We're Confused, Too

A Historical Perspective for Discussion of "Land Ahead"

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For the times they are a-changin'.

—Bob Dylan

The Israel Defense Forces' (IDF) Ground Forces Command concept, "Land Ahead," originally published in 2015 and again as a draft in 2017, is the IDF's most comprehensive attempt to redefine its ground combat concept and to offer a practical framework for the transformation of its ground forces.[1] There is virtually no debate about this assertion. "During the Land Ahead process," writes Maj. Gen. Aharon Haliva, "the Ground Forces Command officially identified in writing, for the first time, that the ground maneuver was facing a serious crisis … The Ground Forces Command recognized, again for the first time, that the existing force design trends themselves are not providing the IDF anything new. *More of the same* does not advance us toward the required change."[2] Maj. Gen. Kobi Barak, commander of the Ground Forces Command, adopted the "Land Ahead" concept from his predecessor, Maj. Gen. Guy Tzur, and wrote: "the change is so deep that it requires the IDF to deeply examine and change its operational behavior in every dimension."[3]

How was such a drastic conceptual leap achieved? The architects of "Land Ahead," along with the IDF's Dado Center, turned to design theory to create the concept. In his published reflections on its creation, Tzur specifically points to the design process as the enabling factor of the conceptual breakthrough.[4] The process made clear that

A U.S. Marine Corps light armored vehicle from Battalion Landing Team, 2nd Battalion, 6th Marine Regiment (BLT 2/6), 26th Marine Expeditionary Unit (MEU) is staged prior to training alongside Israeli soldiers 11 March 2018 as part of exercise Juniper Cobra at the National Training Center in Israel. The 26th MEU participated in Juniper Cobra with the Israel Defense Forces in order to improve interoperability and hone both forces' skills in a variety of environments. (Photo by Cpl. Jonathan Sosner, U.S. Marines)

the barrier between force employment concepts and force design concepts had to be torn down. Not only did the Dado Center design team need to gain expertise with technologies and the philosophies behind them, but the IDF force design system also had to think simultaneously about force employment. The "Land Ahead" concept was a turning point at which the IDF design team shifted its focus toward military transformation.

The idea of military innovation, or military transformation, is one of the foundations of modern military thought.[5] Dima Adamsky suggests that we view Revolution in Military Affairs (RMA) as a radical military innovation in which new organizational structures integrate with new operational concepts, which usually stem from the invention of new weapon systems, and change the nature of warfare.[6]

Tzur, Haliva, and Barak are correct; what is unique and critical about "Land Ahead" is its innovative nature and its aim to leap forward, freeing itself from the "more of the same" phenomenon. We must, therefore, ask ourselves how we can figure out which of the wide variety of ideas added to the original 2015 concept are most innovative and best suited to our ground forces today? Further yet, how can we avoid the trap of investing our most advanced technologies to tweak past concepts instead of moving forward into the future?

In the past, the IDF invested in the most advanced technologies, such as the Digital Land Forces project (command and control), without stopping to think how these technologies enable significant transformation in ground combat. Today, the IDF faces a similar risk. Without a suitable historical and conceptual perspective, we might someday find ourselves investigating "the lost decade," despite our investments.

To minimize the risk of such an outcome, this article will offer a historically based conceptual framework. First, it will elucidate the manner in which military revolutions have progressed in the modern era, in parallel to technological developments. The historical process reviewed will then be extrapolated to deduce which step the IDF must take next, with an emphasis on ground combat.[7] Third, the article will assess the development of the IDF and its enemies on the same historical scale. Finally, the article will discuss the Ground Forces' current transformation requirements, as well as the necessity to reorganize the IDF's internal discourse on the matter.

The Four Industrial Revolutions and the Measuring Stick for Military Revolutions

Alvin and Heidi Toffler famously arranged human history according to three technological and social waves: the agricultural wave, the industrial wave, and the information wave.[8] In much military literature, the military parallels of the Toffler scale are the pre-modern war, industrialized war (characterized by firearms, general conscription, firepower, machinery, large mass, and scope), and information-age warfare.[9]

This perspective of history no longer serves us. The IDF adopted the military-information revolution (the reconnaissance-strike complex, developed based on the U.S. Army's AirLand Battle concept) several decades ago. Since, the other side has rapidly adopted the information-age revolution on its own terms (guided missiles and target intelligence). Both sides now have precision fire technology that neutralizes the other's tactical mobility (combat platforms). Israel's enemies, Hezbollah and Hamas, are currently holding a defensive position against Israel, thus providing them with the many inherent advantages of defense and allowing them to gain the upper hand in conflict.

A new historical framework can serve as a way to navigate "outside the box" toward the necessary military transformation. At the core of this proposed theoretical framework lies the discernment of four industrial revolutions (see figure, page 85).[10]

In 2011, as part of the preparations for an industrial fair in Hanover, Germany, a new historical perspective focusing exclusively on the modern era ("The Machine

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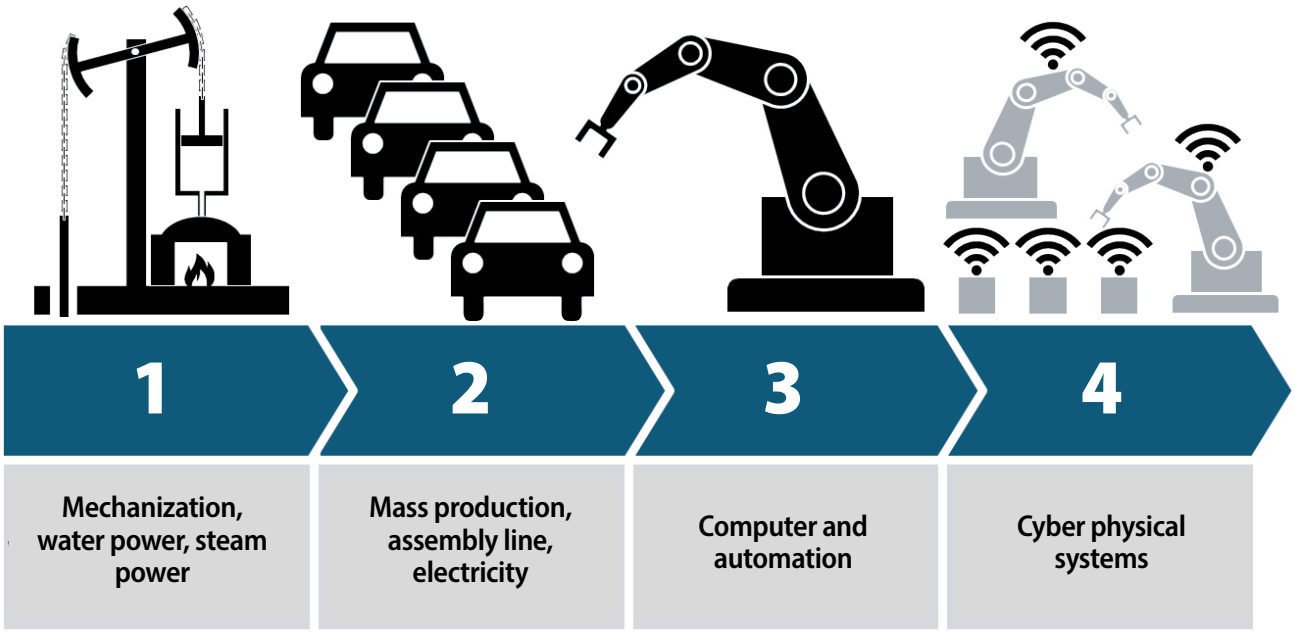
Age") was developed. According to this perspective, four distinct industrial revolutions can be defined since the beginning of the eighteenth century.[11] The *first industrial revolution* (Revolution 1.0) harnessed the power of steam. The *second industrial revolution* (Revolution 2.0) was generated by the technological breakthrough of the internal combustion engine and electricity. The next breakthrough, the *third industrial revolution* (Revolution 3.0), included electronics, printed circuit boards, computers, software, information technology (IT), and the technological and scientific developments such as the telegraph, engraving machines, steel factories, etc. This era generated enormous social change. We will focus on its implications on warfare, beginning with the American Civil War, which is considered the first modern war. The industrialized North owed their victory against the agricultural South to several substantial advantages (beyond population size). The North enjoyed a superior railroad network that provided effective transportation of troops and resources, as well as a modern telegraph network that



