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## The Uncertain Role of the Tank in Modern War: Lessons from the Israeli Experience in Hybrid Warfare

Michael B. Kim

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## **AN INSTITUTE OF LAND WARFARE PAPER**

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### **LAND WARFARE PAPER No. 109, June 2016**

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by Michael B. Kim

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## Foreword

In this monograph, the author examines the past role and the uncertain future of the M1 Abrams tank. With current fiscal constraints and the requirement for expeditionary maneuver, the U.S. Army is under pressure to demonstrate the need for its Armored Brigade Combat Teams and specifically for its main battle tank, the M1 Abrams. An extrapolation from the past 13 years of operations in Iraq and Afghanistan could lead to the conclusion that future conflicts are likely to be limited unconventional engagements. The implications of this reading of recent history influence Army thought in multiple spheres, bringing into question the relevancy of combined-arms warfare—and, as a result, the role of the main battle tank.

This paper presents a case study of the Israel Defense Force experience during Operation Protective Edge (2014) in order to inform the role of the M1 Abrams by analyzing hybrid threat trends, examining Army force-structure challenges and assessing the relevancy of combined-arms maneuver—in which the M1 Abrams tank is a key element—in the future operating environment. Based on this case study, the author argues that the role of this tank in the Army of 2015–2025 is to provide a mobile and survivable precision firepower platform to execute effective combined-arms operations against a sophisticated hybrid threat in urban and conventional environments.

The Army must consider modernizing its armored platforms with an active armor protection system and improved munitions. Current enemy capabilities are surpassing the protection offered by current armament. Given the nature of the military profession and the increasingly limited resources provided by our nation to execute combat, the responsibility to properly allocate resources, direct training and develop force structure is great. It is with fervent discipline, focus and creativity that our military and civilian leaders must consider the future of the Army.



Gordon R. Sullivan  
General, U.S. Army Retired  
President, Association of the United States Army

June 2016

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# **The Uncertain Role of the Tank in Modern War: Lessons from the Israeli Experience in Hybrid Warfare**

## **Introduction**

The future of the M1 Abrams tank is uncertain. With current fiscal constraints and the requirement for expeditionary maneuver, the U.S. Army is under pressure to demonstrate the need for its Armored Brigade Combat Teams (ABCT), and specifically for its main battle tank, the M1 Abrams.<sup>1</sup> The questioning of the tank's role in the U.S. Army of 2015–2025 stems from an underlying uncertainty regarding the future character of warfare. An extrapolation from the past 13 years of operations in Iraq and Afghanistan could lead to the conclusion that future conflicts are likely to be limited unconventional engagements; this supposition shifts the prioritization away from conventional platforms. The implications of this reading of recent history influence Army force structure, concepts, doctrine and training, bringing into question the relevancy of combined-arms warfare—and, as a result, the role of the main battle tank.

As a key element of combined-arms maneuver (CAM), the M1 Abrams tank must be evaluated within the analytic context of this concept. This paper presents a case study of the Israel Defense Forces (IDF) experience during Operation Protective Edge (2014) in order to inform the role of the Army's main battle tank by analyzing hybrid threat trends, examining Army force structure challenges and assessing the relevancy of CAM in the future operating environment.

## ***Hybrid Threat***

Anticipated enemy capabilities frame the requirements for Army force structure, the application of CAM and the role of the M1 Abrams tank. Although the exact nature of the future adversary is uncertain, recent and ongoing conflicts reveal trends that are likely to influence the conduct and character of future war. Army doctrine describes the future enemy threat as a hybrid threat. Headquarters, Department of the Army Training Circular 7-100, *Hybrid Threat*, defines the hybrid enemy as a “diverse and dynamic combination of regular forces,

and/or criminal elements all unified to achieve mutually benefitting effects.”<sup>2</sup> Hybrid threats can combine conventional military capabilities with tactics usually associated with insurgent activities. Dr. David E. Johnson describes hybrid adversaries as state-sponsored, moderately trained, disciplined and organized into moderately-sized formations (up to battalion); employing the same weapons as irregular adversaries, but with standoff capabilities such as Anti-Tank Guided Missiles (ATGMs), Man-Portable Air Defense Systems (MANPADS) and longer-range rockets; and conducting semi-centralized command and control (C2) by multiple means.<sup>3</sup> These definitions can be distilled into two key characteristics: hybrid threats are state-sponsored (differentiating them from non-state irregular forces) and possess standoff capabilities (ATGMs, MANPADS and longer-range rockets).

***U.S. Army Force Structure***

As the Army prepares to face future hybrid-threat challenges, it must make hard decisions to develop the proper force structure to meet future demands. Fiscal constraints have forced the Department of Defense (DoD) to modify the Army’s force structure. To meet future challenges, the Army is building a leaner, more lethal, expeditionary and agile force that is “uniquely enabled and organized to conduct expeditionary maneuver.”<sup>4</sup> Then Chief of Staff, Army General Raymond Odierno, addressing the House Armed Services Committee in 2013, stated that the Army would “reprioritize [its] modernization programs and determine which ones are most critical to filling capability gaps and which ones will be delayed or cancelled.”<sup>5</sup> ABCTs have come under intense pressure to justify their role in the future force structure; concurrently, the relevance of the main battle tank in the modern security environment is under scrutiny.

Amplifying the effects of discussions of the future adversary, the growing importance of unmanned aerial vehicles, cyber warfare and other emerging technologies has also contributed to the force structure debate. The two primary schools of thought (table 1) regarding future force structure can be categorized as “conservative” and “revisionist.”<sup>6</sup>

*Table 1*

**Force Structure Schools of Thought**

<b>Conservative</b>	War has not fundamentally changed; it is a human endeavor whose capabilities cannot be replaced by technology. The Army must focus on conventional capabilities to destroy the enemy and seize/retain terrain.
<b>Revisionist</b>	Future projections negate the likelihood of a high-intensity conflict (HIC). The Army must focus on developing unconventional capabilities and limited engagements with an emphasis on special forces, standoff precision fires and emerging technologies.

The conservative school argues that changes in warfare are incremental and that technological innovations do not fundamentally change the character of war.<sup>7</sup> Proponents of this school claim that reliance on low-intensity capabilities and overreliance on air power, intelligence, special operations forces and unmanned aerial systems will weaken conventional capabilities that are necessary to face future threats. They also argue that becoming too dependent on technology ignores the central lessons of military history: war remains a fundamental clash of wills, and in ground combat there is no substitute for the presence of Soldiers.

The revisionist school argues that future wars will be limited and increasingly unconventional. Advocates of this view see future projections negating the likelihood of an HIC with a near peer competitor and technological advances promoting the use of precision firepower from naval



and aerial platforms. They argue further that the wars in Iraq and Afghanistan support the view that future warfare will be increasingly reliant on special operations capabilities supplemented by local allies and standoff fire capabilities. Linda Robinson at RAND states that budgetary pressures and the continued prevalence of irregular threats place a premium on cost-effective approaches to national security—such as greater utilization of the special operations community, which emphasizes small-footprint operations and effective coordination with allies.<sup>8</sup> In January 2014, *The Washington Post* reflected the view of anonymous military officials, stating, “the manufacturing of tanks—powerful but cumbersome—is no longer essential. . . . In modern warfare, forces must deploy quickly and ‘project power over great distances.’ . . . Weapons such as drones—nimble and tactical—are the future.”<sup>9</sup> In this interpretation, putting the country’s sons and daughters in harm’s way is unnecessary when technological advancements can provide capabilities that achieve desired end states without the loss of lives. Revisionists argue that the future force structure must be expeditionary and possess the technological capability to rapidly deploy scalable forces tailored to be operationally and tactically significant. According to this view, antiquated platforms, such as the M1 Abrams tank, are not expeditionary in nature, possess significant limitations and can be replaced by intelligence, surveillance and reconnaissance (ISR) assets and long-range precision fires.

The debates between the conservative and revisionist schools of thought will shape the construct of the Army force and the concepts behind its employment. An examination of the Army’s current CAM doctrine is necessary to understand the implications of these competing views.

### ***Combined-Arms Maneuver***

The concept of combined arms in ground combat has existed for centuries. Dr. Jonathan House describes the combined-arms concept as the “basic idea that different combat arms and weapons systems must be used in concert to maximize the survival and combat effectiveness of the others.”<sup>10</sup> Prior to World War I, the various combat arms (primarily infantry, artillery and early types of the tank) existed independently of each other, with limited combined-arms doctrine and coordinated training. The development of trench warfare and doctrine of defense-in-depth in World War I necessitated the development of more sophisticated and coordinated attacks; the “seeds of future combined-arms attacks” originated from this requirement.<sup>11</sup>

The interwar period saw the integration of mechanized forces into combined-arms warfare doctrine. Prior to 1937, the lead in mechanized warfare belonged to the Soviets, who envisioned a “deep battle” fought by combined-arms mechanized formations that could “rupture conventional enemy defenses and then simultaneously attack all echelons of that defense” with artillery, infantry, air strikes and the maneuver of mechanized forces.<sup>12</sup> This doctrine established the concept of maneuvering in operational depth to disrupt and destroy enemy capabilities at multiple echelons. The Red Army purge of 1937–1941, however, caused the Soviets to fall behind Germany<sup>13</sup> when Heinz Guderian and other visionaries produced the *panzer* division—a mechanized force in which all the elements of combat arms were integrated. Germany’s initial victories in 1939–1941 established *blitzkrieg* as the standard for mechanized combined arms. The German *panzer* division’s principal roles were exploitation, encirclement and pursuit.

