

Moving into the Future: Allied Mobility in a Modern Hybrid Warfare Operational Environment

A Monograph

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Abstract

Moving into the Future: Allied Mobility in a Modern Hybrid Warfare Operational Environment, by MAJ Kurt R. Grimsrud, Canadian Army, 51 pages.

This monograph investigates the implication of modern hybrid warfare or Russian fourth generation warfare on mobility. Hezbollah in the Second Lebanon War in 2006 and separatists in the crisis in Ukraine in 2014 provide examples of irregular forces applying a wide range of strategies and sophisticated modern weapons and technology. Allied doctrine is analyzed to compare current and past doctrines to the two case studies and the multi-domain battle concept. Using the US Army Warfighting functions as an analysis tool doctrine, equipment and organizational recommendations are made. The recommendations to improve mobility in the modern hybrid threat environment include a doctrinal focus on wider dispersion, less reliance on communications, more mobile and self-supporting units. This requires lighter, multi-role, swimmable high mobility fighting vehicles. Units require a higher ratio of logistics vehicles. These combined arms units must be self-sufficient, well-rehearsed and capable of independent maneuver.

Contents

Abstract	iii
Acknowledgements	v
Acronyms	vi
Illustrations	vii
Introduction	1
Modern Hybrid Warfare Concepts	7
Mobility as a Warfighting Function	12
Current Mobility Doctrine	12
Origins of Mobility Doctrine	20
Mobility in Practice	24
Lessons from Lebanon	24
Lessons from Ukraine	31
Meeting the Challenge	38
Mobility Requirements for Hybrid Warfare	38
Section 5: Conclusion	45
Bibliography	48

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Acronyms

ADP	Army Doctrine Publication
ATGM	Anti-Tank Guided Missile
DOTMLPF-P	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy.
EMS	Electromagnetic Spectrum
FM	Field Manual
GPS	Global Positioning Systems
IDF	Israeli Defense Force
IED	Improvised Explosive Device
ISIL	Islamic State of Iraq and the Levant
MLRS	Multiple Launch Rocket System
NATO	North Atlantic Treaty Organization
SAMS	Surface to Air Missile Systems
SIGINT	Signals Intelligence
SOSRA	Suppress, Obscure, Secure, Reduce, Assault
STANAG	Standardization Agreement (NATO)
TRADOC	Training and Doctrine Command
UAV	Unmanned Aerial Vehicle

Illustrations

Figure 1. Brigade Combat Team Crossing Area Overlay for a Course of Action	17
Figure 2. Map of Second Lebanon War 2006	25
Figure 3. Situation in Eastern Ukraine August 2014	35

Introduction

In Book Eight of *On War*, Clausewitz “wanted to show how every age had its own kind of war, its own limiting conditions, and its own particular preconceptions. Each period, therefore, would have held to its own theory of war.”¹ Warfare constantly changes in response to new technologies and new theories, so must militaries similarly respond. This challenge and response results in revolutions in military affairs, which are periods of innovation in which armed forces develop novel concepts involving changes in doctrine, tactics, procedures, and technology. These changes impact almost exclusively at the operational level of war.²

In the twentieth century, there have been a series of changes in the theories of war. The trench warfare of the First World War gave way to the maneuver warfare of World War II, which resulted from the rise of mechanization and new technologies such as aircraft, and radios. This latter conflict culminated with the atomic bomb, further changing the concept of warfare and ushering in a period of more limited conflicts. The Cold War that emerged with the post-war proliferation of nuclear weapons saw the rise of Soviet military power and an escalation in the number of weapons and their sophistication. With nuclear weapons preventing conventional war, guerrilla warfare reemerged in the wake of anti-colonialism and social revolutions that swept across the globe after WWII. However, the sophistication and firepower of large conventional forces did not help them in wars against enemies with nebulous and elusive targets of passionate and motivated partisans.³

Since 1999, the Russian military has been involved in conflicts in Chechnya, Georgia, and Ukraine where they demonstrated what has been termed a “Russian hybrid warfare” or

¹ Carl Von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1989), 593.

² MacGregor Knox and Williamson Murray, *The Dynamics of Military Revolutions 1300-2050* (New York: Cambridge University Press, 2001), 179-180.

³ Lawrence Freedman, *Strategy: A History* (New York: Oxford University Press, 2013), 179.

Russian New Generation Warfare. This evolution of warfare operates simultaneously along a spectrum of conflict from covert action to overt combat, with the mobilization and employment of partisan forces.⁴ This “Hybrid War” is not only used by the Russian military but was also used by Lebanon against Israel in 2006. The mixture of sophisticated conventional state controlled armies and guerrilla-like irregular warfare used concurrently with modern information technology has created a new operating environment for future conflicts. These state sponsored insurgencies are effective because they are unrestrained by the political limitations of state actors or the rules of conventional conflict. When well-supported irregular forces are linked to conventional long-range fires, air defense, and sensors, a very formidable force is created.

In July of 2016, Iraqi Engineers built an Improved River Bridge to cross a 200-meter gap on the Tigris River. This bridge replaced the Qayyarah Bridge that had been the only span across the Tigris between Mosul and Baghdad. The Islamic State of Iraq and the Levant (ISIL) had been using the Qayyarah Bridge, so coalition aircraft had to destroy it. Iraqi Forces built the military bridge to provide their troops mobility, allowing reinforcements and materials to cross easily. It also helped to isolate ISIL fighters and was a key factor in the campaign to retake Mosul from ISIL. Prior to the construction of the bridge, the Iraqi Forces had a division on both the east and west banks of the Tigris River. Still ISIL targeted the bridge with a mix of improvised explosive devices and sporadic mortar fire, but could not sustain this effort because of coalition air power.⁵ The Iraqi Forces conducted this mobility operation with overwhelming military superiority on the ground and with US Military air dominance. ISIL did not have the sophisticated weapons and resources of a nation state to contest this river crossing. In future conflicts that link conventional

⁴ Amos C. Fox and Andrew J. Rossow, “Making Sense of Russian Hybrid Warfare: A Brief Assessment of the Russo-Ukrainian War,” *The Land Warfare Papers*, No.112 (Arlington, VA: The Institute of Land Warfare, 2017), 1.

⁵ Jim Garamone, “Iraqi Military Demonstrates New Skills in Mosul Campaign”, *DoD News*, Defense Media Activity, accessed 12 Oct 2017, <https://www.defense.gov/News/Article/Article/885558/iraqi-military-demonstrates-new-skills-in-mosul-campaign/>.

and unconventional forces with access to long-range fires, air defense, and sensors such a crossing may not be so successful.

The years of counter-insurgency conflicts in Iraq and Afghanistan resulted in modifications of doctrine and development of capabilities specifically for that operational environment. There is now a growing focus on conventional operations in NATO and the US military. Unfortunately, wars in the future will have elements of both conventional and irregular elements that require a hybrid strategy to combat the hybrid threat.

The term hybrid warfare is widely used and has a variety of definitions and interpretations. For the purposes of this monograph, hybrid warfare is defined “as conflict involving a combination of conventional military forces and irregulars (guerrillas, insurgents, and terrorists), which could include both state and non-state actors, aimed at achieving a common political purpose.”⁶ This style of warfare has been used extensively in the 21st century to counter the conventional military superiority of the United States and NATO. It allows adversaries to blend various approaches to war to fit within their culture, historical legacies, geographic realities, and economic means.⁷ The successes of hybrid wars in recent decades in Vietnam, Iraq, and Afghanistan against an overwhelming conventional military threat suggest that this strategy in war is likely to proliferate. Because of the hybrid nature of combining conventional and irregular forces, it is also likely that the employment of hybrid strategies will differ across regions, cultures, economic systems, and ideologies.

Current NATO and allied doctrine and capabilities do not match the requirements needed to allow mobility in modern hybrid warfare now and into the future. Changes are required to allow Allied forces to move to positions of advantage to be successful in future land conflicts.

⁶ Williamson Murray and Peter R. Mansoor, *Hybrid Warfare: Fighting Complex Opponents from the Ancient World to the Present* (New York: Cambridge University Press, 2012), 2.

⁷ Ibid.

This monograph will not discuss the holistic implication of hybrid warfare. Instead, the paper will investigate the effects of hybrid warfare on mobility.

NATO defines mobility as “a quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission.”⁸ According to NATO doctrine, “Military engineering provides commanders with the means to use terrain in a manner that best meets campaign and operations’ objectives by applying a range of skills such as field, construction, environmental and geospatial engineering.”⁹ These two definitions highlight the critical role that military engineers play in supporting military operations by enabling the mobility of Allied Forces. US Army doctrine divides the role of the engineer into four lines of engineer support: assured mobility, enhance protection, enable force protection and logistics, and build partner capacity and build infrastructure.¹⁰ These lines of engineer support are not restricted to tactical maneuver on the battlefield. They represent a holistic approach to the entire operational environment. Engineer efforts enable the mobility of allied fighting forces and logistics, and help host nations to develop their own infrastructure and road networks.

The ability of militaries to move and achieve assigned missions is not strictly a task for military engineers. Mobility is also a result of several organizational decisions, including doctrine, force structure, and equipment. As threats change with time so must the equipment. To ensure mobility is possible in contemporary and future conflicts the equipment must adapt to the threats. With new equipment, new force structures are required to man, equip, and train new or modified capabilities. All of these changes must be informed by a doctrine that demonstrates flexible understanding of the current and future operating environment.

⁸ Allied Joint Publication (AJP) 3.2, *Allied Joint Doctrine for Land Operations* (NATO: October 2009), Lexicon 16.

⁹ Allied Joint Publication (AJP) 3.12, *Allied Joint Doctrine for Military Engineering: Edition B Version 1* June 2014 (NATO: June 2014), 1-2.

¹⁰ US Department of the Army, Field Manual (FM) 3-34, *Engineer Operations* (Washington, DC: Government Printing Office, 2014).

Mobility of Army organizations is a product of a series of interrelated factors and functions. The factors effecting mobility include the physical characteristics of equipment, logistical requirements, geography, intelligence, planning, communication, and the capabilities of adversaries. Mobility, being the ability to move to achieve the primary mission, is an operational requirement to be able to execute tactics and conduct military operations. A military that cannot move cannot achieve positions of advantage and cannot be tactically successful. Further, because mobility is based on a system of interrelated capabilities it provides a useful concept to analyze doctrine, force structure, and equipment without specific tactical considerations.

In order to analyze mobility as an operational requirement in modern hybrid warfare, the concept of hybrid warfare and the current Allied understanding of the future operating environment must be defined. There are multiple definitions of hybrid warfare and various nations conceptualize the future operating environment differently. The US military uses the term Multi-Domain Battle while the Russians use New Generation Warfare. Their concepts are different in scope and focus but both indicate a change in the way forces will fight in the future.

