IDF Shayetet 13 training exercise. Photo: Israel Defense Forces (CC BY-NC 2.0)

Behind Mandatory Service in Israel: From the Rationale of the Militia to the Rationale of Military-Technological Superiority

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The IDF's singular approach to military-technological superiority prompts dependence on the recruitment of Israel's STEM (science, technology, engineering, and mathematics) elite within the conscription model. The article argues that the quantitative logic, or militia rationale underlying the initial conscription model was also used from the outset to recruit the STEM youth elite, and to track it for building the IDF's techno-operational edge. Over time, the center of gravity of the model's underlying logic shifted—from a quantitative emphasis to an emphasis on the need to recruit a skilled population, and above all, the STEM elite, through the conscription of the general population. Defense R&D and the expansion of the special recruitment tracks advanced simultaneously, and this elite population became the pillar of the IDF and the entire security establishment's techno-operational force buildup. Given this ongoing process and because there is no practical alternative for recruiting this elite without conscription, any change to the conscription model must consider the importance of recruiting this elite. The article concludes with a discussion of the inherent risks to this recruitment in scenarios of shortened or differential mandatory service.

Keywords: IDF, conscription, service model, technological superiority, military R&D, STEM elite, quality, quantity

Introduction

The mandatory service model in the Israel Defense Forces (IDF) was born out of the fire and brimstone of the War of Independence and was an imperative function of the Middle East strategic reality, namely, the extreme asymmetry between Israel and its hostile Arab neighbors: in population, territory, resources, and the lack of strategic depth. This asymmetry was the basis of the national security concept formulated by Israel's first prime minister, David Ben-Gurion, and the need for relatively long mandatory military service followed by compulsory reserve service, which constituted a complete model for creating a semi-militia army. The distress in relation to the size of the population was twofold—first, a small population that had difficulty forming a strong professional army of a size proportionate to Israel's long borders with hostile countries; and second, the stark disparity in population versus its Arab neighbors: Israel's Jewish population in 1948 was 650,000, a ratio of 1:20 in relation to the Arab countries bordering it, and 1:50 in relation to all of the Arab countries, which could dispatch armies that were many times larger (Ben-Israel, 2013, pp. 28-29).

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The formal history of mandatory service in Israel is rooted in the legislation of the Defense Service Law (also known as the Security Service Law), passed in September 1949 (Defense Service Law, 1949) as part of a broad perspective on service in the IDF that was then established. The law was replaced by a more advanced law in 1959 and again in 1986, and since then has undergone changes and updates on all related issues (Defense Service Law, 1986). According to the law, Israeli citizens (who are not Arabs)[1] are obligated to enlist in the IDF or in national service. Today the length of mandatory service is 32 months for men and 24 months for women.

Aside from changes in the length of service,[2] the induction process, and the approach to recruits and other minor adjustments, the principles of the mandatory recruitment and service model have not changed significantly over the years: They are: (1) As a rule, the country's citizens who do not belong to the Arab nation are bound by mandatory service in the IDF.[3] (2) The army's force is based on a core of officers and career soldiers in permanent service alongside conscripts, numbering about 175,000 people ("2022 Israel Military Strength," 2022). (3) The reserve forces, numbering several hundred thousand officers and soldiers, with its size and nature deriving from the mandatory service of combat soldiers and from routine training and maintenance, constitutes the main fighting force of the IDF in times of war, operation, or crisis (with certain differences in the reserve model of the ground combat forces vs. air or naval combat soldiers). (4) Professional and technological systems rely (in regular times and in war) on technological officers and professionals, whose service is usually longer than that of other conscripts.

This article addresses the issue of the mandatory service model in the technological-military context, namely, regarding the close connection between the conscription model and buildup of the IDF as a military where technology is a pillar of its ability to achieve its objectives of defending the State of Israel from various threats, since its establishment and in the foreseeable future. Consequently, the question arises: what is the role of the mandatory service model in achieving the IDF's military-technological superiority from a historical and current perspective, and to what extent is this model essential for maintaining this superiority in the future?

The article contends that the existing mandatory service model stands at the basis of the military-technological ecosystem in Israel and advances the building of this ecosystem, which is a critical component of the IDF's ability to defend the State of Israel. Underlying this was the fundamental stance of the leaders of the state and the security establishment from the beginning regarding the importance of science and technology for the achievement of military superiority, combined with a security concept that emphasizes quality as a response to the acute asymmetry between Israel and its enemies and the severe shortage of skilled scientific-technological manpower in the security establishment and the IDF. These reasons drove the use of the conscription model not only as a response to the quantitative gap between Israel and its enemies but also as a response to the qualitative need, and directed the STEM (science, technology, engineering and mathematics) elite among the enlisting recruits to service tracks that made them a fundamental pillar of Israel's security R&D system.

A second argument is that over the years the IDF's focus on technology grew, and converged with an increase in the tracking of the STEM elite as a necessary human resource for building a strong technological military. Generations of leaders of the security establishment have continued this strategy, which has led the IDF to technological superiority over its adversaries. In other words, the contention is that due to a series of developments and decisions over the years, conscription, which was born out of a quantitative logic, became a central cornerstone of the military-technological superiority of the IDF and the entire security establishment, and that its role is only becoming more critical.

The third argument envisions further increased importance of the technological component of the military, due to two main processes. The first is the rising salience of technology in all aspects of life and in military activity in particular, especially solutions and systems that are necessary for innovation that emerges from an understanding of both the operational and technological sides. The second is the large variety of threats that Israel must confront at an exceptional rate of change and immediacy, alongside constraints due to its geopolitical situation as a country that is not a global power and is threatened by countries and organizations that demonstrate relatively little restraint. This sometimes demands that Israel perform technology-based operational acrobatics.

The article further contends that the mandatory recruitment and service model has no alternative in its role as the main generator of the IDF's technological superiority. For this reason, the final argument is that in any examination of the future of the conscription model, substantial weight must be placed on adapting the model to the continued large-scale recruitment of the science-technology youth elite. Consequently, the lion's share of the models proposed for shortening or differentiating compulsory service are highly problematic, to say the least, and could lead to a significant decline in the number of recruits from among the technology elite into the important techno-operational service tracks. Such a decline could fatally damage the IDF's ability to maintain its technological superiority, and lead to ongoing erosion over time.

The article is divided into three sections. The first section discusses the opening two arguments, namely, the roots of the approach that led to choosing a qualitative military response to the threat toward Israel, and choice of a model that recruits the STEM elite among the greater youth population and tracks it into techno-operational courses to realize this military logic. The intensification and integration of these approaches into a single combined concept over the years is presented. This section has a methodological structure that presents the parallel and intertwined evolutionary development of these two directions alongside one another step after step, by fusing primary materials and analytical articles.

