilities to deter and prevail during competition short of armed conflict. If deterrence fails, Army formations, operating as part of the Joint Force, penetrate and dis-integrate enemy A2/AD systems; exploit the resulting freedom of maneuver to defeat enemy systems and formations; and consolidate gains to force a return to competition on terms more favorable to the U.S., its allies

and partners.[14] The MDO Concept extends the idea of combined arms to convergence – the rapid and continuous integration of capabilities in all domains, the EMS, and the IE. Convergence optimizes effects to overmatch the enemy through cross-domain synergy and multiple forms of attack, all enabled by mission command and disciplined initiative.

g. The EAB Concept describes the corps and division as the linchpin for MDO actions. The EAB Concept recasts the current EAB headquarters into warfighting formations armed with persistent, resident capabilities necessary to prevail against the complex and capable threats that challenge Army forces across the competition continuum. Echelons above brigade formations enable Army forces to quickly respond to crises, compete below the threshold of conflict, defeat aggression, and prevail in large-scale combat operations (LSCO) against capable near-peer threats.[15]

h. This concept describes how BCTs conduct operations to deter adversaries and defeat or destroy enemy forces in 2028. It proposes the required capabilities necessary to provide commanders with multiple options to seize and control terrain, defeat or destroy enemy forces, and protect populations, activities, and infrastructure to achieve mission objectives. This document expands upon current maneuver and combined arms principles, describing how BCTs, operating as part of the Joint Force conducting MDO, execute cross-domain maneuver to compete and shape the security environment, deter adversaries, and, when necessary, dominate and win in armed conflict, and return to competition on favorable terms.

i. The BCT Concept also describes how corps and divisions continuously converge effects enabling BCTs to conduct cross-domain maneuver, thereby facilitating their freedom of maneuver and action and allowing them to accomplish their mission objectives.[16] The notion of continuous convergence implies that some type of effect is continuously being applied, resulting in persistent pressure on adversaries or enemies. The origin, type, and intensity of the effect is not relevant; rather, the sum of the broad range of lethal and nonlethal effects across multiple domains, the EMS, and the IE must be continuous. This synergy imposes a tempo that U.S. adversaries and enemies are unable to match.

> **Cross-domain maneuver** is the synchronization and employment of forces and capabilities through movement in combination with converged lethal and nonlethal capabilities across multiple domains, the EMS, and the IE. Cross-domain maneuver creates synergistic effects in the physical, temporal, virtual, and cognitive realms that increase relative combat power and provide the overmatch necessary to destroy or defeat enemy forces, control land areas and resources, and protect populations.

j. BCTs conduct cross-domain maneuver primarily in the Close Area, that portion of the MDO operational framework where friendly and enemy formations, forces, and systems are in imminent physical contact and will contest for control of physical, temporal, virtual, and cognitive space in support of campaign objectives.[17] As part of the Joint Force, airborne- and air assault-capable Infantry BCTs (IBCT) contribute to forcible entry operations. Airborne-capable IBCTs are unique in that they have the capability to be projected and delivered over strategic distances into the Deep Maneuver Area to surprise an enemy force, seize a lodgment, and gain the initiative. Armored BCTs (ABCT) and Stryker BCTs (SBCT) may also be used to defeat an enemy's A2/AD capabilities

when employed from offset objectives, creating multiple dilemmas for the enemy. BCTs also operate in the tactical support area where they conduct area security.[18]

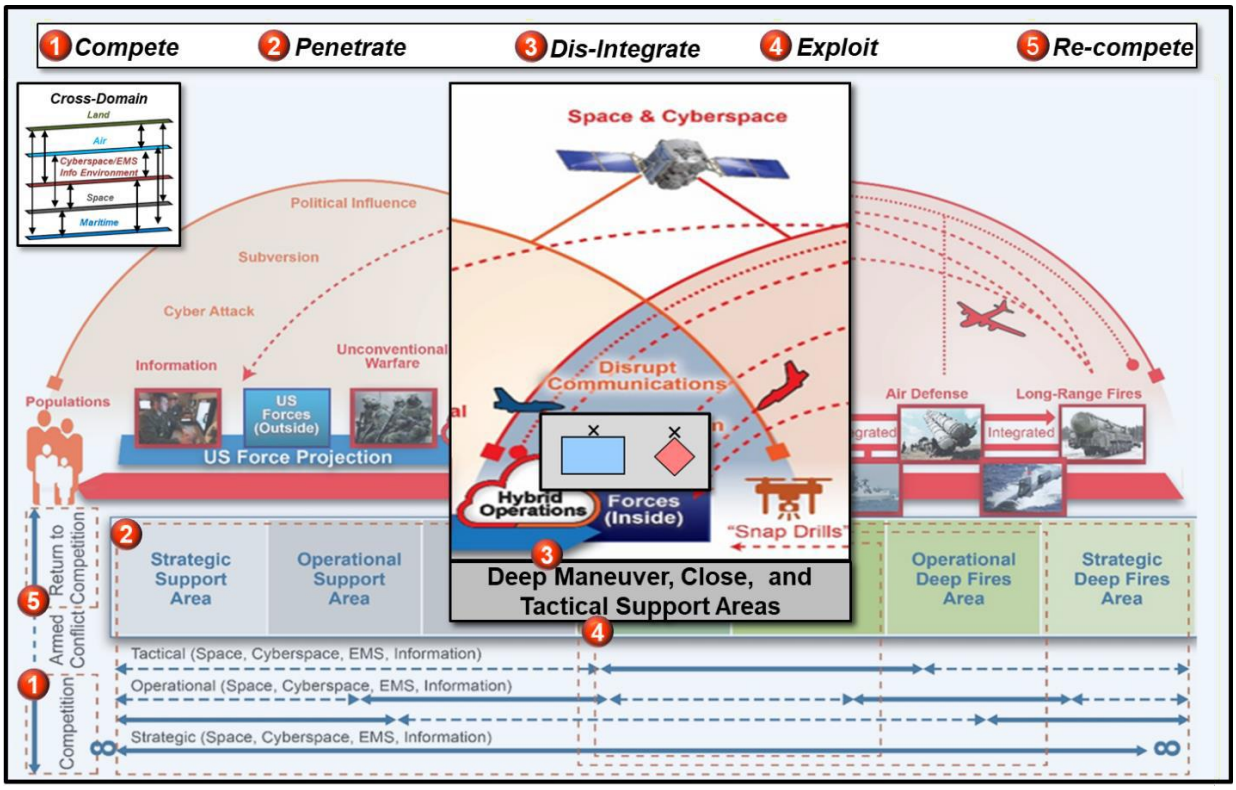

Figure 1-2. BCT cross-domain maneuver in MDO[19]

k. Figure 1-2 depicts the Deep Maneuver, Close, and Tactical Support Areas within the MDO operational framework where BCTs conduct cross-domain maneuver. These areas are not limited to the natural and manmade features of the terrain and instead extend across multiple domains, the EMS, and the IE. Brigade combat teams apply lethal and nonlethal effects in these areas, destroying or defeating enemy forces, controlling land areas and resources, and protecting populations. The BCT's combat readiness and demonstrated lethality provide the credibility essential to deterring adversaries and assuring allies and partners. During operations short of armed conflict, the lethality implicit in BCTs enables their conduct of other tasks with minimal adversary interference.[20]

l. During competition, BCTs provide the senior commander with multiple options, expanding the competitive space to shape the security environment and prevent armed conflict. During armed conflict, while the Joint Force is penetrating and dis-integrating enemy systems, BCTs in the contact layer operate dispersed within range of the enemy's precision and area fires, conducting cross-domain maneuver fix and isolate enemy maneuver forces and stimulating the enemy's mid- range systems. BCTs in the blunt and surge layers conduct expeditionary deployment.[21] After the Joint Force has penetrated and dis-integrated enemy systems, BCTs exploit the resulting freedom of maneuver, achieving mission objectives through the destruction or defeat of the enemy. BCTs then consolidate gains, executing area security and stability tasks to produce sustainable outcomes and returning to competition on favorable terms. BCTs conduct persistent, all-weather, cross-

domain R&S operations across the MDO operational framework throughout the competition continuum to satisfy information requirements that support decision making and provide the protected force with time and maneuver space within which to react to the enemy and develop the situation.

m. BCTs destroy or defeat enemies by forcing them to fight against multiple types of attacks from multiple directions, thus achieving surprise and gaining temporal advantage in decisive spaces. Decisive spaces are locations in time (temporal) and space (physical, virtual, and cognitive) where the optimal employment of cross-domain capabilities generates a marked advantage over an enemy and greatly influences the outcome of an operation.[22] During the return to competition, BCTs contribute to consolidating gains and producing sustainable outcomes, setting conditions for long-term deterrence, and adapting to new security conditions.

1-7. Historical foundations for cross-domain maneuver

a. Eliot Cohen and John Gooch's book, *Military Misfortunes: The Anatomy of Failure in War*, provides a narrative of the critical factors that underpin strategic failure. This book provides a useful perspective that can be applied to the U.S. Army's efforts to achieve the MDO Aimpoint Force. Cohen and Gooch describe three types of failure: failure to learn lessons from recent experiences or history; failure to anticipate by taking reasonable precautions against known hazards; and failure to adapt to existing conditions. One form of failure represents simple failure, two forms represent aggregate failure, and combining all three represent catastrophic failure. Cohen and Gooch provide historical examples of all three types of failure. The 1973 Yom Kippur War is cited as an example of simple failure, where the Israel Defense Forces' (IDF) did not anticipate the Arab attack.[23] The underlying circumstances of this failure were based on Israel's reluctance to account fully for a changing OE. After their crushing defeat in the 1967 Six Day War, the Arab nations made significant advances in training, equipping, and organizing their armed forces. Israel, on the other hand, remained confident in their warfighting approach and chose to implement modest changes. Israel's experiences during the Yom Kippur War and the actions it took afterward provide historical lessons applicable today.

b. As part of the Army's efforts to remain competitive, the BCT must continue to modernize and maintain a relative advantage in combat power to be effective across the competition continuum. The U.S.'s most capable adversaries today, China and Russia, are modernizing their tactical formations at an unprecedented rate. These adversaries will employ a mix of traditional, unconventional, and hybrid strategies, creating a complex, uncertain OE for BCTs. China and Russia have carefully studied U.S. strengths and weaknesses, developing strategies that employ forces and other means, such as cyberspace attacks, at a level short of traditional armed conflict to generate disorder and advance their interests.

c. The following vignette provides a historical foundation for cross-domain maneuver, expanding on Cohen and Gooch's example in *Military Misfortunes*. The narrative broadens the description of the IDF's simple failure to anticipate, including its learning and adaptation failures that almost led to Israel's catastrophic failure.

(1) The IDF's failure to reconcile the changing character of war after the 1967 Six Day War established the initial conditions for the Yom Kippur War. Emerging lessons from the Six Day War revealed applying combined arms warfighting concepts could provide a significant operational advantage. The humiliated Arabs rigorously assessed their failure and looked to the Soviet Union to develop a comprehensive, long-term strategy to improve their armed forces. The Arabs invested heavily in modern capabilities largely based on the Soviet model, to include the most current doctrine, training, education, leader development, and organizations containing combined arms capabilities, including modern tanks, mechanized infantry, mobile artillery, engineers, EW, and air defense artillery (ADA) systems.

(2) While the Arab armies were quick to recognize the importance of this shift in warfighting, the IDF did not, remaining confident that its warfighting approach would remain dominant for the foreseeable future. This failure to adapt to improvements in Arab warfighting capabilities was manifested in IDF reluctance to train, equip, and organize its formations with organic combined arms capabilities, which was mystifying given the Arabs were regenerating their forces under the careful oversight of the Soviet Union.

(3) As Arab capabilities became fully operational, it became more perplexing why the IDF failed to anticipate an Arab attack and mobilize its reserves despite unambiguous warnings that war was imminent. Evidence exists to indicate the IDF's failure to anticipate was influenced by Soviet messaging that a new era of détente with the U.S. was in effect and that both countries were committed to keeping international tensions to a minimum. Even the U.S. was deceived, remaining optimistic that peace with the Soviet Union would prevail. Despite this messaging, the Soviet Union was actively involved in training and arming the Arab armies. Moreover, the Soviet Union's ability to immediately begin resupplying the Arabs once war broke out indicates the Soviet Union were active collaborators.[24] The failure to anticipate the Arab attack became a critical factor during the initial days of the war (see figure 1-3). Compared to the Sinai, where there was sufficient strategic depth to allow for mobilization, the Golan Heights provided little depth, placing a premium on the additional relative combat power mobilized reserves could provide.[25]

(4) The cumulative effect of these three costly mistakes almost resulted in catastrophic failure.[26] The IDF's ability to adapt to the Arab surprise attack and overcome initial operational failures enabled Israel to restore its territorial integrity and achieve a tactical victory. However, the price in blood and treasure was significant. Tactical commanders were left to fight under grim circumstances, resulting in devastating materiel and personnel losses; victory was achieved largely due to the relentless courage of the IDF's soldiers and their ability to adapt to the most grave and difficult conditions. The LSCO that the IDF experienced were not unprecedented; however, the increasing complexity and the employment of lethal and nonlethal effects across multiple domains and environments during competition and armed conflict served as a harbinger of a new era in conflict.

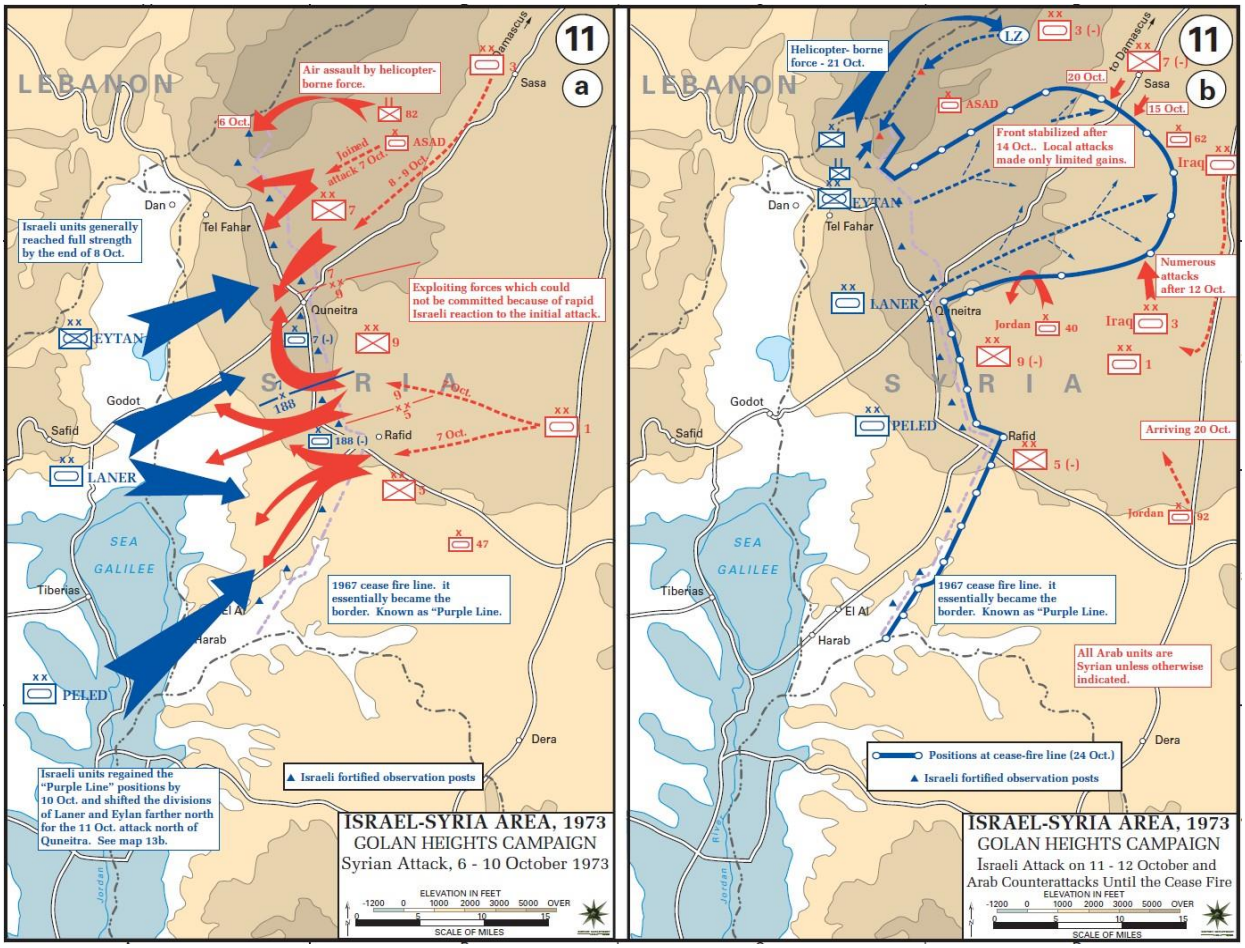

Figure 1-3. Golan Heights Campaign, 1973[27]

(5) From 6 to 8 October on the Golan Heights, the Syrian Army attacked Israel with three mechanized and two armored divisions. Spread thin across the entire Golan plateau before the IDF could fully mobilize its reserves, the 36th (Eytan) Armored Division, composed of the 7th and 188th Armored Brigades, was in danger of annihilation. Fighting an epic defensive battle, the 36th Armored Division quickly became surrounded on all sides against overwhelming Syrian forces. Fighting quickly degenerated into a series of intense, close combat engagements by individual tanks and small units. At the brink of defeat and limit of their endurance, the remnants of the 36th Armored Division broke the relentless Syrian attack and counterattacked with reserve forces to reestablish its original defensive lines.

(6) The costs of the Yom Kippur War were significant for all combatants. On the Golan Heights alone, Syria sustained 3,100 dead and 6,000 wounded. Iraq lost 278 killed and 898 wounded while Jordan lost 23 killed and 77 wounded. Tank losses were also high, with Syria losing 1,150, Iraq approximately 200, and Jordan about 50. For the IDF, both the 7th and 188th Armored Brigades were almost completely destroyed. Israeli Defense Forces' tank losses totaled 250 and personnel losses during 18 days of fighting totaled 772 dead, 2,453 wounded, and 65 prisoners.[28]

d. As it was for the IDF during the Yom Kippur War, BCTs will face an uncertain OE. However, warfighting trends indicate that future conflict will be increasingly complex, competitive, and lethal. Despite this ambiguity, what is certain is that Russia, China, and other threats and adversaries are adapting at an alarming rate, integrating new capabilities in an attempt to outpace the U.S. and achieve overmatch. As a result, the BCT must continue to modernize and maintain a relative advantage in combat power to be effective across the competition continuum. The lessons learned from the IDF's failure to learn, anticipate, and adapt cannot be lost to time.

Chapter 2
Operational Context

2-1. Introduction

Threat forces are eroding BCT comparative advantages. Threat investments in innovative and inexpensive commercial-off-the-shelf and proprietary technology will provide them with unprecedented intelligence, surveillance, and reconnaissance (ISR) and refined targeting capabilities. Along with the rest of the world, U.S. competitors are developing and integrating artificial intelligence (AI) platforms able to corroborate BCT signatures from multiple cue-and-prompt sensor platforms, placing the BCT at risk. Threat forces will continue to employ these new and emerging technologies, including the exploitation of volumes of available information, to gain insights, and potentially compromise or influence activities across the competition continuum. These improvements include capability developments, training, strategies, unit readiness, force flow, and other supporting functions. The sum of these advancements places the BCT's ability to conduct cross-domain maneuver at risk.

2-2. Operational environment

a. This section focuses on China and Russia, the most capable threat forces the BCT may confront in 2028 and beyond. China and Russia are near-peer adversaries that possess comparable capability that can harm U.S. forces and national interests, home or abroad. China and Russia continue to make significant advances in destructive and disruptive capabilities, integrating space, cyberspace, EW, robotics, hybrid strategies, hypersonics, and information technologies as key components of their operations.[29] Similar to the MDO Concept, this concept assumes that Russian and Chinese concepts and force development processes are sufficiently similar to each other for the Army to solve the problems presented by Russia in the near- to mid-term and adapt to changes China develops in the mid- to far-term. In addition, although the ensuing narrative focuses on China and Russia, it equally applies to other adversaries BCTs may face.

b. Contested domains.

(1) China and Russia continue to invest significant resources into research and development, advanced computing, hypersonics, advanced long-range weapons, reverse-engineered U.S. technologies, improved EW and space capabilities, and have developed unique systems and capabilities to enable information operations.[30] Although Russia and China possess similar capabilities and force designs, it is important to note that each adversary poses a distinct threat in its respective OE.

(2) BCTs will confront adaptive threat forces that are continuing to rapidly modernize their capabilities and adapt to the changing OE.[31] Advances in adversary capabilities enable threat forces to challenge BCTs across multiple domains simultaneously. Adversaries possess the capability to selectively deny domains, degrade situational awareness, erode C2, and operate with certain technological advantages at extended ranges to disrupt operations across the competition continuum.

(3) Adversary abilities to sense and observe U.S. formations extend beyond the purely physical domain and into multiple domains and environments (land, air, maritime, space, cyberspace, the EMS, and the IE). The merger of information and sensor technologies overlaid on both old and new weapons systems drive advancements in the adversary's lethality.[32]

(4) Adversaries will adopt hybrid strategies, operate in and among civilian populations, complex terrain, and attempt to mitigate many of the BCT's traditional technological advantages, forcing BCT formations to operate with degraded capabilities across all domains and environments. Urban operations will be particularly challenging, as adversaries will use information warfare (IW) to influence globally interconnected populations to serve their interests.

c. The land domain.

(1) Adversaries create layered stand-off through the employment of an integrated and wide-ranging number of extended range artillery systems and precision munitions. For example, massed area fires provided by the motorized rifle brigade's organic multiple launch rocket system battalion, comprised of three batteries of six BM-21 Grad 122mm multiple rocket launchers each containing 40 rockets per system, can range up to 45 kilometers when equipped with newer rockets.[33] China and Russia rely heavily on the integration of artillery networks and numerically superior, longer-range cannon and rocket artillery systems to support layered stand-off in an effort to avoid close combat. Adversaries have gone to great lengths to develop sensors and linkages that accelerate and integrate a targeting cycle that supports layered stand-off.

(2) BCTs will face non-line-of-sight systems guided by either infrared beam or a combination of fiber optic/wire guidance and television signals. Ground and vehicular-mounted anti-armor systems, such as the Russian Kornet-D and the Chinese Red Arrow variants enable adversaries to engage combat vehicles and critical assets out to eight and 10 kilometers, respectively.[34] Development of these anti-armor systems has the potential to outpace vehicle protection developments, affording threat forces increased stand-off and lethality with which to engage the BCT's combat platforms.[35]

(3) Adversaries are developing manned and unmanned air and ground systems that mirror U.S. capabilities. Their unmanned ground combat platforms will reduce the risks associated with dangerous missions such as wet gap crossings, breaching, and CBRN detection. Advanced sensor payloads on unmanned air platforms will enable adversaries to rapidly develop a common operating picture of friendly disposition and composition to employ effects prior to first human contact. The overall impacts are designed to increase decision making and operational tempo.

(4) Adversaries are capable of using advanced multifunctional mines to deny freedom of action and maneuver while protecting their own land forces. Mine employment includes using large numbers of conventional surface-laid and buried mines, some of which are difficult to detect. Adversaries will also employ camouflage, concealment, deception, and denial in an effort to disrupt friendly intelligence collection and targeting capabilities. Finally, adversaries will attempt to deceive BCTs by creating false emissions or electronic signatures, and employ decoys in an effort to reveal, target, and destroy BCT critical assets.

d. The air domain.

(1) Threat forces will employ organic integrated ADA capabilities ranging from vehicular-mounted to man-portable systems that provide ample protection for their critical assets. Longer-range and layered, integrated ADA systems will aim to defeat or limit friendly employment of aerial systems for reconnaissance, close air support, interdiction, and maneuver. Current Russian and Chinese anti-aircraft and artillerybattalions, comprised of SA-18 Grouse, SA-13 Gopher, SA-19 Grison and PGZ-04, PGZ-07, and PHL03 respectively, provide responsive ADA protection of combat maneuver forces. These ADA missile and gun combinations can engage and destroy low-flying aircraft and cruise missiles.[36] These capabilities likely will continue to improve beyond 2028.

(2) Advances in unmanned air and ground systems enable adversaries to threaten BCTs at lower cost.[37] Organic enemy aerial drones capable of swarming will leverage and employ passive sensing technology, such as infrared search and track, to deny effective U.S. air-ground integration of maneuver and fires.[38] Echelons of unmanned aircraft systems (UAS) will be integrated into reconnaissance and fires systems. Threat forces possess UAS formations with EW capabilities and are developing advanced capabilities that enable them to conduct strikes with small grenade-sized munitions. They will employ UAS to detect critical nodes and confirm BCT formation locations, and disposition, and observe effects of networked artillery systems. Threat forces use these aircraft for reconnaissance and forward observation, as well as target acquisition and battle damage assessment.[39] Russia currently has a UAS density advantage at brigade and lower echelons and is continually increasing its numbers annually.[40]

(3) BCTs should not assume air superiority in any area for any length of time. BCTs will be threatened by FW and RW aircraft, rocket, artillery, and mortars, as well as ballistic and cruise missiles. Pacing threats understand air support greatly expands the geographic area they can influence, as well as provide increased firepower and decreased reaction time to support ground maneuver. Russia and the Chinese People's Liberation Army Army (PLAA) continue to develop and integrate advances in FW and RW aircraft, making awareness, protection, and control of the air domain essential to supporting brigade and battalion operations.

(4) Russian forces synchronize air support of ground troops, closely integrating helicopters and close air support aircraft with artillery planning and priorities.[41] The PLAA has invested significantly in developing its RW capabilities in recent years, moving from a force employing only light multi-role helicopters in limited missions to fully equipped Army aviation brigades that field a mix of advanced new attack and reconnaissance helicopters, multi-role helicopters, and transport helicopters. PLAA aviation brigades are likely to continue expansion as China

modernizes its ground forces. Russians typically employ helicopters to support difficult missions such as air assaults, pursuits, river crossings, or breakthroughs, while FW aircraft will attack deep targets.[42]

(5) BCTs will also face Russian Iskander missile systems that can now fire short-range ballistic missiles or ground-launched cruise missiles (referred to as the R-500 or Iskander-K).[43] China's CJ-10 ground-launched and CJ-20 air-launched land-attack cruise missiles, as well as the development of a long-range bomber, are evidence of China's ongoing modernization efforts to develop a force that is capable of operating at increased distances in all domains and environments.[44]

e. In the maritime domain, BCTs will face threat forces that operate from a position of relative advantage in close proximity to their shore-based networks. Brigade combat teams may encounter littorals and inner waterways that canalize or impede their ability to maneuver throughout the area of operations (AO). Littoral areas will likely contain geographic features such as straits or chokepoints that restrict tactical maneuver or affect weapon and sensor effectiveness. Threat forces will link waterway and shore-based sensors within the BCT AO to air and surface platforms that challenge the BCT's ability to maintain freedom of maneuver and action.[45]

f. In the space domain, an array of actors challenge U.S. and allied freedom of action in space that extends to and affects tactical operations. Russia and China possess counter-space capabilities which can disrupt, deny, degrade, or destroy BCT communications. Russia and China will also challenge the BCT's access to space-based ISR and PNT. Loss of global positioning systems will likely degrade the BCT's ability to conduct all operations that depend on satellite communications (SATCOM).

g. The cyberspace domain.

