An End to Repression – A Sixth Era for Ground Warfare

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“In war there is no second prize for the runner-up.”
General Omar N. Bradley

Introduction

In recent decades, a spirited debate has taken place within the Israeli security community - and elsewhere in the West - about the significance of ground warfare in the post-modern era, its role in relation to the other combat dimensions, and sometimes even its very necessity.

The reasons for this debate vary. Ever since the air dimension was added to warfare, a military doctrine has evolved (Giulio Douhet, David Deptula) that saw aerial warfare as a substitute for ground warfare. This doctrine was revived in the 1990s during the Kosovo war and other conflicts. Another reason for the increasing pervasiveness of this doctrine is the reluctance of Western societies to commit themselves to ground combat. Edward Luttwak called this Western mindset, which pushes for wars that inflict only limited casualties on both sides (therefore tending to favor air wars), “post-heroic warfare” - while also criticizing this tendency. This mindset evidently evolved following the horrors of World War II and the costly failures of post-colonial wars such as those in Algeria and Vietnam. While campaigns dominated by ground combat still occur - for example, the two Gulf wars - they are usually preceded by a long stage of attempted subjugation from the

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air. Finally, the end of the last century and the beginning of this century have been characterized by a growing sense that the international order has stabilized, and wars involving the occupation of territory and the changing of national boundaries are a relic of the past. This mindset is present in IDF thought, and in some senses it is felt strongly even today.\(^3\) The global circumstances that turned ground warfare into a ‘repressed’ element of Western military might were accorded a unique context in Israel: The Israel Air Force (IAF) has had a special role in the Israeli military concept since the 1960s, and it was only natural that its role would be strengthened as much as possible when circumstances were deemed permissive. The Israeli trauma was the Yom Kippur War. Thereafter, although delayed by a decade, Israel formulated a doctrine that sought to negate the ground maneuver capabilities of its enemies through intelligence and fire capabilities, primarily from the air. The rise of subversive and asymmetric threats such as Hezbollah and Hamas, organizations that did not even pretend to constitute a direct military threat to Israel, alongside the state of mind after the First Lebanon War, made ground warfare seem an unnecessary burden.\(^4\) Not only does this type of combat result in large casualties, it also leads to the occupation of territories inhabited by a hostile population, followed by a long military confrontation with guerrilla forces. If there is one thing that all Western armies recoil from, it is being dragged into prolonged guerrilla warfare in hostile territory.


\(^4\) See for example the discussion between Amir Rapaport and Avigdor Klein in “IDF Force design,” *National Security Discussions*, No. 28, the Begin-Sadat Center, May 2014.
Moreover, an extremely important development took place in the form of active defense systems against rocket and missile fire, which provide, at least in the eyes of some, a satisfactory conceptual opening in the form of a defensive doctrine.\(^5\)

The purpose of this article is to discuss the substantive risk inherent in the Israeli tendency to avoid ground operations, and it will argue that there is new potential for ground operations that can successfully match the operational challenges posed by the enemy, and will propose a general strategy to exploit this ground warfare concept.

In other words, our tendency to avoid using ground forces, even when circumstances require it, is dangerous in the long term and must change.

This article does not dispute that there is a challenge in the relevance of the ground forces against asymmetric enemies. But I argue that there is substantive potential for changing the situation, and for restoring to ground combat its effectiveness even in the context of the new enemies. I have named this potential “The Sixth Era.”

This article offers a comprehensive argument about the relevance of the IDF’s ground forces: They have to change, and this change is possible. Specifically, I will argue that our current concept is defined primarily by the notion of ‘Jointness.’ According to this approach, the right combination of ground and other efforts, especially aerial, can generate sufficient operational effectiveness. This concept has not succeeded in providing the required effectiveness, therefore our tendency in practice is to avoid, as much as possible, the employment of ground forces, even when it is quite clear that a campaign is not progressing as required.\(^6\) I will argue that what is needed is a shift from a ‘jointness’ concept to a concept of fusion which, unlike ‘jointness,’ does not bring together separate

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\(^5\) Nir Yanai, “Defensive Doctrine for Israel.” [Hebrew]

\(^6\) Operations “Protective Edge,” “Cast Lead,” and the Second Lebanon War, all illustrate the fact that large ground forces are employed only after all other efforts have been exhausted, and then only to very limited objectives.
organizations for the purpose of ad hoc missions, but links various capabilities (air and ground) into one tactical framework. The first item that would enable this concept is the capability to produce small and cheap UAVs in bulk, capable of taking off and landing in the field; that is, hovering aerial systems. The other dimension of this fusion is the establishment of communication networks directly connecting sensor and shooter, bypassing the bottleneck of the commander. The introduction of a vertical dimension (aerial) within a tactical ground force would enable both the necessary fast communications infrastructure and organizational capacity to avoid human bottlenecks in the process of detection and attacking targets by a tactical force. For the first time, ground forces would have the capability to locate and attack the enemy faster than the enemy could appear and disappear.

I will present the discussion in stages. First I will argue that the Western tendency to avoid ground warfare as much as possible is harmful. It ultimately leads to the abdication of the strategic initiative, in the long run, to one’s opponents. Evidence for this can be seen in the development of Hezbollah’s and Hamas’s offensive operational concepts.

Second, I will argue that at present ground warfare indeed suffers from a relevance deficit. Without real and profound change in the concept and capabilities of ground warfare, it will be impossible to change the post-heroic war mindset. Advocacy efforts will not be helpful here.

In the third chapter, I will present a concept of the sixth generation of ground warfare as a further development of the concept of combined arms warfare, whose roots lie in the First World War and in the German Blitzkrieg concept of World War II. Fusion is the next conceptual and technological leap in the generation of intelligence-fire strike capabilities (the IT revolution in military affairs) in the framework of ground combat.

The fourth chapter deals with the realization of a sixth stage approach - how to implement this proposed revolution and what its implications are.
The fifth chapter discusses the obstacles to the implementation of this approach and ways to overcome them.