The second section discusses the third argument regarding the current and future enhancement of the techno-operational component in the IDF starting at the beginning of the millennium, and the continued evolution of this component and the techno-operational human capital element for creating a critical component of the IDF's capabilities. The emphasis is on indicating the change that the cyber dimension brings to the military world, along with two additional principal technologies that will bring about a revolutionary global change on the battlefield. In addition, the specific implications for the IDF of the need to confront very diverse threats and challenges with great immediacy and at a high pace of change are explored.

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In the third section, the phenomenon of the technological security establishment's reliance on recruiting the science-technology elite is analyzed from various perspectives. The reasons for relying specifically on conscription and the lack of a proper alternative are presented, along with the implications for various proposals for model change. The conclusion briefly presents the combined thesis that emerges in the article.

Part I. Intertwined Evolution of Building Technological-Military Power and Tracking Conscripts of the STEM Elite: The First 50 Years

The First Decades: The Foundations of the Israeli Concept of Technological-Military Power

The concept of science and technology as important components of military achievement has accompanied Israel since the establishment of the state. David Ben-Gurion, the person who led Israel strategically in all aspects of its activity even before its establishment and for over a decade afterward and was its first prime minister, saw science as the basis for future human development: "We live in a generation of scientific revolutions" (Barel, 2009), and directed it first and foremost toward what he saw as an indispensable foundation—defense of the state.

In this respect, the accelerated use of science and technology in World War II had a great impact on Ben-Gurion (Barel, 2009). He contended that the exceptional quality of the IDF's military capabilities will be the primary response to the extreme asymmetry between Israel and its hostile neighbors—in population, territory, resources, and the lack of strategic depth. Science and technology, he believed, alongside other factors such as morality, combat soldiers' capabilities, and in particular, the quality of the commanders, were among the most essential components necessary to build this decisive quality in order to offset the quantitative asymmetry, and were the basis of the national security concept that he formulated (Ben-Israel, 2013, pp. 51-58).

Beyond the need to achieve quality for its own sake, Ben-Gurion sought to achieve technological independence. The fear of an embargo on Israel stemming from a variety of geopolitical interests and reasons led him to the conviction that Israel should not rely entirely on the external acquisition of weapons or settle for their manufacture in

Israel, but rather should strive to strengthen its independent technological-military research and development (R&D) capability. This independent capability would release Israel from dependence on the supply of weapons and enable realization of relative advantages on the battlefield itself, as well as greater independence in military and political decisions (Mardor, 1981, p. 81).

Accordingly, as early as September 1947, after Britain announced its intention to end the Mandate for Palestine, Ben-Gurion expedited processes for acquiring and producing weapons, and immediately thereafter also reestablished the science division, a bureau that had operated previously under the auspices of the Haganah.[4] In early 1948, it was decided to establish the Science Corps as the operational arm for R&D of this bureau (Bachrach, 2015, p. 39; Barel, 2009). The purpose of establishing the Science Corps was to develop independently what the young army needed. As such, the IDF was the only military at the time that placed the issue of science and technology in the hands of a separate corps from the rest of the branches and corps. Over the years the Science Corps became a department in the Ministry of Defense and later became Rafael Advanced Defense Systems, which was established in 1958 (Mardor, 1981, p. 67).

In time, Rafael developed into the "systems house" of the security establishment, an essential pillar of Israel's military R&D, and entered many military technological fields. Two other important governmental defense industries developed alongside it—Israel Military Industries and Israel Aerospace Industries. Israel Military Industries began as small workshops used by the Haganah, and evolved into factories for advanced weapons and ammunition. Israel Aerospace Industries began its path in the 1950s as a workshop for refurbishing aircraft, and over the course of decades became a collection of factories with diverse knowledge and technologies and a producer of multiple weapon systems. In the mid-1960s, Elbit was also established as a private defense industry, and over the years became one of the three biggest defense industries in Israel (Evron, 1980; Rubin, 2018).

The effort to develop technology-based quality occurred not only in the defense industries but also within the military itself, with an emphasis on units that are dependent particularly on this component. First was the air force, which by definition operates in a medium that demands significant technological capability. The idea behind the relatively large investment in the air force (about half of the defense budget) was that in the air it was possible to build capabilities that would provide Israel with considerable firepower and superiority over its adversaries thanks to the technological nature of this realm, based on the skilled quality manpower needed in reasonable numbers even in relation to Israel's size (Ben-Israel, 2013, pp. 56-57).

Intelligence, and in particular signals intelligence (SIGINT), was the second field in which a technological effort was made. This was a period of the rise of the technological dimension of intelligence in general and of SIGINT in particular, in the militaries of the world and in the IDF, and the budget of Unit 8200, the SIGINT unit, grew more than six-fold within a few years (Siman-Tov & Hershkovitz, 2013, pp. 184-189).

Another major effort begun in the 1950s was the decision to build nuclear reactors in order to master nuclear science and technology. This national effort was an exceptional scientific and technological project in an age when there were few scientists and countries in the world that dared to engage in such an effort. Inter alia, it required training many young people and bringing them into this innovative field.

Tracking the Younger Generation toward Technological-Military Work

The development of Israel's national-technological capabilities and its scientific-technological capabilities on an enormous scale relative to its size in its first few decades, during years of economic scarcity and austerity, and with major expenses in immigration absorption that within a few years doubled(!) the country's population, was thus a significant achievement. It required first and foremost suitable quality human capital, despite the shortage of this resource, and it had to be found, directed, and trained for these objectives.

Those who cultivated these capabilities, alongside first-rate scientists and engineers who joined the effort from existing research institutions, were young academics who were trained at that time in Israel's developing universities. Indeed, the concept of young human capital as a key element in building the capabilities for military-technological development emerged at that time, as Ben-Gurion stated: "We need the best of our youth, people of moral-pioneering virtue and with very high intellectual capacity, to dedicate all of their time, their talent, and their lives to the roles of defending the country" (Ministry of Defense, n.d.). He not only stated, but also implemented. As early as the beginning of 1948, before the establishment of the state and the invasion of Israel by the Arab armies, he ordered David Shaltiel, the commander of the Jerusalem district, to release from service those whom the Hebrew University deemed essential for defense technology R&D positions (Barel, 2009).

This measure may seem small in retrospect, but at the time it was an indicator of reliance on young scientists, and pointed clearly to the role of scientists in the country's defense service, which Ben-Gurion saw as being no less important than the role of combat soldiers. Indeed, the importance of this signal should not be underestimated. The recruitment for combat positions stands opposite to the recruitment of highly skilled youth to non-combat techno-operational positions. On the one hand, the military (justifiably) glorifies combat soldiers as part of its fighting ethos; and on the other hand, it has a strong interest to utilize scarce STEM skills found in its recruits. Such tension can be decided in either direction, and other militaries have taken the opposite decision, in favor of combat forces.