(1) Advancements in cyberspace technology allow adversaries to attack the BCT communications network and degrade C2. Adversaries understand that cyberspace enables integration across physical domains by moving data along transmission paths through links and nodes in cyberspace and the EMS. While cyberspace enables communication capabilities, it also creates critical vulnerabilities for adversaries to attack and exploit.[46] China seeks to exploit these vulnerabilities by employing a systems warfare concept, identifying critical and/or vulnerable system components to degrade or destroy the effective use of larger systems through targeted attacks on these vulnerabilities.[47]

(2) The ability to maneuver and provide C2 through cyberspace allows threat forces to conduct attacks from multiple physical and virtual locations thousands of kilometers away. Dispersed infrastructure and other obfuscation techniques make attribution difficult.[48] The shifting nature of cyberspace affects not only the attacker's relation to the target, but its relation to the IE as well.[49]

h. The electromagnetic spectrum.

(1) Russia and China possess significant EW capabilities that enable communications jamming, electromagnetic deception, electronic probing, electromagnetic intrusion, and direction finding that support operational success. They understand the operational impacts associated with the EMS and have invested a significant amount of resources in developing capabilities to enable dominance of this environment. Russia and China seek to disrupt the BCT's ability to synchronize multiple operations and have placed special emphasis on developing and deploying EW capabilities to facilitate communications counter-measures and jamming operations.[50] For example, EMS jamming could impact platform sensors designed to report maintenance data and disrupt BCT sustainment operations.

(2) Russia and China will disrupt and degrade BCT digital networks that enable tactical operations. Russia and China will contest BCT electronic reconnaissance, surveillance, and security operations, reducing the BCT's ability to identify electromagnetic vulnerabilities of enemy electronic equipment and systems.[51] Russia and China will also attempt to synchronize electronic attacks to maximize the effects of other lethal and nonlethal actions. For the first time since the Second World War, the U.S. could face adversaries that can operate in multiple domains, deny domains to U.S. forces, and operate with technological advantages over U.S. forces.[52]

i. The information environment.

(1) The IE is a key component of the OE.[53] Characterized by ubiquitous on-demand media and interpersonal hyper-connectivity, today's IE enables collaboration and information sharing on an unprecedented scale. Often using commercial capabilities, actors disseminate truthful, biased, and false information using digital technologies and access to global audiences to recruit, to gain support and sustainment, and to exploit, disrupt, and delegitimize BCT operations through false narratives. Threat forces understand the importance of the IE and will leverage inexpensive means to exploit this environment to create multiple dilemmas for BCTs.

(2) Threat forces will exploit the persistent ambiguity of the IE and rules of engagement, and will leverage the open nature of friendly media, as well as the closed nature of their own media, to spread disinformation and disrupt friendly operations. They will generate propaganda showing civilian casualties, war crimes, and violations of the law of war and rules of engagement. Threat forces will attempt to use U.S. norms and values to their advantage, such as using human shields to protect their forces. They will also seek to spread ambiguity and uncertainty from the local/tactical to the strategic level to stop or alter friendly actions. BCTs must be aware of these actions and trained how to identify and react to them.

2-3. Threat operations in the Close Area

a. Threat forces recognize and understand domains and environments in a manner similar to U.S. forces. Threat modernization efforts and force design changes at the brigade level enable threat forces to conduct operations in multiple domains and environments. Threat organizations have incorporated larger maneuver elements, robust and capable artillery (cannon and rocket), ADA, self-propelled gun/missile and man-portable systems, highly capable electronic warfare

companies, electronic surveillance systems, advanced anti-tank launchers and munitions, and unmanned aircraft elements that permit long-range visual forward and target acquisition systems. These highly capable and flexible formations enhance multi-domain capabilities and cross-domain integration, enabling them to effectively fight at the tactical edge (see figure 2-1).

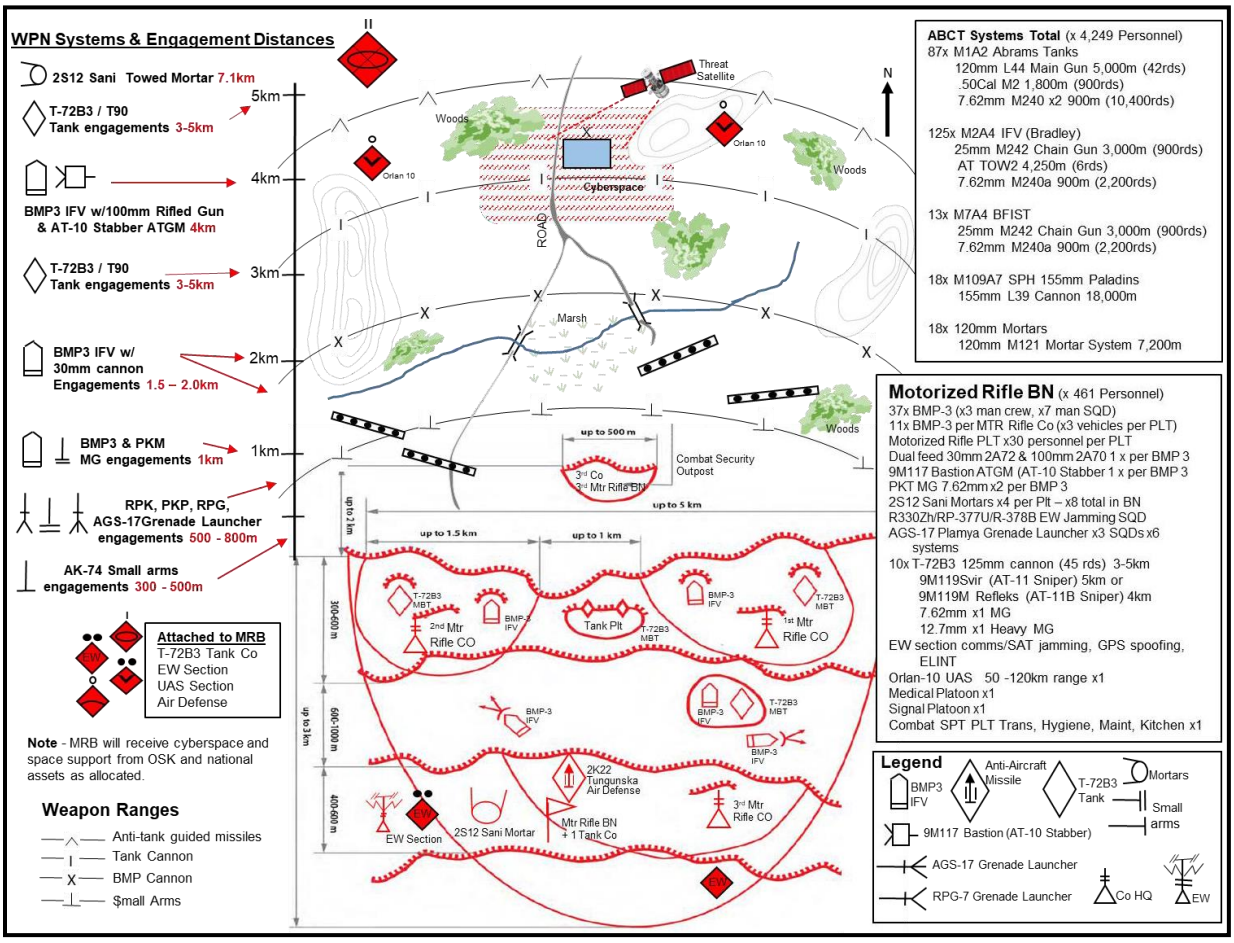

Figure 2-1. Russian motorized rifle battalion in the defense

b. Threat forces at the brigade echelon are flexible formations that incorporate a mix of battalion and company-level infantry and armor units to create a single combined arms command. These brigade and battalion formations possess high operational autonomy, versatility and firepower, and warfighting capabilities that enable them to present multiple challenges for BCTs in the Close Area. These formations are able to conduct day/night combat operations under varying conditions. Threat brigade and battalion formations can perform marches over long distances, deploy rapidly into combat formations, conduct a broad variety of maneuvers, rapidly change directions and areas of action, and rapidly concentrate and disperse units. At the tactical level, threat formations will aggressively maneuver to create massive advantages in combat power at key times and locations, while simultaneously preventing BCT responses through effective deception operations. This will likely result in BCTs entering the close fight in a degraded state from a personnel, equipment, and operational standpoint (see appendix E for additional details on Russian and Chinese capabilities in the Close Area).

c. Integration of systems warfare.

(1) Threat forces also recognize the importance of systems warfare and will employ this approach to identify critical and/or vulnerable systems components, then degrade or destroy the effective use of larger systems through targeted attacks. Formation designs, along with the application of systems warfare, optimizes the principles of force concentration and asymmetric attack, while accounting for lethality, cost, and complexity of modern weapon systems.

(2) Employment of system warfare supports the development of several more-traditional military strategies, such as preclusion, isolation, and sanctuary, throughout all domains and at all levels of war. Preclusion is achieved by keeping BCT commanders and forces off balance through asymmetric means, such as deception and IW, while simultaneously denying use of wide geographic areas through long-range reconnaissance-strike capabilities. Isolation is achieved by jamming or manipulating communications between units, employing psychological warfare techniques to confuse and segregate BCT units from one another, then rapidly maneuvering to physically isolate them. Sanctuary is achieved through a mix of protection, defensive planning, and information warfare and deception warfare. Sanctuary includes not only safety from physical attack, but safety from information attack. It is through systems warfare that threat forces will keep BCTs off balance, forcing them to conduct cross-domain maneuver in a persistent state of degradation.

(3) At the tactical level, systems warfare centers largely on targeting high-value battlefield systems such as radars, C2 nodes, field artillery, ADA systems, select armored vehicles, and critical logistics capabilities. Examples of tactical systems warfare include using organic heavy rocket artillery to defeat or destroy radars and artillery systems, EW to suppress or neutralize enemy C2 networks, and deception operations to target the enemy's situational understanding and state of mind.

(4) Threat forces will mitigate BCT's areas of strength, gaining a combat advantage by approaching these strengths asymmetrically. Critical BCT systems, components, and vulnerabilities will be targeted and exploited to disrupt operations tempo. Threat forces will prioritize targeting of networks, sensors, C2 nodes, and maneuver forces. BCTs will need to operate dispersed with a unified, secure, and resilient communications network required to defeat threat forces. BCTs will be challenged consistently across all domains and environments, forcing commanders to adapt to changing conditions rapidly within the OE at a pace BCTs have not previously experienced.

2-4. Russian and Chinese vulnerabilities and weaknesses

a. Russia.

(1) Although Russia possesses a significant amount of capable drones in their motorized rifle brigades (MRB), Russia lacks in drone design and production, leveraging an Israeli license to help them produce surveillance drones. Russia possesses long-range and precision strike capabilities, but lacks the reconnaissance capabilities required to support timely and effective targeting.[54] Other shortfalls in the development of electronic components, radars, and satellites will likely affect

intelligence and fire support provided to the MRBs. Other technology development and resource challenges such as Russia's need to leverage Thales for the development of the T-90 tank optics demonstrates their inability to domestically produce critical components required to support future operations.[55]

(2) Russia's economic struggles make it increasingly difficult for them to fully modernize across all military districts.[56] The "New Look" modernization effort that began in 2008 has essentially created two militaries; an elite force capable of conducting rapid, complex operations with generally modern equipment; and the rest of the military, which still relies upon conscription, mass mobilization, and mixed levels of modern equipment.[57] These economic and technology development struggles limit Russia's ability to balance military growth and capability development within the MRBs.

(3) Most notably, Russia is at a distinct disadvantage when it comes to developing their noncommissioned officer (NCO) corps and recruiting highly skilled personnel. Russia has taken measures to improve recruitment by offering improved housing, pay, and status. However, these efforts have largely failed to significantly curtail Russia's reliance on conscription forces.[58] These conscript forces are at the center of the personnel turbulence problems that plague Russia's ability to retain highly skilled, well-trained, and experienced soldiers when compared to the U.S. long-serving all-volunteer force. Russia's attempt to create an NCO corps to help train, manage, and develop the technical and tactical skills required to enable operations in a complex and technology-enabled battlefield have also fallen short. In addition to Russia's weak NCO corps, they are challenged to fully fill units, counting on their ability to bring forward-positioned units up to full strength during times of conflict.[59] Aside from airborne, naval infantry, and Spetsnaz, Russia also lacks the logistical support required to sustain LSCO for protracted operations.[60]

b. China.

(1) China also has exploitable vulnerabilities and weaknesses. China's ideology and culture stifle professional military thinking and tend to marginalize junior leaders and soldiers, which has resulted in a broadening generation gap between senior leaders and subordinates. The PLAA is challenged with delegating decision making authority to lower levels, fostering an environment where junior service members and NCOs struggle to professionally advance.[61]

(2) The PLAA's tendency to engage in insufficient, unrealistic, and unchallenging training underscores the Chinese and PLAA culture of striving to avoid failure. PLAA leaders go as far as developing prearranged scripted exercises rather than embracing failure as an opportunity to learn and develop leaders. Training exercises are often seen as an opportunity to impress senior leaders and lack the proper resources required to ensure effective training that holistically prepares units for the rigors of combat. Insufficient overseas and combat experience cultivates a culture in the PLAA that is widely believed to be both xenophobic and ignorant about the outside world and also somewhat naïve about the difficulties associated with future armed conflict.[62]

(3) Aside from elite units such as special forces or reconnaissance elements, the combined arms battalion is likely to be the lowest echelon capable of operating independently for any significant period of time, and even the battalion's independence is limited by a small staff and

limited support assets. China also struggles with fire support modernization, possessing small quantities of attack helicopters, resulting in close air support that is virtually nonexistent. Despite the PLAA's modernization and reformation efforts over the past two decades, its ability to improve its forces has fallen short of expectations. For example many of their towed artillery and mortar systems date back to the 1960s.[63] It is important to note this imbalance in modernization results from the PLAA's prioritization of artillery systems such as self-propelled guns and multiple rocket launchers.[64] Although the PLAA continues to improve, lack of night training, poor quality of recruits, mediocre mental and physical health, and lack of professionalism in the lower ranks create weaknesses that detract from the PLAA's ability to thrive in a rapidly changing OE. Future operations will require junior and senior leaders to plan and execute complicated missions across multiple domains and environments.[65]

2-5. Implications

a. Given the capability of threat forces to disrupt or degrade the communications network, BCTs must possess organic and redundant analog and digital C2 capabilities and authorities to conduct cross-domain maneuver at a tempo threat forces are unable to match. BCTs must own and have access to critical C2 systems that permit the realization and rapid adaptation to continuous changes in the OE with reduced reliance on higher echelons for direct support. Enabling subordinate leaders to seize, retain, and exploit the initiative consistent with the commander's intent regardless of the condition of the communications network or other multi-domain capabilities is imperative to ensuring success when operating in degraded environments.

b. BCTs must significantly improve operations security, signature management, obscuration, concealment, intelligence, deception, and security in all domains and environments to mitigate the increased lethality of the OE. The steady increase in lethality, range, and rate of fire of modern weapons requires BCTs to protect themselves and reduce their vulnerability by operating dispersed. Semi-independent operations enable BCTs to exploit vulnerabilities and create gaps in threat formations, enhancing survivability and maximizing advantages. BCTs must employ obscuration capabilities not just on the physical battlefield, but also across cyberspace and the EMS to prevent detection and protect the force. Brigade combat teams require an expanded understanding of cross-domain maneuver that accounts for simultaneously synchronizing, integrating, and employing capabilities to achieve dominance and gain positions of relative advantage.

c. Winning in the complex OE requires an integrated cross-domain R&S effort across all echelons. Threat forces will try to evade long-range detection through concealment, deception, electronic masking, emission control, decoys, and intermingling with civilian populations. As a result, BCTs will need to develop situational understanding while in close contact with the enemy and civilian populations. To achieve depth, preserve freedom of movement and action, and prevent isolation, BCTs must integrate cross-domain R&S operations, and resource, organize, and synchronize area security efforts across multiple echelons to develop situational understanding, prevent surprise, preclude enemy action, and protect the force.

d. Adversaries will increasingly broaden their operations to the other domains and environments. Corps and divisions must establish and maintain an operational advantage,

continuously converging and synchronizing effects across all domains and environments, enabling BCTs to conduct cross-domain maneuver. These actions will create conditions designed to generate overmatch, present multiple dilemmas to the enemy, and enable freedom of movement and action.

e. To address the challenges described in this chapter, BCTs must be prepared to operate across the competition continuum. The BCT's ability to confront and overcome threat forces is a key component in the Army's ability to preserve peace, and, if necessary, prevail in armed conflict. Winning will require an operational concept for BCTs that provides solutions for integrating capabilities across multiple domains, the EMS, and the IE.

Chapter 3
Military Problem and Components of the Solution

3-1. Military problem
How do BCTs, operating as part of the Joint Force conducting MDO, shape the security environment to deter adversaries and assure allies and partners during competition, and, when necessary, dominate and win in armed conflict, and return to competition on favorable terms?

3-2. Central idea
BCTs conduct cross-domain maneuver to deter adversaries and assure allies and partners during competition, dominate and win in armed conflict, and return to competition on favorable terms. During competition, BCTs support regional engagement, shape the security environment, prevent conflict, and provide multiple options for responding to and resolving crises. On order, BCTs deploy and transition to armed conflict to destroy or defeat enemy forces. BCTs execute C2, integrate cross-domain R&S operations, and conduct dispersed operations with the ability to operate semi-independently. BCTs integrate enabling support from corps and divisions, which continuously converge and synchronize lethal and nonlethal effects across multiple domains, the EMS, and IE to enable BCTs to conduct cross-domain maneuver. During return to competition, BCTs consolidate gains, produce sustainable outcomes, and set conditions for long-term deterrence.

3-3. Solution synopsis

a. Conducting LSCO presents the greatest challenge for BCTs and represents the most significant readiness requirement. BCTs executing LSCO conduct cross-domain maneuver converge lethal and nonlethal capabilities across multiple domains, the EMS, and the IE, creating opportunities to destroy, dislocate, disintegrate, and isolate enemy forces. Whether short or protracted, LSCO are by nature intense, chaotic, and destructive due to their inherent nature.[66]

b. BCTs must be capable of operating dispersed in degraded conditions given an adversary's capability to contest all domains and environments. It also means that corps and divisions play a crucial role in setting conditions, shaping operations, managing transitions, and converging and synchronizing multi-domain capabilities necessary for BCTs to be successful in LSCO.

c. Corps and divisions conduct coordination, conduct synchronization of forces and capabilities, and continuously converge effects allowing BCTs to focus combat power on the decisive operation in the Close Area. This allows BCTs to avoid enemy strengths, attacking enemy weaknesses from multiple positions of advantage throughout the depth of the battlefield. The objective is to shatter the enemy's cohesion and create a situation in which the enemy cannot effectively respond. The increased speed and rhythm across multiple domains and environments allow BCTs to concentrate combat power at a tempo the enemy is unable to match, achieving a position of relative advantage that provides freedom of maneuver and action.

d. Theoretical basis for cross-domain maneuver during large-scale combat operations.

(1) Close combat is warfare carried out on land in a direct-fire fight, supported by direct and indirect fires and other assets.[67] Close combat has one central purpose: the defeat or destruction of enemy forces to decide the outcome of battles and engagements.[68] The ability to win engagements is essential to successful campaigns and achieving military objectives. Battles and engagements are the fundamental building blocks of operational success and strategic victory.[69]

(2) The ability to dictate the terms of action throughout an engagement or battle determines whether the attacker can compel enemy behavior at acceptable cost. Presenting the enemy with multiple dilemmas in the form of simultaneous or sequential threats from different locations and directions, and in multiple domains can quickly overwhelm the ability to resist effectively. Increased tempo accentuates the pressure on enemy decision-makers, creating both physical and cognitive positions of advantage.[70] The BCT, enabled by attached tactical psychological operations elements, conducts cognitive maneuver through IW to deliberately affect the enemy's behavior and help break the enemy's will. The BCT's exploitation of the resulting positions of advantage created by engaging in close combat forces the enemy to yield position quickly, be destroyed, or surrender its forces.[71]

(3) To place emphasis on the need to seize, retain, and exploit the initiative and create synergistic effects that increase relative combat power and provide the overmatch necessary to destroy or defeat enemy forces, the BCT Concept promotes an offensive approach, but acknowledges that armed conflict manifests itself in two different, but complementary, forms: offense and defense.[72] It is through the offense that the U.S. Army seeks to impose its will on the enemy and dictate the terms of the battle. The defense, on the other hand, contributes resisting combat power, which provides the ability to preserve and protect.

(4) BCTs cannot sustain the offense indefinitely. At some times and places, it becomes necessary for the BCT to halt the offense to conduct sustainment operations and assume the defense. Furthermore, the requirement to concentrate combat power in decisive spaces during offensive operations often necessitates assuming the defense elsewhere. Dispersed defenses arranged in a noncontiguous AOs are generally mobile defenses; however, some subordinate units may conduct area defenses to hold key terrain or canalize attackers into engagement areas. BCTs conducting an area defense work to retain the initiative by concentrating overwhelming firepower on enemy forces, retaining freedom of movement, and defending in depth.

(5) Whether conducting offensive or defensive operations, all echelons rely on cross-domain R&S operations. Cross-domain R&S operations are synchronized with lethal and nonlethal capabilities across multiple domains, the electromagnetic spectrum, and the information environment. Reconnaissance is intended to collect, develop, and report actionable combat information on the enemy, terrain, weather, and populations. Security operations provide early and accurate warning of enemy operations and provide the protected force with time and maneuver space within which to react to the enemy and develop the situation. Security operations help mitigate risks associated with the frequent transitions from offense to defense which are common to a dynamic and hyperactive environment. Cross-domain R&S operations place a premium on communications, intelligence, mobility, C2, and sustainment since they are frequently conducted in a decentralized and dispersed manner in denied, degraded, and disrupted conditions.

(6) Cross-domain obscuration enabled by space, cyberspace, and EMS capabilities enhances protection and makes BCTs more difficult to detect. When multiple subordinate formations operate dispersed and out of mutual supporting range, higher-level commanders integrate capabilities across multiple domains, echelons, and formations. Corps and divisions conduct continuous cross-domain R&S in AOs not assigned to subordinate formations, such as providing a dedicated reconnaissance force, employing both manned and unmanned air and ground systems, robotics and sensors, or a combination of both. The aim is to integrate cross-domain R&S operations throughout the AO to prevent surprise, protect the force, and preclude enemy options.

(7) Corps and division formations operate across multiple domains to provide freedom of maneuver for BCTs operating dispersed across the MDO operational framework. This includes positioning key capabilities forward to create positions of advantage to defeat enemy capabilities. Corps and division long-range capabilities, to include deep aerial maneuver, lethal and nonlethal fires and threats of fire, allow the Army to transition from shaping to decisive combat operations from a position of relative advantage and with increased shared understanding. Along with lethal fires, corps and division formations employ offensive cyberspace operations (OCO); EW; electronic and physical deception, physical feints, and ruses; and persistent IE operations to cause enemy forces to miscalculate the strength and location of friendly forces, lose the will to fight, surrender in an engagement or battle, and, ultimately, capitulate the entire conflict.[73] Corps and divisions also augment BCTs with additional Army and Joint Force sustainment capabilities which provide BCTs with the endurance to achieve mission objectives that otherwise might not be attainable with organic capabilities.

(8) Corps and division formations reinforce their successful shaping activities and employ capabilities to relentlessly strike enemy critical vulnerabilities across multiple domains, the EMS, and IE. When operating as a tactical formation, corps and division formations then exploit the initiative by conducting cross-domain maneuver to rapidly close with and attack enemy forces and capabilities at tempo from dispersed positions. In doing so, corps and division formations converge physical, temporal, virtual, and cognitive capabilities in decisive spaces to exploit momentum and enable follow-through.

e. Applying the BCT Concept to multi-domain operations.

(1) As part of calibrated force posture and because threats to national security and vital interests can develop rapidly, the Army employs rotational and forward-deployed units at the division and BCT echelons. Regionally aligned forces conduct integrated cross-domain R&S operations essential to the defense policy goals of shaping security environments and preventing conflict. Forward stationed and rotational BCTs demonstrate U.S. resolve and provide the credibility to assure partners and deter threats. However, short of sufficient forward presence, or if deterrence efforts fail, corps and divisions deploy combat-configured BCTs over strategic distances, enabling BCTs to transition quickly to cross-domain maneuver to accomplish mission objectives.

(2) The capability to enter an operational area (OA) at just about any point with combat configured, highly mobile, and lethal BCTs provides the Joint Force commander with options to surprise the enemy and present multiple dilemmas. To compound initial surprise, commanders add shock effect by defeating enemy forces in fast-paced, violent tactical battles and engagements.[74] Surprise, shock effect, and rapid destruction disorient and weaken the enemy while also increasing Joint Force freedom of movement and action from the land domain.[75] This approach defeats enemy forces by causing dislocation and disintegration rather than by engaging in sequential, set-piece battles of annihilation.

(3) A successful initial entry into an OA may not be sufficient. To be decisive, all echelons must sustain an ever-increasing operational tempo; specifically, corps and divisions must reinforce initial-entry formations by moving additional forces onto beachheads or successful salients with a steady flow of follow-on elements, while executing and sustaining combat operations by BCTs already engaged. However, the critical measure of successful force projection is not the speed with which the first combat elements engage, but rather the rate at which the Joint Force and its partners are able to penetrate enemy A2/AD capabilities and attack into the depth of the enemy defense. In order to be successful, the BCT must possess freedom to maneuver and the ability to consolidate gains. This will require the division to task-organize maneuver short-range air defense (M-SHORAD) to the BCT to protect its formations. Brigade combat teams must translate the initiative gained by forcible entry into decisive operations against key enemy capabilities and vulnerabilities in depth rapidly, in order to disrupt the cohesion of the enemy's defense.[76]

(4) To ensure successful entry and follow-on operations, corps and divisions integrate and synchronize Army, JIM capabilities to develop situational understanding continually, organize sustainment operations, integrate cross-domain R&S operations, shape the AO to support battles and engagements, and consolidate gains to accomplish mission objectives. Corps and divisions enable air movement from land or sea bases to austere or unprepared landing zones and forward points of need, and provide air medical evacuation to facilitate BCT freedom of maneuver and action. Entry operations are enabled by a unified, secure, and resilient communications network that allows decision making and the generation of tempo at echelon. Corps and division commanders also enable BCT commanders to use disciplined initiative to exploit opportunities and respond to unexpected threats. In turn, BCT commanders issue flexible and adaptive orders that enable subordinate commanders to operate for extended periods without additional guidance.

(5) Combat-configured BCTs deploy with the ability to seize, retain, and exploit the initiative within the commander's intent attacking from multiple locations, directions, and domains

presenting multiple dilemmas to the enemy throughout the AO. Depending on the mission variables, BCTs may deploy with enhanced combat configurations. These configurations could include mobility, lethality, protection, intelligence, and network upgrades, along with additional sustainment that allows maneuver formations and their enablers to transition quickly to combat operations and prolong endurance.

(6) Corps and divisions enable BCTs to operate semi-independently allowing BCTs to disrupt enemy forces throughout the depth of the AO. Moving along multiple routes, BCTs can infiltrate, evade attacks, deceive the enemy, and reduce vulnerability to massed fires and attacks by superior forces. Dispersion and deception coupled with continuous integrated cross-domain R&S operations reduce vulnerabilities and risk to the force. Collectively, these actions reinforce the effects of lethal and nonlethal fires and present a set of options to paralyze and overwhelm the enemy.[77] The corps or division commander's ability to seize and maintain a position of relative advantage in decisive spaces can be contingent on a BCT's ability to operate semi-independently, especially when employing formations in noncontiguous AOs.

