Tightening the Belt and Introspection – Preparing for the Cut in Shekel Aid

Saul Bronfeld

"The Israeli Navy was always hampered by limited budgets, but achieved smart solutions... It resembles a painter, a poet - [who] creates his greatest art only on an empty stomach."

Brigadier General (ret.) Shabtai Levy¹

Introduction

The conference at the Institute for National Security Studies in Tel Aviv on the subject of the defense industries² can be summarized in two sentences: first, the defense industries are very important to the IDF, the economy, and the country's outlying areas; and second, a reduction of the shekel component in US aid will have a severe negative impact on Israel's security, the economy, and the local defense industries.

Echoing these statements, most of the speakers at the conference concurred that the reduction in shekel aid was another reason to increase the defense budget for local procurement, and the sooner the better. Brigadier General (res.) Prof. Jacob Nagel, who led the drawn-out negotiations with the American authorities, was the only speaker who argued that the reduction in the shekel aid budget should also prompt some self-reflection on the part of the defense establishment. To illustrate his remarks, he recalled the collapse of Kodak, which failed to identify in advance the changing environment in which it operated.

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This article follows Nagel's argument, and points to a matter that was not raised, but that should be before the budget is reshuffled to deal with an emerging defense-economic problem. In other words, before various actors pounce on the budget, there is a need to reassess the three-way relationship between the IDF, the Administration for the Development of Weapons and Technological Infrastructure (MAFAT), and the defense industries so as to enhance the effectiveness of the budget for force build-up, "to get more bang for the buck." This article will attempt to shed light on this complex issue from an IDF perspective, as reflected in unclassified articles that appeared in the *Journal on Operational Art*, published (mainly in Hebrew) by the IDF's Dado Center for Interdisciplinary Military Studies.

Issue #1: The Need to Increase Compatibility between the Order of Battle and the Doctrine for the Next War

It is difficult to exaggerate the importance of this issue. History is replete with examples of armies that entered a war with an unsuitable order of battle. The British fleet was not prepared before WWII for dealing with the German submarines. The Unites States Air Force entered the Vietnam War without an attack aircraft capable of operating deep in the North Vietnamese rear. In this vein, the IDF has its own examples of procurement decisions and large-scale investment that were incompatible with the operational doctrine.

- In the early 1960s, air force commander Ezer Weizman undertook to fund the French aircraft manufacturer Dassault Aviation for the development and production of a new supersonic high altitude attack aircraft, Mirage 3F2, a project amounting to hundreds of millions of dollars. Fortunately for Israel, the agreement was canceled due to the intervention of Deputy Prime Minister Yigal Allon.
- After the Six Day War, the Armored Corps asked for and received authorization to procure British Chieftain heavy tanks that had serious and persistent engine defects. This project amounted to hundreds of millions of dollars. Fortunately for Israel, it was canceled because of the British arms embargo.
- Following the Yom Kippur War, the Israeli navy hastily and haphazardly procured Zivanit hydrofoil missile boats, a \$100 million project financed with American aid, which went down the drain.

- After the peace treaty with Egypt was signed, Minister of Defense Ariel Sharon and IDF Chief of Staff Rafael Eitan pressed for the construction of a military port off the Gaza Strip coast – another \$100 million project. Opposition by Navy commander Zeev Almog overcame the pressure (the First Lebanon War later erupted, and Sharon and Eitan found other matters with which to occupy themselves).³
- To these can be added the mishaps of the Lavi aircraft and other projects that were completed, but whose operational utility is disputed.

Another type of error made was not purchasing and developing weapons that might have made a critical difference. A glaring example is the shortage of antipersonnel weapons in tanks in the Yom Kippur War. To this sad list can be added the procurement or development of important weapons systems that were authorized only very belatedly, because of opposition by generations of air force commanders: Hawk surface-to-air missiles, unmanned aerial vehicles (UAVs), helicopters for naval warfare, and, in the last generation, Iron Dome and ground-to-ground missiles.