Next, current doctrine must be analyzed to determine if current concepts and procedures will be effective in the changing operational environment. Current doctrine demonstrates a bifurcated view of military operations between counter insurgency operations and conventional operations. In order to determine the requirement for doctrinal change engineer mobility operations such as conducting combined arms breaching, conducting area and route clearance, and conducting gap crossing will be analyzed in terms of a hybrid threat that uses both irregular and conventional military capabilities.

There are contemporary examples of modern hybrid warfare that provide lessons on mobility. In Lebanon in 2006, the Israel Defense Force (IDF) was determined to use conventional combat power against Hezbollah to prevent rocket attacks into Israel and recover an Israeli soldier captured in a border incident. Hezbollah demonstrated an ability to use state sponsored conventional weapons in a hybrid manner to successfully force negotiation with a much larger

and technologically advanced IDF. Russia also has been developing its hybrid capability through a series of conflicts in Chechnya, Georgia, and most recently in Ukraine. The use of massed conventional fires, electronic warfare, irregular warfare, espionage and information warfare has been prominent in their strategy. Of interest to mobility is the use of modernized mass artillery cued by sophisticated sensors and unmanned aerial vehicles to support both conventional and irregular combat. The US Army's Warfighting Functions can provide a lens through which these two particular cases can be holistically examined for interrelated issues that affect mobility. This study focuses on mission command, movement and maneuver, sustainment, intelligence, protection, and fires to analyze the case studies of modern hybrid warfare and provide recommendations.¹¹

Hybrid conflicts require dispersed forces that are highly mobile and capable of independent maneuver. The significant logistics and communications requirement of current force structure and doctrine does not align with the lessons learned from recent conflicts or the current conceptual understanding of future conflict. Importantly, however, improved mobility for a hybrid warfare environment is not an engineer responsibility but instead requires systematic changes to armies. There is a requirement for lighter, highly mobile vehicles to support combined arms maneuver with more lethal weapon systems. The current trend toward more armor and less mobility is not the answer. Organizational changes require combined arms teams to increase interoperability and self-reliance thus reducing network communication requirements. Further, the ratio of logistic to combat forces must increase. This allows for increased operational reach, wider dispersion, and independence of land maneuver forces.

¹¹ US Department of the Army, Army Doctrine Reference Publication (ADRP) 3-0, *Operations* (Washington, DC: Government Printing Office, 2012), 12-13.

Modern Hybrid Warfare Concepts

In order to understand the effects of hybrid warfare on mobility and the required changes for future Army doctrine, organizations and equipment, the concept of hybrid warfare must be understood and defined. Further, understanding of how the contemporary military powers have changed their conceptual understanding of the operational environment is required.

US Joint doctrine defines mobility as “a quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission.”¹² The Canadian definition is more specific, “Mobility provides for freedom of maneuver such that the tempo and momentum of operations are preserved without forces becoming concentrated and vulnerable to enemy firepower.”¹³ The Canadian doctrine highlights some of the complexity of mobility operations in the face of firepower and the need to avoid concentrating forces, thus the requirement for multiple routes. Both definitions are clear that mobility is the ability for military forces to move to advantageous positions of their choice on the battlefield to achieve their assigned missions.

Unfortunately, the term “hybrid warfare” has a multitude of different interpretations as it relates to modern conflict. In actuality, “hybrid warfare” is not a modern phenomenon and there are several historical examples. Throughout history, several forces employed hybrid threats and strategies in order to become difficult and powerful opponents. The German Army on the Eastern Front in World War II had continual disruption to its lines of communication due to the thousands of Soviet partisans conducting irregular operations behind the conventional front. In the Second Sino-Japanese War from 1937 to 1945, Mao Tse Tung and his forces perfected the use of both

¹² US Department of Defense, Joint Publication (JP) 1-02, *DOD Dictionary of Military and Associated Terms* (Washington, DC: Government Printing Office, 2017), 158.

¹³ Canadian Department of National Defence, B-GL-361-001/FP-001 *Land Force Engineer Operations Volume 1* (Ottawa, ONT: Canadian Department of Defence, 1998), 5.

regular and irregular forces to attack in both symmetric and asymmetric ways.¹⁴ Hybrid war is not new and does not change the nature of war, however it changes the ways in which it is fought.

Hybrid threats blend the lethality of state conflict with the fanatical and protracted fervor of irregular warfare. Modern hybrid warfare has proven to be even more dangerous because advanced conventional weapons and capabilities are being supplied to irregular forces. In modern hybrid war, states, state-sponsored groups, or self-funded actors exploit access to modern military capabilities to proliferate capabilities previously only available to state actors in novel ways. This practice has happened in Iraq and Lebanon with devastating effects on US Forces and the Israel Defense Force.¹⁵

In future hybrid warfare, the adversary will most likely present a unique combination of threats designed to target NATO vulnerabilities. This will merge separate challengers with fundamentally different approaches (conventional, irregular, or terrorist). NATO forces will face competitors who will employ all forms of war, including criminal behavior, simultaneously. Therefore, the greatest military challenge in the future will come not from a state that selects one approach, but from states or groups that select from a wide variety of tactics and technologies and blend them in innovative ways to meet their own strategic culture, geography, and aims. They will blend traditional and irregular tactics with decentralized planning and execution, employ non-state actors, and use both simple and sophisticated technologies in innovative ways.¹⁶ In modern hybrid war, states, state-sponsored groups, or self-funded actors will exploit access to modern military capabilities to proliferate capabilities previously only available to state actors in novel ways.

¹⁴ Williamson Murray and Peter R. Mansoor, *Hybrid Warfare: Fighting Complex Opponents from the Ancient World to the Present* (New York, NY: Cambridge University Press, 2012), 4-5.

¹⁵ *Ibid.*, 14-15.

¹⁶ Hoffman, Frank G, "Hybrid Threats: Reconceptualizing the Evolving Character of Modern Conflict," *Strategic Forum* Number 240 (April 2009), accessed September 21, 2017. http://www.ciaonet.org/wps/ifnss/0017056/f_0017056_14593.pdf.

Canada's 2017 Defence Policy, *Strong Secure Engaged*, dedicates a section to the Changing Nature of Conflict. The policy indicates that state and non-state actors are pursuing their agenda with hybrid methods in the "grey zone" that exists just below the threshold of armed conflict. It indicates that diplomatic, informational, cyber, military, and economic instruments will be used to achieve strategic operational objectives. This definition of hybrid warfare seeks to spread misinformation to sow confusion and create ambiguity to increase the potential for misperception and miscalculation. These methods undermine the credibility of national governments and international alliances.¹⁷ This understanding of the "Changing Nature of Conflict" has led Canada to conclude that, "in a global environment defined by complexity and unpredictability, Canada requires an agile, well-educated, flexible, diverse, and combat-ready military capable of conducting a wide range of operations."¹⁸

Similarly, the US military has also acknowledged the complexity of the changing operational environment in a Joint Marine Corps/US Army White Paper, *Multi-Domain Battle: Combined Arms for the 21st Century*. This document highlights some of the past doctrinal frameworks such as AirLand Battle in the 1980s followed by a transition to counterinsurgency. The White Paper highlights the fact that full spectrum dominance and a reliance on precision deep fires is no longer a solution. The AirLand battle doctrine that focused on two domains now requires expansion to five domains. These domains include the physical domains of air, land, sea, and space; the 'abstract' domain of cyberspace; as well as the electromagnetic spectrum (EMS); the information environment; and the cognitive dimension of warfare. Allied forces no longer can assume dominance in all domains as adversaries have been studying Allied capabilities and are developing strategies and systems to contest within the various domains. Specifically, adversaries have studied the manner in which the United States coordinates technical reconnaissance,

¹⁷ National Defence Canada, *Strong Secure Engaged: Canada's Defence Policy* (Ottawa, ONT: Minister of National Defence, 2017), 53.

¹⁸ *Ibid.*, 57.

satellite-based communications, and air and maritime power to enable ground freedom of maneuver and overmatch. Specifically, air superiority is unlikely to be assured in the future operating environment due to integrated air defense systems, missile systems, fourth and fifth generation aircraft, and electronic warfare capabilities. Missile systems and precision deep fires allow adversaries, with ever-increasing precision and speed, to threaten command and control nodes, maneuver and support forces, and infrastructure. Systems designed to contest allied forces use of the EMS hinder command and control, and reconnaissance capabilities required to coordinate operations including fires, maintain situational awareness, and conduct logistical and deployment activities.¹⁹ White Paper Multi-Domain Battle demonstrates that the basis of current Allied and US doctrine is flawed and the forces and equipment in current usage are not suited to the current or future operating environment.

Russia has developed a new approach to operations that has been called Russian New Generation Warfare, 4th Generation Warfare, or hybrid war. The Russian 2010 Military Doctrine describes modern warfare as the integrated utilization of military and other forces and resources of a nonmilitary character. In this approach, information warfare is used to achieve political objectives without the utilization of military force, with the goal of shaping a favorable response from the world community to the utilization of military force. In 2014, the Russian doctrine added that participation of irregular armed force elements and private military companies in military operations and use of indirect and asymmetric methods of operations are a part of modern warfare.²⁰ Clearly, the Russian military is using hybrid warfare techniques to achieve its policy aims.

¹⁹ US Army-Marine Corps, *White Paper Multi-Domain Battle: Combined Arms for the 21st Century* (Washington, US Government Printing Office, 18 Jan 2017), 1-5.

²⁰ Michael Kofman and Matthew Rojansky, "A Closer look at Russia's "Hybrid War"," *Kennan Cable No. 7* (April 1, 2015): 2, accessed October 3, 2016, <https://www.wilsoncenter.org/sites/default/files/7-KENNAN%20CABLE-ROJANSKY%20KOFMAN.pdf>.

For the purposes of this monograph, modern hybrid warfare includes the use of conventional, irregular, criminal, terrorist, or partisan forces to conduct conventional and asymmetric activities to directly or indirectly achieve their military objectives. This definition highlights the complexity of the modern operational environment with adversaries conducting operations in various domains by a variety of groups not limited to the military operations and potentially without a chain of command. Although Russian New Generation Warfare represents a highly sophisticated hybrid threat with capabilities to rival allied forces in several domains, it is not the sole focus of the monograph.

The hybrid threat in a multi-domain battle will have significant impact on the ability of forces to freely move on the battlefield and conduct operations such as logistical or offensive operations. The current and past doctrine provides insights to the current capabilities and lessons from the past.

Mobility as a Warfighting Function

As demonstrated, modern hybrid warfare is changing the operational environment and redefining the way we understand warfare. Mobility doctrine provides guidance on how to conduct military operations based on our capabilities and threats. Mobility as a key requirement to success in land warfare provides a useful tool to compare current doctrine to our current operational environment. Additionally, looking at older mobility doctrine provides parallels to operational concepts from the past that have modern utility.