In 1951, the academic reserve model had already been established. This framework made it possible for high school graduates to postpone their IDF service in order to attend academic studies at civilian universities and to enlist in service in their professional field after completing their studies. The academic reserve was established against the backdrop of a severe shortage of both academic and non-academic professionals in the military (Neemani, 2021). A large portion of the students were directed to scientific-technological fields, and subsequently they were also a central pillar in building up the support units of the defense establishment such as Rafael, and not only of the IDF. Over the years, the academic reserve became a central component of the IDF's reliance on its technological edge, and led to a large portion of its career officers being engineers.

The 1973 War and Heightening the Technological Dimension

The technological-military capabilities were not built overnight. The initial steps that were taken in the first two decades of the country's independence were very significant in building the ethos, vision, method, and foundations that would one day make the IDF a military with a core technological component, but they were still far from creating capabilities at the forefront of military R&D knowledge (Mardor, 1981, p. 75). Accordingly, at the outset the IDF was not a military that relied on substantially different technology from that of its enemies, and it did not have technological superiority over them. Twenty-five years after the state's establishment, in the 1973 War, the quality of the IDF still rested mainly on the quality of its fighters and the quality of its command, and not on substantial technological superiority (Finkel, 2020). Even if the IDF had better means than the adversary (aircraft), there were areas in which the IDF was technologically inferior to its enemies (anti-tank weapons, rifles).

The 1973 War accelerated processes of investment in technological-military R&D. Along with political activity (the interim agreements in Sinai in 1975, followed by the peace agreement with Egypt in the late 1970s sponsored by the United States to take Egypt out of the cycle of war in the short-medium term, and tightened political-military relations with the United States) and quantitative growth in the IDF, the technological direction was a primary track for building a military ready for victory in future wars. The investments in defense R&D grew, based on the growth of the Israeli defense industries, which after 20 years and more of development and production had reached the forefront of global knowledge in many fields. The R&D that began before the war and its subsequent advancements started to bear fruit during the 1970s and the early 1980s. The defense industry spread to more and more technological fields, and beginning in the 1980s, created for itself a global footprint (Rubin, 2018).

However, there was a catch to the process. Spreading into more and more numerous and sophisticated fields with the introduction of the computer as a main platform in systems led to a situation where the security establishment could no longer fund development and acquisitions alone. The industry therefore needed to find customers outside of Israel in order to continue its process of expanding and strengthening. After 20 years it was ready for this, and began to sell an increasingly diverse range of products to other countries in growing volumes, which enabled it to support itself financially and afterwards to grow, while continuing to develop technological solutions for the IDF. While the number of people employed in the defense industry in the middle of the 1960s was about 14,000 and its exports amounted to about $15 million, in the mid-1980s the defense industry employed about 63,000 people for diverse development and production, with about a billion dollars' worth of exports (Lifshitz, 2011). The defense industry became the main tool for the IDF to develop and acquire innovative and designated weapons for the army's needs and gained a reputation and standing in the world: on the one hand the IDF's use of its products leverages its capabilities to sell them worldwide, and on the other hand, its worldwide sales enable it to support itself financially and to continue to develop the tools needed by the IDF while becoming a critical industry in the Israeli economy in general.

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But it was not only the defense industry that took part in achieving technological superiority. A significant portion was carried out in the IDF itself. Over the decades following the 1973 War, the IDF led processes for technological developments combined with operational understanding, in order to make technology the basis for superiority over Arab armies. An example of such thinking was countering surface-to-air missiles, which impeded the air force's ability to achieve air superiority in the 1973 War. Techno-operational development work by air force personnel in partnership with the defense industry enabled achieving air superiority in the First Lebanon War in 1982 by destroying the Syrian surface-to-air missiles without any harm to Israel's aircraft.

This success was specific and was not duplicated at the same time in other dimensions of combat on the same scale (Finkel & Friedman, 2016). However, perhaps more than anything else, it reflects the turning point in the IDF's increasing reliance on military technology based on independent development as a prominent component of achieving an advantage over enemies, especially vis-à-vis regular armies.

Increasing Techno-Operational Tracking: Establishment of the Talpiot Program

Along with the increased investment in technology, the security establishment upgraded its doctrine regarding STEM human capital with the inception of the Talpiot program. Talpiot is undoubtedly the flagship program of the security establishment's STEM human capital pyramid, and to a certain extent also the flagship program of the entire country for training Israel's STEM leadership. The program picks out, screens, vets, and trains Israel's top STEM 0.1 percent, and at the end of the training gives soldiers customized, tailor-made assignments in the IDF's core R&D frameworks. During its 40 years, the program has trained slightly more than 1,000 graduates in total. The influence of the graduates in all defense R&D systems far exceeds their number, and the demand for them is only increasing.

The program was established in 1979 as one of the insights from the 1973 War, along with the accelerated focus on technology. It was proposed to the IDF by two professors of physics from the Hebrew University of Jerusalem, Felix Dothan and Shaul Yatziv, to address the need to develop technological superiority for the IDF. "Proposal to Establish an Institute to Develop New Weapons" was the title of the document submitted to security officials in 1974, in which they wrote what prompted this proposal: "The military and political trends in the short and long term appear bleak. This raises the question: what can be done to take action against these trends, and how the IDF's force can be greatly strengthened…We propose a concentrated and systematic effort to invent and develop new weapons…with 'new' defined as what is not used by other armies." They proposed what became the Talpiot program: "A necessary condition for the success of such a program is the creation of a team of creative people, who 'spawn' the ideas and afterwards translate them [into practice]" (Dothan & Yatziv, 1974).

The STEM elite's importance to the IDF was also highlighted by the forum at the discussion concerning the program, which took place on July 10, 1975 with Yuval Ne'eman, then the chief scientist of the security establishment, with the participation of senior officials from Israeli academia, the military, and the security establishment. The issue was not only urged by the scientists, but also by the military figures, chiefly Col. Aharon Beth-Halachmi, who was then the head of R&D in the Israeli Air Force and later head of R&D in the IDF, and for a short period was also the director-general of the Ministry of Defense. He convinced then-Chief of Staff Lt. Gen. Rafael Eitan to create the program. The program was thus established with the understanding, agreement, and support of many figures who recognized, in Ne'eman's words, the importance of "the more effective utilization of a certain layer of highly capable people" (Ministry of Defense, 1975).