Today, the need to increase compatibility is the focus of military discourse, and is being addressed by many excellent people. We will present here an important aspect of the current debate – the concepts of the land forces referred to as "Land on the Horizon" and "Hupat Atar," as discussed in articles in the *Journal on Operational Art* – without attempting to take a position on such a complex matter.⁴

In the last generation, Hezbollah and Hamas have succeeded in establishing a balance of terror that the IDF has not yet managed to quash. The difficulties in conducting land-based operations against rocket launchers in Lebanon and the Gaza Strip are hampering Israel's freedom of action. Despite the importance of the long-standing threat from high-trajectory weapons, no land-based response has been yet devised, though experience has shown that an aerial response – both offensive and defensive – also has many constraints.

One of the main efforts at dealing with the dilemma is the Land on the Horizon concept, prepared by the ground forces in 2012-2015. This is an innovative operational concept, requiring many technological developments, that will make it possible to deal with the rockets themselves, and also those that operate and protect them. At the heart of this plan is what is known as the "system of systems," Hupat Atar, which integrates surveillance and

strike systems with intelligence, ground, and air units. According to Major General (res.) Yoav Har-Even:

The integrability will make it possible to improve the effectiveness of an attack and provide close support to a variety of forces in all kinds of terrain. Note that the emphasis on integrability naturally centers on an extremely difficult challenge – complete integration of all capabilities from the air, sea, and cyberspace with the ground forces. The main requirements can therefore be described as follows: an ability to gather and process intelligence for the purpose of attacking a range of targets (direct attack and counter-attack) at rapid firing rates in difficult terrain, and close support for a range of forces, while optimizing all of the intelligence gathering and attack units in all areas (air, land, sea, and cyber).⁵

In other words, Hupat Atar is composed of advanced target acquisition systems and long-range high-speed communication systems connecting all participating combat forces and the advance and rear headquarters. The concept also includes digital command posts enabling the ground commander to select the optimal means of fire. The revolutionary quality of Hupat Atar is actually the ability to complete the spot and strike cycle in less than a minute, which is enough time to destroy an anti-tank squad before it can escape and to avoid injuries to uninvolved parties.⁶ Simultaneously with Hupat Atar, there is a need to continue developing weapons and doctrine for combating high-trajectory fire – it is desirable to intercept high-trajectory fire in enemy airspace. This task also requires the use of advanced technologies beyond those of Iron Dome. It should be noted that the new concepts require not only innovative weaponry and infrastructure, but also organizational changes for redistributing the missions between the ground forces, the intelligence corps, and the air force.

Such developments mark another recent chapter in the close dependence between technology and industry and the operational concepts. In its first decades, the IDF made do with imported platforms. These were initially upgraded old platforms, and later also new ones: Sherman, Centurion, and Patton tanks; British, French, and then American warplanes and electronic systems. Later, the IDF and the industries were forced to develop innovative technologies, because it was impossible to procure weapons that would meet the IDF's operational needs. This is what happened in the early 1960s, when the navy developed missile boats in response to the Komar and Osa boats that the Soviet Union supplied to Egypt. The same thing happened in the 1970s, when the air force developed the weapons used in Operation Mole Cricket 19 to destroy the Syrian-Soviet air defenses, and in the 1990s, when IDF air and land services developed a system code, called Asufa, as a response to a mass land attack by Syria (the naval and air responses proved to be very effective, while Asufa, developed at great cost, was fortunately never used).

Land on the Horizon requires the development of a new battle doctrine based on very expensive innovative technologies, together with a reassessment of the institutional system. The expected cut in shekel aid, however, limits room to move within the budget, while the force build-up required against "third circle" enemies and various defensive improvements further reduce the budget for land operations. IDF Operations Directorate head General Aharon Haliva described the result: "We continue to strengthen our 'healthy leg'-intelligence gathering and counter-attack capabilities, and are surprised that we still walk with a limp caused by the land operation."⁷ He was referring to the budgetary priorities in recent years: intelligence and air attack capabilities come first, while land operations are in second place. Land on the Horizon plays a key role in the IDF strategy presented by the last chief of staff, Lieutenant General Gad Eisenkot, but it was not decided who would lead it, and the necessary resources were not earmarked.⁸ There are many reasons for prolonging the discussions. Here we will mention only the difficulties of the IDF and the defense establishment in coping with an innovative operational concept requiring technological breakthrough, large-scale investments in R&D, and organizational changes in the IDF's branches and directorates. The difficulties stem from a number of causes: "fear" of new technologies by commanders, the weaknesses of the General Staff vis-à-vis MAFAT, conflicting interests of the defense industries, and others.9 In addition to all these, there is no consensus in the General Staff and the defense establishment agencies regarding the practicality of Hupat Atar and its expected contribution towards resolving the ground maneuver difficulties (see note 5 above).