Current Mobility Doctrine

There is a wide variety of engineer capabilities in NATO. Each nation has doctrine that reflects its national capabilities, strategic and political goals. American, British, Canadian, Australian, and New Zealand Army engineering capabilities are well known, and data about them is readily available. Further, there are several standardization agreements (STANAG) that facilitate engineer interoperability and cooperation.²¹ Therefore, when discussing mobility doctrine and engineer capabilities, a variety of NATO, American, and Canadian references are used. There are small variations in the concepts and terminology, but all NATO countries are generally similar and nested within the ratified NATO standards. As the largest NATO contributor, the US doctrine is indicative of the application of Allied standards and doctrine.

Mobility doctrine and, specifically, how freedom of movement is assured is an all-arms task. However, engineer units have specific tactical tasks that have operational effects. Some of the key tasks are combined arms breaching, gap crossing, and the maintenance of roads and routes. These tasks are predicated on specific organizations, equipment, and procedures. Doctrine provides the foundation for these tasks and it is based on a specific understanding of the operational environment. New capstone doctrine reflects a changing understanding of the

²¹ US Department of the Army, Field Manual (FM) 3-34, *Engineer Operations* (Washington, DC: Government Printing Office, 2014), 1-19.

operational environment; however, mobility doctrine itself has remained largely unchanged. Mobility doctrine is not based on the current modern hybrid warfare environment in which NATO militaries may operate.

The newest US Army Field Manual 3-0 *Operations* provides emphasis on the importance of the combined arms nature of mobility operations. It states, “Freedom to move and maneuver within an operational area is essential to the application of combat power and achieving results across the range of military operations. An operational environment will present numerous challenges to movement and maneuver. These are typically overcome through the integration of combined arms mobility and counter-mobility in support of mission requirements.”²²

US mobility doctrine is conceptually captured in Field Manual 3-34, *Engineer Operations*. Mobility support operations are combined arms activities that mitigate the effects of natural and manmade obstacles to enable freedom of movement and maneuver. Engineers support these operations with a series of tasks at the tactical level.²³ Engineer tasks are organized around four lines of operation: assured mobility, enhance protection, enable force protection and logistics, and build partner capacity and build infrastructure. Engineer tasks that support mobility operations typically support the assured mobility line of engineer support, but may also support the other three lines. They enable force protection and logistics lines of effort directly and affect the elements of operational art, specifically, operational reach, tempo, and culmination of military forces that have an effect on movement and maneuver. Engineer support to mobility operations includes the following primary tasks:

- conducting combined arms breaching,
- conducting area and route clearance,

²² US Department of the Army, Field Manual (FM) 3-0, *Operations* (Washington, DC: Government Printing Office, 2017), 5-16.

²³ FM 3-34, *Engineer Operations*, 2-2.

- conducting gap crossing,
- constructing and maintaining combat roads and trails,
- constructing and maintaining forward airfields and landing zones, and
- conducting traffic management and enforcement.

Engineer contributions to the planning of mobility operations occur at all levels of war. The execution of engineer tasks in support of mobility usually occurs at the operational and tactical levels, but will often have strategic level implications. At the tactical level of war, combat engineer units are frequently required, especially in offensive and defensive tasks. At the operational level, general engineer units typically perform engineer tasks.²⁴

Each of the tasks above that support mobility operations have detailed doctrine and technical manuals that describe their execution. However, there are some principles and assumptions for each task that effect their potential viability in the future, hybrid, operating environment. Conducting combined arms breaching is a task that synchronizes combined arms activity under the control of the maneuver commander to allow maneuver through an obstacle. When planning this operation the mnemonic, SOSRA (Suppress, Obscure, Secure, Reduce, Assault) is used to consider the fundamentals.²⁵ Thus to breach successfully, the Army must suppress enemy direct and indirect fire to prevent aimed fires at the breach, obscure to limit observation on friendly breaching forces, secure to prevent enemy interfering with reduction operations or passage of forces through the lane, reduce the obstacle to allow safe passage through the lane, and assault a force through the obstacle.²⁶ This is a complex operation with

²⁴ FM 3-34, *Engineer Operations*, 2-1 to 2-10.

²⁵ FM 3-0, *Operations*, 5-16.

²⁶ LTC Mark Federovich, "Combined Arms Breaching" in *Ten Fundamental Brigade Combat Team Skills Required to Win the First Fight*, CALL Newsletter No 17-19 (Center for Army Lessons Learned, 2017), 17.

significant combined arms interaction to counter multiple enemy capabilities. Allied abilities to succeed in SOSRA are highly dependent on current allied and enemy capabilities that change.

The procedures to conduct a gap-crossing have similar complexities to combined arms breaching. Gap crossing operations are defined as projecting combat power across a linear obstacle (wet or dry gap).²⁷ There are several kinds of gap crossing operations depending on the requirements. There are hasty gap crossings conducted when enemy resistance is weak and the obstacle is not severe. A deliberate crossing is conducted when a hasty gap crossing is not possible or has failed. Covert gap crossings are done in smaller organizations to facilitate an infiltration and to maximize surprise, but require ideal conditions. All of these gap crossing operations are governed by six fundamentals: surprise, extensive preparation, flexible planning, traffic control, organization, and speed. These fundamentals seek to address the limitation imposed by a gap. These limitations include crossing at a limited number of suitable sites that expose the force to enemy fires while crossing the gap. This exposure happens while the forces' combat power is split on both sides of the gap. Gap crossing operations thus constrain maneuver, limit tempo, require significant resources, and expose the force to significant risk. These complex combined arms activities require significant coordination and control measures.²⁸

The phases are described in Canadian doctrine as the securing of the near side of the obstacle, assaulting to gain lodgment on the far side of the gap, the build-up of forces to the bridgehead line, and the consolidation to establish a force to breakout and continue the operation. When selecting a crossing site specific requirements include: cover from observation, routes to and from crossing sites, cover for forces moving to cross, sufficient space for the bridgehead force, and locations for indirect and direct fire assets. There are also technical engineer

²⁷ US Department of the Army, Field Manual (FM) 3-90.12, *Combined Arms Gap Crossing Operations* (Washington, DC: Government Printing Office, 2008), 1-1.

²⁸ *Ibid.*, 2-1 to 2-8.

considerations as to where the gap crossings are possible and how many sites are required to cross the force, including accounting for crossings lost to enemy action.²⁹ This process and the factors are well known and understood to most western adversaries. The requirements of gap crossing operations make crossing very risky and a likely focus of enemy fires and effects that could limit mobility and isolate forces for destruction.

The complexity of this operation and the number of available targets for enemy indirect fires is clear from the figure below that depicts the various control measures required to ensure the efficient crossing of the gap. All of the staging areas, holding areas, call forward areas, routes and crossing sites are based on the terrain and existing infrastructure that the enemy could determine by a detailed map study. Therefore, the combined arms fight is to provide direct fire, obscuration, air defense, and deep fire to protect the crossing sites in order to complete a gap crossing. The basis of our doctrine is an understanding of the enemy's capabilities and an

²⁹ Director of Army Doctrine Canada, B-GL-300-001, *Land Operations* (Kingston, ONT: Army Publishing Office, 2008), 7-144 to 7-146.

assessment of western abilities to counter them.³⁰

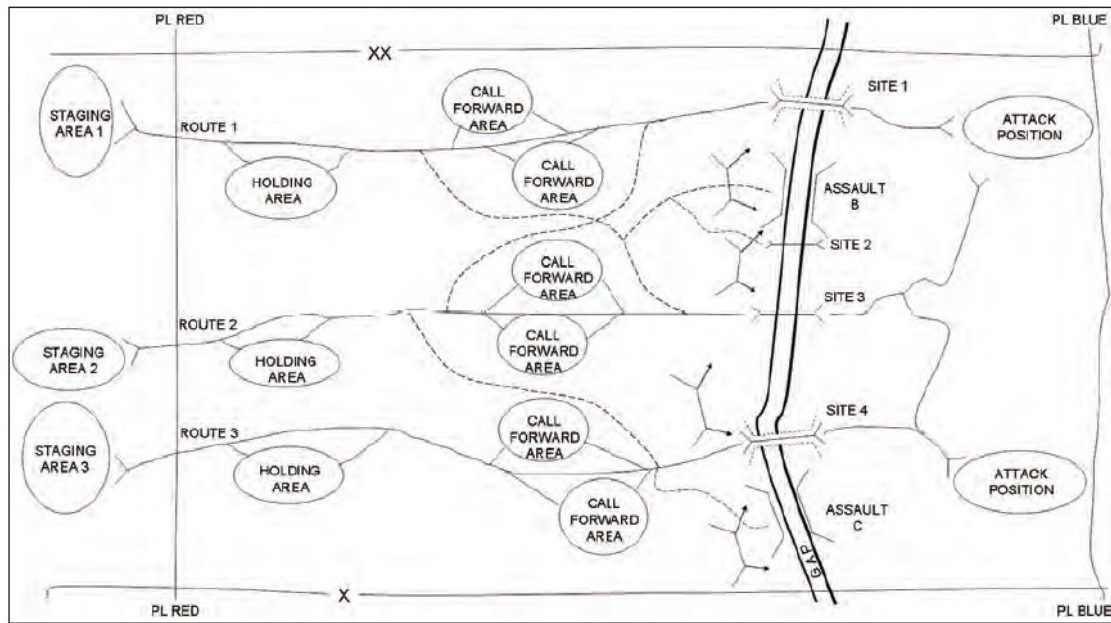


Figure 1: Brigade Combat Team Crossing Area Overlay for a Course of Action. *Source:* US Department of the Army, Field Manual (FM) 3-90.12, Combined Arms Gap Crossing Operations (Washington, DC: Government Printing Office, 2008), 3-8.

General engineer tasks are another set of tasks engineers conducted to support mobility. These tasks are focused on affecting terrain while not in close support to maneuver forces. They include:

- conducting area and route clearance,
- constructing and maintaining combat roads and trails,
- constructing and maintaining forward airfields and landing zones, and
- conducting traffic management and enforcement.

General engineer units are not organized, manned, equipped, and trained to conduct their tasks while in close support. General engineer units are not designed to perform as combat engineers without significant augmentation and training.³¹ General engineer units can defend themselves

³⁰ FM 3-90.12, *Combined Arms Gap Crossing Operations*, 3-8.

³¹ FM 3-34, *Engineer Operations*, 2-2.

but cannot engage in close combat. The ability to conduct general engineer tasks and operations is predicated on a doctrinal assumption that general engineer units will be conducting mobility operations in the “rear area” subject only to small arms fire.