(7) To outmaneuver the enemy, BCTs must employ combat vehicles that reduce logistics demand through increased reliability, availability, and maintainability and significant reductions in size, weight, and required power. The intent is for BCTs to outmaneuver enemy forces using ground combat vehicles, Army watercraft, or Army aviation vertical lift platforms. BCTs are equipped with improved firepower based on enhanced target acquisition technologies; integrated cross-domain R&S operations; and the capability to integrate joint fires. Advanced target acquisition and weapon systems enable Soldiers, crews, and teams to detect and engage at extended ranges in all weather conditions with superior overmatch potential for direct and indirect fire systems. These capabilities include both kinetic and directed energy weapon systems.

(8) Integrating capabilities across all formations, echelons, and domains enhances force protection, situational understanding, and creates a secure OE. Integrated cyberspace, space, and EMS capabilities, enabled by air and ground manned and unmanned systems, AI, and multi-mode delivery sensors, provide BCTs with enhanced multi-domain R&S advantages. Active and passive armor provides an additional layer of protection for combat vehicles. Additionally, obscuration of BCTs is achieved by integrating capabilities in the EMS and cyberspace domain that degrade enemy sensors and detection capabilities, and overwhelm an enemy's ability to discern targets. Organic obscuration, advanced protection, and direct and indirect fire capabilities allow BCTs to detect the enemy, deploy, close with the enemy under obscuration, and engage at a time and place of their choosing.

(9) BCT endurance to sustain cross-domain maneuver is extended depending on the mission variables, reduced logistic demands, organic power generation, autonomous resupply, additive manufacturing, and additional medical capability and capacity. Reduced logistics demand extends and enhances the BCT's ability to maintain a pace and tempo to a level the enemy cannot sustain. Additive manufacturing technologies may allow formations to reduce reliance on the sustainment system external to the BCT. Increases in power generation, storage capacity, and engine efficiency capabilities will increase system ranges and operating durations, further reducing logistical demands. Autonomous and unmanned resupply enables greater dispersion, allowing more flexibility for maneuver formations. Increases in organic medical capability and capacity will

provide BCTs flexibility while planning the time and distance required for medical treatment and required aviation support.

(10) However, vulnerability can increase as BCTs conduct dispersed operations at maximum supporting range and sustain operations at extended supporting distance. This is especially the case if the concept of operations includes positioning BCTs throughout the depth of the battlefield, in which the ability to move to reinforce a troubled friendly unit could be challenged. Additionally, noncombatants, bypassed enemy formations, degraded capabilities, and dispersed operations have the potential to disrupt operations. To address these risks, commanders leverage C2 tools and technologies at all echelons, such as manned and unmanned air and ground systems. These capabilities create shared understanding, enable commanders to continuously converge effects, and enable BCTs to conduct cross-domain maneuver. The ability to converge lethal and nonlethal capabilities across multiple domains, the EMS, and the IE allows BCTs to dominate and win in close combat.

(11) Conducting cross-domain maneuver enables BCTs to operate as part of the Joint Force conducting MDO, with the ability to deter or defeat the enemy in the degraded, contested, lethal, and complex OE. If the enemy chooses to orient in multiple directions, it potentially weakens its defense. If the enemy choses to remain concentrated in one area, it risks being enveloped, turned, isolated, or destroyed in detail. As enemy units lose mutual support due to multiple attacks, they lose coherence of action, and become dislocated. As enemy capabilities in multiple domains are attacked, its ability to communicate, control direct fires and movement, and sustain the fight are lost. Enemy forces disintegrate, while BCTs exploit success and dictate the terms of battles and engagements achieving mission objectives. BCTs are then able to consolidate gains, execute area security and stability tasks, produce sustainable outcomes, and return to competition on favorable terms.

3-4. Components of the solution

a. Successful application of the BCT Concept relies on a BCT's ability to conduct cross-domain maneuver and apply four components of the solution to the military problem, which are: execute C2, integrate cross-domain R&S operations, operate semi-independently, and integrate enabling support from corps and divisions (see figure 3-1).

(1) Defeating capable enemies requires BCTs to expand the combined arms concept to include employing capabilities in all five domains, the EMS, and the IE. Cross-domain maneuver is the synchronization and employment of forces and capabilities through movement in combination with converged lethal and nonlethal capabilities across multiple domains, the EMS, and the IE. Cross-domain maneuver creates synergistic effects in the physical, temporal, virtual, and cognitive realms that increase relative combat power and provide the overmatch necessary to destroy or defeat enemy forces, control land areas and resources, and protect populations.

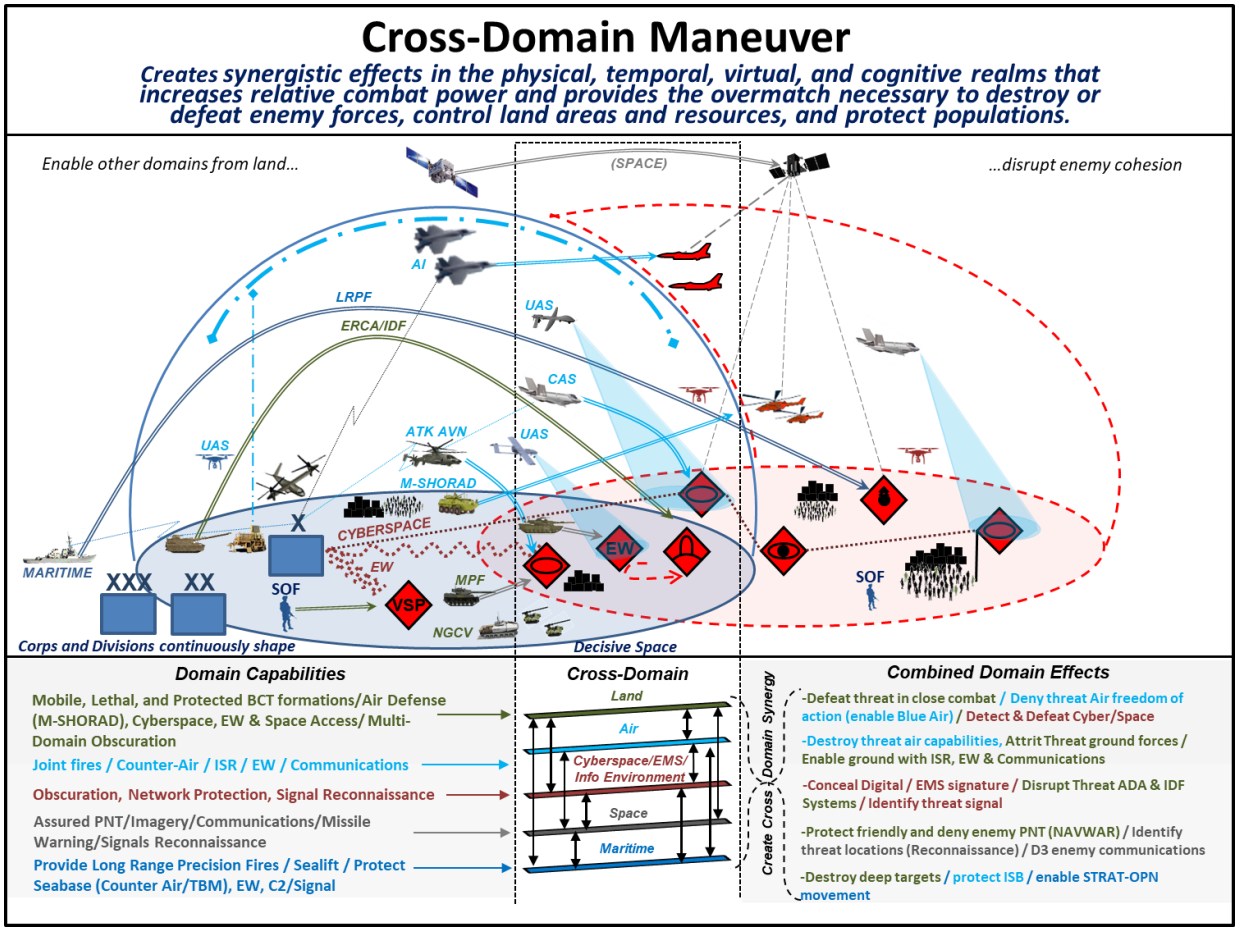

Figure 3-1. BCT conducting cross-domain maneuver

(2) BCTs must be able to access and employ capabilities in multiple domains and environments to conduct effective cross-domain maneuver. The BCT requires the corps or division's ability to continuously converge and synchronize effects enabling BCT cross-domain maneuver. The synergistic effect of integrating capabilities in all domains and environments to support maneuver enables BCTs to develop situational understanding continually, achieve overmatch, gain positional advantage, and operate at a pace and tempo the enemy cannot sustain. The BCT's persistent cross-domain maneuver capabilities and its capacity for physical destruction are the basic building blocks of military operations.

(3) BCTs must be able to access and employ surface-to-surface, coordinated, integrated, and synchronized fires with other Army and joint capabilities, providing lethal and non-lethal effects to achieve the commander's objectives. BCTs engaging in close combat will require dedicated ADA systems to detect, track, identify, and destroy hostile aircraft and defend critical assets such as C2 nodes, sustainment areas, and others. Dedicated (Army ADA) and non-dedicated (combined arms for ADA, EW systems for counter-UAS, and others) will protect BCTs as they close with and destroy the enemy. In the maritime domain, Army and Navy forces provide lift, sustainment, and ship-to-shore fires to support maneuver, while ground forces project land-based combat power via direct and indirect fires into littoral areas to support maritime operations.

(4) Within the space and cyberspace domains, land, maritime, and air forces access and employ EMS capabilities to deny the enemy secure communications necessary for C2, attack enemy C2 systems, and deny PNT data required for precision navigation and weapons. Additionally, space and cyberspace systems protect and provide Army information network capability, assured PNT, and contribute to cross-domain R&S operations.

(5) Operations on land provide a physical component to operations in the IE to influence the threat or enemy commanders' decision making, enemy formation or population's will to fight, and other behaviors of resident populations and institutions consistent with operational goals. Conversely, BCTs employ information-related capabilities to advance the commander's intent and concept of operations; seize, retain, and exploit the initiative in the information space; and consolidate gains in the IE to achieve a decisive information advantage.[78]

b. Execute command and control.

(1) A cluttered and hyperactive battlefield challenges higher commanders' ability to manage all decisions in a timely manner. To generate the operational tempo desired and to cope best with the uncertainty, disorder, and fluidity of combat, execution authority must be delegated to subordinate commanders. That is, subordinate commanders must exercise disciplined initiative, based on their understanding of their higher commander's intent. If commanders are unable to communicate with their higher commander, they can then make a decision and execute a modification to the original order and accomplish the mission. A competent subordinate commander who is at the point of decision will naturally have a better appreciation for the true situation rather than a higher commander some distance removed. Because of these circumstances, the OE demands that commanders execute C2 through decentralized execution that employ flexible schemes of maneuver to allow subordinate leaders to press the fight under degraded conditions. Decentralized execution is the delegation of execution authority to subordinate commanders.[79]

(2) The potential for enemies to degrade communications will force commanders to change how they execute C2. Commanders determine the extent to which they centralize or decentralize authority based upon their understanding of the situation, their concept for accomplishing the mission, the mutual trust and confidence shared with subordinates, and the degree of risk they are willing to assume to accomplish the mission. Executing the mission command philosophy means commanders enable agile and adaptive leaders and organizations to execute disciplined initiative within the commander's intent to exploit opportunities. Under dispersed and degraded conditions the Army's ability to seize, retain, and exploit the initiative will depend on empowering and enabling leaders to exercise disciplined initiative consistent with the commander's intent when C2 and information systems become degraded, fail, or are not used in order to conceal operations and reduce electromagnetic signature.

(3) Executing cross-domain maneuver requires corps, divisions, and BCTs to be capable of task-organizing rapidly among BCT types, functional brigades, and corps and division enablers, allowing subordinate units to maintain maximum flexibility and operate dispersed within and beyond range of the enemy's stand-off capabilities. Command posts must be able to establish and maintain their networks while stationary and on the move to enable situational understanding and

decision making.

(4) A unified, secure, and relsilient communications network enables ground-ground and air-ground interoperability, permitting transient members like Army aviation and other enablers to seamlessly enter and exit networks in the operational area (OA) with guaranteed connectivity. Air defense airspace management cells provide commanders multiple tactical radio capabilities, including access to the joint and multinational tactical data links providing data into and from the multi-tactical data link network. This data directly affects manned and unmanned air and ground platforms that have multi-tactical data link capabilities, supports airspace clearance, and improves decision making. These capabilities create effective combined arms teams, enable dynamic task organization, facilitate achieving the commander's intent and concept of operations, and ensure flexibility to meet unforeseen events and enable future operations.

(5) Corps, divisions, and their enablers are specifically designed to create the agility and versatility necessary to form, dissolve, and reform teams rapidly to allow the Joint Force to succeed throughout the competition continuum. As victory favors an agile force able to quickly reinforce and task organize without loss of momentum, corps and division formations are specifically designed around the BCT's ability to rapidly form, dissolve, and reform teams with multinational and joint partners. These combined arms formations balance assigned enablers to create cohesive and ready formations needed to succeed in LSCO, while avoiding the rigidity of past formations.[80]

(6) The extended distances across the MDO operational framework and prevalence of multiple U.S., coalition, and interorganizational partners magnify the already complex challenges of integration, communications, and collective cooperation. Additionally, formations will likely encounter varying degrees of degraded communications due to threat attacks against C2 infrastructure. Consequently, corps and division commanders and their formations must be comfortable continuing to operate within the higher commander's intent to achieve objectives even when virtually isolated. Under these conditions, employing the proper level of command and the appropriate amount of control, coupled with an intrinsic bias toward action, plays a pivotal role to the overall success of dispersed operations.[81]

c. Integrate cross-domain reconnaissance and security operations.

(1) The complexity of the OE requires an integrated, combined arms approach to R&S beyond traditional air-ground screen, guard, and cover missions conducted by dedicated R&S forces. Brigade combat teams use their organic cavalry squadron and cross-domain capabilities to develop tactical depth and to create reaction time and maneuver space. Traditional R&S operations are still relevant; however, organizing all formations within the AO to assist with integrating intelligence and operations across all domains and environments enables commanders to continually develop situational understanding, protect the force, and create a secure environment. Cross-domain R&S operations are the synchronization and application of forces and capabilities while gaining and maintaining contact through maneuver and the eleven forms of contact to collect critical information, and provide early warning, time and maneuver space that facilitate decision making and enable seizing, retaining, and exploiting the initiative.[82] Cross-domain R&S operations are synchronized with lethal and nonlethal capabilities across multiple domains, the EMS, and the IE, to include while operating in denied, degraded, and disrupted conditions.

(2) Corps and division formations aggressively and continuously conduct R&S operations in all domains to identify threat activities that reveal intentions, strategies, capabilities, and tactics. By seeing and understanding the depth, breadth, and layers (physical, temporal, virtual, and cognitive) of the MDO operational framework, corps and division formations more easily maintain enemy contact and identify likely decisive points where the enemy attempts to gain positions of advantage. Corps and division formations achieve this battlefield understanding through proactive physical and virtual methods, including persistent multi-domain R&S or cross-domain R&S operations; perpetual, multi-domain, and multi-echelon operational preparation of the environment; and targeted deception and stimulation of threat systems at the right time and in a manner that cause enemies to react, displace, or reveal their physical, virtual, and cognitive dispositions.[83]

(3) When operating as a tactical formation, corps and division commanders assign subordinate units responsibility for OAs and they continuously converge multi-domain effects to enable subordinate units to conduct cross-domain maneuver. To support the requirement for cross-domain R&S operations at the corps and division echelon, the corps and division commander employ assigned R&S formations. The corps or division commander may also designate and task-organize a BCT or squadron if requirements exceed existing capacity. When securing areas, R&S formations at each echelon incorporate manned and unmanned air and ground reconnaissance systems, aerial high altitude, and space sensors to expand their area of influence, identify threats to the force, and continually develop situational understanding. Corps, division, and BCT commanders synchronize cross-domain R&S operations across subordinate formations, coordinate intelligence requirements, fuse intelligence from multiple echelons, downlink information from Army, joint, and national collection assets, and employ the full range of multi-domain capabilities to protect the force from threats employing effects in all domains.

(4) Whether assigned or task-organized, the division R&S squadron conducts cross-domain R&S operations to set conditions to support division and BCT cross-domain maneuver. The division R&S squadron employs a combined arms team of organic cross-domain collection capabilities with the ability to execute cross-domain maneuver and survive first contact. Collection in depth and aggressive maneuver stimulates enemy activity and exposes hidden enemy capabilities to further R&S squadron and division collection and targeting efforts. Cross-domain reconnaissance focuses on the division commander's priority information requirements by employing multi-domain mounted, dismounted, manned, unmanned, air, ground, and technical collection techniques combined with the ability to fight for and report information to gain and maintain contact across the eleven forms of contact. Cross-domain security employs continuous reconnaissance and aggressive maneuver to identifying threats, providing early warning, time, and space for the protected entity to react.

(5) Continuous R&S operations and the ability to share timely information assist in building the common operating picture to account for all domains and decisions. It aids the division's decision making, executing shaping operations to dis-integrate enemy systems, and identify opportunities and positions of advantage to employ BCTs. Sustaining dispersed operations for

sufficient duration over extended distances is a critical enabling function to ensure the success of continuous cross-domain R&S operations.

(6) Corps, divisions, and BCTs employ a layered approach to conducting R&S. If available and employed, corps and division R&S formations are normally forward of BCTs and make first contact with enemy forces. Higher echelon R&S gain contact with the enemy and share information with BCT cavalry squadrons to facilitate maintaining contact and develop the multi-domain common operating picture. On order, the higher-echelon R&S formations conduct a passage of lines and R&S handover with BCT R&S formations, which then continue developing the situation. BCT cavalry squadrons normally accept the handover and, when directed, will conduct a passage of lines with battalion scout platoons for final reconnaissance actions direct contact between the maneuver battalions and enemy forces.

(7) Forward positioning enables greater reach for organic and supporting capabilities, such as UAS and ground-based sensors. Corps and division R&S formations initially have greater access to corps, division, and joint capabilities that enable first contact with enemy forces. In addition, the physical presence and activities of the corps and division formations stimulate enemy activity which enhances collection prior to BCTs making contact. As higher-echelon R&S formations gain contact with the enemy, they distribute the information to the supported headquarters for further analysis and directly with BCT cavalry squadrons to facilitate maintaining contact and developing the common operating picture.

d. Operate semi-independently.

(1) The OE requires BCTs to disperse their formations when operating semi-independently, with the ability to concentrate combat power rapidly to achieve positions of relative advantage. Dispersion is the spreading of troops, materiel, establishments, or activities, which are usually concentrated in limited areas to reduce vulnerability.[84] Operating semi-independently allows BCTs to infiltrate along multiple axes, evade enemy attacks, achieve surprise, and gain positions of relative advantage to isolate, envelop, or destroy enemy forces.

(2) BCTs operating semi-independently require sufficient mobility, lethality, protection, intelligence, C2, and sustainment capabilities to conduct dispersed operations at maximum supporting range, and sustain operations at extended supporting distance to achieve mission objectives. The BCT will require dedicated, on-demand access to dynamic event-based imagery and automated terrain generation when changes are detected in their AO. Flexible, responsive, and precise fires enable BCTs to shape and set conditions to destroy enemy forces. Brigade combat teams deceive enemy sensors across all domains and environments by providing faulty targeting signatures and stimulating enemy systems, making the enemy susceptible to detection, exploitation, destruction, or neutralization.

(3) Operating dispersed when conducting semi-independent operations at an increased tempo will place a premium on the BCT's ability to detect, identify, secure, reduce explosive and nonexplosive obstacles and hazards, breach structures, bridge gaps, and shape terrain to provide freedom of maneuver and action. Improved mobility and sustainment capabilities, along with fundamental demand reduction, supply chain innovation, additive manufacturing, and autonomous

ground and air distribution will allow BCTs to operate at a tempo the enemy cannot respond to or sustain, while enabling BCTs to concentrate combat power rapidly to close with and destroy enemy forces from multiple positions of advantage.

(4) BCTs are enabled by organic, assigned, and attached formations to conduct successful cross-domain maneuver and enable dispersed operations. These include engineer, military police (MP), CBRN, and civil affairs (CA) formations containing the capabilities and capacity to enable BCTs to easily task-organize and create effective fighting formations. Engineer, MP, CBRN, and CA formations are fundamental to supporting corps, division, and BCT echelons through clear command and support relationships. CBRN formations allow BCTs to understand CBRN threats when operating with organic BCT cavalry squadrons conducting cross-domain R&S operations. CBRN units increase understanding and provide early warning and maneuver space for BCTs. Improved mobility capabilities allow BCTs to operate at maximum ranges while dispersed. Engineers provide freedom of maneuver through mobility tasks and enable BCTs to operate along multiple axes. CA formations enhance mobility through civil network engagement and civil-military integration. As BCTs reach maximum supporting range and extended supporting distance, corps and divisions deploy MPs for security and mobility support to enable protection of movement corridors and provide security of lines of communications (LOC) and critical capabilities, assets, and activities. Across the MDO operational framework, engineers, MP, CBRN, and CA formations facilitate cross-domain maneuver and enable BCTs to focus combat power on decisive operations.

(5) Corps and divisions continuously shape the OE to set the conditions for the tactical success of the subordinate organizations, employing BCTs that can effectively operate semi-independently in contested and degraded environments. Corps and divisions identify obstacles and hazards and shape terrain to enable freedom of action and maneuver. The BCT's longer tether, increased limit of endurance, and ability to conduct dispersed operations at maximum supporting range and sustain operations at extended supporting distance allow it to operate for longer periods of time between operational pauses.

(6) Operating semi-independently in a dispersed manner will most likely require additional resources beyond the BCT's organic capabilities. Mission variables may preclude a BCT and attached formations from operating semi-independently for extended periods. Corps or divisions can support the BCT with Army and Joint Force enabling capabilities to allow a BCT to achieve its mission and facilitate achievement of the higher echelon's mission that otherwise might not be attainable with organic capabilities. Combined with platform technologies that incorporate advanced sensors, reduced vehicle signatures, efficient power sources, vehicle protection, and reductions in size, weight, and power, BCTs can increase their endurance.

(7) Increased endurance enables BCTs to maximize operational reach and minimize operational pauses. This generates speed and rhythm across multiple domains, enabling the concentration of combat power from multiple locations and directions, and attaining a position of relative advantage. However, since commanders cannot always achieve simultaneity, depth, and tempo for all formations to the degree desired, they weight the main effort, limit the number of objectives and decisive points engaged simultaneously, and phase operations to achieve mission objectives. Phasing is critical to arranging all tasks of an operation that cannot be conducted

simultaneously. Commanders deliberately sequence certain actions to maintain tempo while focusing combat power at a decisive point in time and space.[85]

(8) An understanding of the mission variables, to include what is organic to the BCT, what is task-organized to the BCT, and what capabilities remain at corps and division, is essential to employing BCTs operating semi-independently. For example, an ABCT designated as a supporting effort conducting a shaping operation as part of a division attack could have a shorter limit of endurance compared to an ABCT designated as the main effort and weighted with the preponderance of combat power, along with task-organized sustainment capabilities from corps or division, to conduct the decisive operation. Alternatively, an Infantry BCT or Stryker BCT conducting a limited contingency operation could operate with increased reach based on a reduced operational tempo.

e. Integrate enabling support from corps and divisions.

(1) Corps.

(a) The corps is the most versatile echelon in the Army. Conversely, divisions maintain an uncompromising emphasis on readiness for the task of integrating multiple BCTs and enabling formations as a highly lethal and cohesive tactical formation to win in armed conflict. This limits an aspect of versatility at the division. The corps, functioning as the link between the operational and tactical levels of war, emerges as the echelon that affords the greatest potential for adapting to account for uncertainty of threats, the environment, and potentially flawed predictions based on incomplete information. The corps is composed of organic and assigned warfighting components and a headquarters designed, organized, equipped, and trained to continuously converge and synchronize effects across multiple domains, the EMS, and IE. The corps also receives, integrates, and assimilates joint, multinational, and interorganizational augmentation. The corps retains its ability to perform its traditional role of commanding divisions and enablers in LSCO.[86]

(b) Though highly versatile, the Army corps is the foremost tactical warfighting formation with assigned capabilities and capacities to see and understand, decide, shape, strike rapidly, and endure. Corps have assigned military intelligence, R&S, field artillery, ADA, maneuver support, space, cyberspace, information environment operations (IEO), EW, sustainment, and aviation formations as principal capabilities with which to train and prepare to deploy on short notice to austere locations and conduct operations immediately upon arrival. Multi-domain capabilities enable the corps to conduct deep operations physically, temporally, virtually, and cognitively, and enable subordinate tactical formations to dominate the close fight. While these capabilities are assigned to the corps, they can be further task organized to directly support the main effort.[87]

(2) Division.

(a) The primary task of a division is to command and sustain multiple BCTs and enabling formations in tactical operations to defeat an enemy maneuver force in violent combat. Given the OE, division commanders and staffs must hone their tactical warfighting skills while incorporating the ability to integrate capabilities from new domains into the close fight. The singular, uncompromising focus of Army divisions is lethal, tactical warfighting; it is the principal tactical

echelon above brigade. Divisions that are properly force-tailored, postured, and positioned are a powerful, credible, and devastatingly lethal deterrent to any would-be threat.[88]

(b) The division is expeditionary and assimilates additional functional and multifunctional units easily, enhancing its ability to conduct deep operations and improving its sustainability. The division can adjust its task organization easily, increasing its agility and unpredictability throughout the conduct of close combat. Divisions have multiple types of units that form the core of a cohesive, warfighting formation capable of conducting tactical operations and winning in close combat during LSCO. The units include assigned R&S, fires, sustainment, engineers, CBRN, and aviation formations and attached or operational control (OPCON) military intelligence and CA formations. Divisions continuously converge and synchronize effects across multiple domains, the EMS, and IE; shape the Deep Maneuver and Close Areas; and plan, prepare, execute, and assess deep maneuver.[89]

3-5. BCT contributions to MDO

a. This section describes the BCT's contributions to MDO in support of corps and division operations. The corps commands two or more divisions and the division is the foundational maneuver echelon.[90] The BCT is the division's primary combined arms, close combat force and tactical fighting formation. The BCT includes capabilities across all the warfighting functions which are tailorable and scalable to meet mission requirements. All BCTs include maneuver; field artillery; ADA; intelligence; signal; engineer; chemical, biological, radiological, and nuclear (CBRN); cyber electromagnetic activities; medical; and sustainment capabilities. Higher commanders augment BCTs for specific missions with additional combat power and enablers based on the mission variables. Augmentation might include aviation, armor, infantry, field artillery, ADA, MP, information-related capabilities (IRC), engineers, CBRN, space, cyberspace, sustainment, CA, psychological operations, information operations, and EMS capabilities.[91] The BCT's persistent cross-domain maneuver capabilities and its capacity for physical destruction are the basic building blocks of military operations. The demonstrated lethality of the BCT provides the credibility essential to deterring threats and assuring allies and partners during competition, prevail during armed combat, and return to competition on favorable terms.[92]

b. Competition.

(1) Regionally aligned and assigned BCTs provide the senior commander with scalable and tailorable capabilities to shape the OE. The BCT executes shaping tasks and provides forces for security cooperation (SC), to include military engagement, security force assistance (SFA), foreign internal defense (FID), or security assistance (SA). These shaping activities could include coordinating and performing missions with a Security Force Assistance Brigade (SFAB), or smaller SFAB elements, which involve supporting a broad range of advising requirements that are designed to build and foster relationships necessary to develop long-term foreign security force (FSF) development. The BCT can also conduct SC-related activities during armed conflict. The BCT regularly participates in multinational exercises and training exchanges with FSFs to improve interoperability. During these exercises and exchanges, the BCT directly engages with FSFs to accomplish its mission, build rapport, and improve conditions to promote stability while simultaneously improving its combat readiness. These activities also contribute to improving the

senior commander's ability to access territory, infrastructure, information, and resources, and build FSF capabilities and capacity consistent with operational objectives.