The proposal, the deliberations, and the decision to establish the program underscore several points. First, a critical component of the IDF's ability to cope with threats is the technological component, and this requires elite young human resources, in other words, continuing the emphasis on technology and its link with the pool of recruits. Second, special weapons should be developed that others don't have, i.e., the direction that the Israeli R&D system indeed later adopted, with an emphasis on special relative technological advantages. This issue was also the basis of many military R&D projects that were initiated after shelving the plan for the Lavi aircraft toward the end of the 1980s and instead investing in unique technologies and solutions. Third, there must be an emphasis on the STEM elite and effective tracking ("maximation") toward technological R&D. Finally, the new direction highlighted the need for a new type of military technologists and training scheme, different from other STEM training, chiefly the academic reserve—a type with one foot in science and technology and the other deeply in the military. In other words, the emphasis lay on an integrated understanding of both the problem area and the solution area, through long and in-depth training in understanding the military and its needs as well as technological skills, for the maturation of a systemic view of the techno-operational world.

The program, notably its strength, and its uniqueness in integrating academia and the military, was described well by Israeli Prime Minister Benjamin Netanyahu in his letter marking the 30th anniversary of the Talpiot program: "You, the graduates of Talpiot, have been at the forefront of military and technological practice… for 30 years; you were chosen carefully for a unique program that is the flagship of the security establishment's research and development bodies. In this way you are contributors to Israel's security—while you combine the value of academic study with defense and military purposefulness" (Netanyahu, 2009).

Toward the End of the Millennium: Reaching Technological-Military Superiority

The technological component's salience continued to grow thanks to the combination of three processes that converged in the last decade of the 20th century and the beginning of the new millennium: first, the global coming of age of the computer, its miniaturization, and its use in operational platforms; second, the fruit borne by the increasing investments in military technology following the 1973 War in a range of new, singular means in various dimensions of combat; third, the cancellation of the Lavi project and alternative allocation of budgets and skilled personnel to sophisticated innovative computer-based technology.

The convergence of these processes enabled Israel to develop the equivalent of the revolution in military affairs (RMA) that was developed in the United States, based on an operational doctrine of using computer technology to close intelligence-control-attack loops quickly. This independent technological expansion by Israel produced a range of new technologies and capabilities such as unmanned aerial vehicles (UAVs) and their use for a variety of purposes, reaching the forefront of knowledge in the field of missiles on land, at sea, and in the air, the development of excellent radar capabilities, progress in the world of electronic warfare, and more.

Thanks to this technological expansion, the IDF quickly advanced to comprehensive conventional techno-operational superiority over the Arab militaries, for the first time not just in specific areas, in accordance with the "theory of relativity of military buildup" presented by Isaac Ben-Israel. Ben-Israel believed that Israel should expand its relative technological edge over its adversaries and direct the conflict as much as possible toward a basis of technology and not on increases in manpower (Ben-Israel, 1997). Ben-Israel not only wrote but also implemented this doctrine over the years in his senior positions in the Israeli security establishment,[5] until it became fixed as a comprehensive doctrine implemented on the ground and not only as a theoretical principle.

The Expansion of the STEM Human Capital Pyramid

In 1999 a program was added to the network of the IDF's technological manpower development programs based on conscription: the Psagot program. It was founded following the increasing demand in the IDF for elite engineers with an established academic background, and given the difficulty of the existing programs and especially the Talpiot program to meet the demand. Psagot was established as an excellence program of the academic reserve for training elite engineers with degrees in both physics and electronic engineering.

Psagot helped fill the IDF's technology manpower pyramid: at its base is the academic reserve, then the academic reserve's excellence program—Psagot, and at the top of the pyramid is the Talpiot program. Together they were consolidated into a comprehensive response to the IDF's advanced R&D needs.

In tandem, the Atidim program was also established, which aims to bridge two gaps in the IDF's technological manpower roster: first, an increasing shortage of engineers at the base of the technological manpower pyramid (the academic reserve) and not only at the top; second, increased recruitment to the academic reserve among youth from Israel's geographic and social periphery, as part of an effort to change the social stratification and grant equal opportunities to youth from the periphery. The Atidim program is not an alternative to the academic reserve, but rather a designated entrance gate for increasing the periphery's representation. It was initiated by military personnel and received the approval and backing of the IDF's senior command, headed by then-Chief of Staff Lt. Gen. Shaul Mofaz. The program became a significant road to the academic reserve to the point that dozens of percent of those in the academic reserve arrive through it.

Part II. The New Millennium, and a Look to the Future

The Cyber Revolution

In 1990 the internet became a public product and shortly afterward the cyber realm was created, the man-made virtual domain with the internet at its core, containing all the connected communication networks and computers and the information and logic in them. This domain rapidly changed the entire face of humanity. Many human activities have transitioned to take place in cyberspace alongside activity in the familiar physical dimensions, while spheres that previously didn't exist, such as social media or digital currencies, have assumed an increasingly central role.

The next step was the emergence of the cyber domain as a realm of combat—in essence a techno-operational domain, much more than the other (physical) dimensions of combat. Land was the first domain where warfare emerged, not dependent on a technological leap, followed by the maritime realm, which required the technological leap of sailing. Only early in the 20th century did people develop the ability to use the aerial dimension for human activity, and immediately thereafter to use it also as a domain of combat that is more technological in essence than its predecessors, as by definition people cannot move freely in it without complex technology. Cyberspace and in particular cyber warfare are even more complex: the realm is entirely man-made, the activity is technological and based on many physical and logical layers, and thus also warfare in this domain is even more technologically oriented than in the physical dimensions.

The cyber domain is still far from utilized fully as a combat realm. In contrast with the first stage of the cyber revolution, which focused on a dramatic change in SIGINT, when cyber intelligence turned signals intelligence units from essentially passive to active units—no longer antennas deployed waiting for information to pass through them but rather active searches for intelligence on an opponent's computers and attainment of amounts of information in orders of magnitude larger than what we knew before—the second stage of combat in this domain, a stage of impressive utilization of all SIGINT units in the world, is only in its beginning. This is the stage in which the world's SIGINT agencies become not only providers of intelligence but active forces in cyberspace as part of the military's operational whole: not just providing and analyzing information, but operating within the dimension and through it influencing the regular physical dimensions (Matania & Rapaport, 2021, pp. 40-53).

Tracking STEM Human Capital into Cyber

Just as the cyber domain is different and more technological than its predecessors, so are those involved in combat in it. On land, the army needs fit soldiers with the endurance to walk large distances with heavy equipment and to bravely attack the enemy while risking their lives, and commanders capable of deploying their forces in a sophisticated manner in order to create a critical mass in every combat arena and throw the enemy off balance. Alongside them, engineers are needed in designated industries that develop weapons for them, from the crossbow to the cannon and from the tank to missile systems. This is also the case in the air and at sea, with the relevant adjustments.