The relationship between general engineering mobility tasks and sustainment is critical to elements of the operational art to include operational reach, culmination, basing and risk. Sustainment is the provision of logistics, personnel services, and health service support necessary to maintain operations until successful mission completion.³² Critical to enabling sustainment is mobility. In the latest version of the US Army Field Manual 3-34, there have been doctrinal changes that acknowledge the growing threat of anti-access and area denial methods by using hybrid threats to deny logistical lines of communication and limit force projection. For this reason, “enable force projection” has been changed to the enable logistics line of engineer support. This concept seeks to ensure early entry forces can rapidly transition to employment using infrastructure provided by engineers.³³

All of the various tasks completed by the engineers in doctrine are based on an understanding of the current operational environment. NATO describes the role of doctrine as “a framework of principles, practices, and procedures.”³⁴ The clear understanding and acceptance of doctrine by allied joint forces is a prerequisite for the successful conduct of operations. It evolves as its political and strategic foundation changes and in light of new technology, lessons identified, and the insights of operational analysis. “North Atlantic Treaty Organization (NATO) policy and doctrine forms the fundamental principles by which NATO military forces guide their actions in

³² US Department of the Army, Army Doctrine Reference Publication (ADRP) 4-0, *Sustainment* (Washington, DC: Government Printing Office, 2012), 1-1.

³³ FM 3-34, *Engineer Operations*, V.

³⁴ AJP 3.2, *Allied Joint Doctrine for Land Operations*, xiii.

support of objectives.”³⁵ This clearly suggests that over time doctrine must change as the situation changes.

The doctrine referenced above reflects an evolution of generations of doctrine. While multi-domain battle is an emerging concept, most US Army doctrine is based on Unified Land Operations, which is itself an update of Full Spectrum Operations (2001) and AirLand Battle (1986). The newest doctrine provides updated terminology, concepts, and tenets of US Army operations and planning. Yet, these changing doctrines and philosophies have had minimal changes on mobility planning, procedures, or equipment. The operational environment in this current generation of doctrine highlights important trends such as globalization, urbanization, technological advances, and failed or failing states that can affect land operations. Specifically related to mobility, enemies are developing the capability to mass effects from multiple domains at a speed that will affect ongoing operations. Land-based threats will attempt to impede joint force freedom of movement and action across all domains and disrupt the electromagnetic spectrum. The enemy will attempt to present multiple dilemmas to land forces from the other domains.³⁶

The implications of these trends are significant for mobility. The massing of effects is most effective when forces are concentrated at predictable locations, as they are during crossing operations or along designated lines of communication. In the modern hybrid environment almost any adversary is able to collect, predict, and interdict like a near peer adversary. The disruption of the electromagnetic spectrum also affects lines of communication but has significant effects on gap crossing and breaching operations where coordination is critical to success. The enemies’ desire to provide multiple dilemmas means that we are likely to face threats throughout the area

³⁵ AJP 3.2, *Allied Joint Doctrine for Land Operations*, xiii.

³⁶ US Department of the Army, *Army Doctrine Reference Publication (ADRP) 3-0 Operations* (Washington, DC: Government Printing Office, 2008), 1-1.

of operations. This means that there will be attacks on the rear areas and lines of communication. This will require additional mobility support assets and additional security. Clearly, the conceptual view of the operational environment is changing, as demonstrated in US Army Field Manual 3-0 *Operations*, but mobility operations and tasks do not reflect today's understanding of the current and future operational environment.

Origins of Mobility Doctrine

Engineer and mobility doctrine have evolved over time with changing threats and technology. Clausewitz wrote extensively about mobility, dedicating chapters to River Crossings, Maneuver, and Attacks on Swamps, Flooded Areas, and Forests. In the Maneuver section, Clausewitz addresses five factors for actions that in his time needed to be considered for success. They are enemy food sources, combination with other units, threats to communication with home country and other units, threat of retreat, and an attack on individual points with superior forces. These factors become the objectives around which everything revolves. Bridges, highways and entrenchments gain their importance in relation to these things.³⁷ This passage highlights the role of bridges and highways as critical enablers that provide mobility for military forces to achieve their objectives. Mobility doctrine and procedures have evolved considerably since Clausewitz's *On War*. However, to understand current mobility doctrine it is necessary to understand some of the history of the doctrine. An understanding of mobility doctrine development, or stagnation, in the post-Second World War era is useful for analysis in this monograph.

The mobility doctrines of the 1950s and 1960s were developed with lessons learned from the Second World War and a focus on a conventional Soviet near peer. The post-Vietnam crisis in the US Military led to a re-write of doctrine and the development of AirLand Battle doctrine in the early 1980s for the continuing Cold War. Then there was a revision of mobility doctrine during the Iraq and Afghanistan wars to adjust to increasingly lethal counter insurgency mobility

³⁷ Clausewitz, *On War*, 541.

challenges. The multiple iterations of US military doctrines have matching mobility doctrines. The most current US Army engineer publication is FM 3-34, *Engineer Operations*, which was first published in 2004. It updated the previous FM 5-100, *Engineer Operations*, to align with the current US Army doctrine framework. FM 5-100 has a series of subsequent engineer doctrine manuals that provide additional detail on the procedures, equipment, organization, and threats from several periods. These manuals demonstrate the evolution of military mobility doctrine. Most recently in 2014 FM 3-34 was updated and acknowledges the shift to modern hybrid warfare conceptually. This admission was an important initial step, however, the DOTMLPF-P framework that the US military uses to develop new capabilities is a necessarily slow and bureaucratic process designed to procure, man, train, equip, and field military capabilities based on requirements. Although FM 3-34 is the first step in identifying the required capabilities there is little direction on how this is to be accomplished in a modern hybrid or multi-domain operational environment. Unfortunately, engineer procedures have always played catch-up after a crisis.

As demonstrated earlier, the concept of hybrid warfare is not new. The use of partisans and the mix of irregular and conventional tactics, for instance, is not a new phenomenon. However, the sophistication of modern hybrid war adds lethality, range, and higher levels of situational awareness with the distribution of significant technological capabilities to very low levels. The complexity of the post Second War World operating environment provides some parallels and insights to current mobility issues.

In the late 1950's, the US Army had finished fighting in Korea and experienced typical post war budget and manpower cuts. The continuing spread of communist ideology was accompanied by the proliferation of and improvements in nuclear weapons. Tactical nuclear weapons such as the M31 "Honest John" nuclear rocket systems provided a new devastating firepower capability. The rise of these types of weapons by the Soviets and the US military necessitated a change in doctrine to demonstrate atomic mindedness. Those changes included

increasing the ratio between combat and support units, achieving greater flexibility and mobility in combat units, and improving the force's capability to sustain itself for extended periods in combat.³⁸ Such changes parallels how TRADOC describes the characteristics of the future operational environment. Of particular interest is the potential for overmatch and proliferation of weapons of mass destruction.³⁹ The peacetime Army challenges of shrinking budgets and manpower in a climate of limited conflicts against ideologically different and complex adversaries is similar to contemporary challenges.

FM 5-135, *Engineer Battalion: Armored, Mechanized and Infantry Divisions* from 1961 was the doctrinal solution to the problems encountered in the late 1950s and reflects atomic mindedness. This doctrine stipulated that when a division attacks through an area with an unfordable river, plans must be made to cross without the loss of momentum or significant concentration on either bank. The river is approached at maximum speed on a broad front and all existing bridges should be seized intact. If intact bridges cannot be seized, then hasty crossings are attempted on a wide front capitalizing on organic resources such as assault bridging, amphibious armored carriers, airlift capability, nuclear fires, chemical munitions, and improvised means. Such a hasty crossing was considered to provide the best chance for success on a nuclear battlefield because it minimized the risk of presenting a massed target that could be defeated by a tactical nuclear strike.⁴⁰

Clearly, some of this doctrine is not relevant in the modern operation environment. NATO forces are unlikely to face nuclear weapons during a hasty crossing operation. However, the precision and lethality provided by modern air delivered munitions and long-range fires

³⁸ Donald A. Carter, *The US Army Before Vietnam 1953 –1965*, CMH Pub 76-3 (Washington: Center of Military History, US Army, 2015), 7, 24-27.

³⁹ US Department of the Army, *The US Army Operating Concept: Win in a Complex Environment*, TRADOC Pamphlet 525-3-1 (Washington, DC: Government Printing Office, 2014), 11.

⁴⁰ US Department on the Army, *Field Manual 5-135 Engineer Battalion: Armored, Mechanized and Infantry Divisions* (Washington, DC: Government Printing Office, 1961), 78-80.

systems can have similar effects. Thus, key concepts from this doctrine should be considered in the light of hybrid threats, including: attacking on a wide front to overwhelm the enemy fires capabilities; having sufficient organic resources within tactical formations including amphibious infantry vehicles and bridging assets to enable multiple hasty crossings instead of fewer, deliberate crossing sites; and conducting hasty crossings along that same wide front to avoid massed targets subject to enemy fires. As with the nuclear battlefield of the 1960s, today's multi-domain battle concept would suggest that a hasty crossing is most likely to succeed. The logic used to develop doctrine in an atomic minded army led to some doctrine that could prove useful in addressing modern conceptual issues.

Another area from the 1961 doctrine that is of interest to today's Army is the section on security against guerrilla forces. This concept is the precursor to the insurgencies that are prevalent on the modern battlefield and likely to remain in the future. Guerrilla forces conduct irregular warfare tasks to contribute to a hybrid warfare environment. Doctrine indicates that they are likely to use surprise, mobility and decentralized operations to conduct ambushes and emplace booby traps. The doctrine provides simple security tasks to protect engineer forces and equipment such as briefing units on fighting techniques, not allowing local inhabitants near the assembly areas, and security precautions on work sites. Clearly, these tactical actions are not foreign to the modern battlefield. Modern hybrid warfare expands the capabilities of these guerrilla forces with sophisticated IEDs and modern weapons systems controlled with networked communications capabilities.⁴¹

⁴¹ FM 5-135, *Engineer Battalion: Armored, Mechanized and Infantry Divisions*, 1961), 112.

Mobility in Practice

Two modern conflicts provide insights into the application of modern hybrid warfare concepts and mobility doctrine. The Second Lebanon War in 2006 and the Ukraine Crisis in 2014 are modern hybrid warfare case studies. These conflicts are different from the insurgent conflicts in Iraq and Afghanistan, primarily because of the mix of state sponsored irregular forces and the application of a wide variety of threats including conventional weapons and forces.

Lessons from Lebanon

The Second Lebanon War in 2006 demonstrates a non-state actor, in this case Hezbollah, acting as a guerrilla force with support from a state. The support provided to Hezbollah in the form of weapons, sophisticated equipment, and training from Lebanon, Syria, and Iran allowed Hezbollah to prevent the Israel Defense Force (IDF) from achieving its political and military objectives. The Israeli government applied the conventional wisdom that advanced conventional warfare technology, combined with precision firepower and the superiority of the IDF, would defeat Hezbollah forces. Hezbollah's state-sponsored guerrilla tactics rapidly transitioned the nature of the conflict from one of conventional warfare to a modern hybrid war that negated the IDF's technological advantage. Hezbollah's actions departed from historical asymmetric, irregular operations and shifted toward conventional tactics, which included defending terrain from fortified defensive positions and maneuvering in formations with conventional warfare weapons and equipment.⁴² Hezbollah also demonstrated an "information-age guerrilla force," employing asymmetric military methods atypical of past non-state actors. These methods included higher-tech versions of sniping, ambushes, harassing indirect fire, and the use of

⁴² US Department of Defense, *DOD Dictionary of Military and Associated Terms* (Washington, DC: Government Printing Office, 2018), 23, 120. Irregular warfare is a violent struggle among state and non-state actors for legitimacy and influence over the relevant population(s). Asymmetric warfare is the application of dissimilar strategies, tactics, capabilities, and methods to circumvent or negate an opponent's strengths while exploiting his weaknesses.

civilians, including houses, as shields from attack.⁴³ Hezbollah was able to use the terrain of southern Lebanon, in combination with guerrilla tactics and sophisticated modern weapons, to limit the IDF's ability to move. By limiting the IDF's mobility in a modern hybrid threat environment, Hezbollah was able to prevent Israel from achieving the objectives of the Second Lebanon War.