(2) During competition, all BCTs, whether they are permanently forward-stationed or provided on a rotational presence, train to ensure their combat readiness. The BCT's combat readiness and its proficiency in its mission-essential task list (METL) provide the credibility to assure partners and deter adversaries (figure 3-2). During multinational training exercises and training exchanges, the BCT will normally focus on its METL and commander's guidance for collective training requirements on which the unit trains to accomplish mission success. Brigade combat teams can also provide individual training when supporting SFA, FID, and SA activities. All BCTs conduct deployment readiness training and deployment exercises to improve combat readiness and demonstrate the Army's global response capabilities.

● Conduct a movement to contact	● Conduct an airborne assault (IBCT only)
● Conduct an attack	● Conduct an air assault (IBCT/SBCT only)
● Conduct an area defense	● Conduct expeditionary deployment
● Conduct area security	at the brigade level

Figure 3-2. BCT Mission-Essential Task List[93]

(3) The BCT also contributes to conveying selected information and indicators to foreign audiences to influence their emotions, motives, objective reasoning, and ultimately, the behavior of foreign governments, organizations, groups, and individuals in a manner favorable to the senior commander's objectives.[94] The BCT understands and shapes the OE through action, and influences the population and its leaders. Commanders understand competing interests within the OE and IE to determine what is of value to competitive parties and entities in the BCT's AO. Understanding competing interests helps to develop courses of action that influence the populace and political structure, enhance the security situation, and lead to mission success.[95]

c. Armed conflict (penetrate and dis-integrate).

(1) If escalatory measures do not sufficiently deter threat actions, then BCTs are prepared to contest a preemptive attack. The Joint Force penetrates and dis-integrates enemy A2/AD systems to defeat the enemy's stand-off capabilities, enabling strategic and operational maneuver. Armored BCTs and SBCTs may be used to defeat an enemy's A2/AD measures when employed from offset objectives. As part of the Joint Force, airborne- and air assault-capable BCTs contribute to forcible entry operations. These formations capitalize on mobility to surprise an enemy force, seize a lodgment, and gain the initiative. Airborne operations are particularly unique from other operations in that they can project and deliver operationally significant forces over strategic distances into the Deep Maneuver Area.[96]

(2) Forward-stationed and rotational BCTs, enabled by corps and divisions, operate dispersed conducting cross-domain maneuver, and establish positions of relative advantage to fix and isolate enemy maneuver forces. Brigade combat teams deceive enemy sensors across all domains and environments by providing faulty targeting signatures and stimulating enemy systems, making the enemy susceptible to detection, exploitation, destruction, or neutralization. During this timeframe,

BCTs may have to operate semi-independently, persisting within range of the enemy's precision and area fires until additional expeditionary BCTs arrive into the OA and are fully integrated. If SFABs are operating in the OA during the initial phases of armed conflict, BCTs may also have to support SFABs to enable the SFAB to conduct liaison and support tasks for FSFs that are conducting combat operations.

(3) Unmanned ground systems leverage their sensor packages to rapidly develop a common operating picture while at the same time employing EW payloads to stimulate enemy responses, enabling BCT targeting efforts without risking Soldiers' safety or friendly combat power. Unmanned ground systems can also provide security for internal LOCs, thus enabling commanders to reallocate combat power elsewhere while extending their operational reach. To preserve its combat power, the BCT monitors, regulates, manipulates, and obscures its signatures and emissions across all domains and environments, denying the enemy's ability to sense and target its formations, thereby enabling its freedom of maneuver, force protection, and C2. Where permissible, corps and divisions conduct joint entry operations with BCTs from strategic distances to present multiple dilemmas to the enemy and enable freedom of maneuver and action. Corps and divisions also deploy and sustain other expeditionary combat-configured BCTs, enabling them to transition quickly to cross-domain maneuver of sufficient scale and ample duration.

d. Armed conflict (exploit).

(1) BCTs in the blunt and surge layers continue to arrive into the OA.[97] BCTs already in their assigned AOs close with and destroy the enemy, repelling enemy attacks, continuously controlling the initiative, and gaining and maintaining a psychological advantage to control land, populations, and resources. BCTs develop the situation in close contact with populations and the enemy, close with and destroy or defeat enemy forces, and accomplish mission objectives. SFABs remaining in the OA during exploitation execute liaison and support tasks for FSFs conducting combat operations may still require BCT support. With the enemy defeated, BCTs, or their reinforcements, follow through to the next action to retain or exploit the initiative, consolidate gains, and achieve mission objectives. In this manner, tactical success enables operational opportunities and decisive results.

(2) Operating dispersed with decentralized execution makes BCT cross-domain maneuver ambiguous to the enemy. Successful cross-domain reconnaissance on enemy defenses uncovers opportunities that commanders can choose to reinforce by employing follow-on forces or reserves to maneuver through gaps and around obstacles to exploit success in the enemy's AO. Unmanned ground systems are a combat enabler, allowing commanders to dictate the terms of the first human engagement and preserve combat power to support decisive operations. These actions and capabilities disrupt the coherence of the enemy's formations, rendering them unable to respond to friendly actions effectively. The combination of dispersion and rapid concentration in decisive spaces enables attacking forces to negate numerical advantage by avoiding enemy strengths, and attacking enemy weaknesses to seize, retain, and exploit the initiative.

(3) BCTs impose an operational tempo that allows them to seize and maintain the initiative by forcing the enemy to react to actions in multiple domains and environments continuously and in ever shorter periods of time. Brigade combat teams exploit the initiative with maneuver that

defeats or destroys enemy forces. As the enemy loses its capability to resist, it becomes compelled to withdraw, surrender, or be destroyed. Enabled through the application of IRCs, attacking forces penetrate the enemy defense along multiple directions of attack and concentrate effects in decisive spaces to rapidly seize and control terrain, destroy enemy forces, or compel the enemy to withdraw.

(4) BCTs seek opportunities aggressively to attrit and weaken enemy forces before the initiation of close combat. BCTs maneuver to place the enemy in a position of disadvantage and attack the enemy at every opportunity, employing all organic capabilities, corps and division enablers, and joint assets, such as close air support. When in the defense, the static and mobile elements of the defense combine to deprive the enemy of the initiative. BCTs contain the enemy while seeking every opportunity to transition to the offense.[98]

e. Return to competition.

(1) BCTs contribute to returning to competition on favorable terms by consolidating gains and producing sustainable outcomes, setting conditions for long-term deterrence, and adapting to new security conditions. Consolidating gains is essential to retaining the initiative over determined enemies and threats. In essence, consolidation of gains is the act of leveraging tactical, operational, and strategic-level advantages to retain the initiative and create irreversible momentum toward the desired end state.

(2) BCTs begin consolidating gains after achieving a minimum level of control. BCTs assigned the mission of consolidating gains execute area security and stability operations, to include establishing rule of law and controlling narratives to influence population support. In AOs that have not achieved a minimal level of control, other BCTs may still be conducting operations against bypassed forces, defeated remnants, and irregular forces. Even in secure AOs, BCTs could potentially return to armed conflict if conditions change.

(3) BCTs may eventually participate in creating or reconstituting security forces as they return to conducting SC, SFA, FID, and SA, to include newly arriving BCTs specifically task-organized to conduct stability and support operations. BCTs could also return to performing missions with SFABs, or SFAB elements, which involve advising requirements that are designed to rebuild partner FSF capabilities and capacity. The BCT commander builds partner capacity through collaboration and empowerment that enhance the legitimacy of host-nation forces and government. Partner capacity must be sustainable and eventually independent of the BCT's influence to maintain legitimate authority and perception of the rule of law and governance. Corps and divisions continue to enable BCTs conducting stability and support operations, including the requirement to demonstrate national resolve by presenting a persistent, credible coercive force that may include BCTs.

Chapter 4
Conclusion

a. The BCT Concept describes how BCTs contribute to MDO by conducting cross-domain maneuver applying four components of the solution to the military problem, which are:

(1) Execute C2 by enabling subordinate leaders to seize, retain, and exploit the initiative consistent with the commander's intent regardless of the condition of the information network or other cross-domain enablers;

(2) Integrate cross-domain R&S operations by synchronizing and employing R&S formations and capabilities across multiple domains and environments to satisfy information requirements that support decision making and enable freedom of maneuver and actions;

(3) Operate semi-independently by conducting dispersed operations at maximum supporting range, and sustaining operations at extended supporting distance to achieve a position of relative advantage;

(4) Integrate enabling support from corps and divisions which continuously converge and synchronize lethal and nonlethal effects across multiple domains, the EMS, and IE to enable BCTs to conduct cross-domain maneuver.

b. BCTs conduct cross-domain maneuver to deter adversaries and assure allies and partners during competition, dominate and win in armed conflict, and return to competition on favorable terms. During competition, BCTs support regional engagement, shape the security environment, prevent conflict, and provide multiple options for responding to and resolving crises. On order, BCTs deploy and transition to armed conflict to destroy or defeat enemy forces. BCTs execute C2, integrate cross-domain R&S operations, and conduct dispersed operations with the ability to operate semi-independently. BCTs integrate enabling support from corps and divisions, which continuously converge and synchronize lethal and nonlethal effects across multiple domains, the EMS, and IE to enable BCTs to conduct cross-domain maneuver. During return to competition, BCTs consolidate gains, produce sustainable outcomes, and set conditions for long-term deterrence.

c. Will the U.S. Army learn lessons from its recent experiences or history, anticipate and take reasonable precautions against known threats, and adapt to the changing OE? Will the Army find itself having to adapt tactically to avoidable battlefield circumstances like the IDF experienced during the initial days of the Yom Kippur War? Eliot Cohen and John Gooch agree that the failure to learn, anticipate, and adapt can result in catastrophic military failure.[99] This failure can leave tactical formations in a position to compensate for an insufficient strategy. Even if eventually successful, the cost could prove to be prohibitively high, leaving the nation diminished and in a weakened state.

d. History should serve to remind U.S. military capability developers to remain vigilant. Over the course of history, technology has not simplified war, as contemporary misconceptions now claim: it has made it exponentially more complex. Friction, uncertainty, and confusion in warfare are not

superficial annoyances to be eliminated gradually by technological "progress." War is inherently nonlinear; it is a collision of two living wills. The past suggests that pure technological development without the direction provided by a clear strategic context can easily lead in dangerous directions. The most successful organizations avoided wild leaps into the future; their innovations remained tied to past experience, derived from conceptually sophisticated and honestly assessed experimentation, and depended on the ability to learn from both success and failure.[100]

e. The Army continues to evaluate the fundamental principles contained in this concept through the physical and intellectual activities that help leaders integrate capabilities and develop interim solution strategies for capability gaps, ensuring BCTs are prepared to meet operational requirements.

Appendix A
References

Section I
Required References

Army regulations, DA pamphlets, field manuals (FM), Army doctrine publications (ADP), and DA forms are available at http://www.usapa.army.mil/. TRADOC publications and forms are available at http://www.tradoc.army.mil/publications.htm. Joint publications (JP) are available at http://www.dtic.mil

TRADOC Pamphlet 525-3-1
The U.S. Army in Multi-Domain Operations 2028

TRADOC Pamphlet 525-3-8
U.S. Army Concept: Multi-Domain Combined Arms Operations at Echelons Above Brigade 2025-2045

Section II
Related references

ADP 1
The Army

ADP 1-01
Doctrine Primer

ADP 2-0
Intelligence

ADP 3-0
Operations

ADP 3-19
Fires

ADP 6-0
Mission Command: Command and Control of Army Forces

Army Training Network Mission Essential Task List. Retrieved fromhttps://atn.army.mil/ATNPortalUI/METL/

Bartles, C., Grau, L. (2018) The Russian Way of War: Force Structure, Tactics, and the Modernization of the Russian Ground Forces. Fort Leavenworth, KS: Foreign Military Studies Office. Retrieved from https://community.apan.org/wg/tradoc-g2/fmso/p/fmso-bookshelf

Bowen, Andrew S. (June 7, 2015). The *National Interest: Russia's deceptively weak military*. Retrieved from https://nationalinterest.org/feature/russias-deceptively-weak-military-13059

Brimley, S. (2015) While We Still Can: Arresting the Erosion of America's Military Edge. Center for a New American Security. 17 December 2015. Retrieved from https://www.cnas.org/publications/reports/while-we-can-arresting-the-erosion-of-americas-military-edge

Chase, M., Engstrom, J., Tai Ming Cheung, Gunness, K., Harold, S., Puska, S., Berkowitz, S. (2015) *China's Incomplete Military Transformation: Assessing the Weaknesses of the People's Liberation Army (PLA)*. Santa Monica, Calif.: RAND Corporation. Retrieved from https://www.rand.org/content/dam/rand/pubs/research_reports/RR800/RR893/RAND_RR893.pdf

China Military Power, Modernizing a Force to Fight and Win. Defense Intelligence Agency, January 2019. Retrieved from https://www.amazon.com/China-Military-Power-Modernizing-Force/dp/1794195041#reader_1794195041

Cohen, E., Gooch, J. (1990) Military Misfortunes: The Anatomy of Failure in War. New York, New York: The Free Press. Retrieved from https://www.amazon.com/Military-Misfortunes-Anatomy-Failure-War/dp/074328082

Cloughlin, S., Higgins, R. (2019) Unconstrained analytics, Re-remembering the mis-remembered left: The left's strategy and tactics. Version 1.2, February 2019. Retrieved from https://unconstrainedanalytics.org/report-re-remembering-the-mis-remembered-left-the-lefts-strategy-and-tactics-to-transform-america

Creery, Madison. (2016, June 26) The Russian Edge in Electronic Warfare. Georgetown University Center for Security Studies. Retrieved from https://georgetownsecuritystudiesreview.org/2019/06/26/the-russian-edge-in-electronic-warfare/

Department of Defense Strategy for Operations in the Information Environment, June 2016. Retrieved from https://dod.defense.gov/Portals/1/Documents/pubs/DoD-Strategy-for-Operations-in-the-IE-Signed-20160613.pdf

Dunstan, S. (2003) The Yom Kippur War 1973 (1). Oxford, United Kingdom: Osprey Publishing. Retrieved from https://www.amazon.com/Yom-Kippur-War-1973-Campaign/dp/184176221

FM 3-0
Operations

FM 3-12
Cyberspace and Electronic Warfare Operations

FM 3-14
Army Space Operations

FM 3-52
Airspace Control

FM 3-57
Civil Affairs Operations

FM 3-90-1
Offense and Defense Volume I

FM 3-94
Theater Army, Corps, and Division Operations

FM 3-96
Brigade Combat Team

FM 3-98
Reconnaissance and Security Operations

Herzog, C. (1982) The Arab-Israeli Wars: War and Peace in the Middle East. New York, New York, Random House. Retrieved from https://www.amazon.com/Arab-Israeli-Wars-Peace-Middle-East/dp/1400079632

Herzog, C. (2018) The War of Atonement: The Inside Story of the Yom Kippur War. New York, New York: First Skyhorse Publishing. Retrieved from https://www.amazon.com/War-Atonement-Inside-Story-Kippur-ebook/dp/B078869N3

Hickey, J. (2004) The Land Warfare Papers, Surprise, Shock and Daring. Retrieved from https://www.ausa.org/publications/surprise-shock-and-daring-future-mobile-all-arms-warfare

Jane's Defence, Kornet Family, 29 June 2018. Jane's Group UK Limited. Retrieved from https://janes.ihs.com/Janes/Display/jlwu0010-jlwu

Jane's Defence, Red Arrow 10, 16 October 2019. Jane's Group UK Limited. Retrieved from https://janes.ihs.com/Janes/Display/jaaua269-jlwu

Janjevic, Darko. (2018). The Strengths and Weaknesses of Russia's Military, Deutsche Welle (DW), Made for Minds, Retrieved from https://www.dw.com/en/the-strengths-and-weaknesses-of-russias-military/a-43293017

Joint Concept for Integrated Campaigning

JP 2-01.3
Joint Intelligence Preparation of the Operational Environment (available by permission)

JP 3-0
Joint Operations

JP3-05
Special Operations

JP 3-20
Security Cooperation

JP 3-30
Command and Control of Joint Air Operations

JP 5-0
Joint Planning

Knox, M., Williamson, M. (2001) The Dynamics of Military Revolution 1300-2050. New York, New York: Cambridge University Press. Retrieved from https://www.amazon.com/Dynamics-Military-Revolution-1300-2050-ebook/dp/B00E3UREDY

Marine Corps Doctrinal Publication (MCDP) 1: Warfighting. Retrieved from https://www.marines.mil/Portals/1/Publications/MCDP%201%20Warfighting%20GN.pdf?ver=2019-01-31-110543-300

Meakins, Joss. (March 8, 2017) *The Washington Post: Democracy Dies in Darkness. Why Russia is far less threatening than it seems*. Retrieved from https://www.washingtonpost.com/news/monkey-cage/wp/2017/03/08/why-russia-is-far-less-threatening-than-it-seems/

OE Watch: Foreign News and Perspectives of the Operational Environment. Special Operations Forces. Vol. 8, Issue 8, August 2018. Retrieved from https://community.apan.org/wg/tradoc-g2/fmso/m/oe-watch-past-issues/268599/download
People's Liberation Army Tactics (Draft), September 2019. National Ground Intelligence Center. (Permission to cite draft reference granted)

Red Diamond Threats Newsletter. Operational Environment Enterprise Analysis and Control Element Threats Integration. TRADOC G-2. Volume 9, Issue 01. Retrieved from https://community.apan.org/wg/tradoc-g2/ace-threats-integration/m/documents/223579

Red Diamond Threat Newsletter. Operational Environment & Threat Analysis. Focus on China; Bits in the Wire: Advancing Threats in the Cyber Domain. TRADOC G-2. Vol 10, Issue 03. Retrieved from https://community.apan.org/wg/tradoc-g2/ace-threatsintegration/m/documents/295598

Summary of the 2018 National Defense Strategy. Retrieved from https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

The United States Military Academy Maps and Atlases, The Golan Heights Campaign, Israel-Syria Area, 1973—Combined. Retrieved from https://westpoint.edu/sites/default/files/inline-images/academics/academic_departments/history/Arab%20Israeli%20Wars/ArabIsraeli11Combined.pdf

TRADOC Pamphlet 525-3-3
The U.S. Army Functional Concept for Mission Command 2020-2040, February 2017.

TRADOC Pamphlet 525-92
The Operational Environment and the Changing Character of Warfare: Modernizing Adversaries, October 2019.

Appendix B
Required Capabilities

B-1. Introduction

a. This concept provides a general description of how BCTs operate to accomplish tactical-level effects and identifies capability statements, also known as required capabilities (RCs). The BCT RCs represent what BCTs must execute to achieve the desired effects and objectives under the conditions described within this document. RCs identify and focus BCT cross-domain maneuver capability development.

b. RC 1 addresses the preeminent idea of the concept, which is cross-domain maneuver. RC 1 derives from the central idea and describes the overarching BCT requirement to shape the security environment and deter adversaries during competition, dominate and win in armed conflict, and return to competition on favorable terms. RCs 2, 8, 12, and 17 represent the main idea of each

component of the solution, which are execute C2, integrate cross-domain R&S operations, operate semi-independently, and integrate enabling support from corps and divisions, respectively.

c. RCs 1-16 apply to all BCTs. These RCs derive from the key ideas in the concept corresponding to the first three components of the solution. RCs 17-24 are dependencies that describe corps- and division-enabling capabilities necessary for BCTs to conduct cross-domain maneuver. These capability statements correspond to the fourth component of the solution.

d. Each RC is followed by reference paragraphs from within the narrative identifying its primary source, otherwise known as integrity of intent. These references help readers understand the context and intent of the RC, thereby reducing the likelihood of misinterpretation during subsequent capability analysis and development. To eliminate the necessity of repeating the same OE, parameters, or conditions (where and when) for each RC, the phrase, "across the MDO operational framework throughout the competition continuum" applies to all RCs.

B-2. Required capabilities

a. Conduct cross-domain maneuver. RC 1. BCTs require the capability to synchronize and employ their formations and capabilities through movement in combination with converged lethal and nonlethal capabilities across multiple domains, the EMS, and the IE to destroy or defeat enemy forces, control land areas and resources, and protect populations. (BCT Concept: 3-2, 3-3, and 3-4)

b. Execute command and control.

(1) RC 2. BCTs require the capability to enable subordinate leaders to seize, retain, and exploit the initiative consistent with the commander's intent regardless of the condition of the communications network or other multi-domain capabilities. (BCT Concept: 3-4)

(2) RC 3. BCTs require the capability to employ a unified, secure, and resilient communications network while operating dispersed in degraded conditions to enable cross-domain maneuver. (BCT Concept: 3-4 and 3-5)

(3) RC 4. BCTs require the capability to monitor, regulate, manipulate, and obscure signatures and emissions across all domains and environments, denying the enemy's ability to sense and target friendly forces, enabling freedom of maneuver, force protection, and C2. (concept: 1-6, 3-5)

(4) RC 5. BCTs require the capability to deceive enemy sensors across all domains and environments, providing faulty targeting signatures and stimulating enemy systems, making the enemy susceptible to detection, exploitation, destruction, or neutralization. (BCT Concept: 3-4 and 3-6)

(5) RC 6. BCTs require the capability to task organize and create effective combined arms formations among BCT types, functional brigades, and corps and division enablers to conduct dispersed operations at a tempo the enemy is unable to match. (BCT Concept: 3-4)

(6) RC 7. BCTs require the capability to interoperate with joint, interorganizational, and multination (JIM) partners supporting regional engagement to expand the competitive space, enhance regional stability, and produce sustainable outcomes. (BCT Concept: 3-3 and 3-4)

c. Integrate cross-domain reconnaissance and security operations.

(1) RC 8. BCTs require the capability to synchronize and employ R&S formations and capabilities across multiple domains and environments to satisfy information requirements supporting decision making and enabling freedom of maneuver and action. (BCT Concept: 3-3 and 3-4)

(2) RC 9. BCTs require the capability to conduct persistent, all-weather, cross-domain reconnaissance to collect, develop, and report near real-time actionable combat information on the enemy, terrain, weather, and populations. (BCT Concept: 3-3 and 3-4)

(3) RC 10. BCTs require the capability to conduct persistent, all-weather, cross-domain security operations to provide early and accurate warning of enemy operations and provide the protected force with time and maneuver space within which to react to the enemy and develop the situation. (BCT Concept: 3-3 and 3-4)

(4) RC 11. BCTs require the capability to gain and maintain situational understanding of CBRN threats to provide friendly forces and populations timely warning that allows for measures to mitigate or eliminate the threat. (BCT Concept: 3-4, 3-5, D-5, and D-11)

d. Operate semi-independently.

(1) RC 12. BCTs require the capability to conduct dispersed operations at maximum supporting range and sustain operations at extended supporting distance to achieve a position of relative advantage. (BCT Concept: 3-3 and 3-4)

(2) RC 13. BCTs require the capability to maneuver manned and unmanned air and ground systems when operating dispersed to destroy or defeat enemy forces, seize and control terrain (including dense urban and subterranean), and protect populations, infrastructure, and activities. (BCT Concept: 3-3, D-3, D-5, and D-11)

(3) RCs 14. BCTs require the capability to maneuver and survive in close combat against enemies with manned and unmanned air and ground systems to achieve a position of relative advantage. (BCT Concept: 3-4, D-3, and D-7)

(4) RCs 15. BCTs require the capability to conduct targeting, deliver lethal and nonlethal fires, and integrate effects in all domains and environments to enable freedom of maneuver and action. (BCT Concept: 3-3.e, 3-5, and D-4)

(5) RC 16. BCTs require the capability to detect, identify, secure, reduce explosive and nonexplosive obstacles and hazards, breach structures, bridge gaps, and shape terrain to provide

freedom of maneuver and action. (BCT Concept: 3-3.e, D-5, and D-9)

e. Integrate enabling support from corps and divisions.

(1) RC 17. BCTs require corps and divisions to continuously converge lethal and nonlethal effects across multiple domains, the EMS, and IE to enable BCTs to conduct cross-domain maneuver. (concept: 3-2, 3-3, and 3-4)

(2) RC 18. BCTs require corps and divisions to develop and disseminate multi-domain situational understanding to satisfy information requirements that support BCT operations. (BCT Concept: 3-4)

(3) RC 19. BCTs require corps and divisions to conduct persistent, all-weather, cross-domain R&S operations, develop situational understanding, protect the force, perform economy of force roles, and facilitate reconnaissance handover to enable BCTs to focus combat power on the decisive operation. (BCT Concept: 3-3)

(4) RC 20. BCTs require corps and divisions to enable joint entry operations in a high A2/AD environment from strategic distances that facilitate BCT freedom of maneuver and action. (BCT Concept: 3-3 and 3-5)

(5) RC 21. BCTs require corps and divisions to conduct targeting (joint and Army), deliver fires, and integrate effects in all domains and environments to enable BCT freedom of maneuver and action. (BCT Concept: 3-4.e and D-4)

(6) RC 22. BCTs require corps and divisions to shape terrain to enable BCTs to generate tempo and gain positional advantage in decisive spaces. (BCT Concept: 3-4.e and D-9)

(7) RC 23. BCTs require corps and divisions to enable air movement from land or sea bases to austere or unprepared landing zones and forward points of need, and provide air medical evacuation to facilitate BCT freedom of maneuver and action. (BCT Concept: 3-3 and D-7)

(8) RC 24. BCTs require corps and divisions to deploy and sustain dispersed, combat-configured, combined arms formations, enabling BCTs to transition and conduct cross-domain maneuver of sufficient scale and ample duration to accomplish mission objectives. (BCT Concept: 3-3, 3-4, and D-6)

Appendix C
Science and Technology

C-1. Introduction

a. This appendix recommends a set of breakthrough scientific discoveries and breakthrough technological innovations that enable the BCT to conduct cross-domain maneuver in 2028 and beyond. Keys to successful cross-domain maneuver include extensive improvements in mobility

and sustaining, robotic and autonomous systems (RAS), deception and obscuration, lethality and survivability, and artificial intelligence (AI) and machine learning (ML)-enabling capabilities. Critical areas for future advancements also include protection, network, sensing systems, and sustainability. These areas are addressed in the recommended science and technology (S&T) capabilities of other functional and supporting concepts.

b. Realizing these future capabilities requires targeted investment, extensive experimentation, and constant assessment. With these capabilities, BCTs can more effectively conduct cross-domain maneuver, employing their forces and capabilities through movement in combination with converged lethal and nonlethal capabilities across multiple domains, the EMS, and the IE. Cross-domain maneuver creates synergistic effects in the physical, temporal, virtual, and cognitive realms that increases relative combat power and provides the overmatch necessary to destroy or defeat enemy forces, control land areas and resources, and protect populations. To achieve this, the Army must work with academic experts, joint partners, industry leaders, and key stakeholders to develop the requisite capabilities.

c. This appendix does not encompass all research within the Army modernization enterprise, but is intended to be a running estimate of disruptive scientific discoveries and emerging technologies being executed by the Army to overcome technical challenges that prevent the realization of the RCs described in this concept. S&T stakeholders will review this appendix on a frequent basis to account for evolving BCT formation requirements, and leverage potential breakthrough scientific discoveries and breakthrough technological innovations.