**Absurdity and Danger in the Impulse to Avoid Ground Warfare**

Humans are terrestrial animals. From the dawn of history, human groups have fought over control of plots of land. It was never just a struggle over natural resources, but rather a struggle for self-determination of groups of people. Indeed, in antiquity the Jews already defined themselves through a combination of living in the Land of Israel and the observance of Jewish ritual. The Gauls described themselves similarly, as did the Carthaginians and essentially every culture with which we are familiar from history. Clashes between peoples, therefore, were always about control or influence of continental territories and those living on them. All this does not necessarily mean that any use of military force in history was directly intended to occupy or to protect a piece of land. Throughout history, weaker parties found themselves using asymmetric tactics, guerrilla warfare, as a substitute for direct conquest or defensive operations. What the weaker sides lacked in military might, they made up for in terms of time - a willingness to persevere in an obstinate struggle, taking its toll in human life and economic damage. However, the strategic logic of guerrilla warfare remains the same - achieving control or denial of enemy control over land, by negating the enemy’s willingness to pay an ongoing price. Thus, for thousands of years, human acts of war focused on land.

True, man learned at a very early stage to build boats, then ships to sail the seas, but usually naval battles were also linked in one way or another to wars over land. Only in the 17th and 18th centuries, with the beginning of the era of navigating the open seas, did war for control of the seas and the dominant sea routes become a central concern in itself. Still, the fact that large fleets began defining the power of empires formed in Europe did not nullify the

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7 Yehoshafat Harkabi, *War and Strategy*, pp. 44-46. [Hebrew]
centrality of land wars. Against this historical background it is difficult to understand the evolution of the mindset that sees ground warfare as something that can and should be avoided, even if it is not yet possible to give it up completely. If, in any case, we wish to provide an explanation for this unique phenomenon, it would seem to consist of several key points:

**The mindset of the modern era** - The age of enlightenment, the formation of the modern state, the scientific revolution and the industrial revolution fashioned a mindset, according to which the modern era has “changed the rules.” Modern man has freed himself from the terror of the natural elements, invented machines that can power themselves and reorganized (again and again) international relations in order to resolve conflicts between states “once and for all.” This was the purpose of the Treaty of Westphalia, the Treaty of Versailles, the establishment of the League of Nations and finally the establishment of the United Nations after World War II.

**A growing aversion to the horrors of war** - There is presumably a direct relationship between the formation of national consciousness, the development of mass media and a societal anti-war mood. While it is true that patriotic national consciousness served as fuel for the motivation of the million-strong war machines of modern times, at the same time the mass participation of citizens in war (in contrast to the previous mercenary era) brought the horrors of combat into every home. Anti-war moods were already recorded during the Crimean War and a rich anti-war literature was written after the First World War. As media coverage of war became more sophisticated, so the Western public’s willingness to criticize the war's objectives grew (for example, "What is the United States looking for in Vietnam?"). The cost of war in human life is the main consideration underlying this criticism. Even in the young State of Israel, which was embroiled in a war of attrition on its western border with Egypt in the late 1960s, anti-war protests - limited but noisy - like the famous high
school seniors' letter and the cabaret show “The Queen of the Bathtub” caused substantial public uproar.

The appearance of the third dimension of war, the aerial one - For the first time in thousands of years, man established a presence in the skies and made war from there. This innovation, which began during the American Civil War with observation balloons and continued in World War I, which saw the employment of a tactical air force on the battlefield, and a strategic air force (Zeppelins and Gotha GV German bombers), enthused the world of military thinking precisely at a defining moment in its history, when ground warfare seemed to be “stuck” at a dead end. This innovation has continued, for about 100 years, to rock the world of military thought around the discussion of the relationship between air and ground, or “fire” versus “maneuver.”

Indeed, these three points merged into a complete conceptual mindset: We can ignore thousands of years of history and the fact that man lived and fought on the ground, since the modern era freed man from the shackles of history, and made him his own master; it is advisable to ignore the dominance of ground in warfare, because Western society is not willing to pay the price anymore, certainly not when wars are not fought against a foreign invader; and it makes sense to repress the need for ground warfare as a key tool on the battlefield because a “substitute” has been created - air power.

Why, then, is this mind set, according to which aerial force may significantly replace the ground war effort, absurd? What is so dangerous about this concept?

One reason is the fact that the modern era did not truly change the nature of man. The international order established after World War II has been drastically undermined. Big, powerful countries like Yugoslavia and Iraq collapsed under the weight of the human will to realize their tribal identities on a piece of land, and others have become empty shells. Iraq, Syria, Sinai, Libya, Yemen, Ukraine, Nigeria and North Africa – in all these places, battles are currently waged by organizations, groups and ideologies over control of
territory that would allow them economic viability and self-realization. Even in Europe, the international order, previously considered eternal, was shaken – the disintegration of Yugoslavia in the 1990s and the recent sophisticated Russian invasion of Ukraine are good examples.

It has also become clearer that giving up a significant military presence on the ground has strategic implications that may be even less desirable than the cost of ground warfare itself. The essence of these outcomes is that when the enemy is not fighting you in his territory, you find yourself fighting him in your own territory. Hezbollah and Hamas have both developed concepts and offensive operational capabilities that include large-scale raids by elite forces into Israeli territory. They did this after two decades in which it became clear that Israel was no longer inclined, as it had been before, to move the main ground battle to the other side. These groups also did so after reaching the conclusion that the achievements of fire attacks on the Israeli home front could no longer satisfy them. They want more. This is not a new historical phenomenon. The Romans found themselves defending against incursions (and were eventually defeated by Alaric the Visigoth in 410 CE) at the end of a process that had weakened their readiness to conduct offensive campaigns against their enemies; and when these did take place, a large proportion of the troops were barbarian tribesmen recruited into the service of Rome.

All of this has been written about by others. Why then, has the Western military concept, which recoils excessively from the use of ground forces, not changed fundamentally? The reason for this lies, of course, in the wishful thinking that grips us all, that hopes we can wage technology-oriented wars, speedily and with a low cost in human lives.

This is the idea of human progress in military terms.

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8 The attack in the “Bataclan” theater in Paris, on Nov. 15, 2015 is another illustration of this.
The Need for an Updated Ground Warfare Concept.