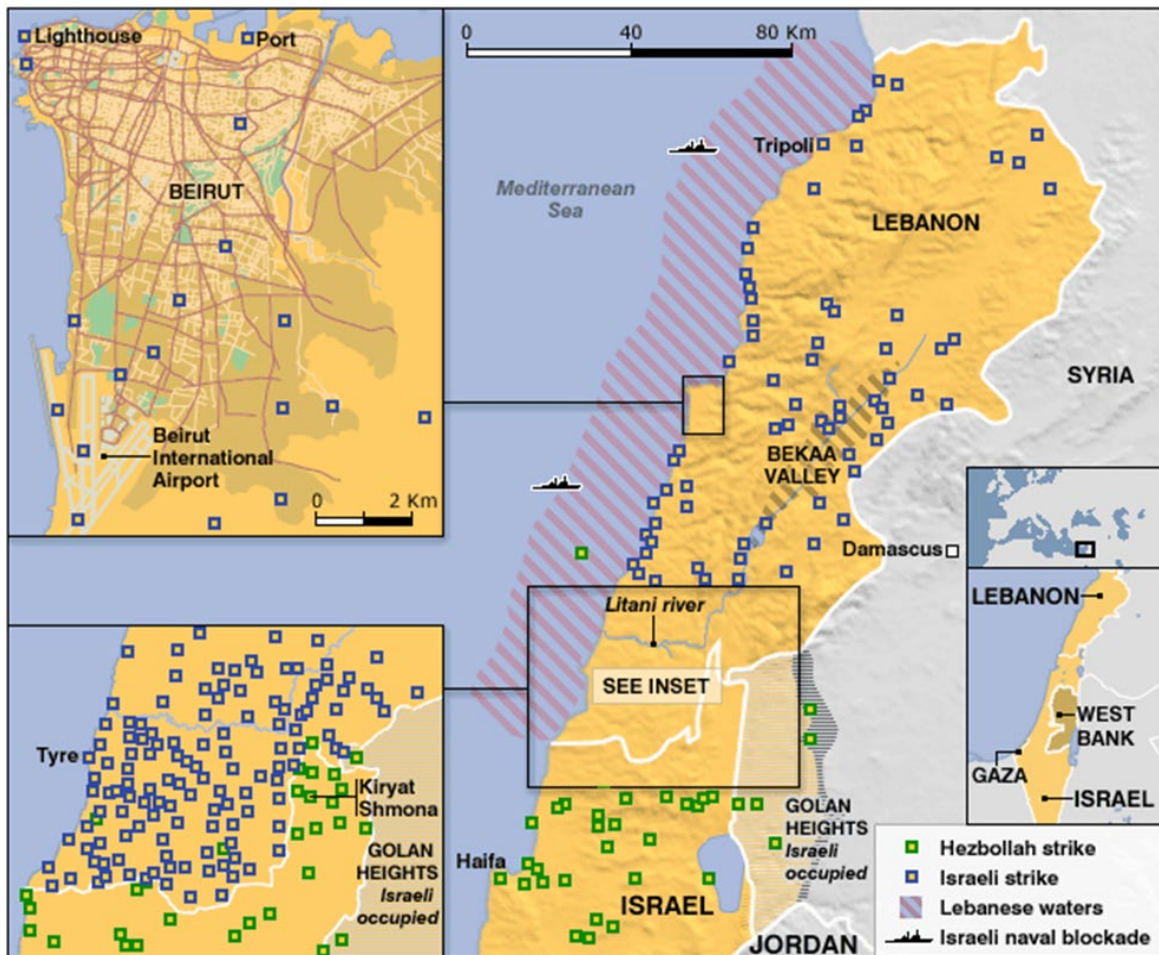


Figure 2: Map of Second Lebanon War 2006. *Source:* BBC News, “Middle East crisis: In maps,” accessed 10 January 2018, http://news.bbc.co.uk/2/hi/in_depth/629/629/4801243.stm.

⁴³ John R. Davis Jr, “Defeating Future Hybrid Threats: The Greatest Challenge to the Army Profession of 2020 and Beyond,” *Military Review*: September-October 2013 (September 2013): 22.

On July 12, 2006, eight IDF soldiers were killed and two kidnapped on the border with Lebanon. Hezbollah conducted this attack and simultaneously launched Katyusha rockets against Israeli communities near the border.⁴⁴ This was the start of the Second Lebanon War. It led the Israeli military to conduct its first operation in Lebanon since the IDF's withdrawal in 2000 and, ultimately, to the largest Israeli military action since the First Lebanon War (1982). Israeli Prime Minister Olmert articulated the hybrid nature of this conflict on the day of the attack, stating that the "morning's events were not a terrorist attack, but the action of a sovereign state that attacked Israel for no reason and without provocation. The Lebanese government, of which Hezbollah is a member, is trying to undermine regional stability. Lebanon is responsible and Lebanon will bear the consequences of its actions."⁴⁵ The consequences included an immediate cross border attack by the IDF in the region of the two kidnapped soldiers. This attack, with a platoon of infantry and a Merkava tank, was an attempt to find the missing soldiers and in retaliation for their abduction. After an IED destroyed the Merkava tank, additional forces were sent to recover the soldiers' bodies but those reinforcements soon came under mortar fire, killing another IDF soldier. The IDF responded with preplanned air strikes against seventeen Hezbollah locations in Lebanon and against three bridges that spanned the Litani River, all in an effort to prevent the movement of the captured soldiers out of south Lebanon.⁴⁶

Forced to make a decision, Israeli political and military leaders met to discuss what to do about the abduction and rocket attacks. They decided on a limited response that did not conform

⁴⁴ "The Second Lebanon War (2006)," Israel Ministry of Foreign Affairs, accessed October 19, 2017, <http://mfa.gov.il/MFA/AboutIsrael/History/Pages/Hizbullah%20attack%20in%20northern%20Israel%20and%20Israels%20response%2012-Jul-2006.aspx>.

⁴⁵ "The Second Lebanon War (2006)," Israel Ministry of Foreign Affairs, accessed October 19, 2017, <http://mfa.gov.il/MFA/AboutIsrael/History/Pages/Hizbullah%20attack%20in%20northern%20Israel%20and%20Israels%20response%2012-Jul-2006.aspx>.

⁴⁶ David Johnson, *Hard Fighting: Israel in Lebanon and Gaza* (Santa Monica, CA: RAND Corporation, 2011), 54-56.

to either of the two existing IDF plans for Southern Lebanon. Both the political and the military leadership expressed reluctance at sending a large ground force into Lebanon, preferring instead to rely on airstrikes and limited ground raids on towns of symbolic importance.⁴⁷ This was the culmination of a series of changes in the IDF in response to a series of previous failures by the IDF to prevent wide spread violence in a series of low intensity conflicts. After Operation Defensive Shield in 2002, the IDF began focusing on low intensity conflict, using small-unit tactics for conducting search and arrest operations and targeted killings. This had a negative effect on the IDF's training for non-urban guerrilla warfare and preparation for large-scale joint-force operations.⁴⁸ The focus on low intensity conflict was paired with a belief that standoff fires were an effective means of affecting the will of the adversary and determining conflict outcomes. This was due to the perceived successes of the United States in Kosovo, Afghanistan, and Iraq in using intelligence and precision air power to reach rapid decisions with few coalition casualties.⁴⁹ Both changes resulted in significant operational shortfalls for the IDF at the start of the Second Lebanon War.

Hezbollah had been preparing southern Lebanon for a war with Israel since May of 2000. Hezbollah used the complex natural terrain in southern Lebanon to great advantage. The mix of highlands and lowlands results in significant canalized terrain that limits mobility. The steep valleys make wheeled vehicles and armored forces targetable, as they are restricted to predictable routes. This terrain is well suited to ambushes, mines and Improvised Explosive Devices. Not only did Hezbollah prepare the terrain but they also used modern hybrid tactics to counter IDF strengths. Hezbollah possessed some capabilities associated with conventional military forces,

⁴⁷ Johnson, *Hard Fighting: Israel in Lebanon and Gaza*, 56.

⁴⁸ *Ibid.*, 20-25.

⁴⁹ *Ibid.*, 32.

such as standoff weapons, but focused fighter training on unconventional means, with an emphasis on fighters operating individually and in small groups. Hezbollah trained its forces in Lebanon, Iran, and Syria in units that combined the weapons normally associated with state warfare with guerilla tactics such as ambushes, and hit and run attacks.⁵⁰ Further, Hezbollah fighters fought near their homes and lived with their families. This allowed their weapons and munitions to be stockpiled in prepared bunkers and caches near their homes, limiting the requirement for transport and protecting lines of communication from Israeli interdiction.⁵¹ The use of ambushes on Israeli infantry within urban areas and the use of standoff weapons to engage IDF armor proved effective. Hezbollah also had a rocket force that provided indirect fire into Israel from bunkers with preset rockets that only required minimal manpower to initiate. Hezbollah possessed both offensive and defensive signals intelligence (SIGINT) capabilities and demonstrated the ability to intercept IDF radio communications. They also had sophisticated modern communication devices and used radio procedure and encryption defensively to avoid the IDF intercepting their communications. Hezbollah also employed fiberoptic communications systems, which are not subject to jamming.⁵² Clearly, Hezbollah demonstrated capabilities usually possessed by a state vice a guerrilla force.

Israel sought three objectives during the war: the release of the kidnapped soldiers, a stop to rocket fire into Israel, and the disarming of armed militia in Lebanon. As mentioned earlier, the Israelis believed that Hezbollah would sue for peace after a few days of the air campaign and that Lebanon would be forced to act against Hezbollah. After two days of bombing, 14 July, the bombing campaign escalated to the destruction of Hezbollah targets near Beirut and throughout

⁵⁰ Johnson, *Hard Fighting: Israel in Lebanon and Gaza*, 46.

⁵¹ *Ibid.*, 48.