(Figure courtesy of Christoph Roser at AllAboutLean.com)

Figure. The Four Industrial Revolutions

automation revolution. It is also known as *the digital revolution*, which has defined our world since the 1980's. According to this concept, we are currently at the dawn of the *fourth industrial revolution* (Revolution 4.0), defined by computer-enhanced mobility and computer performance in the physical world (automation).

What exactly do we mean by the "fourth industrial revolution," and why is it different from the "digital age"? More importantly yet, how is this related to our discussion about "Land Ahead" and the military transformation we need today? To answer these questions, we will connect the industrial revolutions to a series of RMAs.

Industrial Revolution 1.0. The technological essence of this era is the power of steam, along with further facilitated the central management of the war effort and enabled the allocation of resources according to changing needs of the multiple fronts. The North also had greater production capabilities, which meant more weapons (such as cannons) and more ammunition.

Additionally, the North enjoyed a major economic advantage. Using their superior navy, the North enforced a naval embargo on the South, thus stunting the South's economic development. In fact, the American Civil War, the Prussian-French War, the Japan-Russia War, and even World War I, all exemplify the Modern Military Revolution 1.0. It is a revolution of strategic mobility (steamboats and trains), centralized management (the telegraph) and the development of a general staff and

senior headquarters that act as conduits between the industrial production at home and the resources needed on the front.[12] These elements create a total war—a war in which the entire home front is effectively conscripted to a war of attrition on a massive scale, through manufacture, transportation, and communications.

Industrial Revolution 2.0. The technologies leading this era were the internal combustion engine, electricity, the radio, and the modern production line. We will jump directly to the military perspective: the military revolution associated with Industrial Revolution 2.0 is undoubtedly the revolution in mechanized maneuver. Modern Military Revolution 1.0 was stuck in the trenches of World War I. The strategic home front continued to equip armies of millions and ship soldiers to the front in massive numbers. However, on the battlefield, the superior firepower of the machine gun and artillery stopped the human masses: the infantry and the cavalry. Although the tank and airplane were relatively overlooked at first, upon their premier appearance in World War I, they were a harbinger of the upcoming military revolution realized only some twenty years later, in the next round of European warfare. The German blitzkriegs of September 1939, May 1940, and June 1941 relied on the revolution of tactical mobility provided by tanks, trucks, personnel carriers, and close aircraft support, as well as the revolution of the radio that enabled decentralized and flexible mission command. This new tactical mobility required the reorganization of the forces in a way that provided them with local combat independence. This was the beginning of the doctrine of combined arms (even if not of the idea itself). To maintain the pace of tank movement, a close but diverse support system was required, including mobile infantry, engineers, supporting fire from towed and motorized artillery, and air support from dive-bombers. To broadly summarize, World War II took place on two levels. The first is the strategic level; it was a war of manufacture and transportation of resources, similar to World War I. The second level is operational; a war of mobility and denial of mobility. The Modern Military Revolution 2.0 is, therefore, the tactical mechanized and mobility revolution, and the revolution of huge campaigns of massive forces.

Industrial Revolution 3.0. Transistors, printed circuit boards, computers, and digital communication generated enormous changes in social and economic structures. Warfare also underwent changes in the information era. The term "Revolution in Military Affairs" was coined in Western military thought in the 1980s. The military thinkers of these years, such as U.S. Army Gen. Donn Starry and Andrew Marshall from the Department of Defense's Office of Net Assessment, understood that their current forces could not complete their missions.[13] The U.S. military and its allies in Europe did not have the ability to stop the Warsaw Pact's enormous mechanized force, but they also realized the great potential provided by the new era of technology. Electronics enabled the installation of sensors, which were once too large, on fighter jets. Lasers and electro-optics upgraded normal rockets into smart missiles. Computers allowed humans to quickly concentrate, process, and transfer all new information collected from sensors to digital management systems that helped other humans maximize their attack resources. The RMA 3.0 was coined in the U.S. military as AirLand Battle and was later named the Information Technology RMA.[14]

This revolution was successfully implemented in the first and second Gulf Wars and demonstrated the futility of combat between a mechanized 2.0 military (Iraq) and a modern 3.0 military (United States). RMA 3.0 was based on information dominance, precision weapons, and the ability to connect these two domains effectively and quickly. The critical reader will discern that these three key elements are mostly based on aerial assets (sensors, precise payload munitions delivered from air and space) on the one hand and fixed infrastructure (headquarters with excellent infrastructure and communications) on the other.[15] The reconnaissance-strike complex required a revolutionary reorganization of the forces, combining intelligence with operational planning teams. Naturally, these teams were most effective in fixed headquarters.[16] In the IDF, the primary recipients of new power were the regional commands (which established large intelligence and fire control centers), the Air Force, and the J2/Intelligence Directorate.