Beginning in 1942, the Red Army rebuilt its tank and mechanized forces, retrained its leaders and reestablished its Deep Battle doctrine to counter German combined-arms tactics. The Soviets used deception operations and selective massing on narrow frontages to achieve

overwhelming superiority at specific strong points. Combined-arms assault groups reduced these strong points, while heavy tanks, medium tanks, infantry, artillery and engineers cooperated to rapidly push through the main German defenses. Once this penetration developed, combined-arms mechanized formations conducted rapid exploitation, maneuvering in operational depth to preempt German efforts to organize new defensive lines, disrupt supply and C2 nodes and destroy the enemy reserve.<sup>14</sup>

The Soviet concept of Deep Battle remains the foundational concept of the U.S. Army's combined-arms doctrine today; the Army maintains a force structure built around combined-arms platforms (the M1 Abrams tank, the Bradley Infantry Fighting Vehicle, helicopters and artillery) with a doctrine focused on penetrating an enemy's defense, seizing and holding terrain and exploiting in operational depth. The integration of these concepts can be traced in the evolution of Army doctrine, particularly AirLand Battle, and is clearly seen in Army Doctrine Publication 3-0, *Unified Land Operations*, which defines CAM as the "application of the elements of combat power in unified action to defeat enemy ground forces; to seize, occupy and defend land areas; and to achieve physical, temporal and psychological advantages over the enemy to seize and exploit the initiative."<sup>15</sup> However, the emergence of modern disruptive technologies has led senior leaders and analysts to once again consider the relevancy of CAM and the platforms designed to execute its concepts—foremost among them the M1 Abrams tank.

### ***M1 Abrams Tank***

Since its inception, the M1 Abrams tank has been the spearhead of Army ground forces, embodying the belief that combining mobility, protection and precision firepower provides a uniquely powerful system on the battlefield.<sup>16</sup> However, the unclear nature of the future threat, the challenges facing Army force structure and the uncertain relevance of CAM have called into question the role of the M1 Abrams tank in the Army of 2015–2025. Uncertainty surrounding the role of a main battle tank is not a new phenomenon. There has been a cycle of acceptance and rejection throughout history based on emerging technologies and the most recent combat operation of any given time. In 1960, B. H. Liddell Hart, a British officer and military theorist, observed, "Time after time during the past forty years the highest [defense] authorities have announced that the tank is dead or dying."<sup>17</sup> In his book *The Tank Debate*, Dr. John Stone states that the uncertainty surrounding the role of the main battle tank has in fact been a defining feature of the Anglo-American attitude since World War I.<sup>18</sup> Even the Army's own Armor Branch has questioned its future role; a 1972 article in *Armor* magazine titled "The Death of the Tank" claimed, "Changes in tactics have led to the technological advances which have killed the concept of the tank as we know it."<sup>19</sup> The uncertainty regarding future employment of the main battle tank has been a near-constant debate throughout its history. Today's environment is no different; as the U.S. Army draws down from the wars in Iraq and Afghanistan, the debate continues.

### ***Conclusion***

Having reviewed the analytical context of the Army's main battle tank, the paper establishes the following statement:

The problem is the unclear role of the M1 Abrams tank in the Army of 2015–2025, which stems from uncertainty regarding the future adversary, the optimal U.S. Army force structure to face this threat and the relevancy of CAM in the hybrid environment.

To address this problem, the thesis uses the IDF and its experience during Operation Protective Edge to inform the future role of the M1 Abrams tank in the U.S. Army of 2015–2025.

## The Israel Defense Forces and the Merkava Main Battle Tank

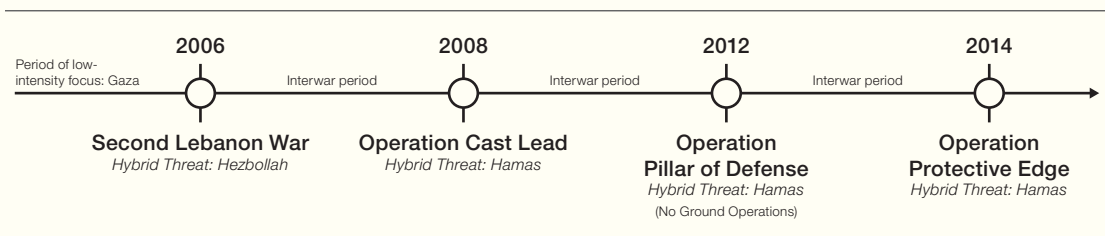
IDF leaders are facing challenges similar to those of their U.S. counterparts in assessing the future adversary, optimal force construct, CAM concepts and the role of their main battle tank—the Merkava. The IDF’s recent operations provide a unique opportunity to analyze a conventional force addressing similar challenges (table 2).

Table 2  
U.S. and IDF Similarities

	U.S.	IDF
<b>Hybrid Threat</b>	Future adversary is unclear	Hezbollah (2006), Hamas (2008, 2014)
<b>Force Structure Challenges</b>	Fiscal constraints, two schools of thought	Fiscal constraints, two schools of thought
<b>CAM</b>	Interwar period after 13 years focused on low-intensity conflicts (LIC); no prioritization between LIC and HIC; relevance of CAM uncertain	LIC prior to 2006; shifted to high-intensity CAM concepts for Operations Cast Lead and Protective Edge
<b>Main Battle Tank</b>	M1 Abrams Tank	Merkava Tank

Unlike the United States, the IDF has experienced multiple iterations of ground combat against a hybrid threat to inform its decisions regarding CAM and the Merkava (figure 1). From the Second Lebanon War to Operation Protective Edge in 2014, the IDF tested its force structure, doctrine and platforms in combat operations. Operation Protective Edge is a valuable case study because it provides an opportunity to examine both the adapting capabilities of a hybrid threat and the effects of adaptations and innovations in conventional force structure, CAM concepts and the role of a main battle tank in recent ground combat.<sup>20</sup>

Figure 1  
IDF Combat Operations, 2006–2014



### IDF Merkava Main Battle Tank

The Israeli example is useful for this discussion in another way—the Merkava tank is an analogous platform to the M1 Abrams. In the IDF, the Merkava is the primary symbol of the debate between conventional and nonconventional capabilities. Examining the tank debate provides a contextual understanding of the IDF’s challenges regarding force structure and the prioritization of CAM. Like the U.S. Army, the IDF debates the merits of a main battle tank amid significant budgetary pressures.

The Merkava is an advanced main battle tank—deployed by the IDF in ways that are similar to the U.S. Army tank deployments—that serves as the centerpiece of Israel’s three regular and nine armored divisions (table 3). It is the principal instrument through which IDF ground commanders implement Israel’s version of “lightning war,” a doctrine that calls for the IDF to win all of its battles quickly and decisively and with the fewest possible casualties. The IDF deploys the Merkava across the range of military operations in low- and high-intensity environments. The Merkava, first deployed in the late 1970s, is Israel’s only domestically built heavily armored combat system. Its design makes it ideal for force-on-force engagements and for the provision of tactical support to Israeli soldiers in low-intensity environments.<sup>21</sup>

*Table 3*  
**Merkava Mk IV and M1A2 Specifications**

	<b>Merkava Mk IV</b>	<b>M1A2 SEP</b>
<b>Weight</b>	65 tons	69.5 tons
<b>Length</b> <i>(including gun barrel)</i>	29 feet 8 inches	32 feet
<b>Width</b>	12 feet 2 inches	12 feet
<b>Height</b>	8 feet 7 inches	8 feet
<b>Crew</b>	4 <i>(commander, driver, gunner, loader)</i>	4 <i>(commander, driver, gunner, loader)</i>
<b>Passengers</b>	6 maximum	None
<b>Armor</b>	Composite matrix of laminated ceramic-steel-nickel alloy	Depleted uranium mesh-reinforced composite
<b>Main Armament</b>	120mm MG253 smoothbore gun <i>with laser-homing ATGM capability</i>	120mm M256 smoothbore gun
<b>Secondary Armament</b>	One 12.7mm (.50 cal) machine gun Two 7.26mm machine guns One 60mm mortar 12 smoke grenades	One 12.7mm (.50 cal) machine gun Two 7.62mm machine guns 24 smoke grenades
<b>Engine</b>	1,500 horsepower V12 water-cooled diesel	1,500 horsepower multi-fuel turbine engine
<b>Power/Weight</b>	23 horsepower per ton	26.9 horsepower per ton
<b>Payload Capacity</b>	48 rounds, 10 ready in an electrical drum	42 rounds
<b>Operational Range</b>	310 miles	265 miles
<b>Speed</b>	40 miles per hour	42 miles per hour

*Source: GlobalSecurity.org, “M1 Abrams Main Battle Tank,” accessed 12 March 2015, <http://www.globalsecurity.org/military/systems/ground/m1-specs.htm>.*

Like U.S. Army leaders, IDF senior leaders have faced mounting pressure to terminate production of the Merkava tank as defense budgets come under increasing strain.<sup>22</sup> Faced with the effects of a deep recession, a drop in government revenues and the rising cost of conflicts in Gaza, advisors to Israel’s Prime Minister have argued that the Merkava tank program has “simply become unaffordable and must be scrapped.”<sup>23</sup> Opponents point to dramatic advances in ATGMs, improvised explosive devices (IEDs), anti-armor mines, refinements in close air support and the proliferation of unmanned vehicles as evidence that a global revolution in ground combat is now underway. Proponents of the Merkava argue that the advent of more lethal anti-tank weapons, attack aircraft and long-range smart weapons has not diminished the

value of the tank but rather has emphasized the need for greater survivability and lethality on the modern battlefield. It is clear that the IDF and the U.S. Army are struggling with similar discussions. For this reason, the IDF provides the U.S. Army with a case study to analyze the debates surrounding the M1 Abrams tank.<sup>24</sup>

### **Case Study: Operation Protective Edge**

Operation Protective Edge provides a robust case study of combat between a conventional force and a hybrid adversary. To understand the actions of the IDF during Operation Protective Edge, the Second Lebanon War and Operation Cast Lead must be addressed.