Israel is a developed Western country and a modern consumer society, a society that places great moral value on the sanctity of human life. At the same time, Israel is challenged by non-state enemies who have adapted impressively to its aerial superiority. These enemies openly seek the long-term goal of wiping the State of Israel off the map and the short-term goal of temporarily occupying parts of it.9

Hamas demonstrated a capacity for prolonged survivability in the last war and exhibited its ability to disrupt life on Israel's home front, terrorizing the residents of the Israeli communities on the Gaza border by threatening a ground invasion launched through tunnels. It is clear today that Hamas has only intensified its intentions in this regard.

Hezbollah has developed its fire capabilities since the 2006 war, perfected its ground defensive combat capabilities, and developed an offensive ground concept that has been publicized in its propaganda videos and backed by the actual combat capabilities it exhibited in the fighting in Syria. Hezbollah does all this while working to ensure the survivability of its forces from the Israeli aerial threat. In Sinai and Syria additional jihadist threats are developing against Israel, and they will certainly develop and discover Israel's vulnerability as perceived by the other side—an over-reliance on air power.

On the one hand, we do not want to change Israeli society - we love it as it is, peaceful and sanctifying of human life. On the other hand, we do not want this to be its downfall, and we definitely see a continuous decline in Israel's ability to translate its military might into a strategy of deterrence and stability. We need a new idea, an idea that would allow the IDF and the political leadership to recreate the momentum of ground warfare, and to stop recoiling

9 See the YouTube propaganda videos of these two organizations: Hezbollah on the “Galilee Occupation Plan,” (https://goo.gl/OOaGhD) and Hamas’s plan for the “Occupation of Kibbutz Zikim.” [Arabic/Hebrew]
from the employment of ground forces when necessary, This would allow at the same time fast ground maneuver, effective and with limited casualties, a ground maneuver capable of overcoming the enemy ruse of concealment and disappearance.

Stage Six in the Development of Relations between Air and Ground

In order to define the new era that we must seek in ground warfare, we should first examine the previous stages in the development of this warfare. Since this article deals with ground warfare against the backdrop of Western armies' clear preference for air power in recent decades, I will try to define different phases and approaches to ground warfare by emphasizing the degree of dominance and the relative roles of the air and ground forces.

The first phase – Until the First World War: Armies fought on the ground, naval fleets supported ground warfare through amphibious operations and by imposing variations of naval blockades or restrictions on the maritime navigation of the opponent. Air power was not a part of the equation.

The second phase – Air as a new dimension supporting and assisting ground operations: World War I brought aerial power onto the military operations stage. The main approach that developed viewed air power as the continuation of the ground battle. The first planes were used for patrolling, directing artillery fire, and later for tactical bombing missions. This use was, in fact, a continuation of the observation balloons used during the American Civil War. Over time, a dynamic of dogfighting developed between the patrol aircraft of both parties, and the field of combat to achieve air supremacy over the battlefield was born. Through the study of the military history and strategy of the 20th century, Air Marshal Lord Arthur Tedder reflects this approach in his book Air Power in War, which is a kind of counterweight to the heritage of Air Marshal (“Bomber”)
out of the second phase a combined arms operations approach with matching force design. From the jointness of Stuka dive bombers with German Panzer tanks within the Blitzkrieg concept of the Second World War, to the AirLand battle of the 1980s-1990s and the modern ‘jointness’ concept.

The third phase – “Strategic bombing”: Simultaneously with the trend discussed in the previous paragraph, out of the deadlock of the First World War there grew and developed another school of thought, dealing with the potential of air power to become a real substitute for ground operations. The impasse of the First World War accelerated the development of innovative warfare concepts that sought to circumvent the ground battlefield and to achieve decisive defeat from the air by destroying the industrial base of the enemy. The Germans pioneered this concept with the Zeppelin airship division, which conducted bombing raids on English cities, and later with the first strategic bomber, the “Gotha GV” model. This approach won the status of a full-fledged military doctrine when Giulio Douhet, an Italian general, published his article “Control of the Air” in 1921. It is still present in Western military thinking today, as can be read between the lines in the effect-based operations concept and the criticism thereof, and as reflected in Western operations, such as the war in Kosovo, the Second Lebanon War and the coalition's aerial campaign against ISIS.

The fourth phase – Decisive operational defeat from the air: If in the beginning, air power was perceived in the tactical domain as supporting the ground forces, in the last two decades of the 20th century there developed an approach that an army that enjoyed aerial and technological superiority could rapidly and on a large

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Harris, who most noticeably gave expression to the approach of strategic bombing disconnected from ground operations.

scale strike another ground army, with the main burden of the fighting being borne by aerial platforms. In other words, unlike the third phase approach which could be called the “Theory of Strategic Bombing,” the fourth phase approach to air power does not strive anymore to bypass the ground battle, but rather seeks to decide its outcome. In this equation the ground forces benefit from the achievements of the air force, the air force operates deep behind enemy lines and on its flanks, while the ground forces handle the worn down forces that do reach the battlefield. In essence, this is the AirLand battle approach, developed in the US Armed Forces-European Command (EUCOM) by General Don Starry in the 1980s, and its IDF version is very present in today's thinking too.

Theoretically, this approach de-facto accepts the centrality of the ground forces and the need for major achievements on the ground, but it emphasizes the role of air power in realizing these achievements. In practice this approach has contributed much to the “post-heroic” mindset of the Western armies.

The fifth phase – The combined arms approach: Following the remarkable success of the AirLand battle in the Persian Gulf campaign (1991), the Kosovo campaign revealed its weaknesses, despite its initially successful image. A military force that refuses to expose itself to air power may survive relatively intact even after a prolonged aerial campaign, a lesson adopted by many forces. The Syrian army in the 1990s and 2000s, for example, developed dummies and smokescreens to hide its forces from the aerial dimension, alongside the “close battle” concept that sought to deny the air force clear skies that would allow it to attack without fear of friendly fire incidents. Hezbollah in Lebanon perfected its guerrilla and camouflage techniques. The fifth phase approach had to deal with the enemies’ adaptation to Western air power, primarily by hiding. The method of flushing out the enemy and turning it into a target was by exhausting tactical friction on ground. Air power could no longer pretend to decide the ground
battle by itself. Now the ground forces played an important role whose essence was in forcing the enemy to emerge, thereby allowing the air force to become effective again. Thus came into prominence the doctrinal concept common in the military jargon: ‘jointness.’\textsuperscript{12} The first phase of the war in Afghanistan, the Second Gulf War and Operation Days of Penitence in Gaza (2004), were used largely as platforms for this approach.