The utilization of cyberspace as a domain of military combat also affects the kind of "fighters" and "engineers" needed. The fighter in cyberspace doesn't need cardiovascular endurance or resistance to seasickness or the capabilities needed for flying an aircraft. The fighter is a network specialist, someone who moves around the network like a soldier moves around the field, and needs advanced technological understanding of the tools to be employed. The R&D engineers are not just computer scientists detached from military operations. To develop cyber tools, they need to understand the human activity in cyberspace. In other words, the distance between the fighter and the engineer is shrinking and they work shoulder to shoulder in building joint techno-operational capability, where those leading the entire process are those who have one foot deeply rooted in the technological research of computer networks and the other foot in network military operations, forming a techno-operational elite force.

The fast rise of cyberspace as a new kind of intelligence-gathering domain and as a domain for potential combat forced human resources managers to respond quickly in order to channel additional STEM skilled personnel, as a response to the increasing demand of military cyber and with an emphasis on the combined world of research, development, and operation.

The Psagot-Software (*Psagot-Tochna*) program was established in 2007 in order to address the need for elite engineers to develop new technologies in the techno-operational world surrounding computer systems, in particular for cyber. The program trains its participants for consecutive Bachelor's and Master's degrees in software engineering, and alongside the academic training, conducts specialized training in military cyber. In so doing, the program followed what had already become a doctrine—when a substantial military technological need arises, in this case cyber, a specialized academic training program is established to address the increasing need for a techno-operational elite for fulfilling that need. In this specific case, it is not only academic training in technology and technological solutions, but also specialized training in understanding operational problems.

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But in parallel with the Psagot-Tochna program, in an innovative and unique manner led by the Intelligence Directorate, the IDF also established a variety of non-academic cyber training programs, out of the understanding that this is a field in which a new kind of operational technologist is needed, and because the cyber field relies on various capabilities, some of which do not necessarily require academic training. Against this backdrop, in the first two decades of the 2000s, the IDF began to build specialized training programs within the framework of conscription for developing skilled personnel for military cyber, which cannot be found in places outside of the military.

Core Technologies that will Change the Face of Combat in the Coming Decades

The developing convergence between the roles of fighter and engineer is more prominent in the cyber realm than in any dimension of combat to date, but it will also be very significant in other dimensions, even if in a somewhat different manner, with the development of two main technologies that will essentially change the face of combat.

The first is an emerging technological process of increasing dependence in all dimensions of combat on gathering and analysis of big data through artificial intelligence technologies and its immediate transfer anywhere—to weapons and soldiers—for the purposes of localized defense, precision attack, destruction of the enemy, command and control, and overall management of the campaign. This does not refer only to what began with RMA on closing intelligence-control-attack loops, but to much more—the ability to bring enormous quantities of sensors to all dimensions of the battlefield; the ability to process their information and automatically and intelligently distribute it without any human contact; the ability of platforms to communicate with one another in different dimensions of combat and access all data; or in other words: the ability to create insights that are not located in any one of the endpoints or on a certain platform, fuse them into new information, and distribute it.

An example of this is the use of thousands of sensors in the air and on land to monitor an area such that any movement in it is discovered. But because no specific movement has any significance in itself, except if it is understood in the context of other movements, people, or specific tools and a specific operational situation, sophisticated algorithms are needed in order to build operational insights from the big data gathered. In the past it was not possible to gather such large amounts of information or to analyze it in a useful manner. The use of advanced artificial intelligence algorithms enables gathering, analyzing, and creating such insights.[6]

The second technology that is still in its infancy is the transition of platforms and weapons to autonomous systems (abounding with artificial intelligence) on an enormous scale in all dimensions. Miniaturization, computation, and communication capabilities already enable building platforms of any size that can function fully on the battlefield and replace manned platforms, currently mainly in the world of UAVs, but subsequently also in all dimensions and all sizes—from robots and drones that are the size of a fly to giant platforms. Thousands and even more of unmanned platforms will be seen moving alongside one another on the battlefield, communicating with one another, working alone and as a flock, separating and merging. The integration of these platforms with one another, meaning their ability to communicate together and create decentralized intelligence among them, will enable them to carry out combat missions in a way that is difficult to dream about today.

The Unique Israeli Situation

The challenges that face the IDF are more diverse, more substantive, and more immediate than those of almost any military in the world. The IDF must address tactical terrorism; cope with hybrid—half-state / half-terror—organizations (Valensi, 2015), meaning that they have capabilities of small, skilled armies but their sensitivity to damage in their host countries is significantly lower than that of regular armies, and they sometimes intentionally use primitive technologies as a response to the IDF's technological superiority, such that do not threaten its superiority but challenge its effective protection of civilians and the territorial integrity of the country (Matania & Seri-Levy, 2021); operate in failed states that suffer from lack of governance (Valensi & Michael, 2021); prepare for conventional war against regular armies; and be ready to conduct a military campaign against remote threats.

All these levels challenge Israel, as it is not a global power, either politically or militarily. Therefore many restrictions apply on its ability to use force. Israel, for example, cannot and is not interested in bombing its enemies indiscriminately. Furthermore, deterrence is limited when it comes to many of its enemies: if they are able to use force they will do so. Those who have dug a tunnel will use it; those who have stockpiled rockets will fire them; those who have acquired drones will fly them; if they have cruise missiles they will use them; and finally, the threats are located here and now, and not just in the distant future.

This unique situation, different from what other militaries in the world encounter, regarding the number of threats, their frequency, their immediacy, and the limitations of deterrence against them, forces the IDF to develop operational capabilities based on technology that others simply don't need, certainly not at the high pace of change as in the Middle East. The Iron Dome as a designated and unique response to uncontrolled rocket fire on the Israeli home front, or exceptional technological capabilities that are the first of their kind in the world for detecting tunnels penetrating Israel's territory for the purpose of terrorist attacks and local achievements in war are examples of this. They were developed following a threat to Israel before others in the world experienced it, through combining techno-operational capabilities of IDF officers with the work of the defense industries.

At the same time, the unique Israeli situation also includes a major opportunity. This is because the global technological changes—the rise of cyberspace as a dimension of combat, the arrival of artificial intelligence, and enormous progress in autonomous systems—and their influence on military technology and on the battlefield could enable a techno-operational military like the IDF to realize the advantages that lie in them in order to cope well with the range of threats and challenges it incurs, and to strengthen its reliance on technological superiority.