It should be added that the coming multi-year plan, "2030 Defense Doctrine," presented by Prime Minister Benjamin Netanyahu, will contain heavy demands from the defense budget and human and technological infrastructure, and thus it is extremely important that there is coordinated action by the three partners in this plan – the IDF, the Ministry of Defense, and the defense industries. It should be stated unequivocally: the difficulties are not just budgetary. There is also competition for the supreme command's attention, the defense industry's development infrastructure, and the best officers.

In sum, we argue that the hesitation over Land on the Horizon is only one example, albeit an important one, of the need to make R&D and force build-up correspond to the operational concepts. This need is exacerbated by the anticipated budget cutting. Introspection is therefore imperative in order to examine ways of more quickly applying the efforts of the defense establishment and the defense industries to today's strategic and economic realities.

Issue #2: A Digital IDF?

Since the 1960s, the IDF and the defense industries have successfully climbed the ladder to the forefront of military technology. At the same time, many of the people working in technology claim that alongside its excellent digital achievements, the IDF also suffers from mediocrity, if not worse. The requisite self-reflection should address this question – is Israel's vast technological potential being fully realized? The following remarks by technology experts, both in and out of uniform, appeared in the *Journal on Operational Art*. They highlight mainly the "half-empty glass," because the "half-full glass" aspects of defense innovation are so well known.

Yotam Hacohen and Yoel Yaffe argue that in the 21st century, the emphasis on innovation is shifting from the development of combat platforms to software development. They add that the defense establishment has not yet adopted the Agile development concept; it still adheres to the oldfashioned Waterfall methods of project management. "The IDF's concept for developing weapons," they say, is based on "separation between [1] the operational party making the request ('the customer'), [2] the party writing the specification documents and [3] the party developing and producing the weapons (an industry or IDF technological unit). This concept has advantages for platforms, but it fails in the development of a core software system."¹⁰ Carmel Or studied the extent of use of open code in the IDF and the defense industries, under the assumption that this is a good indicator of innovation. Her findings are not encouraging: "Israeli defense firms are adopting open source code for their work in a very slow and awkward fashion, due to their organizational cultures... while MAFAT contributes to the adoption of open source code in the defense establishment, it does so passively." In Or's opinion, the United States defense establishment and the business sector in general are far ahead of the Israeli defense establishment on this matter.¹¹

Other barriers to digitalization in the IDF include a reluctance to use off-the-shelf products, unsuitable procurement procedures, handling of copyright issues, and other aspects that hamper agreements with development entities. Volume 17 of the *Journal on Operational Art*, in December 2018, was devoted to the army and technology in the information era, with several articles outlining these and other barriers. The articles were written by a long "chain of command" from Major General Lior Carmeli to Brigadier General Guy Paglin to Captain Or Glick and reserve officers involved in defense duties.¹²

A discourse between two groups is taking place within the pages of the Journal on Operational Art. One group consists of young technology professionals wanting to lead a culture of development in the IDF similar to that in the business sector; the above statements are a sample of their opinions. The second, older, group demonstrates why the IDF will never operate as a "startup." Major (res.) Erez Ne'eman, who previously worked on technology in the air force, is a prominent representative of the second group. He described a wonderful "Agile" event that is no longer possible. He recalled that in 1969, three air force engineers replaced the unreliable engine of a French Super Mystère warplane with a high-quality American Skyhawk engine within seven months (the airmen called the upgraded airplane "Blaiberg," after the first recipient of a heart transplant). Getting back to the present time, Ne'eman said that "Today, rewriting the manual for changing tires periodically will require more time and approval processes than the project of replacing an engine in the 60s."13 Ne'eman also explained why the R&D processes for aerial weapons became longer: the introduction of rigorous procurement rules, following the Rami Dotan affair (in which a former air force procurement chief was convicted of embezzlement); separation between the parties deciding about procurement and those using and maintaining the

equipment; the closing down of the development department in the air force equipment group and transfer of most of the professional engineering knowhow to the defense industries; and raising the safety requirements threshold (which significantly reduced accidents). In other words, he demonstrated once again why the modern IDF resembles an aircraft carrier, rather than a surfboard.