Usually we strive energetically, in advanced armies, for a better realization of the fifth phase approach. The assumption is that ‘jointness,’ i.e. the synergy between air power and ground forces, will greatly improve the effectiveness of acts of war. There are many difficulties in realizing this vision: Jet pilots are unable to distinguish tactical details on the ground; the threat to helicopters has increased, with technological improvements in shoulder-fired SAMs and anti-tank missiles; UAVs are typically operated from rear areas, far from the tumult of a dynamic ground battlefield. One hundred years of air power led to the development of air platforms, air combatants and air command and control structures that are very difficult to integrate successfully into the ground battlefield at the lower tactical levels.

If these problems were not enough, the enemy has persevered with its learning and adaptation processes. Since the demonstration of AirLand ‘jointness’ in the Gaza Strip during Operation Days of Penitence (2004), the enemy has greatly accelerated the consolidation of its defensive and offensive capabilities in built-up and underground modes. Enemy sorties to the surface are few and brief. Hezbollah also developed combat concepts, whose essence is reducing the exposure time of its combatants to the aerial dimension to a few minutes, sometimes seconds, and reducing to a

\textsuperscript{12} A term which was already widely accepted in the past and which in recent decades has become an idiom and necessary prefix for almost any military action.
minimum the intelligence signature they emit. The enemy is eventually exposed, thanks to the effort invested in various sensors, when launching missiles or otherwise attacking the ground forces or the home front, but usually it disappears faster than the time required to close the loop between intelligence, ground and air forces. This is our current situation. We are working hard to bridge the physical and organizational gaps in command and control, among the intelligence entities and air and ground forces, through command and control systems linking the commanders of different bodies at different levels. Yet the enemy is still likely to be effective against ground forces by firing anti-tank missiles and high trajectory fire, and by clever tactical conduct they will also be able to avoid ‘closing of the loop’ against them. Western forces in Afghanistan and Iraq have met similar challenges.

What is the “Sixth Phase”?
The basic analysis of the “sixth phase” approach remains similar to that of the “fifth phase.” An effective tactical confrontation with an enemy that has adapted itself to Western air superiority requires much better synergy between air and ground forces. Ground forces make the enemy emit intelligence signatures due to the tactical context of the combat - firing, launching, radio communications, etc. - and air forces are able to identify these signatures, regardless of topography and attack. But unlike the “fifth phase,” this approach acknowledges that the ad-hoc jointness of separate organizations (air, intelligence and ground forces), although it may keep improving, will not, by itself, be able to turn the tables and be more effective than the enemy’s evasive skills. The “sixth phase” approach aims to transition from ‘jointness’ to ‘fusion.’ The essence of this approach is the elimination of the dependence of the tactical commander on a relationship between ‘supporting’ and ‘supported’ forces. ‘Jointness’ between air, intelligence and ground forces will continue to develop and to provide a critical contribution. However, at the same time, a force needs to be developed whose dominant structure is ground forces
oriented, but is simultaneously fused with the benefits of the vertical dimension.

For thousands of years there was no significant organizational separation between combat forces and large war machines. English archers, catapults and battering rams were all war machines that were present on the battlefield and constituted an integral part of it. Even at the beginning of the artillery era, the cannons were “field artillery,” present on the battlefield, close to the infantry, and with the requirement for special intermediation mechanisms to find their targets and avoid harming friendly forces.

The relationship between “supporter” and “supported” was born when modern technology enabled a cannon to launch projectiles from a great distance and at a standoff. It became clear that it would be prudent to position the cannons at a distance from the front lines. Thus, it became necessary to create a system linking the guns in the rear with the fighting at the front, as well as a separate artillery command and control system, which of necessity developed into a stand-alone profession. An entire intermediation system was created - forward observers, lines of communication, coordination doctrines, and mechanisms for allocating artillery pieces among various units. As modern support capabilities grew, even more so with the development of the air force – the tactical bomber, tactical air surveillance systems, precision fire, UAVs - so have more and more units evolved, as well as separate operational organizations - air forces and squadrons, intelligence gathering bodies, artillery battalions and observer battalions - whose presence on the battlefield at the tactical level required increasing numbers of intermediation and coordinating bodies.
The essence of ‘jointness’ is the optimization of the coordination and intermediation among separate operational support entities and tactical assault units. The need for inter-service ‘jointness’ and inter-corps jointness grew over the years. The era of ‘jointness’ began as a response to the quantitative challenge facing NATO in Western Europe in the 1970s and 1980s vis-à-vis the Warsaw Pact forces. ‘Jointness’ is a term that describes, to a large extent, the idea behind the ‘Reconnaissance-Strike Complex’\(^\text{13}\) that underlies the concept of AirLand Battle and the Revolution in Military Affairs (RMA) of the 1990s.

With changing strategic circumstances the concept of ‘jointness’ continued to reflect the need for better coordination between ground, intelligence and air, in direct proportion to the tendency of enemies to hide themselves from the naked eye and abbreviate their window of exposure in the tactical context. In the context of

\(^{13}\) A Soviet concept adopted by US intelligence who studied Soviet insights related to the revolution in military affairs. See Dima Adamski, *The Culture of Military Innovation*. 
overseas force projection and the need to strike quickly at opponents who may be larger than the expeditionary force, Douglas McGregor, author of “Transformation under Fire” called for the “elimination of unnecessary command levels and the creation of viable joint planning and execution capability.”