⁵² *Ibid.*, 51-54.

the country. The air attacks continued until the conclusion of the war on 14 August. Although the bombing was extensive, it did not stop the short-range rocket attacks into Israel.⁵³

Israeli ground forces misunderstood the threat posed by Hezbollah. From 14-18 July, the IDF conducted a series of raids 1-2 kilometers inside Lebanon to destroy Hezbollah positions along the border. On 23 July, the IDF decided to attack and occupy the Lebanese border town of Bint Jbiel only to withdraw a few days later. By this point, there were four Israeli divisions fighting in Lebanon. The next major offensive occurred on 11 August. Operation Changing Direction 11 sought to create favorable conditions for Israeli negotiations at the UN Security Council and to slow the volume of rockets in Israel by pushing back Hezbollah. It “was meant to be a large, broad ground operation, which would fundamentally alter reality in Southern Lebanon and the image of the operation in the military sense.”⁵⁴

Operation Changing Direction 11 involved four divisions: 91st, 162nd, 98th and 366th. Overall, the plan envisioned the 91st Division pressing north and the 162nd Division crossing the Saluki River from the east and pushing north where it would link up with the 98th Division along the Litani River. The 98th Division would conduct a helicopter assault and move to the Litani River in the direction of Tyre. The 366th Division would attack Hezbollah forces north of Metula.⁵⁵ None of these divisions would achieve their objectives. Hezbollah effectively used terrain, anti-tank guided missiles, and guerrilla tactics to stifle the numerically and technologically superior IDF by limiting their mobility along the limited and predictable avenues of approach.

⁵³ Johnson, *Hard Fighting: Israel in Lebanon and Gaza*, 62-66.

⁵⁴ David Johnson, *Hard Fighting: Israel in Lebanon and Gaza*, 72. Quotation from testimony at the Winograd Commission, 370.

⁵⁵ Johnson, *Hard Fighting: Israel in Lebanon and Gaza*, 73.

Of these failed division objectives, the intermediate objectives of the 162nd division to cross Wadi Saluki enroute to the Litani River most clearly demonstrates the challenges to mobility posed by a modern hybrid threat. The wadi was described as the gateway to the Litani and crossing it was the first step in a sweep west across southern Lebanon. The 401st Brigade's Merkava tanks had been waiting for the push to the Litani for close to a week. On 11 August, the 401st Brigade tanks advanced on Wadi Saluki. The Hezbollah fighters knew the only way west was through this wadi and they were waiting with at least 100 guerrillas and their most advanced anti-tank guided missile, the Russian-made Cornet.⁵⁶ Crossing the wadi required the 401st to climb a steep hill surrounded by mountains in all directions. Despite efforts to cover the Armored Brigade advance with infantry, a well-armed and well-prepared Hezbollah force ambushed them. The lead battalion of the 401st Brigade halted and failed to open the route across the Saluki. On 13 August, the 401st Brigade again forced a crossing of the Wadi that was successful but was forced to stop due to the pending ceasefire. They had failed to achieve their objective.⁵⁷

The failure of the IDF to achieve the military successes that are vital to the survival of Israel resulted in the Winograd Commission that sought to determine the causes. The commission identified three key lessons learned from Israel's Second Lebanon War. First, the assumption that a reliance on air power would coerce the government of Lebanon to control Hezbollah was not valid. Second, a changing Israeli operational construct and doctrine created confusion in the Israeli Army. Third, there was a lack of jointness when air power was planning and supporting land operations. Air power was unable to find and strike well prepared Hezbollah sites that would allow for the success of mobility tasks.⁵⁸ Clearly, IDF doctrine did not reflect and

⁵⁶ Yaakov Katz, "Wadi Saluki Battle- A Microcosm of War's Mistakes" in *The Jerusalem Post*, 29 Aug 2006, accessed 30 October 2017, <http://www.jpost.com/Israel/Wadi-Saluki-battle-microcosm-of-wars-mistakes>.

⁵⁷ Johnson, *Hard Fighting: Israel in Lebanon and Gaza*, 74-76.

⁵⁸ *Ibid.*, 86-89.

understand the modern hybrid threat employed by Hezbollah. On the other hand, the Hezbollah tactics demonstrated a clear understanding of IDF capabilities and procedures.

Hezbollah's modern hybrid tactics allowed them to hide from the Israeli Air Force's fires. Hezbollah were able to demonstrate both conventional and guerrilla tactics that benefitted from the IDF's doctrinal confusion and lack of jointness. Hezbollah forces fought in their local area blurring the line between combatant and non-combatant and disguising lines of communication. Traditional guerrilla tactics coupled with sophisticated weapons and equipment allowed Hezbollah to limit the IDF's mobility. The man portable Anti-Tank Guided Missiles (ATGM) supplied to Hezbollah defeated the protection that armored vehicles were to provide. The Battle of Wadi Saluki demonstrated Hezbollah's ability to recognize key terrain and limit the IDF's mobility. By contesting this piece of key terrain and limiting the IDF's ability to maneuver, they prevented Israel from achieving its political and military objectives. Hezbollah was able to use conventional military equipment in conventional and irregular ways to be successful against a technological and numerically superior force.

Lessons from Ukraine

The Second Lebanon War exemplified a state sponsored non-state actor conducting a modern hybrid war. By contrast, Russia, through a series of conflicts in Chechnya, Georgia, and Ukraine, has developed a modern hybrid war strategy being employed by a state under the auspices of non-state actors. This development demonstrates a dangerous and powerful evolution of the concept of modern hybrid warfare as the full technological, diplomatic, informational, military, and economic powers of a state can be applied in a variety of ways to meet Russia's political and military objectives. By concurrently fighting with conventional forces, irregular forces, and guerrilla forces, modern hybrid warfare provides a wide range of dilemmas to opponents of Russia. The varied tempo, threats and tactics in operations allows them to overwhelm their opponents and achieve their objectives.

General Valery Gerasimov, Chief of the General Staff of the Russian Armed Forces, stated in 2013, “Wars are no longer declared and, having begun, proceed according to an unfamiliar template.”⁵⁹ This idea underpins the current Russian philosophy on warfare that has been coined Russian New Generation Warfare or Fourth Generation Warfare. The phrase hybrid warfare is a western term that means little to the Russian military. Russia’s actions in Ukraine can be understood through concepts from its Soviet past, namely deep operations, active measures, and reflexive control theory. The Soviet concept of deep operations was based around the central belief that the most effective way to defeat an opponent was to subject it to a number of successive blows throughout its operational depth. This deep operations concept gives contemporary Russian decision-makers a framework through which to integrate its diplomatic, informational, military, and economic instruments of power in an offensive manner.⁶⁰ Active measures are a form of political warfare conducted by Soviet intelligence and security services to influence the course of world events. Active measures give Russia deniable or ambiguous means to pursue their objectives. The theory of reflexive control is a means of conveying to a partner or an opponent specifically prepared information to incline him to voluntarily make the predetermined decision desired by the initiator of the action. Reflexive control shapes the Russian use of information operations and explains its approach to them.⁶¹ Although the term hybrid warfare is not used by the Russians to describe their operations, the deep operations, active measures, and reflexive control concepts fit well within the definition of Modern hybrid warfare used in this monograph.

⁵⁹ Valery Gerasimov, “The Value of Science is in the Foresight: New Challenges Demand rethinking the Forms and Methods of Carrying out Combat Operations,” Robert Coalson (ed.), in *Military Review* (January-February 2016), 24.

⁶⁰ Aleksandr Andreevich Svechin, *Strategy*, ed. Kent D. Lee (Minneapolis, MN: East View Publications, 1992), 239-256.

⁶¹ Andrew J. Duncan, “New ‘Hybrid War’ or Old ‘Dirty Tricks’? The Gerasimov Debate and Russia’s Response to the Contemporary Operating Environment” in *Canadian Military Journal* Vol. 17, No. 3 (Summer 2017): 9-14.

In February 2014, anti-government protesters toppled the Ukrainian government of Viktor Yanukovich. Shortly thereafter, pro-Russian separatists began seizing infrastructure in Crimea while systematically occupying territory in the eastern part of Ukraine. Many of the supposed separatists were actually highly trained Russian Special Forces personnel wearing no insignia. The precision of these operations surprised many western analysts. The most surprising aspect was the ability of the Russians to swiftly and efficiently coordinate numerous and wide-ranging operations. Remarkably, during the annexation of Crimea and subsequent fighting in Eastern Ukraine, Russian conventional military forces played only a supporting role. Russian Special Forces, which organized much of the resistance, secured key infrastructure, and established many of the checkpoints that sprang up throughout the peninsula were advantageous elements in this conflict. The extensive and well-coordinated use of intelligence, psychological warfare, intimidation, bribery, and internet/media propaganda that undermined and eventually collapsed Ukrainian resistance was decisive.⁶² The employment of conventional forces, irregular forces and myriad diplomatic, intelligence, and criminal endeavors demonstrates the complex and highly coordinated hybrid approach that was employed by Russia to annex the Crimea.

Beginning in February 2014, Russia conducted two distinct phases of operations in Ukraine. First, the occupation and annexation of Crimea, which began as a covert military operation that combined ambiguity, disinformation, and the element of surprise at the operational level with more traditional aids such as electronic warfare. The annexation was completed by a traditional military invasion and occupation of the peninsula using Russia's airborne, naval infantry, and motor rifle brigades.⁶³ This phase of the operation annexed a population of 2.5

⁶² Tony Balasevicius, "Looking for Little Green Men: Understanding Russia's Employment of Hybrid Warfare" in *Canadian Military Journal* Vol. 17, No. 3 (Summer 2017): 17.

⁶³ Michael Kofman and Matthew Rojansky, "A Closer look at Russia's "Hybrid War"," *Kennan Cable No. 7* (April 2015): 3, accessed October 3, 2016, <https://www.wilsoncenter.org/sites/default/files/7-KENNAN%20CABLE-OJANSKY%20KOFMAN.pdf>.

million people and a sizeable territory that had a large Ukrainian Force of up to 22,000 military personnel stationed in it. Surprise and confusion were created by Spetnaz troops, the support of Pro-Russian Self-Defense forces in Crimea, and a combat readiness inspection of Russian troops stationed in the Western Military District. These activities used sophisticated hybrid tactics to rapidly control key infrastructure and hide the intent of the Russian military allowing them to annex Crimea without any bloodshed.⁶⁴ Next was the invasion of Eastern Ukraine's Donbas industrial region. The swift declaration of independence of Crimea from Ukraine and subsequent reincorporation into the Russian Federation led activists in the eastern oblasts of Donetsk and Luhansk, and their supporters in Russia, to believe that they could repeat the scenario in eastern Ukraine. This triggered eight months of war, during which at least 5,000 people died.⁶⁵ This second phase of operations in Ukraine saw Russia support non-state actors in their attempt to gain independence from Ukraine. As Ukrainian military efforts in eastern Ukraine escalated against events they perceived as being orchestrated by Russia, violence increased. Because Ukrainian military victory in the east would be extremely undesirable for Russia, Russia began to provide limited and clandestine materiel support to the separatist in June 2014. President Pyotr Poroshenko mobilized the Ukrainian military and remained intent on securing the border with Russia and defeating the separatist forces. On July 1, 2014, Ukrainian forces began a new offensive with all the artillery and air power they had. It was successful in initially sealing the border with Russia and the rebel provinces. However, the overstretched Ukrainian forces fell victim to mass fire from Multiple Launched Rocket Systems and various anti-aircraft systems. By

⁶⁴ Anton Lavrov, "Russia Again: Military Operation for Crimea" in *Brothers Armed: Military Aspects of the Crisis in Ukraine* edited by Colby Howard and Ruslan Pukhov; Center for Analysis of Strategies and Technologies (CAST), Moscow, translated by Ivan Khokhotva (Minneapolis, MN: East View Press, 2015), 147-178.