#### ***The Second Lebanon War (2006)***

When war broke out in 2006, the disappointing performance of the IDF surprised both the public and the army itself. Senior IDF leaders believed, prior to the war, that a conventional engagement was highly improbable. After the United States invaded Iraq, Saddam Hussein fell and the eastern front between Iraq and Syria collapsed, senior leaders believed that the risk of full-scale war was greatly reduced. Political and military leaders believed that “in the event such a danger should arise, the IDF would have plenty of time to train and deploy its troops.”<sup>25</sup> In 2003, the IDF adopted a multiyear fiscal plan involving significant budgetary cuts, closing entire units, including Merkava tank brigades, and releasing 6,000 regular army personnel. By 2006, the IDF training budget was only half of what it had been in 2001, and the budget for reserve training had been cut by 70 percent.<sup>26</sup> There seemed no real reason to provide serious training to the reserve forces, given that preparation for fighting in the occupied territories required no more than a few days each time and that the budget for field training had been gradually reduced. In the IDF of 2006, battalion commanders—both regular and reserve—went into action without ever having commanded a battalion drill.<sup>27</sup>

Perhaps most telling, the newly developed IDF operational concept reflected the belief that the character of conflict had changed: “The dangers of conventional war against regular armies was all but past.”<sup>28</sup> Prior to the 2006 Lebanon War, the IDF believed that the primary and immediate challenge was asymmetrical warfare. The new operational concept was intended to transform the definition of victory and the means of accomplishing IDF objectives. Amos Harel and Avi Issacharoff, in their seminal work *34 Days: Israel, Hezbollah and the War in Lebanon*, provide an insightful description that summarizes the operational concept prior to the war:

Instead of the classical concept of military victory—conquest, capturing territory and destroying the enemy’s forces—a new idea gained ground: victory would be achieved by applying a chain of “springboards” and “effects” on the rationale of the enemy’s systems. The IDF’s most advanced technologies—precision fire (especially from the air, but also from ground-based missiles), command and control systems, observation and intelligence gathering devices—would make the capture of territory obsolete. Large scale, in-depth troop maneuvering was seen as an outdated, even unnecessary combat technique. The long-term retention of territory was now perceived as an impediment, not an advantage. It was enough to employ return fire and limited ground raids, heavily supported by small, highly trained commando forces, in order to attain the desired results. . . . Technological superiority would ensure victory and save the lives of Israeli troops that would have been lost in close contact with the enemy.<sup>29</sup>

The 2006 Lebanon War was a disaster for the IDF. The Winograd Commission, the investigative body appointed by the state to conduct a thorough assessment of the war, used the word

“failure” dozens of times in their findings. Major General Giora Eiland, head of the National Security Council and Planning Branch of the IDF in the years preceding the war, stated that there was a “black hole” that was not taken into account before the war:

For four years we put the Army at grave risk that, in retrospect, may have been unreasonable. . . . We dismantled units, cut back training schedules and reduced the replenishment of ammunition. We thought that the regional and budgetary realities necessitated this and that we’d have enough time to take the necessary steps to fill in the gaps if the situation worsened. But Israel surprised itself with the decision to go to war.”<sup>30</sup>

The challenges facing the IDF after the Second Lebanon War reflect the current debates of the U.S. Army today: the character of future warfare, the proper force structure to meet its demands and the role of the M1 Abrams tank in the force structure. The Second Lebanon War displayed the poor performance of untrained Merkava units against a hybrid adversary; however, the war also sparked debate involving the role of the Merkava tank itself: did the war reflect its vulnerabilities or reinforce its necessity? These questions would be debated and their resolution applied and executed during Operations Cast Lead and Protective Edge.<sup>31</sup>

### ***Operation Cast Lead (2008)***

The IDF integrated numerous lessons learned after the 2006 Lebanon War, foremost among them the critical role of the Merkava against a hybrid threat with ATGM capabilities. Although Operation Cast Lead was relatively short in duration, it set the foundation for further changes and adaptation by both the IDF and Hamas in ensuing conflicts and provided insights into the application of doctrinal and training changes during an interwar period.

Operation Cast Lead was a three-week armed conflict between Hamas and the IDF that began on 27 December 2008. This confrontation had been brewing since the Israeli withdrawal from Gaza in 2005. In the period following the Israeli pullout, tensions between Israel and Hamas increased steadily. Hamas protested Israel’s decision to block traffic entering and exiting Gaza while Israel complained about rocket and mortar attacks launched from Gaza at Israeli towns. In 2008, Hamas increased the number of rockets and mortars fired into Israel. Tensions and altercations increased, culminating in the execution of Operation Cast Lead by the IDF.<sup>32</sup>

The IDF, integrating lessons learned from the Second Lebanon War, deployed units prepared in combined-arms maneuver. From its experience in 2006, the IDF realized that hybrid threats like Hezbollah must be countered with a “joint, combined-arms approach that enables integrated fire and maneuver, particularly in complex terrain and in military operations [that occur] ‘amongst the people.’”<sup>33</sup> During a conference in 2009 sponsored by the IDF, Major General Avi Mizrahi, commander of IDF ground forces, stated, “A war cannot be won without moving forces on the ground. . . . Only a ground maneuver will end the conflict and win the war.”<sup>34</sup> Furthermore, Brigadier General Agay Yehezkeli, chief of the Armored Corps, stated, “In a future conflict with Hezbollah in Lebanon, the IDF [will] need to launch a quick ground operation, heavily depending on tanks, deep into Lebanese territory.”<sup>35</sup> The IDF ground forces that went into Gaza were well trained and prepared to execute combined-arms operations. “Armored forces—[the Merkava] and heavy armored infantry carriers, adapted to survive against hybrid enemies through the addition of extra armor applied to vehicle bellies and elsewhere—played a key role in Operation Cast Lead.”<sup>36</sup> Used in conjunction with infantry, the Merkava provided protected mobility and precision firepower, thereby reducing risk and providing commanders with increased maneuver options.



## Operation Protective Edge (2014)

The IDF integrated lessons learned from the Second Lebanon War and Operation Cast Lead and adapted changes in tactical force structure, tank armament, munitions and combined-arms concepts. Similarly, Hamas integrated new offensive and defensive tactics to counter IDF CAM and deployment of the Merkava. The following analyzes the adapting capabilities of Hamas, examines IDF force structure and concept changes and evaluates the performance of the Merkava.

### Hybrid Threat

The whole of the Gaza Strip is within the maximum effective range of tank fires and provides clear lines of sight, lacking significant elevation changes and heavy vegetation.<sup>37</sup> The population centers are dense, making collateral damage a concern. As a result, Hamas planned to exploit the urban areas for offensive and defensive purposes—providing cover for forces and their movement and helping them to avoid detection. In preparation, Hamas booby-trapped houses and buildings, placed IEDs in homes and used its tunnel network to move forces and supplies.<sup>38</sup>

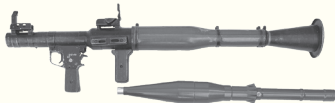
The Izzedine al-Qassam Brigades, the militant section of the Hamas organization, received considerable training and assistance both from within and outside of Gaza.<sup>39</sup> Based on their success in 2006, Hezbollah provided Hamas training in the use of standoff weapons, including ATGMs, MANPADs and rockets. Hamas procured weapons and ammunition with the help of Hezbollah and manufactured Qassam rockets and a variety of IEDs, fielding weapons suitable for urban warfare. Hamas possessed ATGMs (including Sagger missiles), rocket-propelled grenades (RPGs)—including RPG-29s—and a small number of SA-7 MANPADS.

Figure 2

## Hamas Anti-tank Weapon Systems

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### Anti-tank Grenade Launcher RPG-7



- Most widely proliferated infantry anti-tank system in the world
- Light enough to be carried and fired by one person
- 500m effective range; 300m vs. moving target
- 40mm caliber launcher; grenade warhead is forward of tube; grenade diameter can be 105mm or more

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### ATGM Launcher AT-3 Sagger



- Ground-mounted on "suitcase" launcher
- Crew: 3
- Rate of launch: 2 missiles per minute
- Command link: wire
- 3,000m range
- Usable with any portable laser rangefinder

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### ATGM AT-4



- Anti-tank guided missiles
- Crew: 3
- Rate of launch: 2–3 missiles per minute, depending on range
- Command link: wire
- Range: 2,000–4,000m

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Source: Created by author using information from Yoram Cohen and Jeffrey White, "Hamas in Combat: The Military Performance of the Palestinian Islamic Resistance Movement," *The Washington Institute for Near East Policy*, Washington, DC, October 2009, p. 9; Department of the Army, U.S. Army Training and Doctrine Command (TRADOC) Intelligence Support Agency, TRISA WEG, *Worldwide Equipment Guide Volume 1: Ground Systems* (Fort Leavenworth, KS: TRADOC Intelligence Support Agency, December 2011), pp. 2-37, 6-27, 6-30.

During Operation Protective Edge, Hamas demonstrated the ability to learn and adapt by displaying a wide range of combat capabilities. During the interwar period, Hamas had increased protection of its military infrastructure against Israeli attacks, developed a system of underground tunnels and improved effectiveness and cohesion of its ground combat forces. Prior to the operation, Hamas focused on three principle elements: rocket forces, ground forces and the tunnel system. Hamas expended considerable effort in the buildup of its ground forces, aiming to prevent IDF penetration into Gaza by deploying dense systems of IEDs, anti-tank forces, mortar units and snipers. Rocket units and ground combat forces used tunnels to penetrate Israeli border defenses and conduct surprise attacks inside Israel. The IDF discovered 32 tunnels—several with exit points within 500 meters of the Israeli border.<sup>40</sup>

Hamas provided assault squads with RPGs, light machine guns, assault rifles and hand grenades and, in some cases, IDF uniforms. Six brigades (2,500–3,500 men each) were tasked with defending a border sector against IDF penetration. The brigades were grouped together under a regional commander and possessed a mix of forces, including rocket and mortar units, anti-tank units, snipers and infantry. Hamas defense forces prioritized preparations for close combat, including direct-fire engagements with IDF forces. They prepared and employed short-range rockets and ATGMs to support defense forces. Hamas integrated IEDs, anti-tank and sniper capabilities in densely populated areas. They moved between key infrastructure using a sophisticated network of tunnels and routes.