In the Israeli context, the process of adaptation by the “vanishing” enemy to Western military power is based on the enemy’s ability to act in the “seam” of time that exists between the assault force and the support forces. Indeed, our sensor-shooter cycles, short as they may be, provide the enemy with the leeway that it needs. The sixth phase approach – the Fusion approach - holds that in the miniaturization and networked era in which we live, it is necessary and possible to generate a force that will benefit from the main advantages that until now have been attributed to “support” capabilities alone, without paying the price of an intermediation mechanism. Metaphorically, this means we have to flatten the divide that has grown between the support and assault bodies.

What can we compare this approach to in the consumer world? It is like the difference between two devices - the first, a device that connects your laptop, cell phone, digital camera and GPS sensor, and the second, a smartphone. Functionally the two devices reflect the same logic - the synergy between the benefits of a camera, a computer, a network connection and location tracking. In practical terms, it is clear that the smartphone allows revolutionary functioning that is completely different from the inter-connection of different devices. The difference between an ad-hoc linkage and the fusion of the advantages of the various components into a single device changed the world. The moral of the story: At first blush, both ‘jointness’ and ‘fusion’ seek the same thing - a ‘Reconnaissance-Strike Complex’ that exploits the synergy between the ground forces and sensors, and from them, to offensive capabilities. In fact, the difference between a complex built upon

human coordination among different organizations (through command and control systems), and an organic and mostly automatic complex, is the difference between jointness and fusion, between the unwieldy inter-connection of various devices and a smartphone.

**How will the sixth era approach be realized?**

1. *From ad-hoc combined arms jointness to permanent jointness of capabilities, using shared communication networks and joint force design systems* - Tighter jointness, network-based, between force design systems would also ensure better jointness in the employment of force. A partnership with the ground forces during the specification and build phases of new UAV formations would enable expectation management as well as enable better coordination of the capabilities among the services. Furthermore, such cooperation would ensure that the problems encountered in the past - technical difficulties in communication between airborne platforms and ground headquarters and commanders – would not repeat themselves. In addition, joint force design for aerial capabilities would allow the ground forces to create ground-based capabilities that complement the aerial ones, as opposed to building backup systems and creating redundancy.

2. *The jointness of organic aerial capabilities, tailored to the conditions of ground warfare, within the ground forces, through the new potential of small and cheap robotic aircraft, some of which are known as drones* - This element is critical to the sixth phase concept, due to the inherent limits restricting the effectiveness threshold for improving inter-service ‘jointness.’

What is the nature of combat support capabilities? ‘Heavy’ fire, in the form of artillery, rockets and aerial bombs; and the advantages of the vertical dimension. Since the development of air power there has been a constant tension between the professional expertise of air power in its unique domain and the need for its jointness within the main battle taking place on the ground. This small aerial force may not be able to replace the full capabilities inherent in
combined arms operations with the air force, but it would have a unique ability to adapt itself to the dynamics of the tactical battle. By using UAVs operated by ground forces and employing hovering aerial systems activated and operated by ground forces, we can now generate ground forces where the vertical dimension is built-in. In this way a ground force could benefit from aerial intelligence collection that is continuously, reliably and robustly relayed to the force. These smaller robotic aircraft could be directed to places of interest to the field commander on the battlefield at any given moment. The overhead assets could also be used to provoke the enemy and especially to gather information about it.

Thus, the aerial dimension could be transformed from an ad-hoc combined arms multiplayer effort which is intended to connect a few aerial platforms with select brigades, at least at low altitude, into an integral part of ground warfare. A brigade would transform from an entity gathering visual intelligence limited by topography and consuming aerial intelligence gathered by others, into a force with a dynamic and independent intelligence hold over the area in which it is maneuvering. Of course, there would still be important advantages to the intelligence gathered by the primary intelligence agencies and by the air force, and to a fast and direct link to the ground forces (the ‘jointness’). But the tactical commander maneuvering with a basic, but reliable, hold on the terrain, would be able to take more risks, advance more quickly and employ fewer troops to secure his flanks than other commanders.

From an emphasis on connections between commanders to an emphasis on a direct fusion between machines, using the potential of fast data networks and appropriate communication standards - In the past, the intelligence bodies collected and processed information accumulated in the collection agencies. ‘Jointness’ focused on producing better links between the intelligence branches at the General Staff and divisional commands, and the various field commanders, at the brigade, battalion and company levels.
The sixth era approach seeks to automatically link various sensors and weapons systems. The digital network is built on the idea of “elimination of layers.” The sixth era is to some extent also based on this idea. Rapid communications between different types of machines using a common software language; skipping over the layers that existed in the past between ‘sensor’ and ‘shooter’. Formerly, in order to shorten sensor-shooter cycles, it was necessary to load ordnance on to an aircraft, a time consuming process. In an era of “elimination of layers” we may be satisfied with the comparative advantage of an aircraft – its viewing angle – and to virtually link it to ordnance positioned at suitable locations on the ground. Thus, the load capacity of the aircraft can be relinquished, as well as the pilot and the various systems which enlarge and increase the cost of the airplane, and we can settle for a small and inexpensive tool - a tool that can be acquired in bulk. Furthermore, a greater variety of weapon systems can be linked to these sensor-shooter cycles; systems whose availability and lethality may be adapted to any specific purpose.

“Elimination of layers” is not only relevant to links between sensors and armaments. It is also relevant to links between various sensors. The digitization of the world allows various devices to communicate directly with each other using software and common communication protocols. In the civilian world this is called the “Internet of Things” (IOT). Furthermore, if different devices like radar and optical sensors can communicate with each other in a common language, then some of the processing which in the past was done by humans could now be done by software. Improving the accuracy of the coordinates of a particular target, for example, by several sensors with different perspectives and with different relative advantages. A set of different sensors, improving each other’s accuracy through data fusion, may detect with high
reliability and accuracy fire of various types (high trajectory rockets, mortars, anti-tank missiles, etc.).