C-2. Mobility and sustaining

a. BCTs operating semi-independently require sufficient mobility and organic sustainment capabilities to conduct dispersed operations at maximum supporting range and sustain operations at extended supporting distances for extended periods. BCTs will require the ability to use multiple type of fuels and power sources available in the operational area efficiently. These capabilities include the ability to exchange and share energy quickly, generate energy unobtrusively, receive energy from vehicles, and harvest energy from local power sources.

b. Breakthrough technological innovations.

(1) Research in aeroeleastic resonance-free air boosting and new materials and design for light weight turbocharger generators will produce additional power in RAS platforms, which will extend operational reach. This turbocharger technology will extend the range accessible to RAS platforms during semi-independent operations. (RC 12 and RC 13)

(2) Research in substrate and coating materials with high thermomechanical performance for multi-fuel capability will increase survivability and efficiency in combustion engines when using low quality fuels. Multi-fuel technology enable the sharing and exchange of fuel between vehicles and local sources for sustained operations at extended supporting distance. (RC 12 and RC 13)

(3) Development of an experimentally-validated modular tool for hybrid-electric propulsion will account for the optimization of thermal management, universal engine types, energy storage

and distribution, propellers, electric motor modules, and gearboxes. Hybrid-electric propulsion systems will decrease reliance on resupply and extend operational reach, while enabling reduced audible signature during electric operation increasing survivability in close combat. (RC 12, RC 13, and RC 14)

(4) Embedded intelligence in power models within electric and hybrid assets allows for optimal utilization of its actual state in mission planning. Since the capability of these assets varies based on maintenance, damage, environment, and usage profile, real-time capability awareness will not only enable monitoring and evaluation of the current capability, but also the potential for short- term surge capability at the expense of future capability. (RC 12)

(5) Research in efficient and power dense solid state energy (such as, thermophotovoltaic and thermionic) conversion coupled with meso-scale and micro-scale recuperative burners in lightweight and compact form factors will provide power and recharge capability that is several times longer than current battery technologies. Lightweight, portable, multi-fuel power generation will enable the BCT and subordinate units down to the Soldier level to operate with minimal resupply. (RC 12)

(6) Research in non-flammable water-based electrolytes for lithium-ion batteries that are safe, flexible, and damage-tolerant energy storage at the energy density of today's chemistries, will enable energy storage technology to be built onto equipment without excessive packing and safety engineering, saving weight and volume. Non-flammable energy storage will enable power at the Soldier level with reduced resupply burden. (RC 12)

(7) Research in algorithms for small UAS to monitor power levels, land, and recharge wirelessly and autonomously on an energy-sharing platform will enable semi-independent redistribution of power. This advancement will remove the Soldier from energy management decisions on individual devices, removing cognitive and physical burdens on the Soldier. (RC 12)

(8) Research on in-arm suspension design, track tension optimization, and vehicle-squatting capability will improve transportability, off-road mobility, and performance during combat operations. These capabilities will maximize road wheel travel, optimize track tension for the environment, and allow for the use of defilade, supporting mobility in various terrains. (RC 12)

(9) Efforts to identify, qualify, and predict how the Soldier platform responds and adapts to wearable augmentation technologies (such as exoskeletons) will enable the realization of technology to amplify the Soldier, providing them the capability and capacity to accomplish larger tasks, recover faster, and reduce the effects of the load and the repetitive physical stresses on the body. Physical performance augmentation technologies will enable Soldiers to do more, move faster, for extended periods, over the course of their deployment. (RC 12)

(10) Demonstration of an integrated affordable truck auxiliary electrification kit which includes lithium-ion 6T batteries, electronic steering, electronic heating, ventilation, and air cooling, and intelligent stop/start strategies, among others, to provide for a >15% reduction in fuel usage on tactical wheeled vehicle platforms. (RC 12)

(11) Maturation of powertrain technologies, including the Advanced Combat Engine, Advanced Combat Transmission, and an Integrated Starter Generator that results in at least 20% improvement of subsystem fuel efficiency and a 10 times increase in platform electrical power generation. (RC 12)

(12) Maturation of advanced lightweight track that provides lower rolling resistance, reduced noise and vibration, and 20% greater durability reducing the track system maintenance burden. (RC 12)

(13) Maturation for military use of commercial advances in lithium-ion based anode, cathode, electrolyte, and separator battery materials to electrode, cell, and military-specific pack designs to increase energy density to >160 watt-hours per kilogram and increase operating temperature range to -46 to +71 Celsius. (RC 12)

(14) Algorithms for semi-independent redistribution of power from manned and unmanned systems while maneuvering. Devices will communicate to orchestrate energy management across the formation. (RC 3, RC 12, and RC 13)

(15) Research in new catalytic and photo-electrochemical materials for process intensification combined with compact chemical reactors can enable processes to synthesize fuels near the point of need from biomass, water, and carbon dioxide exhaust streams on the battlefield for tactical use. This will reduce reliance on resupplied fuels for continuous operation. (RC 12)

c. Breakthrough scientific discoveries.

(1) Research in new materials and designs for ignition assistance, fuel sensing, and fuel delivery will allow for the use of any locally sourced and indigenous fuels, including heavy fuels, alcohols, and gasoline in combustion engines. Multi-fuel capable engines will decrease reliance on traditional, long-range resupply chain and will decrease operational and tactical pauses resulting from sustainment shortfalls. (RC 12 and RC 13)

(2) Research in aqueous electrolytes can enable the use of advanced electrode materials thought to be too unsafe, such as lithium-metal, leading to disruptive increases in battery energy and power density without sensitivity to moisture or high flammability. Aqueous electrolytes will increase operational availability of power down to the Soldier level. (RC 12)

(3) Advanced solid-state energy conversion using new materials and designs that enable simultaneously high-conversion efficiencies and high power densities, such as micro-gap thermionic with low work functions or near-field thermophotovoltaic energy conversion, can enable wearable, lightweight, energy-dense, multi-fuel generators when coupled to recuperative burners. Combining an energy-dense, multi-fuel generator with a rechargeable battery can enable applications, such as wearable power solutions with greater than six times increase in endurance over current rechargeable batteries to reduce reliance to resupply. (RC 12)

(4) Complex terramechanics research could lead to new descriptions of bulk materials properties from small volumes of soil samples, including development of new computational

methods to enable the ability to generate real-time, high-resolution routing maps that are probabilistic (rather than go/no-go). This capability will allow for real-time actionable combat information on terrain to enable decision making. (RC 2, RC 6, and RC 9)

(5) Research to determine the spatial relationship, inherent material characteristic, and imparted features, such as evapotranspiration, will allow for understanding of how natural surfaces affect flows in complex terrain. These advancements will enable the ability to define and shape terrain on both sides of a wet-gap crossing, increasing freedom of maneuver and action. (RC 16)

(6) Research in ultra-wide bandgap semiconductors to increase power density of betavoltaic batteries with high tolerance to damage from high-energy beta particles. Adding in three-dimensional morphologies between the long-lived beta source and semiconductors can increase the power density for Watt level power over months, years, or decades of operation. (RC 12 and RC 13)

(7) Research on high-ratio variable gear reduction through non-contacting (oil-less) magnetic means through advanced modeling to characterize topology effects, evaluate the trade-space, enable advanced control algorithms, and optimize platform-specific designs. Fault-tolerant gear systems will enable lightweight efficient power transmission that will extend operational reach and reduce audible signature in friendly vehicles. (RC 4 and RC12)

(8) Research in new materials for rapid-recharge batteries that enable minimal tradeoff between energy density and efficiency; compact, lightweight approaches to wireless charging; and fast charging will enable semi-autonomous redistribution of power between RAS platforms and between RAS and Soldiers to reduce or eliminate pauses for battery charging. Autonomous and seamless energy distribution will enable semi-independent redistribution of power during operations, removing cognitive and physical burdens on the Soldier. (RC 12)

(9) Research in optimization algorithms/techniques, energy sources, and energy strategies will enable the development of energy efficient low-space, weight, high-performance, compact design energy storage and generation technologies that will reduce BCT reliance on fossil fuels. This advancement will enable the use of alternative fuels for BCT lethality, mobility, and other operational modalities, including silent watch in support of MDO. (RC 12)

C-3. Robotic and autonomous systems

a. Deployment and use of robotic systems integrated across the BCT will allow commanders to expand or reduce the density of forces on the battlefield without adding additional manned systems. Robotic systems will do the dirty, dull, and dangerous tasks normally assigned to Soldiers and will provide the "unblinking eye" to provide the BCT with early warning, enhanced detection of potential threats at greater distances, and assist in the prediction of future enemy actions.

b. Breakthrough technological innovations.

(1) Advancements in observing, estimating, and predicting human, AI, and human-AI team behavior and performance are generating approaches and algorithms that will allow for increases

in robustness and reliability to socio-technical environments in future intelligent technologies. Predicting human-AI resilience and robustness will allow the Army to field systems with greater intelligent capabilities, greater independence and autonomy, and longer lifespans at reduced burden to the Soldier to enable the deployment and use of RAS in future BCTs. (RC 1 and RC 13)

(2) Research to develop sufficient on-board computing, AI, and machine learning will enable the execution of a supervised human control – man-on-the-loop ISR mission on an organic Group 2 UAS for an extended duration. Availability of organic UAS dedicated to ISR needs will enable the collection of critical information for battalion and squadron commanders. (RC 1, RC 9, and RC13)

(3) Research in comprehensive design tools, fluid-structure interaction models, and vibration mitigation concepts will enable design of efficient and adaptive UAS platforms enabling extended flight time, faster speeds, and robust flight through complex, cluttered environments. UAS that are capable of adaptation in their design, materials, and structures will increase survivability and stand-off distance between enemy and friendly forces. (RC 9 and RC 13)

(4) On-chip energetic research will produce micro-pyrotechnic devices integrated into integrated circuits which will protect the integrated circuit and critical program information from being used or copied by an adversary. This on-chip energetics technology will extend the duration of a technological advantage when developed, and will allow the use of advanced technology in situations where it will be exposed to the threat of capture by the enemy. (RC 9)

(5) Advancements in foundational principles for human-AI partnering and human-robot interaction are generating technical strategies and approaches that will allow for AI, as it evolves away from being tools for humans and towards teammates, to be continually integrated smoothly without requiring re-fielding or re-architecting systems. An ecosystem for evolving human-AI partnerships will allow blue forces faster capability to upgrade to state-of-the-art AI with significant reductions in operator burden, operator training, and system downtime. (RC 13 and RC 14)

c. Breakthrough scientific discoveries.

(1) Research in knowledge representation for spatial and temporal information and uncertainty, and new computational reasoning models to evaluate tradeoffs between expressiveness (what can be represented) and tractability (how quickly will the algorithm give a result) will enable RAS to have a robust internal representation of the external environment (that is, world model). This advancement uses limited computation and data storage on organic autonomous assets, enabling high tempo maneuver without reliance on the network. (RC 12)

(2) Research in robust autonomy architectures, online computation, uncertainty quantification applied to tasks such as semantic segmentation via multi-modal data fusion will enable the consumption of data from newly developed sensors by RAS for situational awareness, decision making, and task execution. Improved perception capabilities in RAS such as multi-modal scene understanding in challenging, dynamic environments will enable greater intelligent capabilities, greater independence and autonomy, and reduced burden to the Soldier. (RC 12)

(3) Research in natural language communication between Soldiers and intelligent systems (robots and robotic vehicles) will not only enable the Soldier to verbally issue direct actions and commands, but it will also allow the intelligent system to seek clarification to resolve ambiguities, enabling a common understanding. Natural language dialog will facilitate the deployment and use of RAS in the commander's scheme of maneuver and increase the tempo of decisions resulting from manned-unmanned teaming. (RC 13)

(4) Research to represent information between humans and agents with uncertainty estimates embedded to increase confidence bounds into inference and prediction models will enable integrated risk assessment during the use and employment of robotic systems. Uncertainty quantification will increase appropriate Soldier trust and confidence in the use of RAS as an integrated teammate during conflict. (RC 13)

(5) Research to discover novel underlying motion primitives through analysis of animal morphology, motor control, and improved physics models will enable the identification of theoretical performance limits while facilitating the development of a corrective control methodology for robust and stable steady-state gaits. The resulting advancements in appendage, body, and gait design will enable unprecedented robust, efficient, rapid, and agile movement of RAS assets in complex and varying terrain, leading to RAS mobility at the same or greater speed and range as the unit it is supporting. (RC 13 and RC 14)

(6) Research to improve real-time planning and enable dynamic gait switching among motion primitives, including the realization of transitions from horizontal to vertical movement (such as, running to jumping to climbing motions while considering environmental characteristics in planning) and stability of transient effects during dynamic gait switching (that is, smooth stable transient from one motion primitive to another) will facilitate efficient dynamic locomotor transitions of legged robotic platforms across vastly different complex terrains (such as, resistive soft soil and tall grass to multifaceted boulders and unstable rubble). These advancements will increase the operational space and tempo achievable by robotic platforms, increasing survivability and lethality. (RC 13 and RC 14)

(7) Research in dynamic whole-body mobile manipulation through computational multi-body dynamics analysis will promote efficient use of the system's entire set of actuators and complete dynamics to achieve more physical work with lighter and cheaper remote systems. This advancement will enable RAS to perform significant physical work on the environment by maximizing use of environmental affordances (such as relocating sensors, placing or removing obstructions, energy foraging, and preparing the battlefield under hazardous conditions) increasing the BCT's capabilities at stand-off and improving Soldier survivability and lethality. (RC 13 and RC 14)

C-4. Deception and obscuration

a. BCTs must understand the electronic signature of their Soldiers, vehicles, command posts (CPs), and formations. BCTs must obscure their electro-optical/infrared (EO/IR) signatures. BCTs must deceive and enable targeting of enemy systems trying to detect signatures associated with

friendly systems.

b. Breakthrough technological innovations.

(1) Research on advanced, software defined radio technology, which miniaturizes radio frequency (RF) System on a Chip provides full RF spectrum situational awareness of self-emissions and RF signature. The ability to monitor friendly forces RF signatures from multiple distributed locations with signature visualization will enable signature management and subsequent manipulation and obscuration. (RC 4)

(2) Research on sensors and models for cooperative, passive sensing of self-emissions over large spatial areas through the use of heterogeneous sensing platforms, including leveraging of Joint Force assets, will provide continuous monitoring of RF signatures. Distributed sensing will allow for the monitoring of signatures from friendly forces over a dispersed area where enemy sensors location is unknown. (RC 4)

(3) Research in highly-conductive, anisotropic new materials within the micro- and nano-particle dimensions regions that are packable and dispersible are proving to be highly effective obscurants from the UV through microwave portions of the EMS. Multispectral and bi-spectral obscurants will increase protection across a larger portion of the EMS for high-value assets against advancing threat sensor technology, and enable concealment during breaching operations. (RC 4 and RC 16)

(4) Research in sensitive RF detection sensors and automated detection algorithms will allow for the discovery of enemy passive RF detection systems, which lack an active signature. This capability will enable enemy systems detection and targeting when the system is not active so that it can be neutralized, destroyed, or manipulated. (RC 5)

(5) Research into new obscurant materials that are survivable in very high G forces, while still able to disseminate efficiently into individual particles will enable the development of a leading obscurant round that produces a cloud that conceals the flight of following lethal munitions from radar. A boutique obscurant round will delay enemy forces ability to react and deny their ability to target and intercept munitions in flight. (RC 4 and RC5)

(6) Development of advanced multi-spectral camouflage solutions across the EMS for Soldiers and equipment is critical to obscuring friendly signatures. Advanced multi-spectral camouflage that is effective across the EMS will assist in making it more difficult for enemy sensors identify and target CPs, equipment, and Soldiers. (RC 4)

c. Breakthrough scientific discoveries.

(1) Research into the use of entangled photons in quantum imaging and quantum illumination will improve resolution, provide the possibility of imaging through obscurants, enable "seeing" in a different frequency domain than the probe light, and enable stealth by using a different photon to image than is used to illuminate the source. This advancement will enable “seeing” more and "seeing" better, such as in obscured environments having smoke, sand, fog, smog, or deliberate

obscurants, thereby increasing the BCTs ability to identify and subsequently destroy or defeat enemy forces, potentially without being seen in the process. (RC 9)

(2) Research in advance computing for full spectrum characterization, where sensor data from multiple sources (RF, cyberspace, acoustic, and EO/IR) in multiple distributed areas can be captured and visualized. Multi-spectral sensing will allow for the measurement, visualization and subsequent management of friendly signatures from multiple distributed locations. (RC 4)

(3) Research in advance integration of RF, cyberspace, acoustic, and EO/IR to enable signature generation from a variety of sources distributed in the area of operations. The ability to generate multi-spectral, decoy signatures will enable friendly forces to deceive enemy sensors and obscure friendly forces and systems. (RC 4 and RC 5)

(4) Research in quantum entanglements would make it possible to "teleport" information between particles without any physical connection and could result in an aerosol that can be tuned remotely to change its electromagnetic response for increased adaptability of the countermeasure. A tunable aerosol obscurant can be prepositioned and tailored as conditions require to adaptively obscure signatures from friendly systems. (RC 4)

(5) Research in the non-linear dynamics of RF circuit types in response to unconventional waveforms will provide the capability to introduce signals into hostile systems that can essentially take control of the system, with or perhaps without warning the operator, to spoof it, introduce false information, turn off, and others. Non-traditional electronic attack will deceive enemy sensors by providing faulty data and denying the enemy's ability to sense and target friendly forces. (RC 5)

(6) Research in EMS sensors embedded in textiles will enable the realization of an embedded flexible low form factor platform that can immediate notify the BCT of enemy sensing attempts. Notification and auto-reporting of EMS enemy targeting will allow for the friendly targeting of enemy sensors and for friendly CP, platforms and Soldiers to take immediate action to counter enemy sensing. (RC 3 and RC4)

(7) Research to discover a single material or a combination of materials that covers the entire EMS spectrum of interest that exhibits very high performance per a unit mass (to avoid unworkable logistics burden) will enable multispectral obscuration for artillery and mortars. This advancement will expand the capability of the Army to project screens that defeat threat sensors and radars operating in the microwave region of the EMS in addition to EO/IR threats. (RC 5)

(8) Research in obscurants with scalable effects will assist with countering battlefield threats that are constantly evolving. Creation of obscurant aerosols that have the ability to change effects remotely and with escalating effect (that is, obscuration, anti-personnel, and lethal) will allow the commander to respond quickly to evolving battlefield threats. (RC 5)

(9) Research in remote activation, such as quantum entanglement or nanoelectromechanical systems sensors in combination with materials that can change their physical state will enable the realization of obscurants with scalable effects that can be controlled remotely and with escalating

effect (that is, obscuration, anti-personnel, lethal). This capability will allow commanders to quickly respond to constantly changing dynamics on the battlefield. (RC 5)

(10) Research into creating, maintaining, and distribution of entanglement will be the basis of future quantum networks containing sensor nodes that will enable distributed quantum sensing for more advanced signature detection, as well as time distribution. This advancement will enable sensing for more advanced signatures, including gradients and higher derivatives, to provide a much more complete picture of the underlying structure of the field patterns being "seen," and clock synchronization for situational awareness, together enabling enemy signatures to be detected and monitored around high-value assets with unprecedented sensitivity. (RC 4)

(11) Research in atom interferometry, including creation of macroscopic quantum superposition states, ways to prolong coherence, spin squeezing, entanglement creation, and ways to improve size, weight, power and resilience of existing quantum sensors, will lead to more sensitive and robust sensors for electric, magnetic, electromagnetic and gravitational fields among other things. This advancement will enable both friendly and enemy signatures to be detected and monitored at unprecedented sensitivity in compact, resilient, and deployable packages, enabling by mid-term improved situational awareness, and in the long term sensing orders-of-magnitude beyond what is possible from traditional sensors. (RC 4)

C-5. BCT lethality and survivability

a. The future OE requires BCTs to operate semi-independently with the ability to concentrate combat power in decisive spaces rapidly to accomplish mission objectives. The steady increase in lethality, range, and rate of fire of modern weapons requires BCTs to protect themselves and reduce their vulnerability.

b. Breakthrough technological innovations.

(1) Gun and missile solutions that are EW, cyber, and SA-capable in the areas of fire on the move, munitions for optimal weaponeering, and non-parabolic firing (off gun target line) will lead to increased capability for organic indirect fires for battalions and squadrons. This additional capability will increase the organic lethality of the BCT during cross-domain maneuver. (RC 13 and RC 15)

(2) Research on extreme energy density materials (advanced energetic materials) for gun and rocket propellants, propellant gain geometry optimization through additive manufacturing techniques to maintain elevated gun pressure, and advanced cannon/rifle materials and designs that can withstand increased pressures and temperatures will result in increased muzzle energy and terminal projectile kinetic energy. Increased muzzle energy will enable cannon/riffle technologies to launch projectiles, while maintaining required projectile terminal kinetic energy at desired range. (RC 13 and RC 15)

(3) Models and simulations and experimental studies of high-rate penetration events will provide insights for optimized/tailored warhead designs for advanced explosive energetics and will increase the lethality and efficiency of blast-fragment warheads. This will lead to munitions with

the increased lethality necessary to defeat projected advances in body and vehicle armor by near peer adversaries and efficiently defeat soft targets. (RC 13)

(4) Fundamental accuracy approaches (related to projectile jump) will be used and underpinned by state-of-the-art accuracy and aerodynamic experimental approach, and computational structural dynamics calculations to provide insight into projectile and weapon interactions and the dynamic deformation of the projectile due to the launch process to discover and quantify sources contributing to decrease in projectile accuracy. These advancements will enable the accuracy of U.S. ballistic (non-guided) projectiles even as target range increases in support of MDO. (RC 13 and RC 15)

(5) Research to synthesize and formulate explosive energetic materials with significant increases in explosive energy will enable RAS, both ground and air, to be disposable, where their self-destruction can be used as an offensive weapon. Disposable RAS offers an alternative delivery platform to employ lethality capabilities. (RC 9 and RC 13)

(6) Advancements in autonomous behaviors, actionable AI information (that is, high probability of detect and low probability of false alarm), and data- and simulation-driven machine learning algorithms will lead to autonomous, tactically-appropriate navigation behaviors for lethal weapons with increased confidence and decreased mission risk. Advancements in aided location, recognition, and tracking will enable Soldiers to supervise rather than operate (man-in-the-loop capabilities) lethal weapons during armed conflict. (RC 13 and RC 15)

(7) Research in image processing and activity recognition will train algorithms rapidly from sparse, unlabeled data rather than from a large databases of labeled images since the latter is not available for complex operational environments. This advancement will enable robust performance of assisted target recognition that can adapt to the changing operational environment. (RC 13, and RC 15)

(8) Research in penetrator-target interaction will enable lightweight concepts that are effective at protecting small critical volumes in unmanned systems. Maintaining mission-critical functions in unmanned platforms increases their survivability and ability to support friendly forces on the battlefield. (RC 14 and RC 15)

(9) Research on advanced protective materials and weight and space efficient passive, active, and reactive material configurations along with advancement in the ability to see, simulate and predict penetrator-target interactions will lead to lighter weight protection concepts. Reducing the weight of these countermeasures on ground combat vehicles will reduce the logistics demand. (RC 14)

(10) Research into highly-abrasive, highly-corrosive, or highly-friction-sensitive particles (to defeat UAS motors or electronics) that can be aerosolized to disrupt or disable the operation of a UAS will allow for the defeat of UAS swarms without precision targeting and tracking. The non-kinetic capability to defeat adversarial swarms at high tempo will eliminate threats to the BCT, such as the denial of effective U.S air-ground integration of maneuver and fires. (RC 14)

(11) Research in electro-optics to detect and record laser usage will provide actionable information regarding: if the enemy is aware of the friendly forces' position; and type and bearing of the enemy targeting system through a field of view. Identification of lasers that are pointed at friendly forces can provide commanders with actionable information. (RC 9)

(12) Research to enable a combat platform to autonomously re-orient physical countermeasures to exploit emerging intelligence, position and geography will protect the vehicle and crew from large volumes of enemy inbound from multiple directions. Extended-range (distance from friendly platforms) countermeasures will greatly reduce residual damage to the platform. (RC 14)

c. Breakthrough scientific discoveries.

(1) Research in the application of computer vision and data fusion to support recognition of partially occluded humans in cluttered environments using IR imagery to recognize partially occluded humans in a clutter environment. Human recognition in the infrared spectrum will allow for the detection of enemy forces in dense urban environments and urban terrains to secure situational advantage during mission operations. (RC 8 and RC 15)

(2) Research to advance nonlinear flow interactions on aerodynamic bodies and novel active flow control methodologies will enable rapid trajectory changes in projectiles, permitting "non-smooth" trajectories and confusing and frustrating enemy detection efforts. Hyper-maneuverability of future projectiles will deceive radar systems that utilize some form of Kalman filtering which can automatically reject a flock of geese but identify an incoming projectile allowing for the delivery of fires. (RC 5 and RC 15)

(3) Research on advanced high-speed maneuverable airframes (aeroballistics science for gliding airframes) and/or post-launch propulsion for direct fire munitions, and structural dynamics M&S and experiments for structurally robust propellants that survive high-g launch, will lead to increase projectile kinetic energy and range. Cannon and rifle technologies with the capability to launch projectiles with sufficient muzzle energy to maintain the required projectile terminal kinetic energy at desired ranges, will increase the organic lethality of the BCT during armed conflict. (RC 13, and RC15)

(4) Research on the use of swarms for collaborative/cooperative projectiles and advancements in guidance, navigation, and control and maneuvering flight bodies for increase flight control authority, high-speed near-field communications, AI, and machine learning will enable the defeat of future hard targets through coordinated, multiple near-simultaneous projectile impacts and are more efficient against soft targets by strategically dispersing the impact points of a number of reduced sized warheads. This capability has the autonomous collaborative/cooperation required for precise projectile/warhead impacts in the short timeframe of the terminal engagement increasing the BCTs ability dominate and win in armed conflict. (RC 13 and RC 15)

(5) Research in guided autonomous direct fire projectiles, where the path of the projectile is corrected during flight, will ensure high accuracy of the ballistic (non-guided) projectile as target range increases. Increased projectile accuracy will enable BCT weapon systems to engage at

extended range to defeat enemy forces. (RC 13 and RC 15)

(6) Research in piezoelectric effects to create the necessary maneuverability and accuracy for long-rod penetrators will ensure increased accuracy of non-guided penetrators as target range increases. Increased long-rod penetrator accuracy will enable BCT weapon systems to engage at extended range to defeat enemy forces. (RC 13 and RC 15)

(7) Research to identify the complex neurological and physiological mechanisms that manipulate motor and/or cognitive function without permanent psychological or physical injury will enable knowledge and technologies for new weaponry based on directed energy and nanomaterials that reversibly incapacitate personnel at stand-off distances. This nonlethal capability will enable friendly forces to incapacitate enemy personnel and increase relative combat power and overmatch. (RC 13)

(8) Application of machine learning and model-based optimization will further protection concepts for penetrator-target interactions, further reducing weight. Reducing the weight of these countermeasures on ground combat vehicles will reduce the logistics demand. (RC 14)

(9) The rapid development of large data sets, the application of machine learning, and the ability to synthesize and assess large numbers of candidate materials and concepts will advance the discovery of lighter-weight protection materials significantly. Reducing the weight of protective armor on ground combat vehicles will reduce the logistics demand and increase endurance. (RC 14)

(10) Research on the intersection of protective countermeasures, autonomy, and collective awareness will enable the coordinated deployment of heterogeneous team of agents (manned/ unmanned) and protective countermeasures to protect the formation against various simultaneous threats with reliance and maximal effectiveness. This advancement will enable protected engagement with enemy forces increasing the survivability of the BCT in close combat. (RC 14)

(11) Research in event-based imagery, where data is only generated when there has been a change in the environment, has the potential to significantly reduce the amount of data that needs to be transmitted. This alternative to computer vision, which typically requires high bandwidth, will allow for the use of communications modes that are more robust but low bandwidth. (RC 3 and RC 8)

(12) Research in stand-off tactical sensing and aided target recognition of explosive hazards, tank ditches, complex obstacles, etc. have the potential to greatly impact maneuver. Tactical sensing at greater distances will reduce cognitive burden and provide greater protection to the Soldier and crew. Automated recognition of hazards to movement will improve tempo and assist in targeting. (RC 14 and RC 15)

(13) Research in algorithms, sensor and payload type, and packaging requirements will enable the development of technologies that allow for the offloading of vehicle protection systems onto non-primary weapons platforms. This advancement will allow for BCT- versus vehicle-focused protection systems in support of MDO. (RC 13 and RC 14)

C-6. Artificial intelligence and machine learning enabling capabilities

a. The future OE requires that BCTs operate at a tempo that far outpaces an enemy's ability to react. AI/ML is critical to create the conditions that allow commanders and staffs to collect information, synthesize, and act before an enemy can effectively counter.

b. Breakthrough technological innovations.