### ***Force Structure and the Tank***

As Hamas adapted its tactics from Operation Cast Lead to Protective Edge, IDF leaders debated force structure decisions to anticipate changes in enemy capabilities. These discussions were divided along the same lines that they were in the U.S. debate, centering around diverging views on the future character of warfare and the force construct required to meet its demands.<sup>41</sup> The revisionist school argued that the IDF should invest primarily in air power, intelligence, special operations forces and standoff precision fire and cyber capabilities; the conservative school expressed concerns that the buildup of these capabilities at the expense of the ground conventional force would weaken the IDF and make it too dependent on technology. IDF Chief of Staff Lieutenant General Benny Grantz stated that the IDF likely would not fight a conventional army force in the foreseeable future, nor have to conduct large-scale ground maneuvers in enemy territory. His views were supported by Brigadier General Avigdor Klein, former Chief of the Armored Corps, who voiced his approval for reductions in armored forces, and by Brigadier General Gal Hirsh, a division commander during the Second Lebanon War and deputy of the IDF Depth Command (formed in 2011 to coordinate the IDF's long-range operations deep in enemy territory). Hirsh argued that the use of flexible special operations forces equipped with excellent intelligence provided the best response for threats currently posed by various terror organizations.<sup>42</sup>

The strongest critique of this revisionist school of thought came from Major General Gershon Hacohen, a conservative thinker and outgoing northern corps commander. General Hacohen argued that the IDF had become too dependent on technological solutions and lacked effective strategies to cope with new threats:

Military doctrine is a function of culture; it is never universal but is rooted in time and place. For years, the hallmark of the IDF was the initiative and creativity of individual soldiers. Instead of the “art of war,” today the IDF has become obsessed with the “science of war”—statistics and numbers of targets hit—but this does not necessarily



measure effectiveness. The IDF needs to maintain its ability to adapt to changing circumstances just like some of its rivals are doing. Technology cannot solve everything!<sup>43</sup>

Major General Hacoen warned the IDF not to neglect its ability to deploy a mass army. A “smart and small army based on special forces is a nice slogan, but sometimes the events dictate the need for large forces to operate.”<sup>44</sup>

A shift in domestic politics added fuel to the debate. Large civil demonstrations in 2011 reflected a change in the priorities of the Israeli public, which called for “more butter, fewer guns”—resulting in growing public pressure on the IDF to become more effective and less costly.<sup>45</sup> Budgetary constraints influenced discussions regarding the future character of warfare. Dramatic cuts to the IDF budget forced the army to choose between two options: strengthening the IDF’s identified weaknesses—especially maneuver-oriented ground forces—or strengthening its relative strengths, i.e., standoff fire, intelligence, cyber and special forces.<sup>46</sup> Budgetary constraints threatened the future development of armored platforms, integration of active armor protection systems, the number of armor units and armored training.

While senior military leaders discussed the future of heavy armor platforms, the IDF made significant improvements to armor formations and the Merkava Mk IV after Operation Cast Lead. Based on their experience in the Second Lebanon War, the IDF predicted that the future threat would maintain low signatures by assimilating in populations and preparing hidden fortified positions, conducting defense in depth with ATGMs and rockets, continuing to use guerilla and irregular tactics while expanding into underground warfare. The IDF identified their operational needs as the following:

1. dealing with enemy anti-tank capabilities;
2. executing C2 in a world full of data and capabilities;
3. conducting combat in “closed areas”; and
4. applying rapid and precise fire capabilities.<sup>47</sup>

Based on this assessment, the IDF developed and adopted an innovative anti-ATGM protection system, improved munitions for combat in closed areas and integrated a support company within the battalion task force to aid the movement and survivability of the tank. The research and development programs initiated after the Second Lebanon War came to fruition during Operation Protective Edge.

### ***Combined-Arms Maneuver***

Although the variables of mission, enemy, terrain, weather, troops, support, time and civilian considerations all ultimately dictated the IDF course of action, IDF operations were consistent with the overall concept of CAM throughout Operation Protective Edge. IDF units used Merkava tanks, armored infantry vehicles, dismounted infantry elements and armored engineer assets—with support from artillery and air assets—to conduct CAM to seize, detect and demolish both combat and cross-border tunnels.<sup>48</sup>

The IDF objective was to destroy key Hamas tunnel systems and restore security to Israeli civilians threatened by rocket fire in three phases:

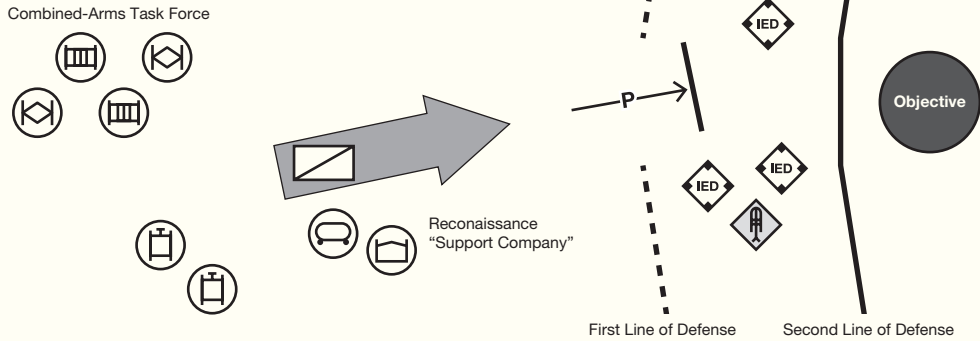
**Phase 1:** Penetrate the enemy’s first line of defense and displace the enemy from its defensive positions (figure 3). IDF units aggressively maneuver and mass firepower in order to breach enemy obstacles. Engineering assets provide avenues of approach when necessary.

Figure 3

## Phase 1: IDF Combined-Arms Maneuver Concept

### Phase 1

1. Scout elements attempt to identify the avenue of approach.
2. If unable, D9 Bulldozers create avenues of approach where terrain dictates.
3. Task force conducts combined-arms maneuver to penetrate enemy's first line of defense and then displace enemy.



The IDF integrated a support company—consisting of an observation platoon to support enemy detection, a reconnaissance platoon to detect maneuver paths and a mortar platoon for fire support—in the battalion task force to enhance their combined-arms maneuverability.

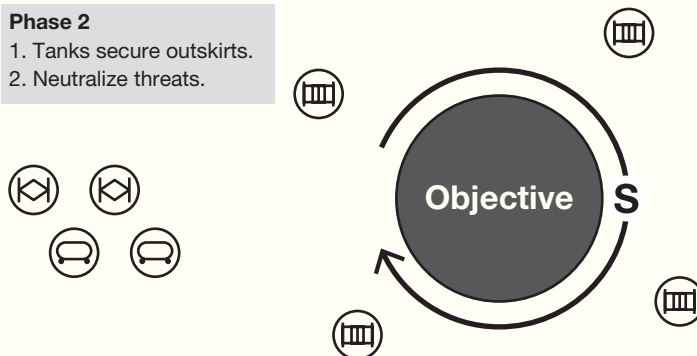
**Phase 2:** Seize the objective and neutralize threats. Once the first enemy line of defense is penetrated, combined-arms units maneuver to secure the objective outskirts and destroy enemy targets (figure 4).

Figure 4

## Phase 2: IDF Combined-Arms Maneuver Concept

### Phase 2

1. Tanks secure outskirts.
2. Neutralize threats.



**Phase 3:** Seize and clear key infrastructure and destroy enemy targets. Once the combined-arms unit secures the objective, infantry elements conduct missions to meet operation objectives (figure 5).

The IDF integrated its armored units into combined-arms task forces with unmanned aerial vehicles (UAVs), air assets, artillery and sophisticated intelligence-gathering assets to seize the initiative and mass combat power in both day and

Figure 5

## Phase 3: IDF Combined-Arms Maneuver Concept

### Phase 3

1. Tanks support infantry in seizing key infrastructure.
2. Destroy enemy threats.



night conditions. Unlike in 2006, the IDF was prepared in conventional CAM prior to Operations Cast Lead.

### Ground Campaign

The IDF initiated ground operations on 8 July 2014. During the initial aerial phase (10 days), the Israeli Air Force attacked 1,950 targets in the Gaza Strip using hundreds of tons of ordnance. Because the Israeli Air Force could not resolve the tunnel threat from the air, the IDF shifted to ground operations and maneuvered two miles inside the Gaza Strip with brigade task forces augmented with engineer and Special Forces elements (figure 6).<sup>49</sup>

The Israeli ground phase had two major goals: damaging Hamas' subterranean network and destroying Hamas' forces and infrastructure. Armor formations employed

Figure 6

## Disposition of Forces – Operation Protective Edge



Table 4

## IDF Southern Command

Note: The task org below does not denote full commitment of forces; some units deployed elements of its formations.

### 162d Armored Division

(Northern Gaza Strip)

- 401st Armored Brigade  
*Merkava Mk 4 with Trophy System*
- Nahal Infantry Brigade
- Reserve Brigade  
*Officer Cadet School*

### 36th Armored Division

(Central/North Central Gaza Strip)

- 7th Armored Brigade  
*Central/North Central*
- Paratrooper Brigade  
*Central*
- Golani Infantry Brigade  
*Central*

### Gaza Division

(Gaza Border and Southern Gaza Strip)

- Gefen Territorial Brigade
- Katif Territorial Brigade
- Givati Infantry Brigade
- 188th Armored Brigade

### Yahalom Special Operations Engineer Units

### Maglan Special Operations Unit

Source: Author application based on information from Central Intelligence Agency, "Gaza Strip," *The World Factbook*, accessed 10 January 2015, <https://www.cia.gov/library/publications/the-world-factbook/geos/gz.html>; disposition of forces developed by Dr. Jeffrey White, Senior Analyst, Washington Institute for Near East Policy, Washington, DC.