Another incredible case is the pace at which the air force, defense industries, and other auxiliary parties developed the revolutionary systems that defeated the Syrian air defenses and air force in the First Lebanon War, in June 1982. Menachem Krauss, who after the Yom Kippur War developed the Periscope command and control system for air warfare, said in an interview, "It was obvious to me that if we work using military methods, meaning forming a team and getting equipment through the IDF bureaucracy, development would take quite a few years... I said that if they would give me a free hand, I could make the system combat-worthy within a year," and that is what happened. Simultaneous with the Periscope system, all the other elements for destroying the Arab missile batteries were developed: UAVs, guided bombs, electronic warfare systems and decoys, simulators, and so on. All of these functioned perfectly on June 9, 1982. On the first day of the war, the air force destroyed 19 Syrian ground-to-air missile batteries shot down 23 Syrian warplanes, and all of Israel's attacking planes returned home safely.

The rapid developments and the ensuing operational success were the result of the grave predicament of the air force and the IDF during the Yom Kippur War. An added push was given to the matter by a small number of dedicated people in the air force, assisted by Weizmann Institute scientists, and later by the defense industries. This is another example of penetrating self-criticism that led to an important breakthrough.¹⁴

There is no doubt that young technology professionals are gradually influencing and changing the IDF. Lieutenant Colonel Ori, former chief technology manager at the IDF Military Intelligence Directorate, described a number of business sector methods that were adopted: different types of "hackathons," "incubators," use of a minimum viable product (MVP) methodology in the early stages of a project, and forging of a close direct connection between developers and users. All these methods encourage young developers to conduct groundbreaking R&D, on the one hand, and reinforce their interest in military service, as well as enabling them to resist tempting offers from the business sector, on the other.¹⁵

Finally, let us describe two events that demonstrate failures in development of weapons systems, which highlight the potential for operational improvements while saving on development costs. Erez Ne'eman wrote about a command and control system for air warfare developed in the 1980s. It was created in a relatively short time, and significantly improved the air force's capabilities. At the same time, as often occurs with first-generation systems, it was complicated, hard to use, and required a lengthy training period. Describing the results, Ne'eman wrote, "Most of the system's functions were not used – no user went near them during 20 years of operational use."¹⁶ Nevertheless, the new system which replaced it in the 21st century had the same drawbacks: "Too much time was spent on trying to operate it correctly, and reserve officers usually use only a small number of the system's functions and are incapable of taking creative action or responding rapidly to changes."

Nissim Hania recounted an idea of developing a modular pod to be installed on aircraft that could contain sensory systems in the form of standard cards. This pod is relatively expensive but it would be installed only once on an aircraft. It would facilitate the quick installation of sensors at a later time. This product has two advantages. First, it would only need to be replaced about every 20 years, although sensors must be replaced every two to five years. Second, sensors developed according to the new standard can be inserted into the pod after short tests taking a few months at most, instead of years, as at present.¹⁷ According to Hania, the idea was not implemented because the air force preferred a quick solution that would meet an urgent operation need.

The last two events are not unique to the IDF. The first describes the development of a system made overly complicated by excessive specifications. The second describes a preference for dealing with urgent needs over long-term economizing and effectiveness. At the same time, both of them highlight the potential for operational improvements and streamlining, which could become possible with closer cooperation within the IDF-MAFAT-defense industries triad.