Programs Looking to the Future

The human capital necessary for the innovative development of present-future technologies that are described above, as well as for their precise operational utilization in the relevant scenarios in the local arena, adoption via relevant new doctrines, implementation in routine use, and skilled operation within the IDF for achieving military superiority is techno-operational personnel on all levels and ranges of the STEM human capital pyramid. The IDF does not settle for the existing programs and continues to expand this pyramid so that it fits new technological emphases. Accordingly, over the last few years, as part of the academic reserve, new designated programs have been developed for training a STEM elite in diverse fields, especially data sciences and artificial intelligence. Dozens of new recruits join each such program each year, and in the coming years will constitute the core that will enable the IDF to build its capabilities in these fields, and as a result, to build its technological superiority in the region. Programs are established at a rapid pace; they invite wide interest and enrollment; and they have begun to constitute a major path in the IDF's conscription system, quantitatively as well.

The mandatory service framework over time became a mechanism that stands at the basis of the IDF's technological power and that of the entire security establishment, and represents a comprehensive paradigm of building the military-technological ecosystem of the security establishment.

Part III.
Discussion and Analysis

A Singular Phenomenon

The mandatory service framework was born out of a quantitative rationale to cope with the extreme quantitative asymmetry between Israel and its enemies. Over time, in a deliberate, spiral process and through increased tracking of STEM elite toward military R&D, this framework became a mechanism that stands at the basis of the IDF's technological power and that of the entire security establishment, and represents a comprehensive paradigm of building the military-technological ecosystem of the security establishment. This process is only intensifying with the changing face of war, along with the increasing reliance by the IDF and the entire security establishment on the techno-operational aspects.

"Since the establishment of the Israel Defense Forces, the combination of developing means of research and technology with strengthening the human resource has been one of the most important sources of the IDF's strength and resilience," stated then-Chief of Staff Lt. Gen. Gabi Ashkenazi in a letter in honor of the 30th anniversary of the Talpiot program (Ashkenazi, 2009), emphasizing the close connection between R&D and the human resource, "a young and talented human elite equipped with original thought, wisdom of action, creative imagination, and the capability to invent and develop." In the same context then-Minister of Defense Ehud Barak emphasized the importance of young human capital with original thinking (Barak, 2009); and according to Brig. Gen. (res.) Shmuel Keren, who served as head of R&D and as director of Israel Military Industries, and then as head of DDR&D from 2002 to 2010: "Without this scientific-technological elite of Israel, the academic reserve, and Talpiot, such an advanced technological network would not have been built in the IDF and in the security establishment in general" (personal interview, May 14, 2019).

The use of mandatory service to enable screening and selection from the majority of high school graduates for the purpose of identifying the STEM elite and utilizing it to build the technological-military R&D systems is a unique phenomenon, first, in terms of the military-technology ethos that was built deliberately from the outset and is not ordinarily natural to a military. This ethos was based on a Jewish value of education and scholarship and channeled in a scientific and a military-technological direction by the founding fathers of the state. Therefore, despite the importance and the shortage of combat soldiers in certain periods, the IDF from the beginning encouraged all those who were capable, even if they were fit for combat, to enlist in the academic reserve and in its range of programs, both regular programs and those for outstanding individuals, particularly regarding the Talpiot program, where screening for the program precedes all other screening in the IDF. This is a very important statement, both militarily and socially for a fighting army.

This unique tracking phenomenon also has economic implications. The service of this elite in the IDF as part of mandatory and low-ranking salaried service is incomparably cheaper than a scheme in which the army would have tried to recruit leading civilian experts, even if it was plausible. The experience of the non-military security agencies proves that it is very difficult to recruit this elite, as even though they are able to offer better working conditions and pay than the IDF, they are unable to compete with the hi-tech industry, and they too are forced to rely on IDF conscription for their core R&D. It is no wonder these elite personnel are seen as a national resource that the army shares with the rest of the security agencies that need them.

The phenomenon is also fascinating and unique from a social perspective. As a greater portion of the STEM elite population (only hundreds of people a year, unlike the entire technology sector) is tracked into directions that the military needs, the military influences the scientific-technological choice of the individual, as well as the time and the way that this elite navigates the beginning of its professional path.

The Unique Use of the Conscription Model

Several principles have guided the security establishment since the first days of the state, and even more so in recent decades, to utilize mandatory service for building technological-military power and not rely on older and more experienced human capital. The first was to fill the gap by seizing the opportunity afforded by the necessary conscription. The serious shortage of science and technology personnel early on in Israel in general and in the military system in particular led the leaders to use compulsory service as the primary source of quality human capital, because it was accessible and had to meet the demands of the military by force of conscription.

The second reason is elite quality. The conscription model enables access to almost the entire population of the country; hence the possibility of screening and locating the STEM elite of the entire country. As a result, the security establishment succeeds in reaching the best and most suitable in the State of Israel, identifying the highest quality people in the country and tracking them into military R&D in the first part of their professional career.

The third reason is the flexibility of tracking. Because at the age of recruitment the majority of individuals from the STEM elite have not yet chosen a preferred academic profession, it is possible to channel them toward the scientific and technological professions that the army needs, not through compulsion but through explanation and appropriate emphases. The Talpiot population, for example, which as part of the program is directed toward scientific disciplines such as physics, mathematics, and computers and not engineering professions, would not necessarily have chosen these professions after regular mandatory service. Presumably at least a significant portion would perhaps have chosen engineering professions or non-technological fields.

Another point is the ability to plan with stability thanks to the flow of young manpower that completes the training programs each year. This advantage is noted repeatedly by the technological units. By means of the steady placement of graduates of various programs, the units succeed in planning their human resources roster over time and investing in thorough, prolonged training that benefits both them and the technologists themselves. In addition, the technological units are able to work quickly and efficiently, "including on long-term plans and projects thanks to the steady source of manpower from conscription" (R. Shamir, personal interview, May 14, 2019).

The technological units are unable to compete with the conditions offered to engineers by the flourishing private hi-tech sector regarding levels of pay, accompanying conditions, and sometimes also professional interest: "The best would not necessarily choose defense" (Keren, personal interview, 2019). Some senior officials in the technological-security establishment add the very fact that Israel, exceptional among small countries, maintains a large-scale defense R&D system that is disproportionate to the size of its STEM population. Hence the enormous need for a high-quality technology elite on the one hand and the competition with the hi-tech industry on the other hand would have left the security establishment R&D without the quality necessary for its existence, if not for conscription (Shamir, personal interview, 2019). The very positive growth of civilian hi-tech in Israel has already affected the veteran defense industries, which are unable to rely on conscription like the military R&D system, and find it increasingly difficult to recruit the technology elite into their ranks. The people from this elite, including those discharged from techno-operational service in the IDF and in the security establishment's units, usually prefer the challenges and conditions of civilian hi-tech.

Finally, the creativity, innovation, daring, vitality, and work hours of young minds as the main mass of techno-operational personnel is an engine of technological creativity in itself. The new blood that flows into the technological units each year brings a lack of commitment to old technologies and projects, a connection to the most modern technologies, the ability to implement quickly and apply the newest technology within the system, as well as the ability to solve problems and enable technological innovation.