Source: Developed by Dr. Jeffrey White, Senior Analyst, Washington Institute for Near East Policy, Washington, DC.

firepower to undermine Hamas from safe distances; IDF elements maneuvered tanks and D-9 bulldozers into Hamas compounds and were followed by infantry forces that swept buildings for tunnels and weapons. The IDF successfully used CAM to rapidly close with and destroy enemy targets and seize key infrastructure, destroying a significant portion of the Hamas tunnel network system.<sup>50</sup>

### ***Main Battle Tank***

The Second Lebanon War and Operation Cast Lead displayed the dangers of enemy ATGM capabilities. Merkava losses in Lebanon led to the development and integration of active armor protection systems. The IDF adopted the Trophy Active Protection System (APS), developed by Rafael Advanced Systems Limited (also known as Windbreaker and Aspro A) in December 2010 after an anti-tank missile in the Gaza Strip damaged an IDF tank. The Trophy APS system employs a network of four radar sensors covering a 360-degree hemisphere around the protected tank.<sup>51</sup> The radars are integrated with the Merkava Mk IV's battle management system, providing instantaneous detection of a missile or projectile fired at the tank. If equipped with a Laser Detection System, the system can identify the location of the threat prior to the deployment of the missile or projectile (ATGMs, such as the Kornet-E, use a laser beam to track targets).<sup>52</sup> The system informs the crew of the location of the firing source, even while the missile is in the air, allowing them to engage and suppress the threat or eliminate it altogether.

Using network-centric connectivity, the location of the target can also be transferred to other weapon systems and platforms in the formation. The kill mechanism of the Trophy system—activated when the projectile reaches a specified distance from the tank—uses multiple explosively formed projectiles to counter the missile. Mounted on a rotating pedestal, this module points to the direction of the incoming threat and projects a sheath of melted fragments to destroy the threat. This hard-kill countermeasure is effective against all types of ATGMs, anti-tank rockets and high-explosive, anti-tank projectiles. The Trophy system is considered the only effective countermeasure against tandem warhead systems, such as the RPG-29. It can simultaneously engage multiple threats arriving from different directions and is effective on stationary or moving platforms.<sup>53</sup>

Along with the APS, the IDF integrated two new tank munitions to increase effectiveness in urban environments: the Kalanit 120-millimeter shell (an M329 Anti-Personnel/Anti-Materiel multipurpose tank round) and the Hatzav 120-millimeter shell (an M339 high-explosive, multipurpose tank round). Israel Industries Military Limited developed the Kalanit round after analyzing lessons learned from the Second Lebanon War and Operation Cast Lead. The round allows the tank crew to choose between two different modes: the first can be shot just above personnel (such as anti-tank crews), stops midair and explodes into six different charges, scattering thousands of deadly fragments; the second can be used against fortified structures, which the shell penetrates before exploding.<sup>54</sup>

The Hatzav round, in the family of the Kalanit munition, possesses a versatile munition warhead that provides an easy-to-operate solution for urban environments. The M339 uses an electronic fusing system and has three modes of operation: point detonation delay, point detonation super quick and air burst; an inductive setter sets the mode of operation. In point detonation delay mode, the round penetrates the target (such as a double-reinforced concrete wall or light armored vehicle) and explodes inside, releasing thousands of controlled fragments. In point detonation delay (super quick) mode, the round breaches a hole in a double-reinforced concrete wall—two rounds can create a passageway allowing infantry soldiers to pass through

the wall. In air burst mode, the round engages anti-tank or infantry personnel operating in the open or hiding behind defilades or walls.<sup>55</sup>

The implementation of new tank munitions increased the IDF's ability to target ATGM and rocket teams and destroy targets in urban terrain, allowing the IDF to counter emerging enemy capabilities on the battlefield.

### ***Merkava Utilization and Performance***

The Merkava Mk IV played a central role in CAM during Operation Protective Edge, providing the protection and mobility needed to seize tunnel sites and displace or destroy Hamas fighters. Combat operations in Shuja'iya—a residential neighborhood in Gaza City just over the border from Israel—provide a glimpse into the utilization of Merkava tanks in urban terrain and into the extensive preparation of Hamas defensive networks. The battle began on 19 July, two days after Israel launched the ground offensive.<sup>56</sup>

The battle began when Israeli troops supported by Merkava tanks entered the densely populated Shujai'ya district. They encountered significant resistance from Hamas fighters, who fired anti-tank missiles, rocket-propelled grenades and other weapons from houses and buildings. Hamas had developed extensive terrorist infrastructure throughout the neighborhood (IDF intelligence estimates more than 140 rockets were fired from this location into Israel during Operation Protective Edge).

Veterans of Operation Cast Lead stated, “This [was] not the Hamas of [2008], but a far more organized force that has adopted many of the same tactics and weapons seen in the fierce 2006 urban warfare in Lebanon.” One officer stated that he had never seen Hamas “like this before . . . [their] equipment and tactics [were] just like Hezbollah.”<sup>57</sup> Hamas incorporated anti-tank ambushes and IEDS throughout Shuja'iya and did not flee immediately as in previous engagements. Hamas used anti-tank missiles (including the Kornet and RPG-29) and booby-trapped the entrances to tunnels and homes. A prime example of Hamas' improved capabilities was their destruction of an armored personnel carrier (APC) by an anti-tank missile that killed seven IDF soldiers. Overall, 13 soldiers were killed in separate incidents in Shuja'iya. The seven-hour battle ended with a cease-fire. The Battle of Shuja'iya demonstrated the capabilities of a hybrid threat that possessed significant anti-tank capabilities, restricted friendly mobility through IEDs and utilized the urban terrain to their advantage.<sup>58</sup> The Merkava tank provided protection to IDF units as they conducted operations in complex and dense terrain.

The Merkava played a central role in CAM in numerous other operations during Operation Protective Edge. The Merkava was used in securing the outskirts of urban areas, providing protective firepower in seizing tunnel sites, disrupting Hamas prepared positions and hideouts and allowing infantry soldiers to enter and clear buildings.<sup>59</sup>

Hamas was more effective and aggressive than in previous conflicts, surprising Israeli forces with coordinated fire. Although IDF formations won most of the close combat actions, Hamas fighters inflicted casualties on even the best Israeli infantry and armored formations. A key focus for Hamas during this operation was action against the Merkava. Hamas formed specialized anti-tank units equipped with a variety of ATGMs and RPGs, including the RPG-7, the tandem warhead RPG-29 and (reportedly) the Malyutka, Konkurs, Fagot and Kornet variations.<sup>60</sup> Hamas adopted a multi-pronged tactic against the Merkava, engaging it at long range with ATGMs while deploying small anti-tank elements in close combat. Hamas also used IEDs and mines against Merkava formations to draw them into prepared ambushes where “all anti-tank means could be brought to bear.”<sup>61</sup>

The Merkava IV equipped with the Trophy APS proved to be critical in countering Hamas anti-tank capabilities. During Operation Protective Edge, a total of 571 Merkava tanks were used in varying missions: 439 tanks as part of offensive operations, 66 tanks as part of the defense effort on the Gaza Strip and 66 tanks in routine operations in the Northern Command. Merkava tanks fired 22,269 rounds, including the M339 multipurpose tank round. No Merkava tanks were destroyed, and the Trophy APS intercepted four anti-tank missiles.<sup>62</sup> IDF armor forces experienced 14 killed in action, nine severely wounded, 12 moderately wounded and 219 ambulatory injuries. The Trophy System proved to be an offensive enabler, allowing armored formations to maneuver with speed and depth without limitations posed by anti-tank missiles.

### ***Conclusion***

At the tactical and operational level, Operation Protective Edge proved to be a success for the IDF. The IDF successfully integrated changes in force structure, combined-arms maneuver and Merkava capabilities to defeat Hamas. The concluding section offers several important lessons that could be applied to the U.S. Army. It is prudent for the Army to analyze this operation to gain insights into hybrid threat trends, force structure challenges, relevancy of CAM and the role of the main battle tank.

### **Insights and Recommendations**

Operation Protective Edge provides a robust case study of warfare between a conventional force and a hybrid threat. Although numerous aspects of Operation Protective Edge are unique to the environment and organizations involved, the case study provides insights into the nature of hybrid organizations, the application of combined-arms maneuver and the relevance of the main battle tank. The IDF integrated lessons learned from the Second Lebanon War and Operation Cast Lead to execute successful combined-arms operations at the tactical and operational levels. Based on the analysis in the previous sections, the paper concludes with the following insights.

#### ***Hybrid Threat***

Hybrid capabilities exhibited by Hamas introduced two trends that the U.S. Army may see in future adversaries.

First, the future threat will most likely possess extensive anti-tank capabilities. The proliferation of anti-tank weapons greatly increased between Operations Cast Lead and Protective Edge. The proliferation of ATGMs (and systems such as tandem-warhead RPGs) will continue, and they will likely be used by future adversaries. Just as the U.S. Army experience during Operation Iraqi Freedom and Operation Enduring Freedom resulted in counter-IED strategy and doctrine, it is critical for the U.S. Army to preempt the ATGM problem and develop holistic strategies to counter this capability. The Army should heed the following assessment of U.S. maneuver doctrine and capability by an Israeli officer: “[The U.S. Army’s] notions concerning intelligence dominance replacing armor are disproved by our lessons . . . . [More] balanced training is not enough. Strykers and MRAPs [Mine-Resistant Ambush Protected vehicles] will not [withstand] a medium-heavy ATGM.”<sup>63</sup> The M1 Abrams tank provides unique protection capabilities required to defeat a hybrid threat armed with ATGMs.