⁶⁵ International Crisis Group, "Eastern Ukraine: A Dangerous Winter. 2014," 1, accessed October 31, 2017, <http://www.crisisgroup.org/~media/Files/europe/ukraine/235-eastern-ukraine-a-dangerous-winter.pdf>.

September 5, 2014, Ukrainian forces had withdrawn and government representatives had to enter into talks with the separatists.⁶⁶ This complex modern hybrid war highlighted the Russian approach to operations on several levels, using a variety of elements of national power both military and non-military with a goal of influencing regime change in Crimea.



Figure 3: Situation in Eastern Ukraine August 2014. *Source:* National Security of Ukraine: Information Analysis Center, “The Situation in the Eastern Region of Ukraine – 17.08.2014,” accessed 12 January 2018, <http://mediarnbo.org/2014/08/17/the-situation-in-the-eastern-regions-of-ukraine-17-08-2014/?lang=en>.

⁶⁶ Lavrov, *Brothers Armed: Military Aspects of the Crisis in Ukraine*, 202-225.

Some of the Russian technology that allowed them to be successful against a larger conventional Ukrainian force included massed rocket artillery, anti-aircraft systems, unmanned aerial vehicles (UAVs) and electronic attack. Outside the town of Zelenopillya, near the Russian border, the Russians fired a three-minute artillery “fire strike” with MLRS. This attack used bomblet munitions that combine an anti-armor weapon with a thermobaric weapon that “virtually wiped out two Ukrainian tank battalions.”⁶⁷ With these thermobaric bomblets, a volley delivered by a single heavy-rocket-launcher battalion can annihilate anything within an area of about 350 acres.⁶⁸ The separatists shot down twenty-one aircraft including attack helicopters, transport aircraft, and fighter jets. The role of combat aviation in eastern Ukraine was much less significant than expected because of the state of the Ukrainian Air Force but also because of the employment of man-portable Surface to Air Missile systems (SAMS). The insurgents’ large numbers of advanced SAMS made it impossible for the Ukrainian Air Force to conduct offensive operations.⁶⁹ Russian tactical UAVs were used to spot for artillery. When the Battle of Debaltseve began, Ukrainians reported that as many as eight Russian tactical drones orbited over their heads at any one time. The electronic warfare technology demonstrated by the Russians in Ukraine provides significant advantages. During the 240-day siege of the Donetsk airport, the Russians were able to jam GPS, radios, and radar signals. Russian electronic intercept capabilities were so good that the Ukrainians’ communications were crippled and Ukrainian commanders complained that a punishing barrage would follow any radio transmission within seconds.⁷⁰ These

⁶⁷ Major General Bob Scales(ret.), *Scales on War: The Future of America’s Military at Risk* (Annapolis: Naval Institute Press, 2016), 162.

⁶⁸ Robert H. Scales, “Russia’s superior new weapons,” in *The Washington Post*, accessed November 1, 2017, https://www.washingtonpost.com/opinions/global-opinions/russias-superior-new-weapons/2016/08/05/e86334ec-08c5-11e6-bdc5-0133da18418d_story.html?utm_term=.be0b687fd3cd.

⁶⁹ Lavrov, *Brothers Armed: Military Aspects of the Crisis in Ukraine*, 234-235.

⁷⁰ Scales, “Russia’s superior new weapons.”

sophisticated tools used in Ukraine to weaken and defeat the Ukrainian military were provided and likely operated by Russia.

The mobility implications of the Ukraine conflict do not relate to the specifics of terrain or vehicle capabilities. The Ukraine conflict instead demonstrates that high tech equipment, when used both conventionally and irregularly, destroys the combined arms nature of maneuver and that some of the doctrines that allied nations employ make them very vulnerable. In Crimea, the modern hybrid tactics confused the lines between police actions and military actions. Once the Ukrainian forces realized what was happening, Russian forces controlled critical infrastructure, the Ukrainian forces could not maneuver, and Crimea was annexed. In eastern Ukraine, insurgent forces sought autonomy from Ukraine and formed local militias to fight the Ukrainian Military. The Russian supplied anti-aircraft systems neutralized the Ukrainian air power. The massed rocket artillery, directed by tactical UAVs and electronic warfare, destroyed and demoralized Ukrainian ground forces and crippled their command and control capability. In the end, Russia destabilized Ukraine, annexed Crimea and demonstrated to the world their new generation warfare, a modern hybrid warfare.

Meeting the Challenge

Mobility Requirements for Hybrid Warfare

As demonstrated in doctrine and in the historical examples, the ability to move is a combined arms task that requires coordination to be successful. In order to structure the discussion about mobility requirements in a modern hybrid threat environment, the warfighting functions used by the US Army will be used. The Warfighting Functions are Mission Command, Movement and Maneuver, Intelligence, Fires, Sustainment, and Protection.⁷¹ These warfighting functions will be discussed from both allied and adversary perspectives to develop a full understanding of the requirement based on historical examples, doctrine, and current force structures and capabilities.

The mission command warfighting function allows militaries to plan, communicate, and control military forces in multiple domains.⁷² As demonstrated in Lebanon and Ukraine, the reliance of western forces on communication systems and the highly networked requirements of modern high-tech militaries create advantages but also vulnerabilities. In Lebanon, Hezbollah demonstrated an ability to intercept IDF radio communications while simultaneously defending against IDF attempts at electronic warfare. The Russians in Ukraine demonstrated a significantly higher level of sophistication in electronic warfare. They jammed GPS, radio and radar while intercepting Ukrainian communications and using those intercepts to target command and control nodes. When Allied forces are conducting combined arms breaches and gap crossings that are critical to maintaining mobility the tactical actions involved require significant coordination with fires, engineers, armor, and infantry. Once a gap or crossing is established, there is a significant command and control requirement for subsequent traffic control across the obstacle. With the

⁷¹ US Department of the Army, Army Doctrine Reference Publication (ADRP) 3-0, *Operations* (Washington, DC: Government Printing Office, 2012), 12-13.

⁷² ADRP 3-0, *Operations*, 5-3.

capabilities demonstrated by Hezbollah and Russia, it is clear that we should expect adversaries to significantly degrade our communications capability, or use our signals to aid targeting, during these critical operations. Thus, physical control measures must be employed to control these operations. Further, detailed training and rehearsals are required to make breaching and crossing operations into drills that require less communication and direct control and more rapidity.

The movement and maneuver warfighting function deals with the ability of forces to move to positions of relative advantage over the enemy.⁷³ A critical factor to movement and maneuver is freedom of movement and mobility. Many Allied fighting vehicles have continued to become heavier and more armored since the Cold War era fleet. Retired Major General Robert Scales, former commandant of the US Army War College, proposes that today's ground fighting vehicles are too massive and immobile to be effective in a war against a distributed, dispersed, and elusive enemy. For Iraq and Afghanistan, many nations purchased mine resistant vehicles that are only good for protecting against IEDs.⁷⁴ These vehicles, as well as modern infantry fighting vehicles, and tanks, are often bound to main supply routes and roads due to their size and weight. Tanks such as the M1A1 Abrams weigh approximately 65 metric tons, and the Leopard 2 weighs approximately 60 metric tons. The size and weight of these vehicles also prohibit their ability to move on urban and complex terrain. The effect that the Hezbollah ATGMs had on IDF Merkava Tanks at Wadi Saluki demonstrates that additional armor can be defeated by modern sophisticated missile systems. Further, ATGMs can be employed by dismounted soldiers and ununiformed combatants that tanks have a limited capacity to defend against. The size and weight of these vehicles force them to maneuver to very specific locations with bridges and roads that can support their significant weight. This makes allied forces very predictable and thus very targetable for direct and indirect fire. The limited ability to disperse and use terrain make gap

⁷³ ADRP 3-0, *Operations*, 5-4.

⁷⁴ Scales, *Scales on War: The Future of America's Military at Risk*, 146.

crossing operations and breaching predictable and a significant risk. Clearly, the massive size of armored vehicles results in a reliance on roads combined with limited gap crossing and breaching capabilities informed by old doctrine and procedures make allied forces predictable and targetable.

Another consideration for movement and maneuver and mobility is the employment of combat power in a hybrid threat environment. In a modern hybrid threat environment, the enemy will transition between conventional, irregular and guerrilla tactics to counter allied technological advantages. These tasks will require soldiers to dismount and conduct a variety of tasks from police actions and engagement with unarmed civilians to combat. This requires vehicles and soldiers to be mutually supporting. The US Bradley Fighting Vehicle has only six infantry dismounts to protect the vehicle. In irregular fighting, infantry dismounts are needed to do the fighting protected by the vehicle.⁷⁵ Tanks and armored vehicles can be destroyed by dismounts with missiles. Bulky vehicles do not provide the intended protection as demonstrated by the destruction of IDF Merkava tanks in Lebanon.

In order to be successful in the movement and maneuver warfighting functions, a highly mobile, medium weight force is required. Future forces must be dispersed, more mobile, and more lethal. Armored fighting vehicles need to be light enough to cross the small secondary bridges common in the developing world to avoid massing at large high-capacity highway bridges. Additionally, the ability to swim combat vehicles allows for dispersion and hasty river crossings on a wide front to avoid massed fires. This concept was part of an atomic-minded past and needs to be considered again for the future. Vehicles need to be smaller and contain sufficient infantry to allow operations in urban and complex terrain. Smaller vehicles will need to use modern missiles and weapons systems to defeat armor while using speed and mobility as a defense. To breach and reduce obstacles, combined arms organizations must be organized with

⁷⁵ Scales, *Scales on War: The Future of America's Military at Risk*, 146.

integral infantry, armor, engineers, breaching assets, fires, and logistics. This will ensure that breaches are conducted rapidly on a broad front to rapidly overwhelm opposition capabilities.