The next era—Revolution 4.0. What distinguishes the fourth revolution from the information revolution (Revolution 3.0)? The drama of the third revolution was the appearance of the computer processing and digital memory, the software dimension that enabled new ways of integrating things and the creation of cyberspace. From the military perspective, Revolution 3.0 contributed significantly to strengthening the operational environment awareness among commanding officers, and it created

Union soldiers survey wreckage on the Orange & Alexandria Railroad August 1862 in Manassas Junction, Virginia, at the Second Battle of Bull Run. Military railroads were part of the revolution in strategic mobility in Modern Military Revolution 1.0. (Photo by Timothy H. O'Sullivan; courtesy of the Library of Congress)

new military capabilities—high-tempo, high-capacity, and precise long-term attacks and counterattacks. The software dimension contributed, and continues to contribute, to the accelerated pace of miniaturization and decreased costs of electronic products, especially sensors.

What remains for Revolution 4.0? This is where computers extend beyond the screen and the person in front of it and begins to operate in the real world—to operate independently, with a certain amount of human mediation but also without it. It is beginning to sound trite, but this is indeed a dramatic development. This revolution is not only being generated because of the integration of the cellular world and the communication cloud but is also and mainly a result of Internet of Things (IOT) technology, automation, and artificial intelligence (AI).[17] Revolution 3.0 connected between everyone and created a universal network. Revolution 4.0 facilitates practical execution using computers in the physical world on a local level, via mobility and automation.[18] For example, it enables smart homes to create local optimization by efficiently utilizing energy for a the household's needs.[19] The General Electric jet engine is yet another example of this revolution. The engine uses advanced industrial IOT technologies to enable a network of sensors embedded within the engine to take various and highly precise internal measurements and connect the results during operation, thus significantly improving their performance.[20] The many different sensors harnessed to create the updated and sufficiently credible information necessary to allow a computer to drive a

Brig. Gen. Erwin Rommel and staff in June 1940 during the Battle for France. German blitzkrieg tactics, developed during Modern Military Revolution 2.0, relied on the tactical mobility provided by tanks, trucks, personnel carriers, and close-aircraft support. (Photo courtesy of the Bundesarchiv via Wikimedia Commons)

vehicle autonomously, is a third example of this revolution. Many experimental models of such vehicles are already traveling on roads around the world.[21]

If so, the essence of Revolution 4.0 is computer-processing power and precision communication. Together, these elements enable computers to execute tasks in the physical world that are complicated for humans to process.[22] In some cases, such as the jet engine, propulsion turbines, and autonomous vehicles, computers are making actual life and death decisions.[23]

Modern Military Revolution 4.0. How is this related to military matters? Militaries around the world today, including the U.S. military, explore the idea of the Internet of Battlespace Things as a possible answer to the threat of long-range guided munitions.[24] They also realize the potential of being inundated with information while pursuing an enemy through densely populated urban areas. This overwhelming abundance of data can be reduced to a manageable level if the attacking forces are equipped with data systems capable of processing and synthesizing the data they receive, using machine learning technologies or AI. These capabilities would facilitate the distinction between "noise" and helpful information, simplify the location of Internet of Battlespace Things anomalies on the field, and most importantly, assist in the identification of the enemy's location. In certain situations, such a system could even give commanders the option of allowing AI to make decisions for them.[25] Militaries are beginning to realize the connection between cyber and the physical-tactical world, as well as the necessity of waging the war in the communications and connectivity domain to ensure victory in the physical-tactical domain. Everyone is still "working on it," but this is definitely the general direction.

The Modern Military Revolution 4.0 is the combined product of reconnaissance-strike resources and autonomous and automatic information processing.[26] The speed and precision of computers, sensors and missiles provide systems with the networking they need to achieve

real-time mission execution. The enemy can be precisely located, identified, and verified. Next, a decision can be made according to a safety protocol and the rules of engagement, and an attack can be executed—all within seconds. Moreover, the decreasing size and cost of missiles and platforms such as quadcopters allow for widespread manufacturing and distribution of such systems. Therefore, Modern Military Revolution 4.0 allows for the production of network-based weapon systems capable of all-around tactical performance.

What Can Be Learned from This Framework?

First, technology is a dominant factor in military thinking. Without diminishing from the importance of original military thinking, it is difficult to ignore the close connection between combat methods and technological progress around the world. This does not necessarily mean that every military undergoes transformation at the right time; however, it does mean that history smiles upon those who fully utilize the advantages provided by current technology, and truly change accordingly.

Second, having the right technologies doesn't mean we've got everything right. It is possible to procure the best technology of the time and to still completely miss the revolution. This is exactly what happened to the French, at the onset of World War II; although the French army and air force were technologically superior to the German *Wehrmacht* in May 1940, they lost the campaign due to conceptual misunderstanding. The French command failed to realize the significance of the mobility and pace of the new kind of warfare they faced on the battlefield, and maintained the old concept of static defense and centralized command.[27]

Third, revolutions are cumulative. Revolutions do not cancel each other out. Rather, they are cumulative in nature, just like the cinema did not kill the radio, and television did not cause the cinema to disappear. For example, the strategic transportation of forces does not become any less important upon the appearance of mechanized tactical mobility. The combat platforms of Revolution 2.0—the tank and the airplane—have not disappeared with the development of Revolution 3.0.

Fourth, militaries are late to adopt. RMAs tend to appear late in comparison to the equivalent revolutions in industry. While World War I was the peak of Modern Military Revolution 1.0, the Western world was already well-oriented and even controlled by the technologies of Revolution 2.0 (i.e., alongside the technologies of the previous wave). A military wise enough to understand the current change sooner, gains a substantial advantage.

Fifth, new revolutions are taking place at an accelerated pace. Revolution 2.0 is said to have appeared one hundred years after the first industrial revolution. Revolution 3.0 took place seventy years after the second, while Revolution 4.0 appeared only thirty to forty years later (see table, page 90–91).

RMA 4.0 and the Ground Forces

The largely neglected art of ground force maneuver is the nexus of our conceptual discussion. Within this context, we must take note of a historical pattern according to which waves of access and area denial are followed by waves reallowing maneuver. This new perspective sheds light on various phenomena we see today.

New 3.0 firepower left the ground forces behind. This phenomenon was not a result of conceptual atrophy; rather, it was caused by objective conditions. The nature of the tactical forces made it nearly impossible for ground forces to take advantage of the Revolution 3.0 advances in firepower. While command-and-control capabilities developed among the ground forces, the maneuver force itself was left out of the revolution.[28] On the regional level, senior headquarters were now able to introduce combat power of a new kind—rapid and precise target destruction. On the other hand, on the local-tactical level, the improvement of situational awareness among commanders (which is important in of itself) could not significantly change the complexity of warfare. Even though the modern information and attack systems were effective in the face of the quantitative challenge presented by the mechanized enemy, it did not provide a new solution for the complexity and pace of a real tactical event taking place in complex terrain.[29] Moreover, guided munitions were costly, and it was difficult to equip the front-line units. The conceptual solution for these limitations was to define the complex, employed by senior headquarters, as a force meant to destroy the enemy and clear the path for the ground forces. "Joint" became a magic word.