Second, future adversaries may use subterranean warfare to counteract the strengths of conventional forces. Subterranean warfare is not new; throughout history, weaker and smaller forces have used tunnels to counter air, firepower and ISR advantages of stronger forces. Although not extensively employed by Hamas during Operation Cast Lead, tunnel operations were significant during Operation Protective Edge. The IDF destroyed 34 cross-border tunnels



during the operation, many of which were complex systems with branch and parallel routes. The United States must anticipate the possibility of fighting in an operating environment with extensive tunnel networks integrated into densely populated terrain. In these types of environments, the Army must expect airpower and ISR advantages to be reduced and must be prepared to seize and hold terrain.

### ***Force Structure***

The force structure required to defeat Hamas during Operation Protective Edge, while employing modern technology, included a preponderance of conventional capabilities. This observation leads to two insights.

First, Operation Protective Edge demonstrated the utility of conventional capabilities against a hybrid threat. However, the operations also showed the importance of extensive ISR (particularly important for targeting in densely populated terrain), special forces and airpower. The IDF experience demonstrates that the conservative and revisionist schools of thought are not mutually exclusive. The challenge for the U.S. Army is to find the balance between the two schools of thought when developing the future force. The IDF experience shows that the emerging technologies espoused by the revisionist school need not be substitutive but could provide additive capability. However, one clear lesson from the operations is that a force structure based on conventional capabilities provides the best foundation for an adaptable force that can meet multiple types of threats. The IDF experience during Operation Protective Edge shows that a force trained and equipped for LICs—even with significant air, ISR and special operations capabilities—may not be capable of defeating or neutralizing hybrid threats. The Army should seek to augment rather than replace its conventional force structure with the capabilities espoused by the revisionist school of thought.

Second, the Army must continually consider the character of future conflicts without basing analysis solely on experiences in the Iraq and Afghanistan campaigns. The decisions made today will directly impact the outcome of future operations; this is especially true in an environment of significant fiscal constraints. The Army has a great responsibility to properly allocate resources, direct training and develop force structure; it must be diligent in extracting enemy trends and identifying the trajectory of hybrid capabilities seen in conflicts throughout the world, rather than relying solely on its recent combat experience. The Army must not revert to the Combat Training Center-based model that predated the experiences after the 11 September 2001 terrorist attacks on the United States. While the past 13 years of combat have developed a generation of combat-tested Soldiers, there is an inherent danger in relying solely on this experience. For the IDF, prior to the 2006 Lebanon campaign, the focus on low-intensity operations “created a misconception of what war is really like” among officers.<sup>64</sup> This experience offers a warning for U.S. leaders to question assumptions and biases and, as much as possible, avoid the human tendency to apply templates from previous experiences without thinking critically about the potential advantages of new strategies.

### ***Combined-Arms Maneuver***

Operation Protective Edge shows that CAM is relevant, and can be critical, in the hybrid environment. The emergence of hybrid threats has not negated the need for conventional forces to maneuver aggressively against an enemy, seize and hold terrain and apply precision fires. Although unmanned aerial systems and other technologies can add to the combat power of CAM, their capabilities cannot replace those provided by conventional CAM platforms. Overall, then, Operation Protective Edge provides two insights regarding CAM.

First, even against a hybrid threat, the ability to seize and hold terrain remains a key aspect of ground warfare. Operation Protective Edge clearly displayed the need for conventional forces to seize infrastructure and hold terrain (urban outskirts) to defeat a hybrid threat. U.S. Army doctrine reflects the importance of this concept in its definition of CAM—the need to apply the elements of combat power to seize, occupy and defend land areas.<sup>65</sup> In 2009, Major General Isaac Ben Israel stated that from the Second Lebanon War the IDF learned that to stop insurgent rocket launchers “you need to send soldiers in and take the area and control it.”<sup>66</sup> Dr. Rand Fishbein, a noted Middle Eastern scholar, states that the ability to seize and hold terrain will forever be a part of a combat winning strategy, including in the Middle East. The U.S. Army must retain the ability to maneuver in depth and mass firepower to seize objectives. Given the enemy’s integration of standoff fire capabilities (particularly ATGMs), employment of extensive prepared defensive positions and use of urban terrain, a mobile precision-fire platform is critical for the successful execution of CAM. The ability to mass discerning fires at extended ranges, maneuver to displace the enemy and provide protection is critical to seizing and holding terrain. Unless there is a fundamental change in the character of warfare, a mobile, protected, precision-fire platform is needed to accomplish CAM.

Second, CAM is essential in displacing an enemy from prepared defensive positions. As an enemy continues to adapt, it will seek to undermine technological advantages held by opposing forces. Hezbollah employed extensive prepared defensive positions in depth during the Second Lebanon War, while Hamas integrated anti-tank capabilities and adopted subterranean networks to negate IDF firepower advantages. The IDF experience supports Dr. David Johnson’s argument that armored platforms are needed to maneuver and force the enemy to expose itself.<sup>67</sup> Aggressive maneuvering exposes the enemy, allowing for the massing of fires from the elements of combat power. Both the psychological effect of the tank and the ability to maneuver, close with and mass fires on the enemy contribute to the ability of a CAM force to take the initiative.

Operation Protective Edge clearly displayed that airpower, ISR and standoff fire capabilities alone cannot always displace the enemy. This is a clear warning for the Army not to develop an overreliance on these capabilities. Effective combined-arms operations can counter an enemy’s use of anti-tank capabilities and underground tunnels, prepared defensive positions and urban infrastructure. In the hybrid environment, CAM is necessary to displace and destroy an enemy that continues to adapt and integrate capabilities to negate the opposing force’s technological advantages.

### ***Main Battle Tank***

Operation Protective Edge displayed the central role of the Merkava in displacing the enemy from prepared defensive positions, reducing risk and providing maneuver options for the battlefield commander in both urban and conventional environments. The M1 Abrams tank is the only platform that can provide sufficient protection against a hybrid threat with ATGMs for the U.S. Army of 2015–2025. Looking at the use of the Merkava in Operation Protective Edge provides three insights regarding the use of the main battle tank in combat operations.

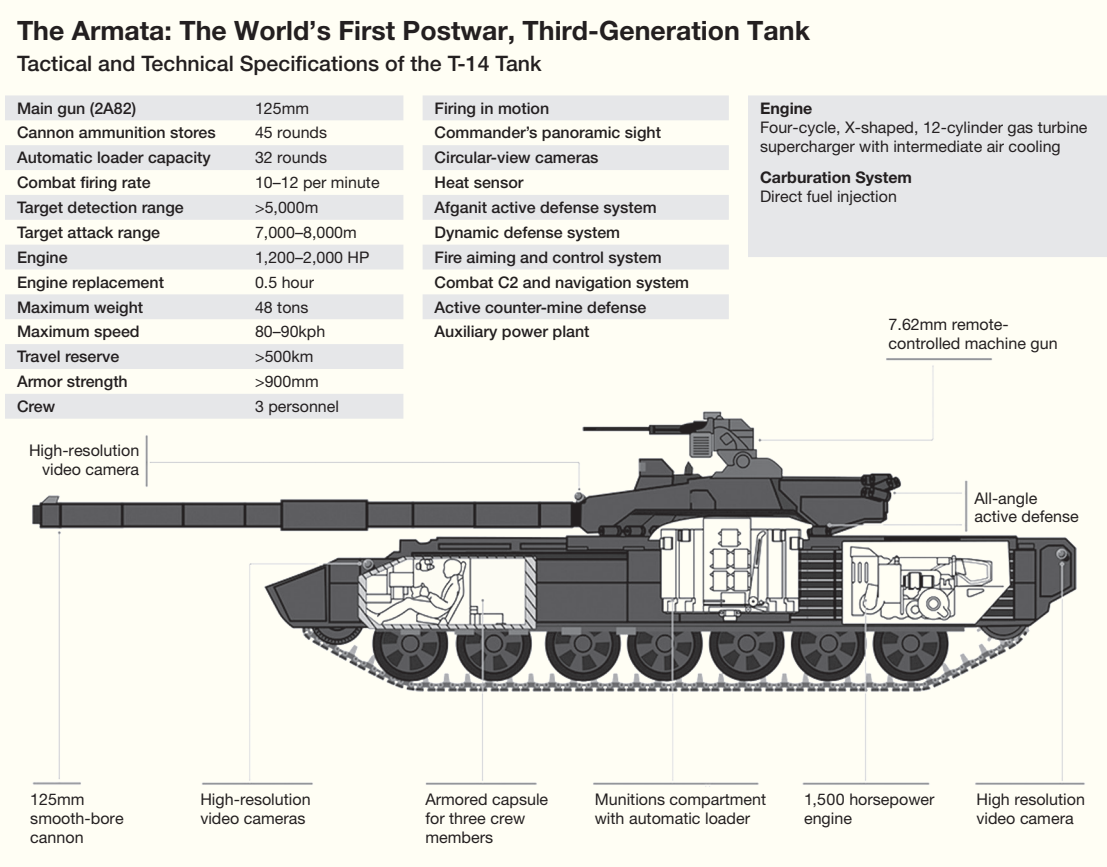
First, the main battle tank provides precision fire capabilities that are critical in urban environments. Operation Protective Edge displayed the Merkava’s capability to employ precision fires to destroy targets and support infantry troops in densely populated terrain, which proved to be critical in an environment in which political and military objectives required discretionary rules of engagement. To support this requirement, the IDF integrated new tank munitions with increased effectiveness in urban environments. IDF tank crews possessed the tools necessary



to destroy enemy targets while minimizing collateral damage. The U.S. Army should consider updating its munitions with capabilities similar to the Kalanit and Hatza tank rounds. As the United States prepares to conduct operations in a hybrid environment, it must ensure that its forces have the proper tools to successfully accomplish its missions.