(1) Research in mutually adaptive human-AI systems and interactive machine learning will lead to the creation of mechanisms to maintain system stability in the face of scenario perturbations, as well as techniques to leverage both human and artificial intelligences to ensure team performance within Army-defined boundaries. This advancement will enable human-AI adaptive systems that mimic cognitive learning and problem-solving functions to rapidly adapt to changing conditions within the OE. (RC 1 and RC 13)

(2) Research to exploit knowledge of mammalian spatial reasoning neural systems, which has hundreds of different sub-architectures to AI and which currently has one of those sub-architectures, to develop a completely novel class of AI will revolutionize AI spatial reasoning capabilities. Neuro-derived AI will mimic human cognitive spatial reasoning functions faster than humanly possible and allow for independent autonomous maneuver in complex MDO environments. (RC 1, RC 3, and RC 13)

c. Breakthrough scientific discoveries.

(1) Research in human-guided AI object detection and identification, human-AI bi-directional communication, and human-AI transparency are creating mechanisms for AI target acquisition and situational awareness systems to be rapidly adapted in the field to evolving threats and context. Intelligent adaptable human-AI target acquisition will enable blue forces to adapt Soldier-AI team targeting acquisition capabilities rapidly to have and maintain the accuracy of Soldiers but with super human speeds and quantities of data processing. (RC 14 and RC 15)

(2) Research in learning human-machine interface technologies, task requirement dependent models of human-AI capabilities, and interactive machine learning are all using mission data and human-led after-action-reviews to iteratively adapt AI planning and coordination technologies on a mission-by-mission basis. Human-guided AI asset coordination capabilities will enhance blue force capabilities to coordinate complex maneuver scenarios at speeds and accuracies to overmatch enemy technologies without requiring Soldiers to be in the loop. (RC 1 and RC2)

(3) Research in algorithms and communication approaches for developing, maintaining, and sharing situational awareness across and between distributed humans and AI is leading to the creation of mechanisms to understand gaps and inconsistencies in information flow and communications underlying decision making. Shared human-AI awareness will allow blue forces to enhance situational awareness throughout the kill chain and develop stronger, more flexible decision making that is resilient to unforeseen events and novel adversarial actions. (RC 1, RC 2, and RC 15)

(4) Research in modelling of human-AI team behaviors that link individual team members (human or AI) to overall team outcomes provides the foundational capability necessary to alter behavior rapidly and increase team performance and even introduce new team capabilities. Rapidly reconfigurable Soldier-AI teams allow for teams of Soldiers and intelligent technologies to rapidly adapt to significant changes in team capability and overcome challenges associated with the effects of EMS capabilities, evolving JIM capabilities, and MDO coordination and complexity. (RC 13)

(5) Research in human-guided AI cycle-of-learning are integrating different forms of human interactions with AI at different stages of product development to effectively adapt a single AI's behavior and performance over time to increase the ability of blue forces to respond to adversarial actions, new technologies, environmental changes, and mission requirements; decrease training data requirements; and increase appropriate Soldier trust and use of technology. Human-guided AI across product development dramatically reduces the time to field and update blue force AI, enhancing the capability to conduct cross-domain maneuver ranging from decreasing decision-making time to increasing coordination capabilities and BCT situational understanding. (RC 1, RC 2, and RC 13)

(6) Research into user-guided AI training, or non-technical user interactive machine learning, is allowing non-technical experts (such as Soldiers in the field) to train AI systems as, or more, effectively than AI experts will enable mission critical adjustments and adaptations by intelligence systems at the edge and on timescales unmatched by expert-driven development. Non-technical user trained AI allows Soldiers to align mission planning, asset allocation, target acquisition, responses to evolving threats, and mobility to situational demands before, during, and after each mission. (RC 1, RC 2, and RC 13)

(7) Research on multi-timescale models of individual humans and machine learning-based predictions of future human behaviors will enable AI to infer human information processing performance and will allow for future AI to weight inputs from multiple humans in making decisions. AI-inferred human long-timescale processing will allow blue force future AI to have mechanisms to non-linearly improve its integration of Soldier intelligence into mission planning, asset coordination, mobility, and effects. (RC 1, RC 2, and RC 13)

(8) Research in understanding what human cognitive skills are critical enablers of rapid adaptation to disruptive change, what human cognitive skills are needed to understand and guide the development of AI, and how to effectively train those skills are enabling future training approaches and will allow for advanced concepts of Soldier/human-AI teaming to be implemented in the field. Preparing Soldiers for volatile technology-induced change will allow them to function effectively and adapt in future AI-enabled maneuver environments. (RC 1, RC 2, and RC 13)

(9) Research in opportunistically sensing Soldier intent and interest coupled with advancing methodologies to sense and interpret Soldier behavior in real-world environments are enabling AI to use the human brain to prioritize tactically critical information without providing any additional burden or stress on the operator. Tactical awareness via collective knowledge will allow blue force AI to infer and integrate the intent of Soldiers as it evolves with mission execution and create a

form of super-human intelligence that leverages the tactical knowledge of Soldiers with the speed and processing power of AI. (RC 1, RC 2, and RC 13)

(10) Research into non-invasive, longitudinal measurements of physiology (brain, heart, skin, eye, and others) will enable objective assessment of Soldier performance fluctuations without interruption of mission execution. Algorithms that can incorporate contextual information and adapt system performance based on objective, real-time assessment of Soldier task-specifics will enable rapid decision making in high tempo operations. (RC 1, RC 2, and RC 13)

(11) Research into biometric assessment of team performance will allow for real-time assessments of human-agent teaming enabling rapid reassignment of both Soldiers and AI agents to more effectively team and thus optimize to accomplish mission objectives. New methods of physiological synchrony, shared representations of external constructs, and spatiotemporal scales of interactions provide the precision necessary to rapidly adapt Soldier/AI teams to ensure high-tempo operations. (RC 1, RC 2, and RC 13)

(12) Research into AI predictive adversarial modeling of enemy intentions and courses of action, where AI/ML will collect and collate enemy doctrine, training, terrain; tactics, techniques, and procedures; and personalities to produce predictive models of potential enemy courses of action, will allow commanders and staffs to reduce the time for the military decision making process. This advancement will enable commanders and staff to refine potential enemy actions and more quickly produce friendly courses of action resulting in greater tempo of operations. (RC 1, RC 2, and RC 13)

C-7. Conclusion

The scientific research and technology approaches in this appendix support the required capabilities necessary for BCTs to conduct cross-domain maneuver in 2028 and beyond. These approaches are focused on providing extensive improvements to organic BCT lethality and survivability; mobility and sustaining capabilities; human-robotic teaming; and deception and obscuration, enabled by technical advancements in artificial intelligence and machine learning (AI/ML). Critical areas for future advancement also include protection, network, sensing systems, and sustainment, where details of the recommended science and technology capabilities are covered in the S&T appendices of other functional and supporting concepts. Achieving these capabilities will require targeted investment, extensive experimentation, and continuous collaboration with academic experts, joint partners, key stakeholders, and industry leaders. When combined with corps and divisions continuously converging lethal and nonlethal effects across all domains and environments, these approaches will enable the BCT to conduct cross-domain maneuver effectively.

Appendix D
Integrating Functions

D-1. Introduction

This appendix describes integrating functions that enable the BCT to conduct cross-domain maneuver.

D-2. Command and control

a. Mission command is the Army's approach to C2 that empowers subordinate decision making and decentralized execution appropriate to the situation.[101] Mission command requires tactically and technically competent commanders, staffs, and subordinates operating in an environment of mutual trust and shared understanding. It requires building effective teams and a command climate in which commanders encourage subordinates to take risks and exercise disciplined initiative to seize opportunities and counter threats within the commander's intent. Through mission orders, commanders focus their subordinates on the purpose of an operation rather than on the details of how to perform assigned tasks. This allows subordinates the greatest possible freedom of action in the context of a particular situation. Finally, when delegating authority to subordinates, commanders set the necessary conditions for success by allocating resources to subordinates based on assigned tasks.[102]

b. C2 is the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of mission.[103] C2 is fundamental to the art and science of warfare. No single activity in operations is more important than C2. C2 by itself will not secure an objective, destroy an enemy target, or deliver supplies. Yet none of these activities could be coordinated towards a common objective, or synchronized to achieve maximum effect, without effective C2. It is through C2 that the countless activities a military force must perform gain purpose and direction. The goal of C2 is mission accomplishment.[104]

c. Commanders cannot exercise C2 alone. Even at the lowest levels, commanders need support to exercise C2. At every echelon of command, each commander has a C2 system to provide that support. The C2 system is the arrangement of people, processes, networks, and command posts (CP) that enable commanders to conduct operations.[105]

D-3. Intelligence

a. BCTs must possess the organic capability to conduct the intelligence process to drive the planning necessary to understand, visualize, and describe their OE; make and articulate decisions; and direct, lead, and assess military operations.[106] BCT intelligence capabilities include making observations about the threat and relevant aspects of the OE through collection resulting in data that is processed and exploited into useable information for analysis and production, and, when appropriate, provides combat information to the commander and staff.[107]

b. Integrating national to tactical intelligence with operations provides commanders a high degree of situational understanding across the MDO operational framework throughout the competition continuum while operating in complex environments against determined, adaptive enemy organizations. This includes cross-domain R&S operations to satisfy information requirements. Underpinning intelligence operations are adaptive leaders and cohesive teams that thrive in ambiguity and chaos, adept at conducting cross-domain R&S operations in close contact with populations and the enemy.

c. Army intelligence uses a multi-domain approach to support situational understanding, collecting information across all five domains, the EMS, and IE. To support BCT cross-domain

maneuver, information collection capabilities configure for rapid deployment and immediate employment upon arrival with mobility and survivability commensurate with the supported formation. Supported by a resilient information network, intelligence development enables continuous positive action throughout the operation. Army intelligence provides all echelons with the capability to generate situational understanding, provide intelligence support to targeting, and collect information to enable cross-domain maneuver. Persistent manned and unmanned air and ground reconnaissance systems, aerial high altitude, and space sensors that enable cross-domain R&S operations remain a key element of information collection.

D-4. Fires

a. The MDO Concept and BCT Concept describe an OE that requires responsive, and effective fires capabilities, resulting in conceptual investment in: expanding Army fires; improving integration with JIM assets through echeloned capabilities; enhanced sensor to shooter linkages; multi-domain targeting; and leveraging partner capabilities.

b. Fires units support BCT cross-domain maneuver by integrating and delivering fires through multiple domains in time and space. Fires organizations at all echelons integrate fires capabilities to support the concept of operation and scheme of maneuver by providing all forms of lethal and nonlethal shaping fires by integrating joint, Army, interorganizational, and multinational capabilities across all domains, enabling friendly freedom of action. Fires organizations require an M-SHORAD capability to enable cross-domain maneuver by destroying, neutralizing, or deterring low altitude air threats to protect critical fixed and semi-fixed assets and maneuvering forces, while also having the ability to provide voice early warning to maneuver forces when threat air tracks are detected.

c. Army fires support cross-domain maneuver by integrating fires capabilities at echelon in all domains. Operating semi-independently requires highly responsive and accurate fires capabilities supported by an integrated sensor-to-shooter network that enable massed and synchronized fires in time and space. M-SHORAD protects maneuver forces in the Close Area, integrates into maneuver formations when required, and has the capability to operate semi-independently with maneuver forces. Effective C2 requires fires capabilities that are persistent, comprehensive, and agile, creating sensor networks that provide wide ranging and integrated sensor-to-shooter linkages. Fires formations support integrated security operations across all domains and environments by optimizing JIM capabilities that provide deep shaping fires through air and missile defense and fire support. As maneuver is movement supported by converged lethal and nonlethal capabilities across multiple domains, the EMS, and IE, the components of the solution within both the BCT Concept and *The AFC Concept for Fires* are mutually reliant and interrelated to conduct cross-domain maneuver.

D-5. Protection

a. The protection warfighting function enables cross-domain maneuver and semi-independent operations through tasks and systems that preserve the BCT's critical capabilities, assets, and activities from threats in multiple domains, the EMS, and IE so the commander can apply maximum combat power to achieve the mission.

b. This function expands upon the integration of cross-domain R&S operations to enhance the BCT's fighting potential and freedom of action. The BCT with attached or supporting units at corps and division will enable tempo, endurance, and freedom of action through protection activities. These activities include the establishment of movement corridors and support areas with improved synchronization of survivability, mobility, and area security with defensive countermeasures of dispersed critical assets and activities.

c. When situations dictate, the following actions are essential and require dynamic employment of enablers and effects to preserve combat potential, reach, and endurance: coordination of multi-domain defense support to provide layered protection of critical capabilities, assets, and activities; survivability and terrain shaping; security and mobility support; counter explosive hazards; detention operations; employing forensics and biometrics capabilities; conduct of identity intelligence; CBRN reconnaissance, surveillance, contamination mitigation; explosive ordnance detachment support; cyberspace and EMS defenses and protection; force health protection; populace and resources control; operations security (OPSEC); information security; and physical security. BCTs, enabled by corps and division capabilities, disrupt or deny the threat's ability to sense, detect, or develop targetable data on BCT capabilities and intentions.

D-6. Sustainment

a. Army forces sustain cross-domain maneuver in multiple domains with sustainment organic to the BCT and scalable capability at echelon using multiple routes, modes, nodes, and suppliers, to provide freedom of action to the supported commander. Sustainment forces task-organize to support dispersed BCTs conducting semi-independent operations with reduced demand, improved shared understanding, supply chain efficiencies, and autonomous ground and air distribution. The Army integrates tactical, operational, and strategic sustainment operations to provide the foundational framework to support the BCT, providing multiple options to the supported commander while contributing to integrated security operations. Increased sustainment force lethality will not eliminate the requirement for synchronization of security operations in the Tactical Support Area.

b. BCTs operating semi-independently require a reduction in demand to operate at extended supporting distance. The BCT must also be less distribution-centric. The most significant demand characteristics are fuel, water, and ammunition, which determine the sustainment footprint for supply, storage, and distribution. BCTs operating semi-independently require disciplined resource consumption and materiel management. Development and acquisition of more reliable and efficient manned and unmanned air and ground systems must account for greater than 50% reduction of fuel requirements to enable operational reach. Without this fundamental reduction in demand, BCT requirements will result in a significant reinvestment in sustainment force structure and capacity. Meeting demand at the point of need through advanced technology provides greater capability within the BCT. Development of autonomous, semi-autonomous, and remote-controlled ground, maritime, and aerial distribution systems provides enhanced freedom of action through responsive periodic resupply operations.

c. Sustainment formations maneuvering as part of the BCT require the mobility commensurate

with the BCT type to sustain the operational tempo needed to achieve mission objectives. Sustainment formations also require increased organic lethality and protection to generate security and provide overmatch. Extended and contested LOCs through unoccupied areas that emerge between dispersed, semi-independent units increase risk to sustainment operations. Support operations across domains require smaller, mobile, concealable capabilities with counter-UAS capability to remain undetected and avoid enemy targeting. Corps and divisions establish conditions to conduct distribution and emergency resupply for all formations along multiple routes across the AO.

d. When BCTs operate semi-independently, accurate reporting and visibility of sustainment information are essential for shared understanding and forecasting sustainment activity from the tactical to strategic level. A reliable sustainment component of the BCT C2 information systems with redundant sustainment information systems provides decision support. Current sustainment networks and information systems are vulnerable to disruption by enemy cyberspace operations and require investments to become network integrated, hardened, secure, and resilient. Defensive cyberspace operations capabilities are paramount to maintain sustainment OPSEC. Sustainment information systems must operate with intermittent connectivity in a degraded communications environment with a hardened and redundant network.

e. The Army uses forward positioned forces, rotational forces, and Army prepositioned stocks to assist in reducing response time. Configuration, size, and capability of strategically positioned Army prepositioned stocks allow BCTs to deploy combat configured across strategic distances and transition rapidly from expeditionary movement to cross-domain maneuver. Reception, staging, onward movement, and integration remain enduring missions mitigated with lighter and configured forces.

f. Dispersed BCTs operating semi-independently generate the requirement for an enhanced organic medical suite of enablers for care forward. Contested domains will cause delayed evacuation and will require BCTs to treat and hold casualties for extended periods of time. The BCT requires enhanced medical capability at the point of injury which provides advanced trauma and resuscitation skills, and which possesses prolonged patient holding abilities to enable cross-domain maneuver. Additionally, the increase in existing and emergent health threats to the force must be offset by expanding force health protection capabilities to mitigate disease and non-battle injury casualties from non-traditional agents, CBRN threats and hazards, disease vectors, and toxins.

D-7. Army aviation

a. Army aviation is organized and equipped to support BCT cross-domain maneuver, as well as JIM operations. Army aviation is organized with reconnaissance and attack, cargo, utility, and air medical evacuation helicopters, unmanned aircraft, and air traffic services systems to provide support to BCTs conducting land operations under corps, division, and BCT C2. Army aviation operates in highly contested and complex airspace with the situational understanding to execute cross-domain maneuver. BCTs integrate and synchronize air manned and unmanned systems with fires and ground maneuver formations to attack the enemy at the time and place chosen while minimizing fratricide risk.

b. The rapid and continuous integration of capabilities from different domains provided by air-ground operations, optimizes effects to overmatch the enemy through cross-domain synergy and multiple forms of attack. Army aviation integrates with the ground force at the lowest practical level, ensuring responsiveness to the ground commander's needs, and providing an inherent cross-domain maneuver capability by conducting air-ground operations as part of the combined arms team. Army aviation contributes to effective C2 by extending communication ranges through airborne relay or by rapidly repositioning commanders on the battlefield to maintain continuity of command.

c. Air-ground maneuver teams employing multi-domain R&S capabilities are able to persistently collect, develop, and report actionable combat information and provide early and accurate warning of enemy operations. Army aviation provides a mobility advantage for widely dispersed forces to overcome the constraints of limiting terrain and extended distances, enabling rapid aggregation of separated units to exploit temporary dominance in critical locations, and aerial resupply to avoid easily interdicted LOCs and speed delivery of time sensitive supplies and equipment to widely dispersed elements.

D-8. Special operations

a. The U.S. Special Operations Command provides a special operations joint task force (SOJTF) that supports joint and Army MDO. A SOJTF is a modular, tailorable, and scalable special operations task force designed to provide integrated, fully-capable, and enabled joint special operations forces to geographic combatant commanders and Joint Force commanders.[108] The SOJTF can be tailored for a range of operations from a small-scale crisis response JTF during competition to a Joint Force special operations component command (JFSOCC) for LSCO. The SOJTF typically remains under the OPCON of the theater special operations command and operates in a supporting relationship to, or under the tactical control of the Joint Force commander. When designated as a JFSOCC, the SOJTF supports, or is supported by, the other Joint Force functional components (that is, the joint air, land, and maritime component commands).

b. The SOJTF is the equivalent of an Army EAB formation for joint special operations. The purpose of the SOJTF is to shape the close and Deep Maneuver Areas as the operational level integrator of multi-domain special operations capabilities. The SOJTF is composed of organic and assigned warfighting components and a modular headquarters designed, organized, equipped, and trained to receive, integrate, and assimilate JIM partners. The SOJTF can command multiple joint special operations task forces and a joint special operations air component or task forces consisting of both conventional forces and special operations forces. The SOJTF plans and executes lethal and nonlethal effects in support of the Joint Force commander's effort to shape the OA for corps, divisions, and BCTs.

c. Army special operations forces (ARSOF) operate continuously during competition supporting BCT regional engagement by developing resilient, capable, and interoperable partners. Cultural familiarity and long-term presence enables ARSOF to understand complex environments and relationships; sharing this understanding helps BCTs to dominate the physical, virtual, and cognitive dimensions in a contest of ideas and ideologies. Networked with cyberspace, space, and

other Joint Force capabilities, ARSOF shapes friendly, neutral, and hostile environments, disrupt threat influence activities, influence threat behavior, and disrupt threat information-related capabilities. Access to ARSOF's indigenous partner networks enables BCTs to create stand-off against threats short of armed conflict, seize the initiative to prevent a surprise attack, and set conditions for a commitment of U.S. or coalition forces if diplomacy and deterrence fail.

d. As operations transition from competition to armed conflict, ARSOF use their indigenous forces and human networks to assist the Joint Force commander to see, characterize, and respond to emerging enemy intentions and actions. Indigenous mass developed by ARSOF during competition provides combat power in the form of irregular, or guerrilla, forces that create physical, virtual, and cognitive effects that shape the deep areas in support of BCT maneuver in the Close Area. Army Special Operations Forces conduct unconventional warfare by and with indigenous partners to enable persistent location, disruption, or destruction of enemy stand-off capabilities (that is, ballistic missiles, integrated ADA systems, the integrated fires complex, high value individuals, and weapons of mass destruction). ARSOF shapes the Close Area for BCTs by conducting direct action in the form of lethal and nonlethal precision targeting, deep-penetration raids or interdiction operations and special reconnaissance against targets of strategic or operational significance in the deep maneuver and deep fires areas.

e. When armed conflict ends and operations return to competition, the Joint Force commander may direct ARSOF to conduct operations in consolidation areas to assure freedom of maneuver and the continuity of military operations. Specially trained ARSOF elements perform CA operations and military information support operations (MISO) at echelon to counter enemy influence activities, facilitate integrated security and essential services, monitor civil sentiment, and assist in the restoration of civil governance. Army Special Operations Forces elements assist in the transition to the new security framework by providing SA for the humanitarian activities of the host nation and international governmental and non-governmental agencies.

D-9. Engineers

Engineers enable BCT cross-domain maneuver by countering and mitigating explosive hazards, and providing geospatial, general engineering, mobility, counter-mobility, and survivability capabilities. Key engineer tasks include enhanced breaching, gap crossing, obstacle reduction, obstacle emplacement, and support to movement corridor operations, which provide the commander with additional time and maneuver space when synchronized with terrain shaping operations.

D-10. Military police

BCTs will be challenged with securing their formations, facilities, and activities due to the complex OE. MP fulfill a vital role in the security of the force enabling freedom of maneuver and action through their three disciplines of police operations, detention operations, and security and mobility support. MP provide the commander with increased lethality and multi-disciplinary capabilities at echelon allowing BCTs to focus on the decisive operation.

D-11. Chemical, biological, radiological, and nuclear

Chemical biological radiological and nuclear formations enable cross-domain maneuver by gaining and maintaining situational understanding of CBRN threats to provide friendly forces and

populations timely warning that allows for measures to mitigate or eliminate the threat. CBRN formation capabilities include a unified, secure, and resilient communications network, manned and unmanned air and ground systems, and platforms that possess the mobility and survivability characteristics of the BCTs they support. Chemical biological radiological and nuclear hazardous response teams provide the capability to control, defeat, disable, dispose, and reduce the effects of weapons of mass destruction threats and CBRN hazards.

D-12. Civil affairs

a. Conventional CA forces are human terrain-focused, making them critical enablers to BCTs conducting cross-domain maneuver in close contact with populations throughout the competition continuum. When expeditionary CA forces are mobilized from Compo 3, the CA brigade headquarters at corps, the CA battalion headquarters at division, and the CA company at BCT, bring extensive knowledge of the history, culture, and conditions in the civil component of the operational environment that affect BCT operations. CA forces also bring important linkages to civil networks that include members of populations, government institutions, and interorganizational partners that reside or operate in and around an AO. An established civil-military information sharing architecture, linked to BCT operations and intelligence staff processes, significantly improves the BCT commander's situational understanding, targeting capability, and ability to address stability tasks rapidly during combat operations while preserving combat power.

b. Through civil network engagement (which includes civil reconnaissance, civil engagement, and civil network analysis) and civil-military integration (which includes civil-military operations centers), CA elements understand political and policy issues in the OA, as well as predict, coordinate, and/or control the movement of populations, goods, and services that might interfere with BCT operations during competition, armed conflict, and return to competition. For example: during competition, BCTs executing shaping tasks or providing forces for SC (including military engagement, SFA, FID, or SA missions) are part of the integrated country strategies of U.S. country teams and may require liaison with the U.S. Embassy or joint interagency task forces.

c. In transition to LSCO, CA companies tap into the host nation disaster response and evacuation plans and coordinate with host nation authorities to activate or integrate those plans into BCT movement plans to deconflict mobility corridors and main supply routes with commercial activities, evacuation routes, and others. During LSCO, CA companies and teams accompany lead combat units, helping commanders sort out friendly and neutral elements from threats encountered in the civil component and addressing issues of immediate concern to the people and governments of newly liberated areas. When BCTs execute area security and stability operations during consolidation of gains, CA companies are the BCT commanders' link to U.S. government departments and agencies and the host nation government to minimize reliance on military resources during transitional governance operations and enable the transfer of those responsibilities to other authority.

D-13. Space

a. Joint and Army space forces enable BCT cross-domain maneuver by providing access to the

space-based and space-enabled capabilities needed to conduct MDO. Specifically, space forces support a BCT's ability to conduct cross-domain maneuver through a contested environment using unique technical capabilities such as, space control, space situational awareness, PNT, SATCOM, missile warning, environmental monitoring, and space-based surveillance and reconnaissance.

b. BCTs leverage space-based capabilities through specially trained members of the BCT staff and coordination with the division space support element. Army space control planning teams and Army space support teams augment the division space support element in order to plan, coordinate, synchronize, and integrate the human and technical elements of space operations to support maneuver forces and operations across JIM partners.

c. Space forces enable cross-domain maneuver and integrate cross-domain R&S operations through assured access to space capabilities. Space forces help facilitate semi-independent operations through assuring access to emerging high altitude and space-based ISR; SATCOM; PNT; environmental monitoring sensors; and missile warning. Navigation warfare capabilities enable BCT maneuver through the detection and mitigation of PNT jamming. Space operations enable cross-domain maneuver within the OE via joint friendly force tracking, alternative compensatory control measures, and special technical operations. Space forces protect the use of space-based capabilities and space domain freedom of maneuver through offensive and defensive space control operations.