The intelligence warfighting function facilitates understanding of the enemy, terrain, weather, civil considerations, and other significant aspects of the operational environment.⁷⁶ The intelligence warfighting function in a modern hybrid threat environment requires changes in our military culture and our approach to our enemies if we desire mobility. The UAV has provided allied forces with real-time intelligence support to operations that has been extremely valuable. This technology has grown significantly more accessible on the open market and is now used effectively by our adversaries. In 2014, Russia added 200 UAVs of various sizes to its inventory. These UAVs can be used for communication, intelligence, and electronic attack but have predominantly been used to identify targets for artillery and adjust fire.⁷⁷ In Ukraine, tactical UAVs were very effective and aided the destruction caused by “fire strikes”. Allied militaries need to employ cold war camouflage and concealment methods to avoid detection by UAVs that will result in artillery fire. Further, allied forces need to maneuver in a more dispersed fashion that avoids creating identifiable targets suitable for mass indirect fires. At the same time, allied reliance on real-time intelligence will be impossible due to electronic warfare capabilities and air defenses that will degrade friendly UAV capabilities. Adversaries now understand our UAV capabilities and employ hybrid threat tactics to avoid detection by dispersion and by using overhead cover.⁷⁸ For example, Hezbollah was able to hide multiple launch rocket sites and fighting positions from IDF UAVs effectively. Hezbollah fighters also hid among the local

⁷⁶ ADRP 3-0, *Operations*, 5-4.

⁷⁷ Dr. Lester W. Grau and Charles K. Bartles, *The Russian Way of War: Force Structure, Tactics, and modernization of Russian Ground Forces* (Leavenworth, KS: Foreign Military Studies Office, 2016), 371.

⁷⁸ Scales, *Scales on War: The Future of America’s Military at Risk*, 140.

populace making differentiation difficult, often using cached weapons in their local area to avoid detection.

Further increasing the capability of adversary intelligence is their use of irregular forces and low cost commercial communications to provide reporting on activities throughout the depth of allied forces. This human intelligence will increasingly allow adversaries to identify units and capabilities that are moving on the battlefield in order to predict, reinforce, or interdict allied actions. This rear area intelligence will limit allied mobility by indicating to adversaries where key mobility assets are moving and potentially interdicting them. If there are rivers to cross and a finite number of bridges, irregular forces would likely interdict the bridging assets prior to a crossing attempt, thereby limiting allied mobility. Again, smaller vehicles with more mobility and a capability to swim will allow hasty river crossings to occur lowering the priority to bridging assets.

The fires warfighting function allows for the application of indirect, air, and missile defense and joint fires through a targeting process.⁷⁹ Hezbollah was able to hide from IDF joint and indirect fires in 2006 while using its own indirect fires to harass the population in Israel and force a negotiated solution. In Ukraine, Russia demonstrated an ability to use massed fire to devastating effect. The Russian concept of “maneuver by fire” involves shifting fire from one target, line, or sector without moving the firing position of artillery pieces. Russia uses artillery in battle to cause massive destruction of priority targets in a short period.⁸⁰ This will have devastating effects on mobility support operations. In a combined arms breach of an obstacle the Russians can mass thermobaric bomblet artillery on a breach site to inflict massive destruction. On a river crossing operation, the concentration of forces in waiting areas, cushion areas and

⁷⁹ US Department of the Army, Army Doctrine Reference Publication (ADRP) 3-0, *Operations* (Washington, DC: Government Printing Office, 2016), 5-5.

⁸⁰ Grau and Bartles, *The Russian Way of War: Force Structure, Tactics, and Modernization of Russian Ground Forces*, 234.

bridge sites provide ideal targets for these massed fires. With partisan, and irregular forces reporting locations, UAVs watching, and electronic warfare assets locating communication nodes, this mobility task would sustain heavy casualties. Without highly mobile forces to secure the far bank by swimming across on a wide front, the canalizing effect of needing bridges makes them ideal artillery targets.

Conventional western wisdom relies on joint fires to suppress adversary artillery and provide direct fires to suppress enemy to allow a crossing. As demonstrated by separatist forces in Ukraine with sophisticated SAMS systems, facing such an adversary makes this difficult. Russia continues to improve and modernize its air defense systems so that modern hybrid conflicts will not be able to rely on total air supremacy, or even sustained air superiority, to enable ground maneuver and mobility. Instead indirect fires will mass on fixed priority targets to block river crossing and breaches.⁸¹

Sustainment is the warfighting function that represents the related tasks and systems that provide support and services to ensure freedom of action, extend operational reach, and prolong endurance.⁸² This includes the provision of food, fuel, and ammunition and services such as repair, transport and personnel services. The ability to sustain a force directly affects mobility, operational reach, and endurance. As seen in the movement and maneuver requirements, modern tanks and fighting vehicles have gotten so large that they have limited mobility. The logistics required to support these huge vehicles is equally massive. The volume of fuel consumed to move their mass, as well as their inability to move great distance under their own power due to maintenance requirements and break down, severely limit mobility. The limiting factor on main supply routes now is the weight of a tank on a recovery vehicle and it significantly exceeds the

⁸¹ Grau and Bartles, *The Russian Way of War: Force Structure, Tactics, and Modernization of Russian Ground Forces*, 267-271.

⁸² ADRP 3-0, *Operations*, 12-13.

design load in all but a very few main roads. The logistics to support such heavy forces has made allied force logistics tied to these select roads and the 50-100 kilometers on either side of the roads. This sustainment limitation significantly limits mobility and operational reach. This limited mobility makes for predictable supply routes and creates concentrations of critical supplies. If a convoy of fuel is destroyed, tanks cannot move until they get more. The long lines of communication are difficult to defend and an easy target for irregular tactics in a modern hybrid warfare environment.

Protection is the warfighting function that relates tasks and systems that preserve the force, so the commander can apply maximum combat power to accomplish the mission. This warfighting function includes several tasks that effect mobility and survivability operations. They include explosive ordnance disposal support, antiterrorism measures, populace and resource control, coordination of air and missile defense, and chemical, biological, radiological, and nuclear operations.⁸³ These functions clearly effect the ability to move and resupply. The issue with a modern hybrid warfare environment is that adversaries can use weapons of mass destruction or other massed fires on critical allied vulnerability such as logistics nodes and crossing sites that are predictable and vulnerable points of failure. The routes between the finite nodes and are subject to irregular attack, civilian population reporting, and improvised explosive devices. The resources required to secure lines of communication and rear areas to allow for mobility will rapidly overwhelm the resources available and require combat power to secure. The requirement for rear area security forces in this noncontiguous environment will limit the ability of the commander to maximize combat power. The Russia operation in Crimea is an example of rapidly overwhelming the lines of communication, use of irregular forces, use of sophisticated special forces, deception and information operations. This rapidly overwhelmed Ukrainian Forces and rendered them completely unable to apply any combat power thus ceding Crimea to Russia.

⁸³ ADRP 3-0, *Operations*, 12-13.

Section 5: Conclusion

Hybrid War is not a new concept but the addition of modern weapon systems, communications, and reconnaissance systems has changed its contemporary form. State sponsored irregular forces are blending expensive state technology with the passions of partisan warfare. This was demonstrated in the Second Lebanon War in 2006 and the crisis in Eastern Ukraine's Donbas industrial region. In Lebanon, Hezbollah was able to use a hybrid strategy to stop the IDF along a linear obstacle, Wadi Saluki, with ATGM against a heavy conventional armored forces. They also used cover and concealment and sophisticated command and control systems to effectively fire rockets into Israel and force a negotiated settlement. In the Eastern Ukraine, local separatist militias relied on Russian UAVs, Electronic Warfare and multiple launched rocket systems with thermobaric weapons to destroy Ukrainian Armored forces that forced negotiations. In both cases, Armored Forces were defeated by modern direct or indirect fire systems that were directed based on target acquisition by UAVs or human intelligence employed by irregular forces.

The current western equipment used by allied forces relies on heavy armor for protection which limits mobility due to logistics, such as maintenance, fuel, and access to roads, and physical limitations of terrain, like rivers or other canalizing features. The requirement for western armies to mass at crossing sites and the logistic requirements makes them predictable and subject to modern weapons. Further, modern weapon systems are capable of penetrating and destroying modern armored equipment. The lack of swimming ability results in a critical military limitation of bridging that is easily identifiable and targetable on the modern battlefield. Sophisticated communications and technology that previously provided the western forces asymmetrical advantages has been countered by near peer competitors and has been provided to irregular forces. The heavy reliance on communications has been targeted and adversaries are becoming less reliant on constant communications. New technology and weapons mixed with

new irregular warfare tactics is the basis of a sophisticated and highly lethal modern hybrid warfare.

Current doctrine is starting to understand the complexities of modern hybrid warfare with the US Military concept of multi-domain battle. The concept highlights the complexity of the contemporary operating environment, however, mobility doctrine and military equipment have not changed to respond to this conceptual change. Current, mobility doctrine still is focused on engineers crossing rivers, gaps and obstacles based on templates that have changed little since the Cold War while western adversaries have developed new technology make these operations more dangerous and less feasible. The limited lines of communications available to heavy forces are vulnerable and engineers are required to provide assured mobility and enable force protection and logistics. As a limited resource in a hybrid environment, the engineers will be rapidly exhausted.

Future mobility doctrine can benefit from lessons of the past. In the 1950's, the US military moved towards "atomic mindedness" to avoid the catastrophic effects of tactical nuclear devices. These measures included increasing the ratio between combat and support units to achieve greater flexibility and mobility to increase a units internal self-sufficiency in extended periods of combat. In order to achieve this, dispersion was a key to survivability. The crossing of obstacles and gaps was to be done on the widest front possible.

To achieve this dispersion, future forces need to be lighter. To use all of the existing bridges in the developing world, 60 ton vehicles are unacceptable and as seen in Ukraine and Lebanon, additional armor does not provide the anticipated protection because ATGM and MLRS warheads continue to become more lethal. Heavy armored forces, MG Scales argues, also do not have the flexibility or dismounted infantry required to be successful in a modern hybrid threat operational environment. Therefore, highly mobile, medium weight forces are required. Combat vehicles need to swim, be light enough to cross bridges, have ATGM to defeat adversary armor, and have sufficient infantry dismounts to provide protection. Lighter vehicles require less maintenance, fuel, and can travel more places, increasing mobility. Engineers will still be

required for larger crossings or specific operations but will be less likely to be overwhelmed. The units of the future will need to have logistics vehicles with matching capabilities to the fighting vehicles in order to increase operational reach and flexibility. These units will need to be combined arms organizations less reliant on current networks and have a capacity to use physical control measures or less emissive communication to operate in a sensor rich environment.

The western focus since the end of the Cold War has been on technology in networks and sophisticated aircraft. These strategic capabilities created dominance for the United States and its NATO allies, which they demonstrated in various conflicts. The adversaries of the western allies took note and have developed both techniques and strategies to contest most domains. This multi-domain battle concept addresses this very point. As demonstrated, the mobility of NATO countries is limited by engineer doctrine, equipment, and organization. The engineer limitations are a product of larger army systems that require too much bandwidth, fuel, maintenance, and road infrastructure owing to the incredible weights of vehicles in the western inventories. The problem is further exacerbated by not developing the required logistical systems for widely dispersed operations. In order for NATO armies to live, move, and fight, a full DOTMLPF-P analysis of mobility is required within the conceptual framework of hybrid warfare and multi-domain battle. The wars of the future will still require the Army to be able to move to positions of advantage to win our nations' wars. Currently, there are significant challenges to achieving that.

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