Two Important Issues Must Not Be Forgotten

Introspection on the two issues analyzed above must not make us forget the most important subject – the human factor.¹⁸ Cultivating excellent servicemen and women is the primary imperative of the IDF, and it must not be forgotten in the heat of the technological race. "An open mind is more important than open source code" – the open minds of combat soldiers, headquarters staff, technology specialists, economists, and others are vital. This is a very complex matter that will not be dealt with in this article. The second subject is training, readiness, and more training. As doctrines and weapons become more advanced, more training of all kinds is necessary, including strategic war games, exercises, simulations, and the like. This is also a very complicated matter that is in constant tension with the attention paid to routine security and the "campaigns between wars," budgetary constraints, problems of the reserve forces, and career paths for officers.

Every one of these matters constitutes an entire universe, and dealing with all of them together requires a comprehensive shakeup of the defense establishment.

Summary

Since the defense establishment is facing painful monetary constraints, it should also engage in introspection. First, there is a need to harmonize the IDF's strategic concepts and the directions of R&D and force build-up. Second, barriers to realizing technological potential must be removed, so that the IDF and the defense industries can supply effective weapons systems after rapid development cycles and at low cost. Third, the human and leadership factor should not be neglected.

These are three prodigious and weighty tasks that cannot be accomplished with a stroke of the pen, or even in a multi-year plan, and this article does not purport to portray their full complexity. It is enough for us to demand introspection by the defense establishment agencies, and to propose that this take place in the spirit of the words by Brigadier General (ret.) Shabtai Levy quoted at the top of this article.

Notes

- 1 These words were spoken to Dr. Daniela Ran in an interview. Levy commanded a flotilla of missile boats in 1971-1973. See a study describing the beginning of the advanced technology era of the Israeli Navy and the defense industries: Saul Bronfeld, "The Revolution in Naval Affairs – the Missile Boat Flotilla," *Journal on Operational Art* 14, December 2017 (all articles referenced here from this journal are in Hebrew).
- 2 March 3, 2019.
- 3 Numerous articles, primarily in Hebrew, offer detailed descriptions of these dubious procurement processes. See, for example, on the Mirages Yoash Tzidon, *By Day, by Night, in the Fog* (Ma'ariv Book Guild, 1996), pp. 335-50. On the tanks Saul Bronfeld, "The Chieftain Tank Affair: Real Politik, Perfidy, and the Genesis of the Merkava," *Contemporary British History* 23, no. 3 (September 2015): 314-96. On the Zivanit hydrofoils Zeev Almog, *The Modern Naval Power of Israel Developed after the Yom Kippur War* (Institute for the Study of Israel's Wars), 2018, pp. 28-34. The money wasted on the Zivanit was almost enough to procure a squadron of Phantoms. And on the Gaza military port Zeev Almog, *Voyages of My Life* (Kinneret Zmora-Bitan, 2014), pp. 1,128-134.
- 4 For the complexity of this subject, see the articles (in Hebrew) by Colonel (res.) Yuval Bazak and Colonel (res.) Prof. Gabi Siboni, Lieutenant Colonel (res.) Dr. Ido Hecht, and the late Brigadier General Giora Segal in Maarachot (IDF Publishing House), vols. 482 (January 2019) and 484 (July 2019). See also Dr. Zeev Elron, "The Slowing Pace of Technological Changes," *Zarkur Histori* (Historical Spotlight) 57, IDF Doctrine and Training Division – History Department (January 2019): 44-74, and Moshe Sharvit, "The Technological Campaign," *Journal on Operational Art* 20-21 (July 2019).
- 5 Yoav Har-Even, "The Land Battlefield: From Cooperation and Jointness to Fused Capabilities," *Journal on Operational Art* 16-17 (July 2018): 88. Major General (res.) Har-Even was head of the IDF Operations Directorate, and is currently CEO of Rafael Advanced Weapons Systems. For a more detailed description see articles published by IDF generals in *Journal on Operational Art*, a publication by the Dado Center: Kobi Barak, Tamir Heyman, Yoav Har-Even, Aharon Haliva, Tamir Yadai, Lior Carmeli, and Guy Tzur. See also an article summarizing their views: Saul Bronfeld, "How Did We Get into This Mess, and What Do We Do Now?" *Journal on Operational Art* 2014-2019, 20-21 (July 2019).
- 6 For additional descriptions (in Hebrew) of Land on the Horizon and Hupat Atar, see Amir Rapaport, "Delivering Precision Fire in Real Time Against an Invisible Enemy," *Israel Defense* (May-June 2016); Ami Rojkes Dombe, "Measurement War Against Terrorism," *Israel Defense* (Summer 2017); Ami Rojkes Dombe, "IDF 2030: Small, Efficient & Lethal," *Israel Defense* (Fall 2017). Rafael has developed a smaller operational version of the concept underlying Hupat Atar, called Smart