D-14. Cyberspace and electronic warfare

a. The Army provides strong and resilient cyberspace and EW forces capable of supporting operational demands through technologies that minimize bandwidth constraints, centralize computing operations in a common operating environment, and standardize the provisioning of network services across the Army. Cyberspace, and to some degree EW, operations can be executed from anywhere provisioned with cyberspace infrastructure that provides access to the cyberspace domain. Cyberspace forces need not be present within a designated OA to deliver effects.

b. Scalable cyberspace and EW formations provide organic capabilities to support maneuver forces, including those engaged in independent operations, while also providing pooled capabilities that can offer remote support and augmentation to all multi-domain formations. These scalable formations integrate into existing force structure models and enable supported organizations to conduct all aspects of cyberspace and EW operations. Globally tailored cyberspace mission forces enhance a commander's ability to maneuver by creating denial effects from sanctuary or close to the fight.

c. Scalable cyberspace and EW formations enable multi-domain formations to converge intelligence, reconnaissance, movement, fires, and information to create positions of relative advantage. Army forces use cyberspace capabilities to exploit psychological, technological, temporal and spatial advantages over the threat. This requires understanding the local effects that cyberspace and EW operations produce, while also understanding the potential effects that could be produced far beyond the local focus of operations. It also requires understanding that cyberspace and EW effects can be generated from strategic distance and still produce local effects.

This is accomplished by generating and applying both organic and remote cyberspace and EW capabilities to support Army forces in the exploitation of enemy vulnerabilities, the seizure and retention of key terrain, and to hold targets at risk for sustainable outcomes. Cyberspace and EW capabilities fully integrate into the targeting process, facilitating the synchronization and integration of multiple elements of combat power to gain an advantage, protect that advantage, and place threats at a disadvantage.

D-15. Information

a. Connections between various layers of cyberspace generate a portion of the IE. The IE is the aggregate of individuals, organizations, and systems that collect, process, disseminate, or act on information. It is broken down into the physical, informational, and cognitive dimensions; and each layer is associated with a specific dimension. The physical dimension is composed of C2 systems and supporting infrastructure that enable individuals and organizations to conduct operations. It is the dimension where physical platforms and the networks that connect them reside. The physical dimension relies upon cyberspace infrastructure which includes; but is not limited to; fiber optic cables, computers, the EMS, and networking devices.

b. The informational dimension is the place where information is collected, processed, stored, disseminated, and protected. Information is disseminated via virtual routes over physical networks and stored within virtual file systems either on the local hard drive or in the cloud. Ultimately, actions in this dimension affect data content and flow. The cognitive dimension encompasses the minds of the person or persons who transmit, receive, and respond to or act on information, in this dimension people think, perceive, visualize, understand, and decide.

c. Information environment operations enable cross-domain maneuver integrating IW, information engagement, and information support in the cyberspace domain and IE through the application of nonlethal fires synchronized with lethal fires providing effects that enable BCTs to conduct cross-domain maneuver to seize, retain, and exploit the initiative. Information environment operations integrate the physical and information spaces at all echelons through the coordination and application of IRCs and other activities. Movement of physical forces and resources directly enables the ability of IRCs to be effective.

D-16. Airspace management

BCTs are responsible for airspace management of Army airspace users within their OA. All Army airspace users transiting a brigade OA coordinate with the brigade responsible for the OA they are transiting. BCTs are responsible for integrating airspace users supporting BCT air ground operations. The BCT must continuously plan for, control, and monitor the operations of all airspace users to support their operations and those transiting through the air over their ground OAs. This continuous situational understanding is critical to ensure that the brigade can react to any situation requiring immediate use of airspace, such as immediate fires, close air support missions, unplanned unmanned aircraft system launches, or a diversion of aviation assets in real time.[109] Immediate fires includes but is not limited to indirect fire protection capability; rocket, artillery, and mortar protection; and enemy aircraft engagements.

Appendix E
Russian and Chinese Capabilities in the Close Area

E-1. Introduction

This appendix provides additional details on Russian and Chinese capabilities in the Close Area.

E-2. Russian and Chinese capabilities

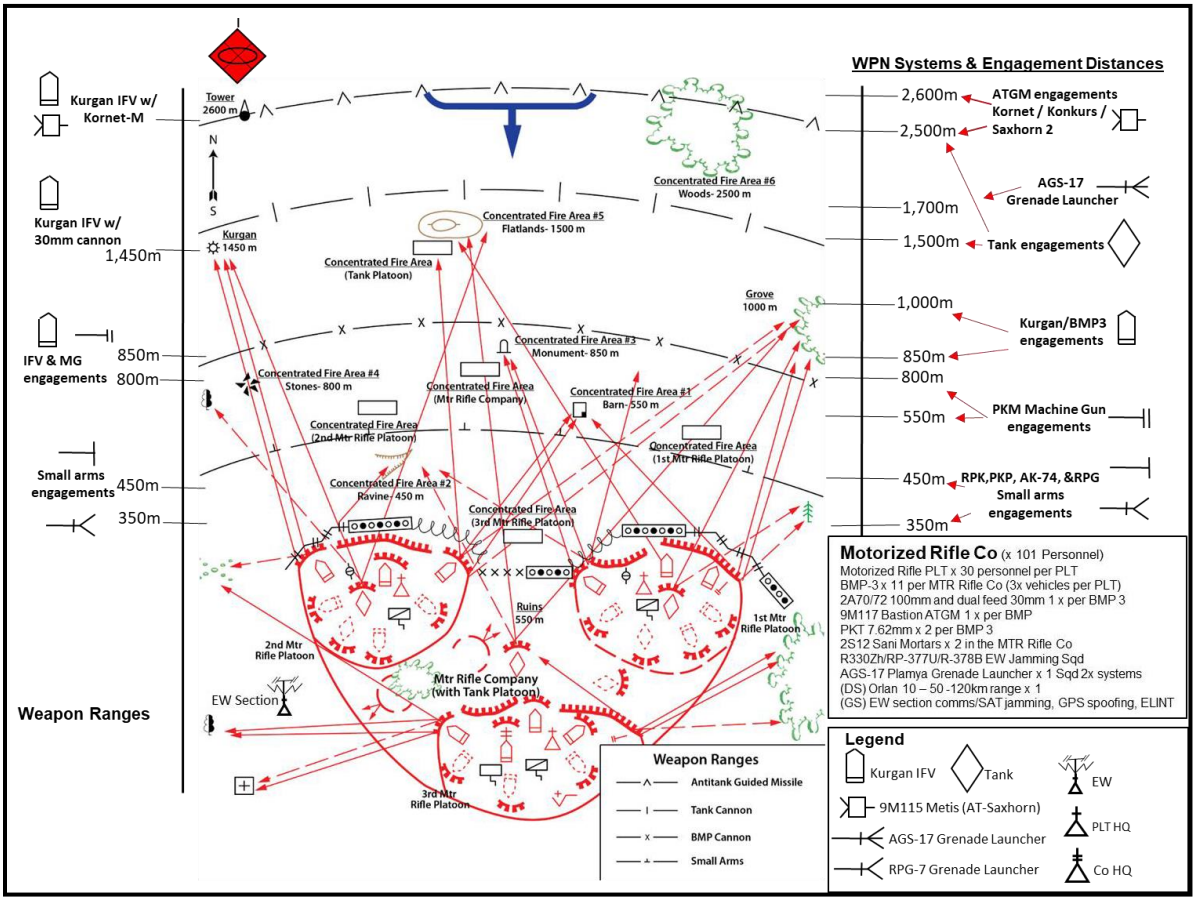

Figure E-1. Russian motorized rifle company in the defense

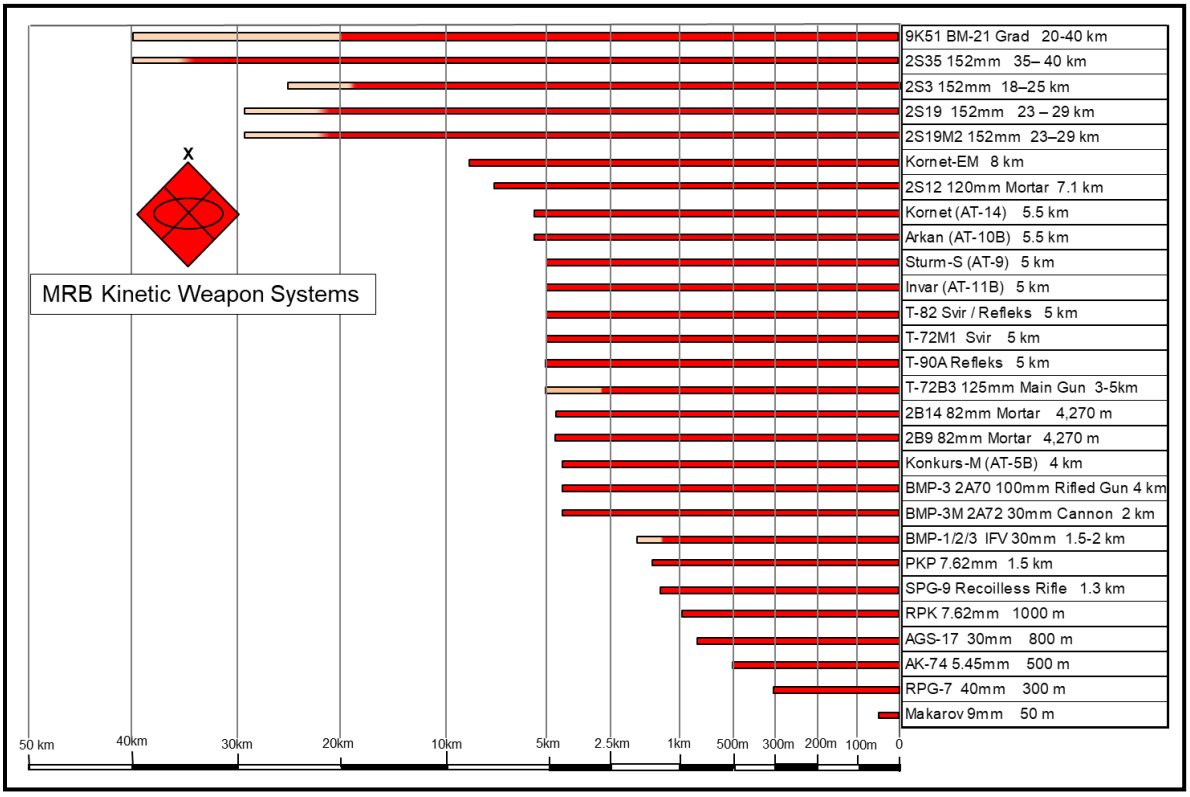

Figure E-2. Russian motorized rifle brigade (MRB) organic weapon ranges

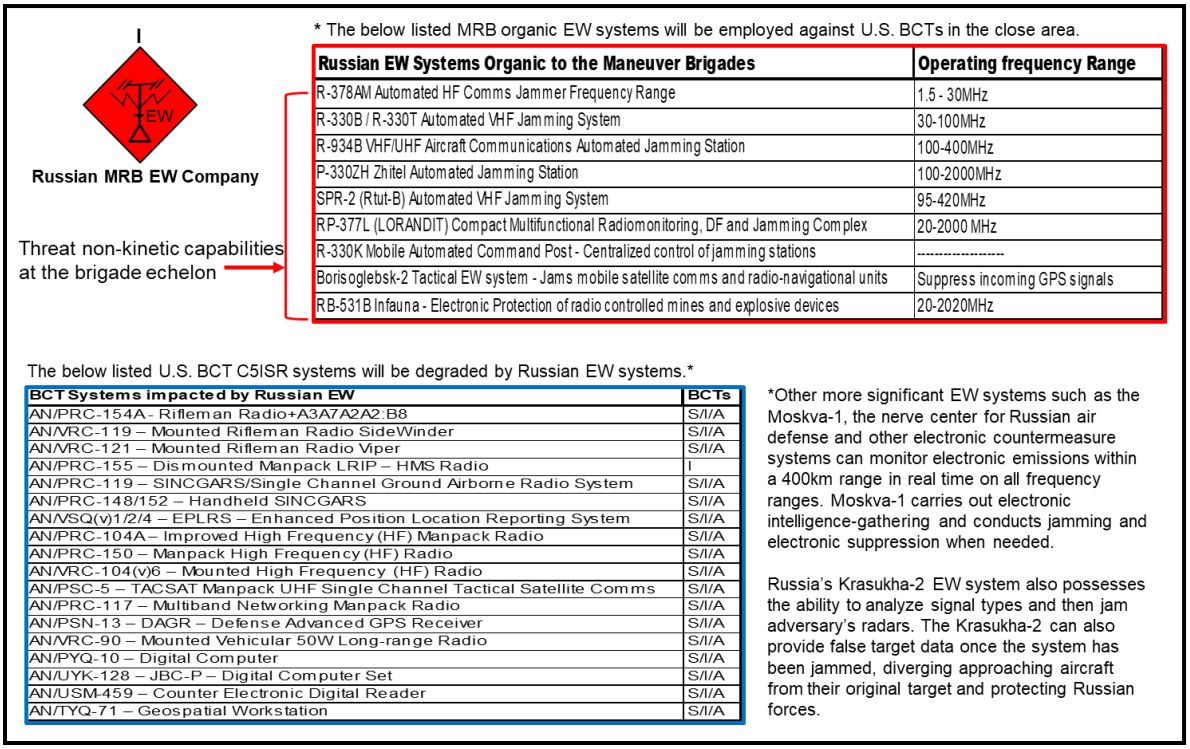

Figure E-3. Russian MRB organic EW systems[110]

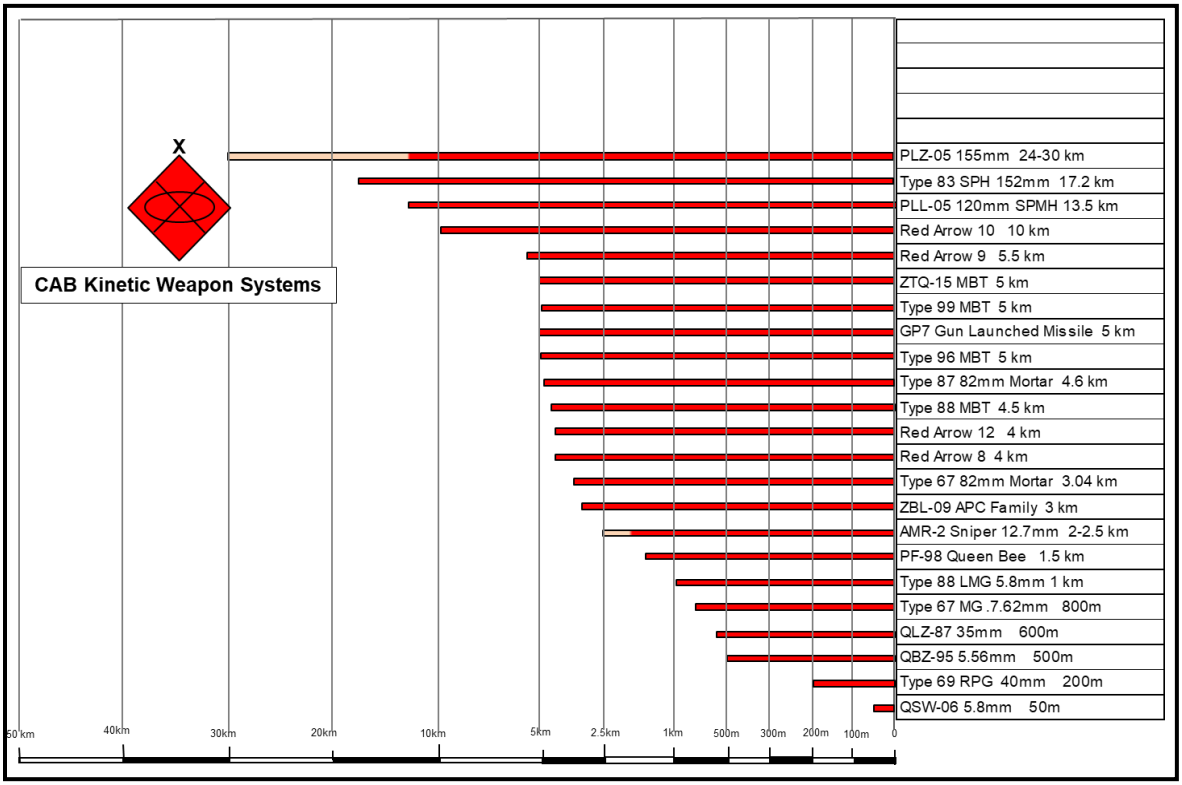

Figure E-4. Chinese combined arms brigade organic weapon ranges

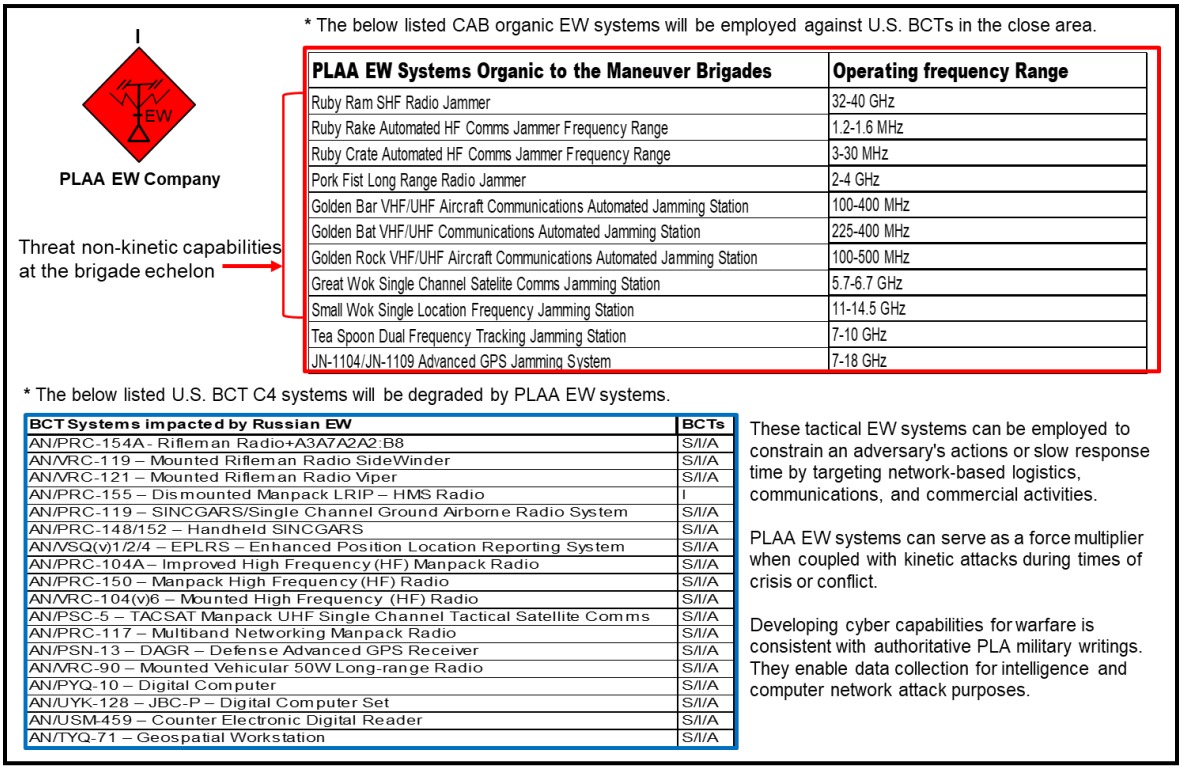

Figure E-5. Chinese combined arms brigade organic EW systems

Glossary

Section I
Abbreviations

A2 anti-access
AD area denial
ABCT Armored Brigade Combat Team
ADA air defense artillery
ADP Army doctrine publication
AFC Army Futures Command
AI artificial intelligence
AI/ML artificial intelligence/machine learning
AO area of operations
ARSOF Army special operations forces
BCT Brigade Combat Team
C2 command and control
CA civil affairs
CBRN chemical, biological, radiological, and nuclear
CP command post
DA Department of the Army
EAB echelons above brigade
EMS electromagnetic spectrum
EO/IR electro-optical/infrared
ERCA extended range cannon artillery
EW electronic warfare
FM field manual
FSF foreign security forces
FW fixed-wing
IDF Israel Defense Forces
IE information environment
IEO information environment operations
IBCT Infantry Brigade Combat Team
IW information warfare
IRC information-related capability
ISB intermediate staging base
ISR intelligence, surveillance, and reconnaissance
JFLICjoint force land component commander
JIM joint, interorganizational, and multinational
JP joint publication
JTF joint task force
LOC line of communications
LRPF long-range precision fires
LSCOlarge-scale combat operations
MCDP Marine Corps doctrinal publication
MDO Multi-Domain Operations

METL mission-essential task list
MISO military information support operations
MP military police
MRB motorized rifle brigade
MPF mobile-protected firepower
M-SHORAD maneuver short-range air defense
NCO noncommissioned officer
NGCV next generation combat vehicle
OA operational area
OCO offensive cyberspace operations
OE operational environment
OIDF organic indirect fires
OPCON operational control
OPN operational
OPSEC operations security
PLAA People's Liberation Army Army
PNT position, navigation, and timing
R&S reconnaissance and security
RAS robotic autonomous systems
RC required capability
RF radio frequency
RW rotary-wing
SA security assistance
SATCOM satellite communications
SC security cooperation
SFA security force assistance
SFAB security force assistance brigade
SOF special operations forces
SOJTF special operations joint task force
STRAT strategic
SBCT Stryker Brigade Combat Team
TBM tactical ballistic missile
TRADOC United States Army Training and Doctrine Command
U.S. United States
UAS unmanned aircraft system

Section II
Terms

adversary
A party acknowledged as potentially hostile to a friendly party and against which the use of force may be envisaged. (JP 3-0)

air domain
The atmosphere, beginning at the Earth's surface, extending to the altitude where its effects upon operations become negligible. (JP 3-30)

anti-access
Action, activity, or capability, usually long-range, designed to prevent an advancing enemy from entering an operational area. (JP 3-0)

area denial
Action, activity, or capability, usually short-range, designed to limit an enemy force's freedom of action within an operational area. (JP 3-0)

area security
A type of security operation conducted to protect friendly forces, line of communications, installation routes, and actions within a prescribed area. (ADP 3-90)

armed conflict
The condition that exists when the use of violence is the primary means by which an actor seeks to satisfy its interests. (Joint Concept for Integrated Campaigning)

assign
To place units or personnel in an organization where such placement is relatively permanent, and/or where such organization controls and administers the units or personnel for the primary function, or greater portion of the functions, of the unit or personnel. (JP 3-0)

attach
The placement of units or personnel in an organization where such placement is relatively temporary. (JP 3-0)

battle
A set of related engagements that lasts longer and involves larger forces than an engagement. (ADP 3-90)

brigade
A unit consisting of two or more battalions and a headquarters company or detachment. (ADP 3-90)

brigade combat team
A combined arms organization consisting of a brigade headquarters, at least two maneuver battalions, and necessary supporting functional capabilities. (ADP 3-90)

campaign
A series of related major operations aimed at achieving strategic and operational objectives within a given time and space. (JP 5-0)

Close Area
Where friendly and enemy formations, forces, and systems are in imminent physical contact and contest for control of physical space in support of campaign objectives. (MDO Concept)

close combat
Warfare carried out on land in a direct-fire fight, supported by direct and indirect fires and other assets. (ADP 3-0)

cognitive
Aspects related to people and how they behave. These aspects include unit morale and cohesiveness, as well as perspectives and decision making. (modified from FM 3-0)

combat-configured*
A readiness status for systems that indicate the system or systems are at a basic level of readiness to conduct combat operations. At a minimum, the system(s) must include the crew, munitions, fuel, communication equipment, supplies, and other enablers required to conduct combat operations. Enhanced combat-configured systems may include mobility, lethality, protection, and network upgrades to maneuver formations and enablers, along with additional sustainment that allows maneuver formations and their enablers to transition quickly to combat operations and prolong endurance.

combat power
The total means of destructive, constructive, and information capabilities that a military unit or formation can apply at a given time. (ADP 3-0)

combined arms
The synchronized and simultaneous application of arms to achieve an effect greater than if each element was used separately or sequentially. (ADP 3-0)

command
The authority that a commander in the armed forces lawfully exercises over subordinates by virtue of rank or assignment. (JP 1)

command and control
The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. (JP 1)

commander's intent
A clear and concise expression of the purpose of the operation and the desired military end state that supports mission command, provides focus to the staff, and helps subordinate and supporting commanders act to achieve the commander's desired results without further orders, even when the operation does not unfold as planned. (JP 3-0)

competition
The condition that exists when two or more actors in the international system have incompatible interests but neither seeks to escalate to escalate to armed conflict. (Joint Concept for Integrated Campaigning)

complex terrain
A geographical area consisting of urban center larger than a village and/or of two or more types of restrictive terrain or environmental conditions occupying the same space. (ATP 3-34.80)

contiguous area of operations
An area of operations where all of a commander's subordinate forces' areas of operations share one or more common boundary. (FM 3-90-1)

control
The regulation of forces and warfighting functions to accomplish the mission in accordance with the commander's intent. (ADP 6-0)

convergence
Rapid and continuous integration of capabilities in all domains, the electromagnetic spectrum, and 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. (MDO Concept)

counter-mobility operations
The construction of obstacles and emplacement of minefields to delay, disrupt, and destroy the enemy by reinforcement of the terrain. (JP 3-34)

cross-domain fires
The integration and delivery of lethal and nonlethal fires across all five domains (land, maritime, air, space, and cyberspace), the electromagnetic spectrum, and the information environment. (MDO Concept)

cross-domain maneuver*
The synchronization and employment of forces and capabilities through movement in combination with converged lethal and nonlethal capabilities across multiple domains, the EMS, and the IE. Cross-domain maneuver creates synergistic effects in the physical, temporal, virtual, and cognitive realms that increase relative combat power and provide the overmatch necessary to destroy or defeat enemy forces, control land areas and resources, and protect populations.

cross-domain reconnaissance and security operations*
The synchronization and application of forces and capabilities while gaining and maintaining contact through maneuver and the eleven forms of contact to collect critical information, and provide early warning, time and maneuver space that facilitates decision making and enables seizing, retaining, and exploiting the initiative. Cross-domain reconnaissance and security operations are synchronized with lethal and nonlethal capabilities across multiple domains, the

electromagnetic spectrum, and the information environment to include while operating in denied, degraded, and disrupted conditions.

cross-domain synergy
The complementary vice merely additive employment of capabilities in different domains such that each enhances the effectiveness and compensates for the vulnerabilities of the others – to establish superiority in some combination of domains that will provide the freedom of action required by the mission. (Joint Operational Access Concept)

cyberspace
A global domain within the information environment consisting of the interdependent network of information technology infrastructures and resident data, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers. (JP 3-12)

cyberspace electromagnetic activities
Process of planning, integrating, and synchronizing cyberspace and electronic warfare operations in support of unified land operations. (ADP 3-0)

cyberspace operations
Employment of cyberspace capabilities where the primary purpose is to achieve objectives in or through cyberspace. (JP 3-0)

decentralized execution
Delegation of execution authority to subordinate commanders. (JP 3-30)

decisive operation
Operation that directly accomplishes the mission. (ADP 3-0)

decisive point
Geographic place, specific key event, critical factor, or function that, when acted upon, allows commanders to gain a marked advantage over an adversary or contribute materially to achieving success. (JP 5-0)

decisive space
Conceptual geographic and temporal location 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. (MDO Concept)