The size of headquarters is increasing. The Revolution 3.0 reliance on human intervention and information processing is the main reason behind the increasing size of tactical headquarters.[30] There are some who perceive this as nothing more than the

natural tendency of bureaucracies to expand. However, it appears more likely that the large increase in rear echelons (both senior and tactical) is largely related to the new Revolution 3.0 military power.[31]

The ethos of command and control and "mission command" are at risk. The Modern Military Revolution 3.0 gave priority to the senior echelons in establishment of a coherent situational picture. The senior echelons directly influence the actions of the tactical units even though they are in the rear and are generally less mobile. This occurrence contradicts the essence of the idea behind mission command. This major contradiction causes doctrinal tension between the way in which the IDF trains its commanders and the way it actually operates and fights. We train our commanders in accordance with the tactical doctrine

Table. Industrial Revolutions and Their Military Manifestation. So What Is the Takeaway?

	1.0		2.0	
Era	~1800–1900		~1900–1970	
Technology	Locomotive, steel (trains, telegraph)		Internal combustion, engine, electricity, transistor	
Civilian implications	Status of workers, status of shareholders, entrepreneurship, colonialism		Middle class, consumption, culture, growth of major cities, suburbs	
Conflict	U.S. Civil War	WWI	WWII	Six-Day War, Yom Kippur
Military technology	Mass armies, industrial base as condition for independence at front, rifled barrels, machine guns, barbed wire (trains, telegraph)		Tank, armored personnel carrier, places, radio, radar, mechanized artillery	
Center of gravity in military organization	**Strategic mobility** General staffs and complex headquarters **Strategic level** (Moltke, Foch, Pershing, Lundendorff)		**Tactical mobility** Division, corps headquarters **Operational level** (Guderian, Rommel, Patton, Bradley, Montgomery)	
Implications for command and control	Concentration (power to headquarters)		Dispersion (mission command)	
Major doctrine	—		Blitzkreig, combined arms	

(Table by author)

of the Modern Military Revolution 2.0 era and "mission command," which stem from the idea that tactical mobility requires commander independence. Yet, the real power lies in the hands of the major headquarters; not only do they have real-time knowledge of the battlefield, but they also hold the power to take various actions that have a real influence on the campaign, such as the conduction of airstrikes on key targets.

The circle of centralization-decentralization and the fourth revolution act as a decentralized revolution. Modern Military Revolution 1.0 (mainly the train and telegraph) focused on the strategic transportation of forces and created the strategic headquarters. Abraham Lincoln's war room with telegraph cables spread throughout it and the German General Staff serve as tangible examples of this first revolution.[32] The revolution of

Table. Industrial Revolutions and Their Military Manifestation. So What Is the Takeaway? (continued)

	3.0		4.0
Era	~1970		~2017
Technology	Microprocessor, personal computer, internet		Internet of things (IoT), artificial intelligence (AI), autonomy, Big Data, 3D printing
Civilian implications	Age of information, social media, change in union-state power balance		TBD
Conflict	First and Second Gulf Wars	Second Lebanon War, Days of Repentance, Operation Protective Edge	—
Military technology	Airborne sensors, guided munitions, control systems		Unmanned aerial vehicle (UAV) flocks, multisensor information-meld, autonomous strike platforms on Internet of Battle-space Things network, automatic intelligence analysis, automatic intel processing, decision-support systems
Center of gravity in military organization	**Neutralization of platforms** Operational role for headquarters, regional commands, general staff		**Intensification of maneuver space** Automatic monitoring ability, immediate targeting and information processing allows striking from platforms, return of ground maneuver (?)
Implications for command and control	Concentration (regional command)		Dispersion (brigade, division)
Major doctrine	AirLand Battle		Multi-Domain Operations, Land Ahead

(Table by author)

tactical platforms and mobility (2.0) required the decentralization the of decision-making and empowered the local command echelon. The mission command doctrine is an important legacy of this era. The military revolution of combined intelligence and attack assets (3.0) again concentrated exclusive authority in the hands of senior command echelons—this time with true combat power. The idea of a universal network (World Wide Web) dictated the nature of the third industrial revolution and allowed for the nonmobile headquarters to accumulate power and assemble vast amounts of information.

The fourth revolution, on the other hand, deals with local functions that require self-contained and phenomenal performance (e.g., autonomous vehicles). The Modern Military Revolution 4.0—the era of autonomy, data communication networks, and the IOT—allows for the local tactical echelons to hold the center of power once again. For the first time, ground-tactical units can now utilize the advantages of the connection between sensors, precision-attack assets, and data processing.

Tactical mobility. The perspective of tactical mobility sheds new light on the various RMAs. Revolution 2.0, with its mechanized platforms, returned tactical mobility to the battlefield and overcame the firepower of the Revolution 1.0. Revolution 3.0 presented far more precise and lethal new firepower. This revolution again limited the tactical mobility of mechanized platforms. The potential of Modern Military Revolution 4.0 is the return of mobility (maneuver) to the battlefield, as result of the automation and miniaturization of the reconnaissance-strike complex of Revolution 3.0 to tactical dimensions. Revolution 4.0 will make it possible to locate and suppress the other side's fire and overcome their ability to conceal themselves.

The New Military Challenge

Modern Military Revolution 2.0—mechanized platforms, side by side with radio and mission command—was the solution to the inability of maneuver to operate in the face of firepower in World War I. Modern Military Revolution 3.0 provided a convincing answer to the frightening question of the time: What can be done against the impossible force ratios in Europe to prevent nuclear war? Revolution 3.0 can also be seen as a return of sort to the days of World War I. Revolution 1.0 greatly restricted tactical mobility and stifled the war; Revolution 3.0 did the same, first to our adversaries, and later to the IDF.

Which military challenges can we solve using the fourth industrial revolution? To answer to this question, we will briefly review the military developments of the last two decades. Both the U.S. military (in 2002 and 2003) and the IDF demonstrated on a number of opportunities that militaries who adopt the Modern Military Revolution 3.0 become too formidable an enemy for militaries using platforms of Revolution 2.0. Tanks and aircraft are simply too vulnerable in the face of the reconnaissance-strike complex of Revolution 3.0. Our adversaries' response is known as asymmetric warfare—giving up platforms and assimilating into complex terrain. IDF thinker and retired Brig. Gen. Itai Brun calls this response "The Other Side's RMA."[33] In other words, our enemies' response to revolution 3.0 is to take combat to a tactical area in which the reconnaissance-strike complex of senior headquarters is no longer an advantage.