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Trigger. See Ami Rojkes Dombe, "The Anti-Tank Missiles Market Needs a Longer Range," *Israel Defense* (Winter 2019): 30. In the same issue, see an article describing a system developed by Israel Aerospace Industries called Sky Capture, which applies the concept to air defense systems, Ami Rojkes Dombe, "Air Upgrade," pp. 54-55.

- 7 Aharon Haliva, "More of the Same On the Need for a Conceptual Leap in Force Build-Up," *Journal on Operational Art* 9 (December 2016): 19. General Haliva currently heads the Operations Directorate.
- 8 Yuval Bazak and Gabi Siboni, "Do We See Ground Forces on the Horizon?" Maarachot, 482 (January 2019): 27-29. Colonel (res.) Bazak and Colonel (res.) Prof. Siboni head the IDF Concepts Laboratory.
- 9 See Eran Ortal, "Confused? So Are We A Historical Perspective to the Debate over 'Land on the Horizon," *Journal on Operational Art* 16-17 (July 2018): 29-37; Yuval Bazak, "The Drivers of IDF Force Design in the Past, Present and Future," *Journal on Operational Art* 9 (December 2016): 72-74.
- 10 The Waterfall method, a software development concept from the specification stage via division into sub-systems, development of a prototype, and practical demonstrations, to the large-scale production stage is essentially linear. The Agile system is a response to the flaws of the Waterfall method. It cuts the development time and costs by creating a closer connection between users and developers, among other ways. For details, see Yotam Hacohen and Yoel Yaffe, "Land Warfare in the Digital Age: Why Aren't We Succeeding?" *Journal on Operational Art* 16-17 (July 2018): 137. On this subject, see also Daniel Bren, "This is How We've Always Done It: Personal Insights from Transformation and Adaptation Processes," *Journal on Operational Art* 8 (August 2016): 44-45.
- 11 Carmel Or, "Open Source Code Culture: To What Extent Has the Defense Establishment Adapted to the Software Culture, and What Does It Say About Its Level of Innovation?" *Journal on Operational Art* 7 (April 2016).
- 12 For other examples and opinions, see Saul Bronfeld, "How Did We Get into this Mess, and What Do We Do Now?"
- 13 Erez Ne'eman, "Force Design in the Services: R&D in the Air Force," *Journal on Operational Art* 9 (December 2016): 88-89.
- 14 Meir Finkel, "Force Design for Operation Mole Cricket 19, 1973-1982," *Journal on Operational Art* 20-21 (July 2019). Brigadier General (res.) Dr. Meir Finkel served as commander of the Dado Center.
- 15 Lieutenant Colonel Ori, "Hewing Water from the Rock Change and Transformation in the R&D Systems in the IDF," *Journal on Operational Art* 7 (April 2016).
- 16 Erez Ne'eman, "Force Design in the Services," *Journal on Operational Art* 7 (April 2016) pp. 93-94.
- 17 Nissim Hania, "Second Order Force Build-Up Another Viewpoint on Technological Force Build-Up," *Journal on Operational Art* 18 (December 2018): 57-58. Nissim Hania is a technology specialist and Research Fellow at the Dado Center.

18 Meir Finkel and Yaniv Friedman, "Seven Decades of the IDF's Qualitative Military Edge: Change in the Conception of the IDF's Qualitative Military Edge over its Enemies, Change in the Actual Qualitative Edge, and Directions for the Future," *Journal on Operational Art* 9 (December 2016): 61-64. Yaniv Friedman is a researcher at the Dado Center. See also Uzi Ben-Shalom and Boaz Zalmanowic, "Trends in the Development of Israeli Military Leadership Doctrine: Challenges and Responses," *Journal on Operational Art* 16-17 (July 2018).