Deep Maneuver Area
Area where maneuver forces can go (beyond the Close Area) but is so contested that maneuver still requires significant allocation and convergence of multi-domain capabilities. (MDO Concept)

defeat
Render a force incapable of achieving its objectives. (ADP 3-0)

destroy
Tactical mission task that physically renders an enemy force combat-ineffective until it is reconstituted; to damage a combat system so badly that it cannot perform any function or be restored to a usable condition. (FM 3-90-1)

deterrence
The prevention of action by the existence of a credible threat of unacceptable counteraction and/or belief that the cost of action outweighs the perceived benefits. (JP 3-0)

dis-integrate
Break the coherence of the enemy's system by destroying or disrupting its subcomponents (such as command and control means, intelligence collection, critical nodes, etc.) degrading its ability to conduct operations while leading to a rapid collapse of the enemy's capabilities or will to fight. (MDO Concept)

dispersion
The spreading or separating of troops, materiel, establishments, or activities, which are usually concentrated in limited areas to reduce vulnerability. (JP 5-0)

domain
An area of activity within the operational environment (land, air, maritime, space, and cyberspace) in which operations are organized and conducted. (MDO Concept)

electromagnetic spectrum
The range of frequencies of electromagnetic radiation from zero to infinity. It is divided into 26 alphabetically designated bands. (JP 3-13.1)

end state
The set of required conditions that defines achievement of the commander's objectives. (JP 3-0)

enemy
Party identified as hostile against which the use of force is authorized. (ADP 3-0)

engagement
Tactical conflict, usually between opposing, lower echelon maneuver forces. (JP 3-0)

execution
Act of putting a plan into action by applying combat power to accomplish the mission and adjusting operations based on changes in the situation. (ADP 5-0)

force tailoring
Process of determining the right mix of forces and the sequence of their deployment in support of a Joint Force commander. (ADP 3-0)

foreign internal defense
Participation by civilian and military agencies of a government in any of the action programs taken by another government or other designated organization to free and protect its society from subversion, lawlessness, insurgency, terrorism, and other threats to its security. (JP 3-22)

foreign security forces
Forces, including, but not limited to military, paramilitary, police, and intelligence forces; border police, coast guard, and customs officials; and prison guards and correctional personnel, that provide security for a host nation and its relevant population or support a regional security organization's mission. (FM 3-22)

hybrid threat
The diverse and dynamic combination of regular forces, irregular forces, terrorist forces, or criminal elements unified to achieve mutually benefitting threat effects. (ADP 3-0)

hyperactive
More active than usual or desirable; hyper-competitive during competition and hyper-violent in armed conflict. (MDO Concept)

infiltration
Form of maneuver in which an attacking force conducts undetected movement through or into an area occupied by enemy forces to occupy a position of advantage in the enemy rear while exposing only small elements to enemy defensive fires. (FM 3-90-1)

information environment
The aggregate of individuals, organizations, and systems that collect, process, disseminate, or act on information. (JP 3-13)

information environment operations
Integrated employment of information related capabilities in concert with other lines of operation to influence, deceive, disrupt, corrupt, or usurp the decision making of enemies and adversaries while protecting our own; to influence enemy formations and populations to reduce their will to fight; and influence friendly and neutral populations to enable friendly operations. (MDO Concept)

information operations
Integrated employment, during military operations, of information related capabilities in concert with other lines of operation to influence, disrupt, corrupt, or usurp the decision making of adversaries and potential adversaries while protecting our own. (JP 3-13)

information-related capability
Tool, technique, or activity employed within a dimension of the information environment that can be used to create effects and operationally desirable conditions. (JP 3-13)

information warfare
Employing information capabilities in a deliberate disinformation campaign supported by actions of the intelligence organizations designed to confuse the enemy and achieve strategic objectives at minimal cost. (MDO Concept)

integration
The arrangement of military forces and their actions to create a force that operates by engaging as a whole. (JP 1)

interoperability
Operate in synergy in the execution of assigned tasks. (JP 3-0)

interorganizational*
Elements of the Department of Defense; participating United States Government departments and agencies; state, territorial, local, and tribal agencies; foreign military forces and government agencies; international organizations; nongovernmental organizations; and the private sector. (modified from JP 3-08)

joint
Connotes activities, operations, organizations, etc., in which elements of two or more military departments participate. (JP 1)

joint force air component commander
The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking air forces; planning and coordinating air operations; or accomplishing such operational missions as may be assigned. (JP 3-0)

joint force commander
A general term applied to a combatant commander, sub-unified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a Joint Force. (JP 1)

joint force land component commander
The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking land forces; planning and coordinating land operations; or accomplishing such operational missions as may be assigned. (JP 3-0)

joint force maritime component commander
The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking maritime forces and assets; planning and coordinating maritime operations; or accomplishing such operational missions as may be assigned. (JP 3-0)

joint force special operations component commander
The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking special operations forces and assets; planning and coordinating special operations; or accomplishing such operational missions as may be assigned. (JP 3-0)

joint special operations task force
A joint task force composed of special operations units from more than one Service, formed to carry out a specific special operation or prosecute special operations to support a theater campaign or other operations. Also called JSOTF. (JP 3-05)

joint task force
A joint force that is constituted and so designated by the Secretary of Defense, a combatant commander, sub-unified commander, or an existing joint task force commander. (JP 1)

kinetic*
A weapon (action or capability) that after transiting to a designated target employs the dynamic transfer of energy (chemical, explosive, lethal, nonlethal effects)) to defeat, destroy, or incapacitate personnel, platforms, and systems.

land domain
The area of the Earth's surface ending at the high water mark and overlapping with the maritime domain in the landward segment of the littorals. (JP 3-31)

lethal*
A weapon (or capability) that is explicitly designed and employed to produce effects that result in great harm, death, or destruction in designated targets within acceptable levels of collateral damage to property, personnel, and the environment.

maneuver
Employment of forces in the operational area through movement, in combination with fires, to achieve a position of advantage in respect to the enemy. (JP 3-0)

maritime domain
The oceans, seas, bays, estuaries, islands, coastal areas, and the airspace above these, including the littorals. (JP 3-32)

military engagement
Routine contact and interaction between individuals or elements of the Armed Forces of the United States and those of another nation's armed forces, or foreign and domestic civilian authorities or agencies to build trust and confidence, share information, coordinate mutual activities, and maintain influence. (JP 3-0)

military information support operations
Planned operations to convey selected information and indicators to foreign audiences to influence their emotions, motives, objective reasoning, and ultimately the behavior of foreign governments, organizations, groups, and individuals in a manner favorable to the originator's objectives. Also called MISO. (JP 3-13.2)

mission
Task, together with the purpose, that clearly indicates the action to be taken and the reason therefore. (JP 3-0)

mission command
The Army's approach to command and control that empowers subordinate decision making and decentralized execution appropriate to the situation. (ADP 6-0)

mission-essential task
Collective task on which an organization trains to be proficient in its designed capabilities or assigned mission. (FM 7-0)

mission-essential task list
Tailored group of mission-essential tasks. Also called METL. (FM 7-0)

mission variables
Categories of specific information needed to conduct operations. (ADP 1-01)

mobility
A quality or capacity of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission. (JP 3-17)

multi-domain
Dealing with more than one domain at the same time. (MDO Concept)

multi-domain fires
Fires that converge effects from two or more domains against a target. (ADP 3-19)

multi-domain formations
Army organizations possessing the combination of capacity, capability, and endurance necessary to operate across multiple domains in contested spaces against a near-peer adversary. (MDO Concept)

Multi-Domain Operations
Operations conducted across multiple domains and contested spaces to overcome an adversary's (or enemy's) strengths by presenting them with several operational and/or tactical dilemmas through the combined application of calibrated force posture; employment of multi-domain formations; and convergence of capabilities across domains, environments, and functions in time and spaces to achieve operational and tactical objectives. (MDO Concept)

mutual support
That support which units render each other against an enemy, because of their assigned tasks, their position relative to each other and to the enemy, and their inherent capabilities. (JP 3-31)

near-peer adversary
Those nation states with the intent, capabilities, and capacity to contest U.S. interests globally in most or all domains, the electromagnetic spectrum, and the information environment. (MDO Concept)

neutral
A party identified as neither supporting nor opposing friendly or enemy forces. (ADP 3-0)

noncontiguous area of operations
Where one or more of the commander's subordinate forces' areas of operation do not share a common boundary. (FM 3-90-1)

nonkinetic*
A weapon (action or capability) that generates negative systematic effects to personnel, platforms, or system(s) remotely that degrades, disrupts, defeats, or incapacitates the designated target.

nonlethal*
A weapon (or capability) that is explicitly designed and primarily employed to produce effects that are intended to incapacitate or redirect personnel or materiel from interfering with military operations, while minimizing fatalities, permanent injury to personnel, and undesired damage or disruption to activities, property and the environment.

objective
Clearly defined, decisive, and attainable goal toward which every operation is directed.
(JP 5-0)

obstacle
Any natural or man-made obstruction designed or employed to disrupt, fix, turn, or block the movement of an opposing force, and to impose additional losses in personnel, time, and equipment on the opposing force. (JP 3-15)

operate semi-independently*
BCTs conduct dispersed operations at maximum supporting range and sustain operations at extended supporting distance to achieve mission objectives.

operation
A sequence of tactical actions with a common purpose or unifying theme. (JP 1)

operational area
An overarching term encompassing more descriptive terms (such as area of responsibility and joint operations area) for geographic areas in which military operations are conducted. (JP 3-0)

operational control
The authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. (JP 1)

operational environment
A composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. (JP 3-0)

operational framework
A cognitive tool used to assist commanders and staffs in clearly visualizing and describing the application of combat power in time, space, purpose, and resources in the concept of operations. (ADP 1-01)

operational reach
The distance and duration across which a Joint Force can successfully employ military capabilities. (JP 3-0)

operational variables
A comprehensive set of information categories used to define an operational environment. (ADP 1-01)

organic
Assigned to and forming an essential part of military organization. Organic parts of a unit are those listed in its table of organization for the Army, Air Force, and Marine Corps, and are assigned to the operating forces for the Navy. (JP 1)

overmatch
The application of capabilities or unique tactics either directly or indirectly, with the intent to prevent or mitigate opposing forces from using their current or projected equipment or tactics. (MDO Concept)

phase
A planning and execution tool used to divide an operation in duration or activity. (ADP 3-0)

physical
Aspects related to geography, terrain, infrastructure, populations, distance, weapons ranges and effects, and known enemy locations. (modified from FM 3-0)

planning
The art and science of understanding a situation, envisioning a desired future, and determining effective ways to bring that future about. (ADP 5-0)

position of relative advantage
A location or the establishment of a favorable condition within the area of operations that provides the commander with temporary freedom of action to enhance combat power over an enemy or influence the enemy to accept risk and move to a position of disadvantage. (ADP 3-0)

precision munition
A munition that corrects for ballistic conditions using guidance and control up to the aim point or sub-munitions dispense with terminal accuracy less than the lethal radius of effects. (FM 3-09)

preparation
Those activities performed by units and Soldiers to improve their ability to execute an operation. (ADP 5-0)

priority intelligence requirement
An intelligence requirement, stated as a priority for intelligence support, that the commander and staff need to understand the adversary or other aspects of the operational environment.

protection
Preservation of the effectiveness and survivability of mission-related military and nonmilitary personnel, equipment, facilities, information, and infrastructure deployed or located within or outside the boundaries of a given operational area. (JP 3-0)

reconnaissance
A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or adversary, or to secure data concerning the meteorological, hydrographical, or geographical characteristics of a particular area. (JP 2-0)

reconnaissance handover
The action that occurs between two elements in order to coordinate the transfer of information and/or responsibility for observation of potential threat contact, or the transfer of an assigned area from one element to another. (FM 3-98)

regionally aligned forces
Those forces that provide a combatant commander with up to joint task force capable headquarters with scalable, tailorable capabilities to enable the combatant commander to shape the environment. Regionally aligned forces are those Army units assigned to combatant commands, those Army units allocated to a combatant command, and those Army capabilities distributed and prepared by the Army for combatant command regional missions. (FM 3-22)

risk
Probability and severity of loss linked to hazards. (JP 5-0)

security assistance
Group of programs authorized by the Foreign Assistance Act of 1961, as amended, and the Arms Export Control Act of 1976, as amended, or other related statutes by which the United States provides defense articles, military training, and other defense-related services, by grant, loan, credit, or cash sales in furtherance of national policies and objectives. Security assistance is an element of security cooperation funded and authorized by Department of State to be administered by Department of Defense/Defense Security Cooperation Agency. (JP 3-22)

security cooperation
All Department of Defense interactions with foreign security establishments to build security relationships that promote specific United States security interests, develop allied and partner nation military and security capabilities for self-defense and multinational operations, and provide United States forces with peacetime and contingency access to allied and partner nations. (JP 3-22)

security force assistance
The Department of Defense activities that support the development of the capacity and capability of foreign security forces and their supporting institutions. (JP 3-22)

security operations
Those operations performed by commanders to provide early and accurate warning of enemy operations, to provide the forces being protected with time and maneuver space within which to react to the enemy, and to develop the situation to allow commanders to use the protected force effectively. (ADP 3-90)

shaping operation
An operation at any echelon that creates and preserves conditions for success of the decisive operation through effects on the enemy, other actors, and the terrain. (ADP 3-0)

situational understanding
The product of applying analysis and judgment to relevant information to determine the relationship among the operational and mission variables. (ADP 5-0)

snap drill
Rapid reaction military exercise to test combat readiness. (MDO Concept)

space domain
The area above the altitude where atmospheric effects on airborne objects become negligible. (JP 3-14)

special operations joint task force
A modular, tailorable, and scalable special operations task force designed to provide integrated, fully-capable, and enabled joint special operations forces to geographic combatant commanders and Joint Force commanders. (JP 3-05)

special operations forces (DOD)
Active and Reserve component forces of the Military Service designated by the Secretary of Defense and specifically organized, trained, and equipped to conduct and support special operations. Also called SOF. (JP 3-05)

stability operation
An operation conducted outside the United States in coordination with other instruments of national power to establish or maintain a secure environment and provide essential government services, emergency infrastructure reconstruction, and humanitarian relief. (ADP 3-0)

stand-off
The physical, cognitive, and informational separation that enables freedom of action in any, some, or all domains, the electromagnetic spectrum, and information environment to achieve strategic and/or operational objectives before an adversary can adequately respond. It is achieved with both political and military capabilities. (MDO Concept)

supporting distance
Distance between two units that can be traveled in time for one to come to the aid of the other and prevent its defeat by an enemy or ensure it regains control of a civil situation. (ADP 3-0)

supporting range
The distance one unit may be geographically separated from a second unit yet remain within the maximum range of the second unit's weapons systems. (ADP 3-0)

survivability
A quality or capability of military forces which permits them to avoid or withstand hostile actions or environmental conditions while retaining the ability to fulfill their primary mission.
(ATP 3-37.34)

sustaining operation
An operation at any echelon that enables the decisive operation or shaping operations by generating and maintaining combat power. (ADP 3-0)

sustainment
The provision of logistics, financial management, personnel services, and health service support necessary to maintain operations until successful mission completion. (ADP 4-0)

synchronization
The arrangement of military actions in time, space, and purpose to produce maximum relative combat power at a decisive place and time. (JP 2-0)

tactical control
The authority over forces that is limited to the detailed direction and control of movements or maneuvers within the operational area necessary to accomplish missions or tasks assigned. (JP 1)

tactical level of war
Level of war at which battles and engagements are planned and executed to achieve military objectives assigned to tactical units or task forces. (JP 3-0)

Tactical Support Area
The area that directly enables decisive tactical operations in the Close Area and extension of capabilities into the deep maneuver and deep fires areas. (MDO Concept)

targeting
The process of selecting and prioritizing targets and matching the appropriate response to them, considering operational requirements and capabilities. (JP 3-0)

task
A clearly defined action or activity specifically assigned to an individual or organization that must be done as it is imposed by an appropriate authority. (JP 1)

task organization
A temporary grouping of forces designed to accomplish a particular mission. (ADP 5-0)

task-organizing
The act of designing an operating force, support staff, or sustainment package of specific size and composition to meet a unique task or mission. (ADP 3-0)

tempo
The relative speed and rhythm of military operations over time with respect to the enemy. (ADP 3-0)

temporal
Aspects related to time, including when capabilities can be used, how long they take to generate and employ, and how long they must be used to achieve desired effects. (modified from FM 3-0)

theater special operations command
A subordinate unified command established by a combatant commander to plan, coordinate, conduct, and support joint special operations. Also called TSOC. (JP 3-05)

threat
Any combination of actors, entities, or forces that have the capability and intent to harm United States forces, United States national interests, or the homeland. (ADP 3-0)

unmanned aircraft system
That system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft. (JP 3-30)

virtual
Aspects related to activities, capabilities, and effects relevant to the layers of cyberspace. (modified from FM 3-0)

vulnerabilities
Characteristics, motives, or conditions of the target audience that can be used to influence behavior. (FM 3-53)

warfighting function
A group of tasks and systems united by a common purpose that commanders use to accomplish missions and training objectives. (ADP 3-0)

*Proposed definition

Endnotes

[1] ADP 3-0, pg. 4-5.
[2] ADP 3-0, pg. 5-3.
[3] ADP 3-0, pg. 3-9.
[4] ADP 3-0, pg. v.
[5] ADP 3-0, pg. 4-5.
[6] TP 525-3-1, pg. C-1.
[7] FM 3-0, pgs.1-26 – 1-27.
[8] TP 525-3-1, pg. iii. The electromagnetic spectrum and information environment are included because the MDO Concept recognizes them as part of layered stand-off. Sea is an incorrect domain. Maritime replaces sea to be consistent with the MDO Concept narrative.
[9] JCIC, pgs. 7-8.
[10] The EAB Concept also operationalizes the MDO Concept at the operational level for the theater and field armies; however, the BCT Concept limits its discussion to the roles, functions, and responsibilities of the corps and division only. Including the theater and field armies are beyond the scope of the BCT Concept. Instead, the BCT Concept follows a similar format to an operations plan/operations order, limiting the narrative to the two higher echelons that most directly impact the BCT. In this case, these are the corps and division.
[11] ADP 1-01, pg. 4-7.
[12] Figure 1-1 is adapted from the JCIC, pg. 8.
[13] ADP 1-01, pg. 4-7.
[14] TP 525-3-1, pg. iii. Operational objectives included.
[15] TP 525-3-8, pg. i. The EAB Concept also operationalizes the MDO Concept at the operational level for the theater and field armies; however, the BCT Concept limits its discussion to the roles, functions, and responsibilities of the corps and division only. Including the theater and field armies is beyond the scope of the BCT Concept. Instead, the BCT Concept follows a similar format to an operations plan/operations order, limiting the narrative to the two higher echelons that most directly impact the BCT. In this case, these are the corps and division.
[16] TP 525-3-1, pg. 20. Future operations against a near-peer threat will require the Joint Force to conduct convergence—the rapid and continuous integration of capabilities in all domains, the EMS, and IE.
[17] TP 525-3-1, pg. C-3. Temporal, virtual, and cognitive space will be contested and have been added.
[18] ADP 1, pgs. 2-7 – 2-8.
[19] Figure 1-2 is adapted from TP 525-3-1, pg. 22.
[20] ADRP 3-0, pg. 1-10.
[21] A description of the Global Operating Model and the four layers that comprise the model (contact, blunt, surge, and homeland) can be found in the Summary of the 2018 National Defense Strategy, pg. 7.
[22] TP 525-3-1, pg. 20. Temporal added to original text.
[23] Military Misfortunes: The Anatomy of Failure in War, pgs. 26-28; pgs. 105-109.
[24] The War of Atonement, pgs. 286-288.
[25] Military Misfortunes: The Anatomy of Failure in War, pgs. 126-131.
[26] Military Misfortunes: The Anatomy of Failure in War, pgs. 26-27. When three kinds of failure occur together (failure to learn, failure to anticipate, and failure to adapt), catastrophe occurs.
[27] United States Military Academy Maps and Atlases, the Golan Heights Campaign, Israel-Syria, 1973-Combined.
[28] The Yom Kippur War 1973 (1), pgs. 55 and 83.
[29] TP 525-92, pg. 11.
[30] TP 525-92, pg. 14.
[31] TP 525-92, pg. 7.
[32] TP 525-3-8, pgs. 9-10.
[33] The Russian Way of War: Force Structure, Tactics, and Modernization of the Russian Ground Forces, pg. 236.
[34] Jane's Defense. Kornet Family, 29 June 2018. Jane's Defence. Red Arrow 10, https://janes.ihs.com/Janes/Display/jlwu0010-jlwu.
[35] TP 525-92, 7 October 2019, pg. 13.
[36] Defense Intelligence Agency, China Military Power: Modernizing a Force to Fight and Win, pgs. 60-61. The Russian Way of War: Force Structure, Tactics, and Modernization of the Russian Ground Forces, pgs. 268-271.

[37] Shawn Brimley, Center for a New American Security, While We Still Can: Arresting the Erosion of America's Military Edge, 17 December 2015.
[38] Red Diamond Threats Newsletter: TRADOC G-2 Operational Environment Enterprise Analysis and Control Element Threats Integration, Volume 9, Issue 01, pgs. 8-9.
[39] Red Diamond Threats Newsletter: TRADOC G-2 Operational Environment Enterprise Analysis and Control Element Threats Integration, pg. 8. [40] Red Diamond Threats Newsletter: TRADOC G-2 Operational Environment Enterprise Analysis and Control Element Threats Integration, pg. 8. [41] The Russian Way of War: pg. 386.
[42] The Russian Way of War: pg 386.
[43] The Russian Way of War: pg. 263.
[44] Defense Intelligence Agency, China Military Power: Modernizing a Force to Fight and Win, pgs. 33 and 92.
[45] JP 2-01.3, pg. III-8.
[46] FM 3-12, pgs. 1-4 – 1-16.
[47]People's Liberation Army Tactics, September 2019, pg. 1-15.
[48] Red Diamond Threat Newsletter: TRADOC G-2 Operational Environment & Threat Analysis. Focus on China; Bits in the Wire: Advancing Threats in the Cyber Domain, pg. 22.
[49] Red Diamond Threat Newsletter: TRADOC G-2 Operational Environment & Threat Analysis. Focus on China; Bits in the Wire: Advancing Threats in the Cyber Domain, pg. 22.
[50] OE Watch: Foreign News and Perspectives of the Operational Environment. Special Operations Forces, pg.8.
[51] FM 3-12, pgs. 1-30 – 1-31.
[52] TP 525-92, pg. 14.
[53] Department of Defense Strategy for Operations in the Information Environment, https://dod.defense.gov/Portals/1/Documents/pubs/DoD-Strategy-for-Operations-in-the-IE-Signed-20160613.pdf.
[54] The Strengths and Weakness of Russia's Military, https://www.dw.com/en/the-strengths-and-weaknesses-of-russias-military/a-43293017.
[55] Russia's Deceptively Weak Military, https://nationalinterest.org/feature/russias-deceptively-weak-military-13059.
[56] Democracy Dies in Darkness, https://www.washingtonpost.com/news/monkey-cage/wp/2017/03/08/why-russia-is-far-less-threatening-than-it-seems/.
[57] Russia's Deceptively Weak Military https://nationalinterest.org/feature/russias-deceptively-weak-military-13059.
[58] Russia's Deceptively Weak Military, https://nationalinterest.org/feature/russias-deceptively-weak-military-13059.
[59] Russia's Deceptively Weak Military, https://nationalinterest.org/feature/russias-deceptively-weak-military-13059.
[60] Russia's Deceptively Weak Military, https://nationalinterest.org/feature/russias-deceptively-weak-military-13059.
[61] China's Incomplete Military Transformation, pgs. 47-48.
[62] China's Incomplete Military Transformation, pgs. 47-48.
[63] People's Liberation Army Tactics, September 2019, pg. B-1.
[64] People's Liberation Army Tactics, September 2019, pgs. B-1 – B-3.
[65] China's Incomplete Military Transformation, pgs.60-61.
[66] FM 3-0, pg.1-2.
[67] ADP 3-0, pg. 1-9.
[68] TP 525-3-1, pg. GL-7.
[69] The Land Warfare Papers, Surprise, Shock, and Daring, pg. 41.
[70] MCDP 1, pg. 2-19. Speed is rapidity of action. It applies to both time and space. In war, it is relative speed that matters. Superior speed allows us to seize the initiative and dictate the terms of action, forcing the enemy to react to us. Speed provides security. It is a prerequisite for maneuver and for surprise. Moreover, speed is necessary in order to concentrate superior strength at the decisive time and place.
[71] MCDP 1, pg. 4-6. If the aim of maneuver warfare is to shatter the cohesion of the enemy system, the immediate object toward that end is to create a situation in which the enemy cannot function. Friendly forces seek to pose menacing dilemmas in which events happen unexpectedly and more quickly than the enemy can keep up with them. The enemy must be made to see his situation not only as deteriorating, but deteriorating at an ever-increasing rate. The ultimate goal is panic and paralysis, an enemy who has lost the ability to resist.
[72] MCDP 1, pg. 2-13.
[73] TP 525-3-8, pg. 24.
[74] MCDP 1, pg. 2-20. The combination of speed and focus adds "punch" or "shock effect" to U.S.forces actions. It follows that that friendly forces should strike with the greatest possible combination of speed and focus.
[75] MCDP 1, pg. 2-21. Surprise means a state of disorientation resulting from an unexpected event that degrades the enemy's ability to resist. Friendly forces achieve surprise by striking the enemy at a time or place or in a manner for which the enemy is unprepared. It is not essential that friendly forces take the enemy unaware, but only that awareness came too late to react effectively.
[76] Land Warfare Papers, Surprise, Shock, and Daring pg. 13.
[77] Land Warfare Papers, Surprise, Shock, and Daring pg. 15.
[78] TP 525-3-1, pg. C-9.
[79] JP 3-30, pg. I-3.
[80] TP 525-8-3, pg. 27.
[81] TP 525-8-3, pgs. 27-28.
[82] The eleven forms of contact are: visual, direct fire, indirect fire, aerial, obstacle, CBRN, EMS, non-hostile, cyberspace, space, and information. See the Division R&S Operational and Organizational Concept for more information.
[83]TP 525-3-8, pg. 19.
[84] JP 5-0, pg. GL-8.
[85] ADP 3-0, pg. 2-9.
[86] TP 525-8-3, pg.53. Corps also continuously converge effects across multiple domains, the EMS, and IE. See Section 1-6 for a discussion on continuous convergence.
[87] TP 525-8.3, pg. 53.
[88] TP 525-3-8, pg. 54.

[89] TP 525-3-8, pg. 54. Divisions also continuously converge effects across multiple domains, the EMS, and IE. See Section 1-6 for a discussion on continuous convergence.
[90] TP 525-3-1, pg. 22 and 44.
[91] FM 3-96, pg. 1-1. In addition to the capabilities described in FM 3-96, the BCT contains, or has the ability to access, capabilities that enable it to operate across multiple domains, the EMS, and the IE.
[92] ADP 3-0, Operations, pg. 1-11.
[93] Army Training Network, https://atn.army.mil/. [Access-controlled website. Department of Defense Common Access Card login required]
[94] JP 3-20, pg. v.
[95] FM 3-96, pg. 5-1.
[96] ADP 1, pgs. 2-7 – 2-8.
[97] A description of the Global Operating Model and the four layers that comprise the model (contact, blunt, surge, and homeland) can be found in the Summary of the 2018 National Defense Strategy, pg. 7.
[98] FM 3-90-1, Change 2, pg. 6-1.
[99] Military Misfortunes: The Anatomy of Failure in War, pgs. 26-27.
[100] The Dynamics of Military Revolution 1300-2050, pgs. 176-185.
[101] ADP 6-0, pg. 1-3.
[102] ADP 6-0, pg. viii.
[103] JP1, pg. GL-5.
[104] ADP 6-0, pg. 1-16.
[105] ADP 6-0, pg. 4-1.
[106] ADP 2-0, pg. 3-1.
[107] ADP 2-0, pgs. 2-4 – 2-6.
[108] JP 3-05, pg. GL-11.
[109] FM 3-52, pgs. 2-9 – 2-10.
[110] The Russian Edge in Electronic Warfare, https://georgetownsecuritystudiesreview.org/2019/06/26/the-russian-edge-in-electronic-warfare/.