However, the world did not stop at asymmetric warfare. The United States is currently preparing for conflicts with "near-peer adversaries." The U.S. military is concerned by what it calls anti-access/area denial. According to this concept, a major power (Russia or China) could potentially carry out a limited offensive act in a neighboring region (e.g., seizing the Crimean Peninsula, a Baltic country, or islands in the South China Sea). The U.S. forces stationed in the area will not have the slightest chance to respond in time with the force required; they will have to wait for the main U.S. force to arrive from the United States. However, the abundant enemy anti-aircraft and anti-ship missiles deployed ahead of time will threaten the ability of the main force to reach the region (anti-access). This array of capabilities, combined with long-range and precise tactical firepower and disruption of U.S. electronic and cyber capabilities (area denial), will pose a threat to the U.S. forces that have already arrived.[34]

What did the adversaries do, essentially? They decreased their dependence on vulnerable platforms (by limiting tactical mobility) and increased their usage of advanced missile and sensor technologies, to disrupt strategic and tactical mobility (advanced anti-tank capabilities and precise tactical firepower).[35] Due to the ability of missile-based forces to change positions and conceal themselves, they will be difficult to identify and destroy.

Although the scope and distances vary greatly, significant similarities lie between the contexts in which

A full-size model of an Israeli Elbit Hermes 900 unmanned aerial vehicle (UAV). Advances in unmanned aircraft system technology ensure UAVs will continue to figure prominently in Modern Military Revolution 4.0. (Photo by Tal Inbar via Wikimedia Commons)

the U.S. military and the IDF think about war. From the IDF's perspective, Hezbollah has been a standing military for some time, even if it is not an official state force. The various approaches presented here, as well as Hezbollah's approach, are reminiscent of the Syrian "close-battle" period, which has guided IDF training over the past decade.[36] This concept envisions a limited surprise seizure of territory by an anti-tank infantry force; the force takes hold of an easily defendable area inside Israel, and controls it under the cover of artillery fire, tight aerial protection and advanced anti-tank capabilities. This description is also evocative of the Egyptian attack in 1973, during which infantry units equipped with advanced anti-tank capabilities took over a limited area by surprise, under aerial and artillery cover.[37] The difference lies in the scope of the enemy and the theater, but the basic concept is the same: denial of access to an area by means of long-range firepower, and prevention of maneuver within a combat theater using precision missiles against platforms and other fires capabilities.

In other words, our adversaries (e.g., China, Russia, Hezbollah, or Hamas) have adopted Modern Military Revolution 3.0, mainly by combining missiles and sensors. They now have the ability to disable platform movement, including our own. Therefore, since playing defense requires less mobility, our adversaries have essentially gained the strategic advantage.[38] Our enemies succeeded in achieving a symmetric approach. On the one hand, their fire-attack maneuver capabilities near the border evade our Revolution 3.0 advantages. On the other, their regional and local defenses utilize missiles and sensors (the adversaries' Revolution 3.0) to neutralize the transportation of reinforcements and maneuverability of the United States and Israeli forces, while relying on the advantages of the defender and while taking full advantage of the terrain.

The outcome of such a development is clear. "We've improved our strike accuracy from eight digit

coordinates to 10, 12, 14, and even 15-digit coordinates (height dimension)," writes Barak in the *Dado Center Journal*. "Yet the enemy, on the other hand, is usually successful in fleeing from these targets before they are attacked. We destroy the coordinates, but are struggling to hit the enemy."[39]

We can now explain why the IDF is not alone in its quest to find ways of protecting its forces against threats from anti-tank missiles, precision fire, and small unmanned aerial vehicles. Western militaries are looking for tactical solutions to identify and rapidly attack targets discovered during combat. Due to the impression of superiority achieved during Revolution 3.0, many militaries believed their advantages in the air and on the ground were no longer under any significant threat. These militaries now find themselves lacking the capabilities that were once considered elementary (e.g., anti-artillery fire) and that have become relevant once again in face of current threats.[40] The challenges that were once considered unique to the IDF and asymmetric warfare now reflect the challenges China and Russia pose to the United States.

From the military perspective, the challenge of Revolution 4.0 is to return the tactical and strategic mobility to the battlefield—or in other words, to enable maneuver. This can be achieved by using new platforms—swarms of robotic drones, for example, combined with the aggressive suppression of enemy sensors and missiles. These measures will enable our larger platforms carry the necessary ground forces to maneuver (in a manner similar to Revolution 2.0), thus returning our ability to conquer, control, and defend territory.

The Discussion in "Land Ahead"

We will now explore the conceptual ideas raised in "Land Ahead" in light of the historical connection we have established, regarding the current discussion of military transformation in the IDF. We claim that the tactical ground reconnaissance-strike complex was, and must remain, the conceptual focal point of "Land Ahead."

Force reorganization as combined arms brigade. Regardless of whether or not this move is correct, critical or even unimportant, it is clear that the conceptual roots of the combined-arms brigade lie in the military revolution of the mid-twentieth century (Revolution 2.0). In other words, the combined-arms battle originates from the revolution of tactical mobility in World War II.[41] After internalizing the lessons of the Yom Kippur War, the IDF fought in brigade and battalion-sized ad-hoc combined-arms units.[42] Clearly, this integration does not serve as a sufficient response to the threat of anti-access/area denial missiles. While it may be possible to strengthen combined arms in ground forces, it is clear that this is not something related to the new military transformation.

Organizing tactical headquarters in ground units. We are experiencing repeated waves of reorganization in division, brigade, and battalion headquarters; strengthening of professional disciplines; establishment of strike cells; and more. From the perspective of military revolutions, this is an attempt (possibly desperate) by ground forces to regain some of the relevance lost to higher echelon headquarters in the reconnaissance-strike complex era (Revolution 3.0). We are trying to do this by strengthening tactical headquarters in order to introduce the reconnaissance-air complex into the battlefield; militaries call this "joint combat." Nevertheless, the real contribution has been crowded mobile headquarters with limited communication for assets that are usually held by the regional command or General Staff, and this contribution remains marginal. The constant changing and increasing size of tactical headquarters may be critical in the short term, but from an historical perspective, the "stretching" of the Revolution 3.0 paradigm produces diminishing returns.

Intelligence-based combat and the tactical internet project. The essence of these ideas is to lay the groundwork for communication that will enable all the "good" products and intelligence generated by higher headquarters to flow to the local tactical echelon.[43] As important as the mobile/cellular revolution of the third industrial era may be, it alone does not create the critical mass required for the fourth revolution. The world of mobile before the smartphone (e.g., the Nokia 6100 and flip phones) allowed us to read the news on a designated portal for mobile users. It connected us with the information that was prepared "from up above." All of this did not turn mobile users into active systems that created relevant information by themselves, or in collaboration with others, for their immediate needs (e.g., Waze, the navigation application based on crowdsourcing). The first cellular portals were considered unimpressive and not especially practical.