The Discourse on Changing the Model

Along with the continuity and relative inertia of the conscription model, the past two decades have witnessed heightened discourse and arguments that stem mainly from changes in Israeli society, the Israeli economy, and to a certain extent the change in the nature of the threats and the necessary response. This discourse has spread in the media, the academic community, and research institutes, as well as among the heads of the security establishment, the Finance Ministry, and the Knesset.

The questions and the criticism regarding the model come from different directions, among them: what is the significance of the "people's army" at a time when large portions do not enlist; aspects of periphery vs. center in the distribution of service, and the balance between religious and secular in enlistment rates and ensuing social tensions (see for example Harel, 2013, pp. 85-100); the impact of mandatory service on the social stratification in the context of belonging to Israeli society and in the context of gender (see for example Cohen & Bagno, 2001); the very question whether Israel still needs a semi-militia model even after it has grown and developed, or whether it should transition to a professional military (see for example Shelah, 2015, pp. 189-202); economic arguments regarding the validity of the existing recruitment model—the service model's harm to the Israeli economy due to the loss of work years, in part involving the existence of hidden unemployment in the IDF, and pursuing academic studies at a relatively late age compared to Western countries. All these issues also affect the nature of academic studies and the reduction in the number of work years as academics, which are economically critical years (nationally and individually), losses due to reserve service, and more.

But alongside the criticism, the general discourse mostly supports retaining conscription for various reasons, especially: the State of Israel still needs a large military relative to its size, and relying only on a volunteer army might not enable it to reach the critical mass needed for the military; it is a "security blanket" for changing defense needs, which in the Middle East occur too quickly to rectify a strategic decision to cancel the conscription model in a timely manner; the quality of manpower in a professional army of a small country could be lower, because an educated, high-skilled population would not be committed to enlistment and thus its relative proportion in the army could significantly decrease; the military stands to become the military of the "periphery" and the lower-income deciles, which would increase social polarization, which is already extant due to differences in the nature of the service of populations from different sectors, but still not in an extreme manner; concern in such a case of the collapse of the reserve corps, which is particularly important in times of emergency (Gal & Maital, 2014; Shelah, 2015, pp. 189-202).

Committees established over the years to examine the model, as well as defense professionals and many researchers (though definitely not all), believe that while at this stage the conscription law should be maintained, the model should be changed. The main changes that are demanded are reducing the duration of mandatory service to two years or less; instituting service of differential durations and rewards in accordance with the IDF's needs; increasing the number of soldiers serving in short salaried service due to their professional advantage; and more (Elran et al., 2021; Harel, 2013, pp. 85-100; Shelah, 2015, pp. 189-202).

Focusing the Debate on Recruitment of the STEM Elite

Even if the existing discourse emphasizes the need for conscription for reasons of quality of the military, and points out the technological issue (for example Harel, 2013, pp. 85-100; Shelah, 2015, p. 198), the majority of the discourse does not delve into the roots of the deep change that the IDF has gone through since the establishment of the state: becoming a military whose regional superiority relies decisively on technological superiority, which in turn relies on recruiting a STEM elite—hundreds of individuals per year—for long mandatory service, as presented in this article. Furthermore, the reliance on the technological component and on its sources of sustainment from mandatory service will only increase with the new technologies and unique needs of the IDF.

An additional pivotal argument, then, is the acute need for the STEM elite that is recruited to maintain this superiority, and therefore must be an important variable in the discussion on the continuation and nature of the mandatory service model. That is, a critical rationale exists for continuing to adhere to the very existence of the current format, and somewhat paradoxically, stems from reasons that are different from and even almost opposite those for which it was created. In other words: there is a need for the existence of the model of conscription for the entire population—not according to the underlying logic of the need for all of it to create a large militia, but rather so that as part of conscription, hundreds of individuals belonging to the STEM elite will be recruited into the IDF, as they are the IDF's main cornerstone for maintaining technological superiority.

Aspects that should be taken into consideration relate to the very existence of mandatory service, its duration, and the possibility of making it differential:

a. *The very fact of mandatory service:* Most members of the STEM elite live in communities in which the dominant norm is enlistment in the IDF, and even enlistment in meaningful service. Their recruitment into technological-operational tracks therefore goes hand in hand with these norms. As long as mandatory service exists and it is considered a relatively broad norm, most of these populations will not exclude themselves from the society in which they grow up, which is committed to military service. If mandatory service is canceled and the dominant norm of the elite population is no longer military service, as is the case in countries in which enlistment is voluntary, these populations will likely quickly opt out of the IDF.
b. *The duration of service*: The relatively long service awaiting the members of the STEM elite, five to six years (of mandatory and salaried service) after their studies, in addition to three to four years of study before their recruitment (except in the framework of the Talpiot program, in which the studies are an inseparable part of the military training and take place during mandatory service), brings the duration of service including studies to eight to ten years. Their friends who serve as soldiers for two and a half years or as officers in tracks of up to four and a half years, and thereafter study in university after a few months to a year or more of time off between military service and studies, also reach a track of at least six years (minimum service and three years of study, with the transitions between them), about eight years on average and about ten in the longest case (being officers, time off, engineering studies, and the transitions between them).

However, the techno-operational soldiers reach the point of discharge, similar to many of their friends, with a sense of satisfaction with meaningful, contributing service as an obligation of the Israeli society in which they live, as well as experience in professional work, usually intensively and at a high level. Their starting point for the continuation of their career is better than that of their friends who served in non-technological service. But if mandatory service were to be shortened, for example to one to two years, after a decade the regular recruits would reach a similar point or even a better one—one year or two of normal service and then three years of studies and five-six years of professional work. The recruits from the STEM elite who chose military service in a regular track and not in a technological track would find themselves outside of the army during those five years with excellent conditions—in pay, working conditions, freedom of choice, and often also professional interest.

In other words: the competition between the techno-operational elite tracks in the IDF and a parallel track that lacks some of the intensity of the contributing military experience but has excellent experiences and conditions, freedom of occupation, and sometimes also better training, will be harder and harder. This is mainly if the legitimacy for such a parallel track that is not military-technological increases to the extent that service is shortened, or that service is seen less and less as an essential contribution of the elite population, while employment in hi-tech is also seen more and more as a certain (and real) contribution to the country through its economy.