Second, as part of a strategy to counter ATGMs, the Army must consider adopting an active armor protective system. The IDF Trophy System proved to be critical in defending against the ATGM threat in Operation Protective Edge, during which the Merkava's Trophy System successfully repelled four anti-tank missiles. It should be noted that Russia's newly developed main battle tank, the T-14 Armata, possesses a similar active armor protection system (figure 7).<sup>68</sup>

Figure 7  
Russian T-14 Specifications



Source: Sergei Kaprovat, "Russia Considers Standardized Chassis for Most Tracked Vehicles," *Foreign Military Studies Office OE Watch: Foreign News and Perspectives of the Operational Environment*, 5:3, March 2015, pp. 51–52, accessed 16 March 2015, <http://www.rg.ru/2015/02/02/tank.html>.

The Army is behind in the development of an active armor protection system that can counter the ATGM threat. The Army must consider adopting this system not only for its main battle tank but also for armored infantry, Stryker and MRAP platforms. This technology should be part of an overall strategy to counter ATGM threats; development of tactics through combined capabilities (such as the support companies implemented by the IDF) and camouflage should all be incorporated to the overall strategy.

Third, the Army must adjust and adapt tank gunnery and maneuver training to prepare for operations in a hybrid environment; the regional alignment construct provides an opportunity for leaders to focus training based on threat assessments. With the end of the 2006 campaign, IDF leaders reassessed their training strategy to prepare their units for future conflicts. The IDF predicted that the future threat would maintain low signatures by assimilating in populations and preparing hidden fortified positions; conduct defense in depth with ATGMs and rockets; and continue to use guerilla and irregular tactics, including expanding into underground warfare. With a reprioritization and focus on conventional capabilities, the IDF armored corps implemented conceptual changes in gunnery training, focusing on targets “without dimension” Armor corps leaders recognized that most targets encountered in a hybrid environment had minimal exposure—creating detection, identification and targeting complexities.

Rather than firing rounds from battle positions at targets two to four kilometers away (as during HIC engagements), gunnery training may require crews to shoot at targets in urban infrastructure one to two kilometers away but that have reduced signatures. The Army must adjust its training to reflect hybrid threat trends and prepare units for future conflicts.

As the Army has transitioned to capabilities-based concepts (shifting away from a threat-based focus), the need for training prioritization has greatly increased. Units are required to be proficient in all elements of decisive action: offense, defense, stability and defense support of civil authorities operations. However, the requirement to develop proficiency across the range of military operations in both low- and high-intensity environments presents a severe challenge, given the constraints of time, budget and space. The Army has asked its Soldiers to be adaptable and flexible. However, it is important to realize that there is an inherent danger in relying solely on adaptability and flexibility. IDF experiences present a clear warning:

There is danger with relying on adaptability and flexibility. . . . Israel has developed the ethic of improvisation. . . . Over the years, these traits that Israel has attached [to] itself have undergone a pathological change: operational flexibility has turned into negligence and freedom of action in fulfilling assignments has become irresponsible abandon.<sup>69</sup>

Capabilities-based and threat-based assessments are not mutually exclusive; both should be incorporated into a unit’s training plan. Tank gunnery should reflect the character of conflict most likely to be seen by that unit. For that reason, gunnery training in the Pacific should differ from gunnery training focused in the Middle East, Europe or Africa. Although the fundamentals are the same, training objectives should differ (based on projected targets and terrain). The regional alignment construct provides a unique opportunity to re-tailor training based on threat-based assessments. Finding the proper balance between capabilities and threat-based assessments, integrated with the regional alignment construct, will assist units in prioritizing and shaping gunnery and maneuver training.

## **Conclusion**

Based on the preceding analysis, this paper proposes that the role of the M1 Abrams tank in the Army of 2015–2025 is to provide a mobile and survivable precision firepower platform to execute effective combined-arms operations against a sophisticated hybrid threat with ATGM capabilities, in order to seize and hold terrain, mass discretionary fires in urban and conventional environments and destroy the enemy threat. The IDF experience in Operation Protective Edge demonstrates that the capabilities of the main battle tank are likely to be more critical

and relevant in a hybrid environment than they have been during the past 13 years of combat in Iraq and Afghanistan.

The proliferation of ATGMs, utilization of conventional capabilities by unconventional organizations and integration of extensive defensive positions in urban terrain point to a future threat that is adaptive, complex and capable. Based on this assessment, the U.S. Army should maintain a baseline conventional force structure proficient in combined-arms warfare and augmented with emerging technologies. The challenge remains to find the proper balance between conventional platforms and emerging technologies; this analysis suggests that conventional combined-arms capabilities should remain the foundation of the Army, with air, ISR, special operations and emerging technologies providing additive elements to an overall combined-arms concept.

To prepare for future conflicts, the Army must consider modernizing its armored platforms, including Bradley and Stryker vehicles, with an active armor protection system and improved munitions. Enemy capabilities have surpassed the protection offered by current armament. The effectiveness of ATGMs and tandem warhead RPGs requires adaptation in materiel, doctrine and training by the Army (much like the approach to IEDs). Furthermore, tank units must adapt maneuver and gunnery training to meet the challenges of the hybrid environment. The regional alignment initiative provides an opportunity to re-tailor training built on threat-based assessments.

No two conflicts are identical. The complexities and nuances resulting from culture, geography, infrastructure, decisionmaking and chance ensure that history will never repeat itself exactly. However, it would be imprudent to ignore past military operations, as “war is nonetheless a distinct and repetitive form of human behavior.”<sup>70</sup> It is wise to heed Sir Michael Howard’s instruction to be conscious of the “uniqueness of every historical event” while pursuing the study of past military operations in “width, depth, and context” to understand the character of war and to directly improve the officer’s professional competence.<sup>71</sup> An analysis of Operation Protective Edge displays the complexities that could be faced by U.S. political and military leaders. In an environment of fiscal constraints, the decisions made today will have an even more important impact on the outcome of future operations. Given the nature of the military profession and the resources provided by our nation to execute combat, the responsibility to properly allocate resources, direct training and develop force structure is great. It is with fervent discipline, focus and creativity that our military and civilian leaders must consider the future of the Army.

## Endnotes

- <sup>1</sup> Dr. David E. Johnson, Senior Analyst, RAND Corporation, interview with author, Arlington, VA, February 2015. Discussion included the relevance of tanks in the future operating environment, hybrid threat trends, Israel Defense Force, Merkava and regional alignment initiative. Dr. Johnson's work "Hard Fighting: Israel in Lebanon and Gaza" (Santa Monica, CA: RAND Corporation, 2011), <http://www.rand.org/pubs/monographs/MG1085.html>, provided a base of knowledge from which to frame the thesis.
- <sup>2</sup> Department of the Army, Training Circular 7-100, *Hybrid Threat* (Washington, DC: U.S. Government Printing Office, November 2010), p. v.
- <sup>3</sup> Johnson, "Hard Fighting," p. xxii. Definitions are adapted from Dr. Johnson's publication.
- <sup>4</sup> Major General Bill Hix, "Strategic Landpower and Force 2025 and Beyond," PowerPoint Presentation, Army Capabilities and Integration Center, U.S. Army Training and Doctrine Command, Fort Eustis, VA, 22 January 2014, slide 4.
- <sup>5</sup> General Raymond T. Odierno, *Planning for Sequestration in Fiscal Year 2014 and Perspectives of the Military Services on the Strategic Choices and Management Review*, statement before the House Armed Services Committee, 113th Congress, 1st Session, 18 September 2013, accessed 27 October 2014, [http://armedservices.house.gov/index.cfm/hearings-display?ContentRecord\\_id=71D1123F-51F8-4141-B6E7-28D782B427FE](http://armedservices.house.gov/index.cfm/hearings-display?ContentRecord_id=71D1123F-51F8-4141-B6E7-28D782B427FE).
- <sup>6</sup> Lieutenant Colonel Ido Mizrahi, Israel Defense Forces, recommended the Begin-Sadat Institute to the author. The titles of the schools of thought, "Conservative and Revisionist," were taken from the lexicon used by IDF analysts after Operation Cast Lead during a conference sponsored by the Begin-Sadat Center for Security Studies. The summary of the conference can be found at the following: BESA Staff, "Was it a Mistake to Downsize and Deemphasize Israel's Ground Forces?" The Begin-Sadat Center for Strategic Studies, Israel, 21 July 2014, accessed 19 February 2015, <http://besacenter.org/uncategorized/mistake-downsize-deemphasize-israels-ground-forces>.
- <sup>7</sup> *Ibid.*
- <sup>8</sup> Linda Robinson, "The Future of U.S. Special Operations Forces," Council Special Report No. 66, Council on Foreign Relations, New York City, NY, April 2013.
- <sup>9</sup> Marjorie Censer, "The end of the tank? The Army says it doesn't need it, but industry wants to keep building it," *The Washington Post*, 31 January 2014, accessed 23 October 2014, [http://www.washingtonpost.com/business/economy/the-end-of-the-tank-the-army-says-it-doesnt-need-it-but-industry-wants-to-keep-building-it/2014/01/31/c11e5ee0-60f0-11e3-94ad-004fe6a61ee6\\_story.html](http://www.washingtonpost.com/business/economy/the-end-of-the-tank-the-army-says-it-doesnt-need-it-but-industry-wants-to-keep-building-it/2014/01/31/c11e5ee0-60f0-11e3-94ad-004fe6a61ee6_story.html).
- <sup>10</sup> Jonathan M. House, "Toward Combined-Arms Warfare: A Survey of 20th Century Tactics, Doctrine and Organization," Combat Studies Institute, U.S. Army Command and General Staff College, Fort Leavenworth, KS, August 1984, p. 1.
- <sup>11</sup> *Ibid.*, p. 182.
- <sup>12</sup> *Ibid.*
- <sup>13</sup> *Ibid.*, pp. 183–184.
- <sup>14</sup> *Ibid.*, pp. 184–186.
- <sup>15</sup> Department of the Army, Army Doctrine Publication 3-0, *Unified Land Operations* (Washington, DC: U.S. Government Printing Office, 10 October 2011), p. 6.
- <sup>16</sup> Michael Peck, "Why the Death of the Tank is Greatly Exaggerated," *War is Boring Online*, 23 October 2013, accessed 25 April 2015, <https://medium.com/war-is-boring/why-the-death-of-the-tank-is-greatly-exaggerated-751f5ccd091>.