But this is not the case following the advent of smartphones. The new smartphone is not only

An unmanned vehicle travels on a range during a Maneuver Robotics and Autonomous Systems Live Fire Demonstration 22 August 2017 at Fort Benning, Georgia. (Photo by Patrick Albright, U.S. Army)

integrated with the open internet, but it also can communicate with connected sensors that allow it to assume new local roles in real time-space situations. For example, a gate at a municipal parking lot automatically opens when the sensor connects a license plate to a mobile parking app and the lot's gate. At the edge of the spectrum is the autonomous vehicle, which is a connected system composed of sensors and a closed circle of information processing.[44] It continues to operate even when it is not connected to the global network.

Returning to the issue at hand, the tactical internet and intelligence-based combat are important. While they do promote some of the efficiencies of Revolution 3.0 to the ground forces' tactical units, they will be insufficient by themselves to dramatically change the forces behavior in a complex tactical event.[45]

The new fire process concept. Maj. Gen. Tamir Hayman wrote about the new concept of intelligence-fires circles.[46] It espouses a faster, automatic, and more precise connection of intelligence to the attack itself. Better integration, according to Hayman, will improve the *quality* of target attacks, as opposed to their *quantity*. Mirroring our theoretical framework, the concept addressed by Hayman utilized technologies of Industrial Revolution 4.0 (e.g., artificial intelligence, big data, and automation) to improve the reconnaissance-strike relationship that is still concentrated in senior headquarters (Revolution 3.0). This is a much-needed step, but it still cannot be defined as military transformation from the conceptual perspective. It does not provide an answer to the main challenge—the return of tactical mobility for maneuvering forces; neither does it divert the military's focus toward the tactical echelons.

The Tactical Reconnaissance-Strike Complex, a ground-force drone fleet. There was a reason that 2015's "Land Ahead" emphasized the Tactical Reconnaissance-Strike Complex (TRSC) (sensors to shooters networks) as the main issue for a conceptual leap forward for the IDF Ground Forces.[47] The TRSC's purpose is as follows:

> [To] enable a drastic improvement in the tactical and operational effectiveness of ground forces in

> discovering the disappearing enemy, pinpointing his location and striking him quickly…through the creation of layers of ground, mechanized, and air strike and intelligence-gathering layers connected together through a fast network that allows the fusion of data for closing targeting cycles in a matter of seconds …[48]

This idea called for a network that automatically connects sensors to munitions, based on small drones operated at the brigade level.[49] The network was meant to precisely locate the enemy, quickly attack it, and decipher its hiding locations by processing information quickly and locally. Haliva coined the phrase "Tactical Internet of Things" around this idea.[50] Barak developed the idea under the titles "Precise and On Time: The Direct Connection between Sensor and Strike" and "Deciphering the Enemy: Rapid Local Utilization of Information."[51] These senior officers actually described the essence of Revolution 4.0: automatic and small intelligence-attack assets will enable the return of lethal tactical mobility to the ground forces in battle.

Despite the relatively broad consensus that was presented in the beginning of this article, at least among senior officers, a process of reopening and redefining the concept has been ongoing for the last two years. Despite real change, military transformation demands clarity and unified efforts; it seems we lost some of it.

Resisting Transformation

Resistance to change is common in militaries. Nevertheless, some of the motivations of resistance are worth recognizing.

"Tech-phobia" and opportunities missed. "Don't worry, the main thing is that the battalions are good and the battalion commanders are good" is a common attitude across land forces.[52] The fear of technology and what has been mocked as "technology-based concepts" represents a lack of theoretical and historical knowledge about the idea of military transformation. But it could be that the Ground Forces' fear of technology goes beyond the natural aversion to change that most of us suffer from.[53] It also stems from its experience from Revolution 3.0. This wave harmed maneuver and the independence of commanders. Therefore, the intuitive response is to reject additional "digital" reforms.

As stated above, this is a misunderstanding. Heinz Guderian, Erwin Rommel, and George Patton were only able to apply their genius because of radio and internal combustion technology, and they harnessed it to return tactical mobility. If we continue with our intuitive hesitancy, we will miss the potential of the new Revolution 4.0.

Parochial interests. The services and corps in their current state are a creation of the platform era (Revolution 2.0). The organizational efforts invested to maintain their respective positions are enormous.[54] IDF's Air Force and Intelligence directorate (J2) have gained great influence and power due to the IT-RMA. None of these forces are interested in the Conceptual (rather than technological) Revolution 4.0. They are interested, in good faith, of the new technology that enhances the continuation of the concepts from Revolutions 2.0 and 3.0.

The opposition to the idea of Revolution 4.0 from within the Ground Forces, the other services, and General Staff directorates reflects the nexus of these interests.

Summary

The IDF must strive for the development of an autonomous sensor-strike-processing complex. Within the context of force defense, it must also be automatic. To achieve this goal, inexpensive unmanned aerial vehicles that can carry sensors and transmitters connected to advanced attack and information-processing assets can be used. This all must take place on the local tactical level to repress enemy Revolution 3.0 capabilities and facilitate the return of maneuver superiority. Three major generals in the IDF Ground Forces Command have written on this subject. The U.S. Army has published many articles on the multi-domain battle concept, which aims to achieve similar goals.[55] Nonetheless, it does not appear that our efforts toward this vision are full steam ahead.

In the past, the IDF was able to identify the historical moment, to harness its technological prowess to innovative concepts and new organizational models, and to change. This happened in the 1960s with the Israeli fast attack missiles boat revolution, during the IAF's preparations for the anti-SAM battle of the Beqaa Valley in Lebanon 1982, and regarding precision weapons in the 1990s.[56] We have the capacity to change again. ■

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Notes

Epigraph. "The Times They Are A-Changin'," Bob Dylan, track 1 on *The Times They Are A-Changin'*, Warner Bros., 1964.

1. For more on "Land Ahead" as a strategic learning process, see Guy Tzur, "'Land Ahead'—Formulating a Ground Maneuver Concept," *Dado Center Journal for Operational Art* (*DCJ*) 6 (January 2016): 104–33, accessed 9 October 2018, https://www.idf.il/media/11155/tzur.pdf.

2. Aharon Haliva, "More of the Same: The Need for Conceptual Leap in Force Design," *DCJ* 9 (December 2016), accessed 24 January 2019, https://www.idf.il/media/11151/haliva-english-9.pdf.

3. Kobi Barak, "The Sky is No Longer the Limit: The Need for Ground Airpower and Multi-Dimensional Warfare Capabilities," *DCJ* 11-12 (May 2017): 38–60, accessed 9 October 2018, https://www.idf.il/media/11763/11-kobi-barak-pdf.pdf.