Under safety and engagement procedures which were pre-defined by the commander in the field, why shouldn’t the target be fired at immediately by automatic shooters, without further human intervention? Human analysis, decision making and information sharing between commanders and headquarters have become a critical bottleneck in our effectiveness in detecting the enemy and its annihilation. If we put forth an advanced concept of data fusion and relevant communications standardization, we can convert a variety of existing and future sensors and shooters into a single integrated device, on the basis of advanced data communications networks. If we were to do all this at a relatively low level, such as the brigade, we could ensure that these automatic sensor-shooter loops would be relevant at exactly the moment when the enemy exposes itself in battle. If we combine networked blue force recognition technology and supply commanders with the right tools, we will create a space that is not only more dangerous to the enemy, but also safer for our forces with regard to friendly fire.

3. **From a narrow ground communications network to a broadband and stable ground and air network.** The development of vertical capabilities (as noted, using small and cheap hovering systems and UAVs in significant quantities) within the ground forces, besides its contribution in terms of intelligence gathering and controlling territory, has the potential to break through the glass ceiling of the quality of tactical communications networks on the ground. In order to realize the third principle mentioned here, to shift from jointness between commanders to a fusion between machines, a reliable broadband data communications network is necessary. Anyone who has experienced telecommunication systems deployment on the ground realizes how ambitious this

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15 For example, as suggested in the article by the former head of Doctrine and Training Division, Brigadier General (Ret) Eli Reiter, and Col. (ret) Shimon ben Maimon, “Ground Radar - a new kind of binoculars,” pages 28-23. [Hebrew]
requirement is. The dynamic ground battle cannot rely on a fixed communication infrastructure, and wireless infrastructure deployment in the area is sensitive to line of sight problems and to obstructions and disruptions by the enemy. This vertical ‘medium’ to be introduced into the ground forces would ensure, for the first time and with good approximation, that all the relevant forces could benefit from line of sight to a hovering platform at almost any time and place. Weather that could limit the take-off of UAVs from rear landing strips, for example, would not necessarily limit small hovering systems from taking off on the battlefield. Medium altitude flight difficulties do not necessarily apply to very low flight altitudes and vice versa. Thus we could achieve a high level of reliability of data broadband communications networks, which would be more resistant to attempts at electronic warfare disruption. The tactical aerial dimension would link to the air force's aerial dimension on the one hand, and to ground platforms on the other. This would make it possible to realize the vision of a digital ground army at higher capacity, at relevant speeds, with local independence, but also linked to the command echelons and the General Staff.

4. From one-way support to synergy (web 2.0) - In the era of ‘jointness’ it was clear who was supporting and who was supported. Air forces and intelligence held significant exclusive capabilities, and the ground forces needed these in order to fulfill their missions. The opposite was not true - ground forces do not produce any significant operational outputs that are relevant to air forces and intelligence (except for infrequent anecdotes, such as the destruction of the Egyptian SAM batteries across the Suez Canal by Division 162 in October 1973).

However, in an era of fusion, the ground forces would not only fulfill their tasks more quickly and with a relatively small number of casualties, but in addition, the presence of multiple sensors on the ground, the automatic fusion and the speedy transfer of data upwards could contribute tremendously to the quality and accuracy of the intelligence transmitted to the higher echelons, while
improving the precise and rapid attack capabilities of the main air force. As in the relations between the “Waze” app and its users, so it could be in combat. The ground forces would not only benefit from more effective support in the era of rapid data networks, but would also dramatically improve the intelligence and strike systems of the IDF, using accurate intelligence that can only be provided by sensors which are present within the area of operations itself.

5. From rising armament costs to small and inexpensive precision armaments. For several decades, armies have faced an impasse. The requirements of the modern battlefield necessitate multiple strike capabilities which are more accurate and more deadly. The result - procurement of precision weapons on an unimaginable scale and a reality of constant and serious shortages of these resources. For the ground forces, of course, the crisis is even worse. It is impossible to meet the required volume of tactical attacks needed to support the ground battle by relying on precision fire whose cost is high and whose employment demands precious human resources.

The sixth era approach, the era of fusion, would enable the strike missile to be perceived as an extension of the detecting sensor, even if they are not physically linked to each other. Simply put - a network of sensors that can precisely locate the enemy and transmit the location and nature of the target directly to the missile itself would make it possible to dispense with some of the expensive components of precision fire – the homing warhead and the operator’s trailer.

In the fusion era, it will be possible to equip tactical forces on a large scale with small and cheap missiles that require less manpower. These missiles would be able to strike the targets located by the brigade sensor network in high volume and with immediate availability and would provide strike capabilities to the tactical force without any inter-mediation. This is actually closing the loop – elimination of the supporting-supported relationship.
So why are we not there yet?
This is not the first article to describe, in one way or another, a vision of network-centric warfare. Literature about the Revolution in Military Affairs during the digitization and IT era has been produced since the 1990s. The book by Alvin and Heidi Toffler contributed by linking this trend to what they called “the third wave” - the information revolution. Even the term “network-centric warfare” has long been accepted as a professional term and the US Navy already bases an actual doctrine on this type of warfare.

So why is the conventional force structure in Western armies and in the IDF, and their method of employment, still so similar to what we have been familiar with for decades?
The need, as noted, is striking. The fundamental element in the adaptation of asymmetric enemies to conventional armies is their ability to stay a step ahead of the command and control cycles of the conventional armies: To hide, to identify opportunities, to act quickly and disappear before a regular military force has the chance to exploit its advantages in intelligence and fire cycles. So what are the obstacles preventing the necessary change? Of course, the first obstacle is politics. Leaders of democratic countries strive to abstain from armed conflict in general, and ground operations in particular. We have already touched upon this point. However, this article presumes that the absence of a relevant form of ground maneuver, in the eyes of the political leaders, is an important factor in their tendency to avoid using ground forces.

16 Alvin Toffler, *the Third Wave*.
18 See for instance the concept of “Air-Sea Battle” formulated in the United States, and organized in a dedicated office at the Pentagon: “The ASB Concept’s solution to the A2 AD challenge in the global commons is to develop networked integrated forces capable of attack-in-depth.”
The ball is therefore thrown back to the military court - what is blocking us from realizing this vision?