- <sup>17</sup> John Stone, *The Tank Debate* (Amsterdam: Hardwood Academic Publishers, 2000), p. 1.
- <sup>18</sup> *Ibid.*, p. 2.
- <sup>19</sup> Lieutenant Colonel Warren Lennon, “The Death of the Tank,” *Armor* (January–February 1972), p. 5.
- <sup>20</sup> This paper examines Operation Protective Edge as a case study to inform the problem statement. Operation Pillar of Defense is not considered because the IDF did not conduct ground operations.
- <sup>21</sup> Rand H. Fishbein “Tank Tops and Heavy Metal: Armor’s Enduring Appeal on the Modern Middle Eastern Battlefield,” *Ariel Center for Policy Research*, ACPR Policy Paper no. 156, p.10.
- <sup>22</sup> *Ibid.*, p. 1.
- <sup>23</sup> *Ibid.*
- <sup>24</sup> *Ibid.*
- <sup>25</sup> Amos Harel and Avi Issacharoff, *34 Days: Israel, Hezbollah and the War in Lebanon* (New York City, NY: Palgrave Macmillan, 2008), p. 43.
- <sup>26</sup> Lazar Berman, “The Lessons of the Second Lebanon War,” *American Enterprise Institute Online*, 12 August 2011.
- <sup>27</sup> Harel and Issacharoff, *34 Days*, p. 43.
- <sup>28</sup> *Ibid.*, p. 60.
- <sup>29</sup> *Ibid.*
- <sup>30</sup> *Ibid.*, p. 73.
- <sup>31</sup> *Ibid.*, pp. 60, 246.
- <sup>32</sup> Johnson, “Hard Fighting,” p. 96.
- <sup>33</sup> *Ibid.*, p. 126.
- <sup>34</sup> *Ibid.*, p. 124.
- <sup>35</sup> *Ibid.*
- <sup>36</sup> *Ibid.*, p. 134.
- <sup>37</sup> *Ibid.*, p. 101.
- <sup>38</sup> *Ibid.*; Yoram Cohen and Jeffrey White, “ Hamas in Combat: The Military Performance of the Palestinian Islamic Resistance Movement,” The Washington Institute for Near East Policy, Policy Focus no. 97, p. 10; Lieutenant Colonel Scott C. Farquhar, general editor, *Back to Basics: A Study of the Second Lebanon War and Operation Cast Lead* (Fort Leavenworth, KS: Combined Studies Institute Press, 2009), p. 69.
- <sup>39</sup> Dr. Jeffrey White, Senior Analyst, The Washington Institute for Near East Policy, interview with author, Alexandria, VA, February 2015. This discussion greatly informed the author’s understanding of the composition and actions of Hamas during Operation Cast Lead. As one of the leading analysts of Hamas operations in the Gaza Strip, Dr. White provided invaluable context regarding the operating environment.
- <sup>40</sup> Jeffrey White, “The Combat Performance of Hamas in the Gaza War of 2014,” CTC Sentinel 7, no. 9, 29 September 2014, pp. 1–2.
- <sup>41</sup> In December 2013, the Begin–Sadat Center for Strategic Studies, a leading Israeli think tank, held a conference to discuss this very issue; the thesis adopts the concept and naming convention used by

this conference for the conservative and revisionist schools of thought to analyze the current debate in the U.S. Army.

<sup>42</sup> BESA Staff, “Was it a Mistake to Downsize and Deemphasize Israel’s Ground Forces?”

<sup>43</sup> *Ibid.*

<sup>44</sup> *Ibid.*

<sup>45</sup> *Ibid.*

<sup>46</sup> Eitan Shamir and Dr. Eado Hecht, “Neglect of IDF Ground Forces: A Risk to Israel’s Security,” BESA Center Perspectives Paper no. 225, The Begin–Sadat Center for Strategic Studies, Ramat Gan, Israel, 2014.

<sup>47</sup> The IDF Armored Corps developed an after-action review slide deck to share insights with the U.S. Army. Dr. Richard Williams of the Defense Intelligence Agency (DIA) passed on the slide deck to the author for use in the thesis. Richard Williams, Analyst, Middle East, DIA, interview with author, DIA Headquarters, Washington, DC, February 2015; Colonel Ido Haim, “The Armor Corps on Operation Protective Edge,” PowerPoint Presentation, Army Maneuver Center of Excellence, Fort Benning, GA, 2014.

<sup>48</sup> Yiftah S. Shapir and Gal Perel, “Subterranean Warfare: A New-Old Challenge,” *INSS*, November 2014, accessed 28 April 2014, [http://www.inss.org.il/uploadImages/systemFiles/Subterranean%20Warfare\\_%20A%20New-Old%20Challenge.pdf](http://www.inss.org.il/uploadImages/systemFiles/Subterranean%20Warfare_%20A%20New-Old%20Challenge.pdf), p. 53.

<sup>49</sup> Elad Popovich, “A Classical Analysis of the 2014 Israel– Hamas Conflict,” *CTC Sentinel* 7, no. 11, 10 December 2014, p. 21.

<sup>50</sup> *Ibid.*

<sup>51</sup> “Israeli Active Protection Systems for Armored Vehicles,” *Defense Update: Online Defense Magazine*, 9 June 2010, accessed 26 February 2015, [http://defense-update.com/20100609\\_israeli\\_aps.html](http://defense-update.com/20100609_israeli_aps.html).

<sup>52</sup> “Russian Kornet Anti-Tank Missile FAQ,” ABC News, 27 March 2014, accessed 26 February 2015, <http://abcnews.go.com/International/story?id=79586&page=1>.

<sup>53</sup> “Israel Active Protection Systems for Armored Vehicles.”

<sup>54</sup> “The New M339 Kalanit 120mm Multi-Purpose Tank Round is Empowering the IDF Armored Corps Capabilities in Dealing with the On-Going Terror from the Gaza Strip,” *Defense-Aerospace.com*, 24 January 2011, accessed 26 February 2015, <http://www.defense-aerospace.com/article-view/release/121977/israeli-army-introduces-new-120mm-tank-round.html>; Yaakov Katz, “Mid-air Blast Tank Shell Winner of Defense Prize,” *The Jerusalem Post Online*, 6 July 2011, accessed 14 March 2015, <http://www.jpost.com/Video-Articles/Video/Mid-air-blast-tank-shell-winner-of-Defense-Prize>.

<sup>55</sup> “Israeli Military Orders New Tank Rounds,” *United Press International*, 1 August 2011, accessed 26 February 2015, [http://www.upi.com/Business\\_News/Security-Industry/2011/08/01/Israeli-military-orders-new-tank-rounds/55481312215698](http://www.upi.com/Business_News/Security-Industry/2011/08/01/Israeli-military-orders-new-tank-rounds/55481312215698).

<sup>56</sup> *Times of Israel* Staff, “IDF Releases Details on Shejaiya Battle in which 7 Soldiers Died July 20,” *The Times of Israel*, 22 August 2014, <http://www.timesofisrael.com/idf-releases-details-on-shejaiya-battle-in-which-7-soldiers-died>.

<sup>57</sup> Christa Case Bryant, “Why Hamas is a More Formidable Foe in Gaza This Time,” *The Christian Science Monitor*, 25 July 2014, <http://www.csmonitor.com/world/middle-east/2014/0725/why-hamas-is-a-more-formidable-foe-in-gaza-this-time>.

- <sup>58</sup> *Ibid.*; Karin Laub and Tia Goldenberg, “Gaza’s Deadliest Day: Fierce Ground Battle Over Hamas Stronghold Kills 13 Israeli Soldiers, 65 Palestinians,” *National Post*, 20 July 2014.
- <sup>59</sup> Haim, “The Armor Corps,” slide 33.
- <sup>60</sup> White, “The Combat Performance of Hamas in the Gaza War of 2014,” p. 3.
- <sup>61</sup> *Ibid.*
- <sup>62</sup> Haim, “The Armor Corps,” slide 4.
- <sup>63</sup> Farquhar, *Back to Basics*, p. 98.
- <sup>64</sup> Harel and Issacharoff, *34 Days*, p. 45.
- <sup>65</sup> Department of the Army, ADP 3-0, p. 6.
- <sup>66</sup> Charles Levinson, “Israel’s Ground Assault Marks Shift in Strategy,” *Wall Street Journal Online*, 5 January 2009, accessed 7 March 2015, <http://www.wsj.com/articles/SB123106067991451749>.
- <sup>67</sup> Johnson, “Hard Fighting,” p. 134.
- <sup>68</sup> Sergei Kaprovat, “Russia Considers Standardized Chassis for Most Tracked Vehicles,” *Foreign Military Studies Office OE Watch: Foreign News and Perspectives of the Operational Environment*, vol. 5, no. 3, March 2015, pp. 52–53.
- <sup>69</sup> Harel and Issacharoff, *34 Days*, p. 257.
- <sup>70</sup> Sir Michael Howard, “The Use and Abuse of Military History,” *Royal United Service Institute Journal* 107, no. 625, February 1962, p. 6.
- <sup>71</sup> *Ibid.*