4. Tzur, "Land Ahead."

5. See, for example, Williamson Murray and Allan R. Millett, *Military Innovation in the Interwar Period* (New York: Cambridge University Press, 1996). The writers view many of the World War II events as a result of the militaries' ability or inability to adjust to the changing nature of war.

6. Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel* (Stanford, CA: Stanford University Press, 2010).

7. We will refrain from providing a historical briefing of the development of air power, military nuclear capabilities, and other dramatic military commitments, unless directly related to the discussion of the ground combat.

8. Alvin Toffler, *The Third Wave* (New York: Bantam Books, 1981).

9. Presented by Alvin and Heidi Toffler following the Gulf War, in retrospect, in their book *War and Anti-War: Survival at the Dawn of the 21st Century* (New York: Grand Central Publishing, 1995).

10. Klaus Schwab, *The Fourth Industrial Revolution* (New York: Crown Publishing, 2016).

11. Ibid.; Alvin Toffler and Heidy Toffler, "Revolutionary Wealth: New Perspective," *Quarterly* 30, no. 4 (2013). The Tofflers write about the new age of wealth—the change in the economic base the world relies on, as a continuation of the information revolution.

12. The First World War exceeds the conventional timeframe for the first industrial revolution; however, its military characteristics match the method of war discussed here. In general, militaries tend to be late compared to general definitions of eras, which means that wars often "overreach" their boundaries.

13. For more on the role of Gen. Donn Starry, see "Extending the Battlefield," *Military Review* 61, no. 3 (March 1981): 31–50.

14. Adamsky, *Cultural Strategy and Military Innovation*, 101.

15. Edward Hershberger and David Ochmanek, "Information and Warfare: New Opportunities for US Military Forces," in "Strategic Appraisal: The Changing Role of Information in Warfare," ed. Zalmay Khalilzad, John P. White, and Andy W. Marshall (Santa Monica, CA: RAND Corporation, 1999), 157–78.

16. Michael Raska, "The Five Waves of RMA Theory, Process and Debate," *Journal of the Singapore Armed Forces* 36, no. 3-4 (2011): 6.

17. Pascale Minet, Ines Khoufi, and Anis Laouiti, "Increasing Reliability of a TSCH Network for the Industry 4.0" (16th IEEE International Symposium on Network Computing and Applications [NCA], Cambridge, MA, 30 October–1 November 2017), 1–10.

18. "The Fourth Internet Era is at Our Doorstep and it Holds Great Potential for Israeli Startups [in Hebrew]," Geektime, 13 September 2016, accessed 24 January 2019, https://www.geektime.co.il/the-potential-of-iot-for-israeli-startups/.

19. Didi Hanoch, "A Smart Sensor for a Smart Home [in Hebrew]," *Haaretz* (website), 26 June 2013, accessed 24 January 2019, https://www.haaretz.co.il/magazine/the-edge/.premium-1.2056067.

20. From a study session with representatives of a GE incubator in Israel, summer 2017.

21. For example, "Uber Launches Driverless Taxi Service in Pittsburgh [in Hebrew]," *Calcalist* (website), 15 September 2016, https://www.calcalist.co.il/local/articles/0,7340,L-3698055,00.html; for more information, see Wikipedia, s.v. "Vehicular automation [autonomous vehicles]," last modified 28 September 2018, accessed 9 October 2018, https://en.wikipedia.org/wiki/Vehicular_automation.

22. Caution needs to be paid not to confuse this term with a term from the beginning of the previous century, which identified asymmetric warfare against nonstate organizations and coined it Fourth Generation Warfare. See, for example, T. X. Hammes, "Fourth Generation Warfare" (Herzliya, Israel: Fisher Brothers Institute for Air and Space Strategic Studies, August 2007), 53–54; William S Lind, "Understanding Fourth Generation War," *Military Review* 84, no. 5 (September-October 2004).

23. Yoni Blau, "The Fourth Industrial Revolution: Artificial Intelligence and Virtual Reality on the Production Floor," *Calcalist* (website), 23 July 2017, accessed 24 January 2019, https://www.calcalist.co.il/internet/articles/0,7340,L-3717729,00.html.

24. Shmuel Shmuel, *The Journey to the Third Strategic Shifting in the American Defense Establishment 2012-2016* (Ramat HaSharon, Israel: Dado Center, November 2016). This led to lively discussions concerning the role of autonomous systems in warfare—see, for example, U.S. Joint Forces Command, *Unmanned Effects (UFX): Taking the Human Out of the Loop*, Rapid Assessment Process (RAP) Report #03-10 (Norfolk, VA: U.S. Joint Forces Command, September 2003); Artur Kuptel, Multinational Capability Development Campaign (MCDC) 2013-2014, "Policy Guidance: Autonomy in Defence Systems [Focus Area-Role of Autonomous Systems in Gaining Operational Access]" (PowerPoint presentation, HQ Supreme Allied Commander Transformation, NATO Allied Command Transformation, Norfolk, VA, 8 December 2014), slide 3.

25. Sydney J. Freedberg, "Should the Pentagon Let Robots Kill Humans? Maybe," *Breaking Defense* (website), 10 July 2017, accessed 9 October 2018, https://breakingdefense.com/2017/07/should-pentagon-let-robots-kill-humans-maybe/.

26. It is important not to confuse this with the concept of "Fourth Generation War" coined in the beginning of the former decade, which recognized the nonsymmetric fighting against organizations that are not countries. See, for example, Hammes, "Fourth Generation War," 53–54; Lind, "Understanding Fourth Generation War," 12–16.

27. Williamson Murray, "Armored Warfare," in *Military Innovation in the Interwar Period*, 6–49.

28. In a certain way, the firepower on the ground did become more sophisticated, but as soon as this was achieved, the senior headquarters were inclined to take the assets to themselves and deny precision munition resources to the ground forces themselves.

29. Moran Myrocheck and Gabi Siboni, "The Curse of Abundance," *Ma'arachot* 459 (February 2015): 12–19. Mayorchik and Siboni even claim that the abundance of information in the command and control systems hinder commanding officers to distinguish between what is important and what is not.

30. See, for example, Boaz Zalmanovitz, "Inflation of Command Headquarters: A Clear and Immediate Danger," *Ma'arachot* 425 (June 2009): 40–47. He attributes the growth of the headquarters to the

misunderstanding of combat theory, unprofessional officer behavior, and an excess of commanders in reserve duty.

31. Oren Haas, "The Israeli Staff: A Unique Staff Model," *Ma'arachot* 473 (October 2017): 15–16. Haas, for example, explains in his article that one of the causes of increased staff size is the concept of "the combat HQ," which is the adoption of a combat method that is rich in intelligence and air assets.

32. Eliot Cohen, *Supreme Command: Soldiers, Statesmen, and Leadership in Wartime* (New York: Free Press, 2012), 33–34, Kindle.