1. **The first obstacle - A legacy of tactical excellence in the military organization**: Large organizations tend to be naturally conservative, and armies are very large organizations. Furthermore, the last century, the century of industrialized warfare, was characterized to a significant degree by the principle of specialization. Flight, armored warfare, artillery, communications, and combat intelligence collection - all these are modern military professions, and tactical excellence in each was, and remains, essential to success on the battlefield. Armies arranged themselves to enable this tactical excellence through special training, separate professional courses and technological R&D, in order to promote the operational needs of each domain. The tension between the pursuit of tactical professional excellence in each different channel and their fusion into one system is obvious. The corps and services and the technological organizations supporting them prefer to continue to develop the ultimate weapons systems; using our analogy - a better, bigger, faster digital camera. In modern armies there is no agency responsible for the idea of a smartphone, an idea in which there is an inherent need for compromise on the separate performance of each of the various agencies.¹⁹

2. **The second obstacle – organizational territoriality**: Commanders divide sectors between themselves. So did armies at the higher level. And so for the last hundred years, air forces (including those referred to as “Army aviation”) have been entrusted with airspace, intelligence agencies with advanced sensors and intelligence processing, and communications and ICT agencies with their fields. All of the services are partners within the General Staff Headquarters, all of them are represented by senior

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¹⁹ For more on this issue, see: Mohana Ravindranath, “Can the Pentagon Ditch the Password and Finally Embrace the ‘Internet of Things’,” *Defence One* 11/11/15.
generals and they all tend to reject any attempt to ‘infiltrate’ their domains.
The Air Force has traditionally opposed any aircraft not operated by it. The procurement of the “Sky Rider,” the current UAV employed by the IDF ground forces, was greatly delayed due to objections of this kind. The argument about the need to control the forces operating concurrently in the aerial dimension and the need for tangible professionalism in that dimension, is significant. More significant is the absence of a strong external constraint, like competition in the business world that would force separate agencies to give up their traditional exclusivity. The response of the separate services to operational pressures requiring better jointness, is better jointness. But this temporary and ad-hoc linkage of different entities has a glass ceiling in terms of possible levels of operational effectiveness.

3. **The third obstacle - the heroic command ethos:** Ever since armies have grown into organizations of tens and hundreds of thousands of people, the command profession essentially became a profession of mass management. Uncertainty on the battlefield caused most advanced armies to adopt a mission-command approach. Thus the military profession is associated not only with the heroic ethos that has always accompanied it, but also with the ethos of the dominance of the commander and his central role in deciding the outcome on the battlefield.

Let there be no mistake, I have no intention to minimize the centrality of the commander on the battlefield. But most of the literature on network-centric warfare focuses on the volume of information the commander receives, its quality, and the commander’s ability to make beneficial tactical use of this information. Most of the literature, even that written by supporters of the networked military revolution, uses terminology

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20 See in this regard the detailed review by Samuel Samuel, “The effect of the computerized command and control support systems on the commander and HQ.”
primarily associated with the contribution of communications and IT technologies to commanders. The dominant terminology of this literature is related to the act of command – “enhanced” or “shared situational awareness,” “command and control systems,” and “improved command and control,” which could promote better decision making. This discourse tends to almost completely miss the potential of a direct link between machines through computers, not through commanders. It seems that even after realizing the potential of digitization and digital communications, armies are still hesitant to unleash this full potential out of fear (unjustified in the eyes of this writer) of ousting the commanders. Douglas MacGregor, in his book “Transformation Under Fire,” spares no words in describing the extreme conservatism of the structure of ground forces command and control. Again, in my opinion, automatic closure of the sensor-shooter loop, using stringent ‘incrimination’ criteria and security measures, prescribed by the commander of course, would

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21 For example, in a report submitted to Congress, op. cit., on the subject of Network-Centric Warfare it is explained that: "Network Centric Operations (NCO) relies on computer equipment and networked communications technology to provide a shared awareness of the battle space for U.S. forces. Proponents say that a shared awareness increases synergy for command and control, resulting in superior decision-making and the ability to coordinate complex military operations."

22 Rafael - the military research center writes that “It is absolutely clear that our lives have changed because of the information revolution. For better or worse we’re doing other things that we have not done before [...] the military system, being slow to change, and lagging behind in implementing information technology in particular, has not fully internalized the importance of this distinction. The importance of information systems, in the military too, is not what we can do better than the Roman army, but in doing brand new things.” Ben Levav and Amos Kovacs, Efficiency indicators for tactical command and control systems, pages 19-18. [Hebrew]

23 “It is no secret that the ground forces (like the other branches of the military) cling stubbornly to their traditional hierarchy of single-service command and control[,] for example, the traditional concepts about fire support for ground forces from World War II will need to change.” Douglas MacGregor, Transformation Under Fire, p. 139.
make a decisive contribution to the effectiveness of a tactical force against an elusive enemy.

The result of this missed opportunity, by the way, is the phenomenon of commanders being flooded with information, turning them into bottlenecks and building cumbersome human headquarters around them. The swelling of headquarters reflects to a significant degree the absurd attempt by armies to deal with the new wealth of information and link various computerized systems through people, rather than exhaust the potential of information processing and direct communication possible between the computers themselves. A whole new sector of ‘Big Data’ has evolved in the world - automated solutions for exploiting the wealth of information of the current era. In the military world there has developed a behavioral pattern of complaining about the reality of an information surplus, as we man headquarters with more personnel in a desperate attempt to cope with this information dump.

4. The fourth obstacle – past traumas: In recent decades, most important technological progress was focused on developing a concept intended to replace the ground battle, or at least to reduce its centrality through the use of standoff measures. R&D entities began to form a principled identification with the desire to promote combat concepts that would replace the need for ground battle. Ground forces began to develop a concept in which advanced technologies do not serve the interests of the organization. These two approaches are significant obstacles to the advancement of a digital-technology based ground warfare concept.