Differences of a few months one way or another in the duration of service may seem marginal, such that it is seemingly unclear why such a long section has been dedicated to them here. But the perspective through which shortening the length of service should be examined is vis-à-vis a reference basis of three years of mandatory service. This is because academic studies last three (sometimes four) years, and recruits in elite academic tracks examine them in this context. During their studies, are their friends serving in the army, or have they already completed their service and traveled and begun to study as part of their civilian lives? Even though this difference may sound marginal, it can be very significant from the perspective of a 20-year-old in modern society.

c. *Differential service in one form or another?* Setting a differential length of mandatory service for different groups based on their occupation threatens the equality of the recruitment of the layer of the population coming from the same places. Again, to the extent that a certain shorter alternative becomes more legitimate, the parallel track of short service followed by full civilian life would become more attractive. Differential pay of one kind or another would only worsen the condition of the elite population, as even if the military tries to increase its pay, the conditions that it can provide do not come close to what the hi-tech sector can offer. On the contrary—the moment service is measured in money, it will be legitimate not to serve at all, or to choose shorter service.

Thus, it sometimes seems like a slight shortening of the period of service or a certain change in conditions and equality is not material to the overall framework of enlistment and service of elite officers. But with such a strategic and fundamental issue, it is vital to keep a safe distance from the critical sensitive point. An inaccurate adjustment to the length of service, or change in its social framing, could in one fell swoop cause the collapse of the model and a sharp decrease in current recruitment to the point of social legitimacy for settling for "short" service and the sweeping loss of the elite population, seemingly never to return.

The issue of the technological profession acquired in the army, similar to other professions that are acquired and used after discharge, such as pilots, doctors, or simulator instructors, indeed creates clear and substantial inequality in employment after military service, but this is an issue that requires an important and separate discussion on the equality of service in many contexts, one of which is the profession acquired. This topic is beyond the scope of this article, which discusses the need for a small number, hundreds per year, of the STEM elite, who are the critical core of techno-operational superiority.

Conclusion

With the establishment of the state, Israel's leaders, led by Prime Minister David Ben-Gurion, aimed to build the IDF as an army whose quality is the pillar of its ability to address the different threats to Israel, especially given the extreme quantitative asymmetry between Israel and the hostile world surrounding it—in territory, population, and strategic depth. Over the years, deliberately and as a result of considerable work and investment, the technological component of the qualitative element became a central cornerstone of the IDF achieving superiority over its enemies.

From the beginning, what stood at the basis of the ability of the IDF and the security establishment to fulfill the need and the desire to achieve technological superiority is the access to the STEM elite of Israel through the conscription model. While this model was born as one of the main ways of addressing quantitative asymmetry, it was also deliberately used from the outset to recruit the STEM elite of the youth, who were tracked into building up the IDF's techno-operational force.

Over the years, military R&D and the recruitment tracks of this elite progressed in tandem. Consequently and subsequently, the IDF became an army in which the superiority of its technological capabilities is the basis of its ability to fulfill its missions, in a process that has only intensified due to the arrival of innovative technologies that are changing the nature of war and the battlefield substantially, and due to the many threats that Israel faces at an increasing pace. At the same time, and in order to enable the creation of this superiority, the IDF expanded the pyramid of recruitment and training tracks of high school graduates with excellent technological skills by means of a variety of unique techno-operational programs. At the base of the pyramid are non-academic techno-military trainings for recruits with excellent potential in computer technology in general and network technology in particular; next is the regular academic reserve track, which was the first of these programs to be created; above it are the excellence programs of the academic reserve with their range of specializations and their precise adaptation to the IDF's changing and unique needs; and at the top is the Talpiot program, which trains the leadership of the defense R&D with feet planted deeply in both the problem and solution arenas.

In any future conscription outline, the IDF should place major emphasis on maintaining the ability to recruit this STEM elite population, on which it is completely dependent for its continued advancement as a military based on technological superiority.

The article shows that by virtue of the intensification of the technological component in a prolonged evolutionary process, and its impact on the changing nature of combat, the center of gravity of the underlying logic of the conscription model has shifted. The original quantitative logic that aimed at recruiting most of the population into all units of the military has evolved into a logic of recruiting the entire population in order to continue to recruit the country's quality population, chiefly the STEM elite, and track it into the IDF's techno-operational force. For these core personnel, and in particular in the State of Israel, in which the academic sector and the hi-tech sector are very well-developed, there are excellent work and research alternatives in terms of the interest in them and their conditions, and it is difficult to see how these individuals would reach the IDF if not through recruitment into mandatory service.

Accordingly, the article proposes that in any future conscription outline the IDF place major emphasis on maintaining the ability to recruit this STEM elite population, on which it is completely dependent for its continued advancement as a military based on technological superiority, and its ability to realize technological opportunities. It is vital to maintain conscription and tracking of this elite population in the variety of voluntary tracks of techno-operational service. So far, in any discourse on the conscription model, even when there has been reference to the need to maintain the qualitative element and the technological component of the IDF, insufficient emphasis has been placed on the aspects brought forward in this article—the recruitment of the STEM elite into the core techno-operational R&D systems. This conceptual gap has led to proposals such as a general shortening of service or a service model with differential duration and rewards, which is ostensibly meant to address the need to maintain the quality of the IDF's manpower. Such proposals could perhaps address the quality of manpower in combat units and in additional frameworks that require not more than a year of training, but according to the analysis here, these revisions should be approached carefully, out of an understanding of the problem and the population, in order not to harm the extent and the quality of recruitment to elite technological tracks—harm that would make it difficult for the IDF to continue to advance its technological superiority and would lead to a significant deterioration of its capabilities.

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Notes

1. More precisely, the law does not distinguish between nations and religions, but leaves an opening for the enlisting body not to summon a person for military service. The army's directives are what determine the recruitment policy of non-Jews (Orgad, 2007).
2. The duration of mandatory service was originally set as two years for men and one year for women. Over the years it was lengthened, until in 1968 it was set at three years for men and two years for women, a practice that continued until it became an official amendment to the law as part of a temporary order (Defense Service Law—Temporary Order, 1995). This was renewed every two years until the amendment in 2014, which determined 32 months for men and 28 months for women (except for "the rule for women is as the rule for men" in several positions). This process is part of an overall process of shortening mandatory service for men (except in special positions) to 30 months, in stages over the course of several years—a process that is still controversial and is currently suspended (Elran et al., 2021).

3 Except for religious women, married women, or mothers; individuals exempt due to medical conditions or the age of their immigration to Israel; or postponement that becomes an exemption for reasons such as *Torato umanuto* ("Torah study is his occupation," i.e., a religious way of life of yeshiva study).

4 The main Zionist paramilitary organization in Mandatory Palestine, which was transformed into the IDF after the establishment of the State of Israel.

5 Prof. Isaac Ben-Israel served as head of IDF R&D and immediately afterwards as head of the Directorate of Defense research and development (DDR&D), both key positions at the vanguard of the military R&D establishment, for over a decade, from late 1991 until the middle of 2002.

6 For more on the role of artificial intelligence in combat, see for example the RAND report (Morgan et al., 2020, pp. 8-23).