33. Itai Brun, "'While You're Busy Making Other Plans'–The 'Other RMA,'" *Journal of Strategic Studies* 33, no. 4 (August 2010): 535–65.

34. For more information on these issues, read more U.S. military publications, especially U.S. Army Training and Doctrine Command (TRADOC), *Multi-Domain Battle: Evolution of Combined Arms for the 21st Century (2025-2040)* (Fort Eustis, VA: TRADOC, December 2017).

35. The Russians and the Chinese have developed and equipped themselves with modern combat platforms, but more concerning from the U.S. military perspective is the prospect of salvos of missiles launched against maneuvering forces. The balance between missiles and maneuvering platforms changed in the present era.

36. See Amir Eshel, "On the Way to a Maneuver Stale-Mate," *Ma'arachot* 434 (December 2010).

37. Dan Schueftan, "The Unique Nature of the War from the Arab Perspective [in Hebrew]," *The Yom Kippur War: A Reappraisal,* ed. Chaim Opaz and Yaacov Bar-Siman-Tov (Jerusalem: The Leonard Davis Institute, 1999), 129.

38. Thanks to Professor Steve Rosen for clarifying this conclusion.

39. Barak, "The Sky is No Longer the Limit," 55.

40. Fire against artillery batteries. A technique of using artillery fire directly against enemy artillery units.

41. Diverse forces—cavalry, infantry, and archers, for example—have existed throughout history. But the introduction of corps as an organization that focuses on tactical professionalism and the introduction of an organizational mechanism for operational integration of tactical specialties (as part of the multi-arms command) were the trademark of a modern military in Wave 2.0.

42. Following the Six-Day War, the Israel Defense Forces were inclined to believe that combined arms was of critical necessity.

43. For more information about intelligence-based combat as "the most detailed and precise intelligence accessible to forces on the micro-tactical level," see Aviv Kochavi and Eran Ortal, "Ma'ase Aman: Permanent Change in a Changing Reality," *DCJ* 2 (July 2014): 30, accessed 10 October 2018, https://www.idf.il/media/18519/masei-aman-article.pdf; see "The IDF Network," interview with Nati Cohen, (chief teleprocessing officer), *Israel Defense*, 7 August 2016, for more information about the tactical internet project program as part of "the IDF Network."

44. For more information, see "Automated, Connected, Electric, and Shared Vehicles: Are ACES Leading to Unprecedented Change?," Center for Automotive Research, 27 November 2017, accessed 24 January 2019, https://www.cargroup.org/automated-connected-electric-shared-vehicles-aces-leading-unprecedented-change/.

45. "The IDF Network program is the construction of 'Tactical Internet project' infrastructure that will provide inter-service sharing of operational information." Ibid.

46. Tamir Hayman, "Learning in the General Staff," *DCJ* 8 (August 2016), accessed 10 October 2018, https://www.idf.il/media/39138/learning-in-the-general-staff-tamir-hayman.pdf.

47. "The main conclusion from the thought process (Land Ahead) was that the response times required in the battlefield had been significantly reduced … to achieve the last two components to the solution (neutralizing enemy surprise and disrupting the enemy's operational advantage with minimum exposure) led the Ground Force Command to write the reconnaissance-strike complex program …This is a fabric of technologies that was connected to all the platforms and soldiers to one flat information channel …. A type of military IOT." "Measured Warfare against Terror," interview with Ami Rojkes Dombe (former senior officer in the Ground Forces Command), *Israel Defense*, 26 August 2017.

48. See also the Ground Forces Command's presentation: Kobi Barak, *Land Ahead* (conference presentation, Latrun, Israel, May 2017).

49. Aharon Haliva, "More of the Same: The Need for Conceptual Leap in Force Design," *DCJ* 9 (December 2016): 21, accessed 17 October 2018, https://www.idf.il/media/11151/haliva-english-9.pdf; for more on the concept, see Ami Rojkes Dombe, "IDF 2030: Small, Effective and Lethal," *Israel Defense* (website), 16 November 2017, accessed 10 October 2018, http://www.israeldefense.co.il/en/node/31785; Amir Rapaport, "Bringing Precise Firepower to an Unseen Enemy," *Israel Defense*, 6 June 2017; Haliva, *The Maneuver Controls Territory*. An intelligence-air asset level, comprised of small, highly automatic vehicles that are operated by brigades and battalions on the ground, could enable us to locate the enemy and quickly strike. An attack within minutes or seconds will not only harm the location of the enemy but also the enemy itself.

50. Haliva, "More of the Same," 20.

51. Barak, "The Sky is No Longer the Limit," 37.

52. Ezer Gat, "Weapons, Doctrine and Basic Organization," *Ma'arachot* 278 (January-February 1981): 51. Gat is quoting a typical response of commanding officers regarding the observation that what we understand today as the precision-munition revolution (Revolution 3.0).

53. As Gat eloquently said, "generations of military officers haven't experienced anything like them (technological-doctrinal organizational revolutions-E.O.) in their lives. All of their hands-on experience naturally opposes breaking everything that appears to be checked and rechecked and based on the military profession." Ibid.

54. See, for example, Israel Tal: "The corps carried out and continue to carry out a decisive role in the IDF for force design and nurturing its quality … but together with their contribution, an inevitable process also developed which all militaries go through. The corps organization was anachronistic: the professional staff neutralized the coordinating staff and the 'horizontal' organization was the loser. On this background, voices of protest have been heard in recent years against the discrimination of the 'combined battle.'" Israel Tal, *The Few Against the Many* [in Hebrew] (Tel Aviv: Dvir Publishing, 1995), 100.

55. TRADOC, *Multi-Domain Battle*; Shmuel Shmuel, "Multi-Domain Battle: AirLand Battle, Once More, With Feeling," War on the Rocks, 20 June 2017, accessed 10 October 2018, https://warontherocks.com/2017/06/multi-domain-battle-airland-battle-once-more-with-feeling/.

56. The IDF's Navy was the first to develop and employ surface-to-surface naval missiles boarded on small, fast vessels that ended up decisively defeating both Syrian and Egyptian navies in October 1973, the first missile battle in naval history. Also see Wikipedia, s.v. "Battle of Latakia," last modified 23 November 2018, accessed 24 January 2019, https://en.wikipedia.org/wiki/Battle_of_Latakia; Wikipedia, s.v. "Battle of Baltim–Damietta," last modified 21 June 2017, accessed 24 January 2019, https://en.wikipedia.org/wiki/Battle_of_Baltim. To learn more about the battle of the Beqaa Valley, also Known as Operation Mole Cricket 19, see Wikipedia, s.v. "Operation Mole Cricket 19," last modified 16 November 2018, accessed 24 January 2019, https://en.wikipedia.org/wiki/Operation_Mole_Cricket_19.