5. The fifth obstacle – technological maturity and force design concepts: Many officers can quote the important review by Gideon

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26 Ibid; Samuel Samuel, “The effect of the auxiliary command and control computerized systems on the commander and staff.” [Hebrew]
Akavia, 27 which describes and analyzes the failure of the Future Combat System project (FCS). This failure ‘proved’ the futility of the quest to realize the full potential of network-centric warfare. The truth is that the review indicates otherwise. The attempt to promote the idea of a future combat system was made in the late 1990s and at the beginning of the last decade. It is impossible to consider this event as a ‘proof’ of non-feasibility.

From this writer’s perspective, this would be absurd. As the world races towards a vision of the ‘Internet of Things,’ will only the military world remain in the industrial era?!

Two important things have changed since and as a result of the FCS: First - the technological maturity of wireless networks today enables the realization of the vision at a lower level of complexity than it did a decade ago. 28 The idea of small and cheap airborne platforms in significant quantities, enabling stable and reliable communications relay, a concept which was described in detail above, is part of this progress. Second - force design concepts in the network era should be different. The software world’s dynamism allows and requires development processes to be iterative and endless. Instead of getting embroiled in the over-specification which was described by Akavia in his review, 29 it would be appropriate to promote the realization of this vision step by step, using the accepted development logic of the software world - the logic of open architecture. Another important lesson from the failure of the FCS concept is that layers should be eliminated as a primary approach to force design. The concept of network-centric warfare should not depend on other combat components such as new combat platforms and new types of weapons. 30

27 Gideon Akavia, “What Can we Learn from the Failure of the FCS Program or Why it is Dangerous to Believe in Impossible Things.”
28 Ibid. Page 10. Akavia writes that technological maturity was a major factor in the failure of the plan.
29 Ibid, p. 11
30 Ibid. A huge proportion of the resources and focus during the project concerned the development of a whole new family of light armored vehicles.
How to proceed?
So many inherent and tough obstacles. What, then, is the way forward?
The answer lies in the force design entities of the IDF. It’s hard to imagine a big company specializing in excellent digital cameras devoting itself of its own free will to the vision of integrating its products within a portable phone. The managers would not want to do so, the engineers would explain that cameras so tiny cannot be developed and would not be worthwhile, since the cost would be high and the performance low. To promote a vision like a smartphone, teams of professionals need be organized around the new idea.
The IDF force design system is organized as a whole, like the military force itself, around the idea of combat platforms and clear tactical disciplines, corps and services. Armaments departments are made up of specialized branches - armor, infantry, artillery, intelligence and so on. In the air force and the navy the division of responsibly are less corps-based but are still very professional. Communications branches and departments are organized on the founding principle of command and control networks - optimization of the existing command structure through the support of computers and communications. Therefore, new organizations within the armaments departments and the various technological divisions are required in order to promote the vision of the sixth era approach.

Conclusion
Two fundamental questions are the basis for any change: First - Is it necessary? Without a profound recognition of the need for change, a reasonable person, not to mention a reasonable organization, will not undertake upon themselves the investment required and the risks involved in the change.
The second - Is it possible? A strong desire is not enough. Without a belief that change is indeed achievable, even if it involves
considerable investment further up the road, and the taking of some risks, no decision to change will ever be made. Furthermore, without an alternative, realizable vision, we will usually not even be able to recognize the need for change. Psychological repression is indeed the basis for all sanity.

This article has tried to encompass both questions. Regarding the question of need - a change is needed because when we developed the concept of standoff warfare and accustomed ourselves to see ground warfare as a necessity that should be minimized and deferred as much as possible, our enemies evolved in a way that not only adapted to our aerial and intelligence might, but they also developed dangerous ground ambitions. While it is true that these aspirations are still limited, the pace of their development should trouble us. History teaches us two things: One - Man is a creature of the ground, therefore the most important combat phenomena occur on ground, and the other - there is no vacuum. Our repression of the ground battle invites our opponents to find their own way there. There is a need, therefore, for a deep and urgent change in how we perceive the act of war.

Regarding the question of capabilities - software allows machines to communicate with machines. Today, the world is already moving from a limited digital revolution to a virtual world of the ‘Internet of Things’ - objects communicating with other objects and affecting our practical experience. The world is shifting to the ‘Internet of Things’. The theoretical idea of a transition from a world of jointness of separate entities towards a world of synergetic fusion of various capabilities - embodies the practical potential to preempt, on the new battlefield, the tactical appearance and disappearance cycles of the enemy.

In order to realize the transition from the ‘Jointness’ approach to the “sixth era” one – the ‘Fusion’ era - a determined and conscious effort by the officer corps will be required, as well as a paradigm shift and a structural change of the military organization. First and foremost, it is necessary to reorganize force design entities such that their commitment will never be to the world of separate
disciplinary excellence, but rather to the world of merging and fusion of different capabilities into one diverse and decentralized machine.

Our enemies have adapted well, in the tactical and operational sense, to the era of jointness of the modern army. Furthermore, our strategic environment is increasingly shedding its modern packaging – organization into countries and armies – in favor of postmodern and pre-modern organization (terrorist organizations, militias, tribes and denominations).

The required strategy for countries surrounded by a sea of tribes, groups and militias that undermine their very existence, requires on the one hand a strong defense and on the other, periodic forays “over the fence.” If we do not preempt the intentions of our enemies and disrupt them, we will find ourselves like the Romans during the twilight of the Roman Empire, suffering from ongoing rearguard attacks by warrior tribes into our territory. The emerging elements of Hezbollah's and Hamas’s combat doctrines, of ground attacks into our territory, should be an important wake-up call for us.

The tactics needed to realize this strategy require absolute superiority of high quality forces of limited numbers over bold and sophisticated enemies who benefit from a comfortable environment. This approach is realizable in our time through the jointness of the potential of the network and the potential of a mass and cheap vertical dimension, employed by the ground forces themselves. This is the latest development, the most appropriate and necessary, of Lord Tedder's approach to the employment of air power, in contrast to the approaches of Giulio Douhet, “Bomber” Harris and their successors. Only a full exploitation of the best of today's technological potential through a relevant combat concept will enable us to maintain the strategic initiative and ensure the continued stability of the Jewish state in this difficult neighborhood for many generations.

31 See also the Eran Ortal, “The Return of Fatahland.”
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