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Bridging IDF force-design complexities: Blueprint for bottom-up innovation – The emergence of transformational commanders and 5th Gen CINOs

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Abstract: In the face of an intricate defense landscape, the Israel Defense Forces (IDF) confronts evolving challenges, necessitating transformative strategies. In the past decade, the IDF championed innovation through decentralized silos ("islands of innovation"), steered by 4th generation Chief Innovation Officers (CINOs) with 'liquid professionalism'. Since the establishment of the Combat Methods and Innovation (CMI) division, the IDF has formed an institutionalized innovation management system, managed by intraorganizational 5th generation CINOs. This system allowed binding these islands into a cohesive framework (an archipelago) designed to rapidly respond to internal developments and external challenges, showcasing the IDF's capacity to navigate the complexities of modern warfare with agility and foresight. The main contribution of this article is two-folded, first it advocates for the cultivation of two types of change agents: a. the 'transformative commanders', leaders adept at instigating profound, organization-wide change; b. intraorganizational 5th generation CINOs. Second, it introduces a dual-pronged framework specifically designed to harness and streamline a bottom-up innovation within military organizations, and in particularly within the context of the IDF. This interdisciplinary framework is derived from both sociological and organizational systems engineering perspectives. The methodology employed to delineate its contributions leverages the theory of systematic operative design.

Keywords: Israel Defense Forces, change agents, transformational leaders, Chief Innovation Officer, innovation management system, military innovation, systematic operative design

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1 Introduction

1.1 Creative destruction as an approach that promotes transformation and growth

The discipline of innovation is seen as rather new in the academic literature, and its development, as a theory, is associated with the fields of economics and business administration. The theory of 'creative destruction', introduced by economist and political scientist Schumpeter in 1942, places innovation at the heart of economic transformation within capitalism. This concept illustrates the dynamic process through which capitalism incessantly dismantles the old economic order to establish a new, more efficient one. Schumpeter's theory emphasises the transformative power of innovation, suggesting that economic growth and progress are inherently tied to the continuous cycle of disruption and renewal (Ziemnowicz 2013). The main challenge with 'creative destruction' is that it also triggers the wrath of powerful opponents who feel threatened by the frequent changes that the entrepreneur brings about.

Central to this process of 'creative destruction' is the figure of the entrepreneur, who is portrayed as a key agent of change. Entrepreneurs are able to act fast and cope with natural opposition to change; they introduce new technology that replaces the old. The entrepreneur drives 'creative destruction', relentlessly dismantling traditional methods and making existing ideas, technologies, skills and equipment obsolete in favour of new, innovative approaches spurred by capitalist initiative. The act of constantly destroying and creating is what fuels progress and improvements in the standard of living of the general public.

Schumpeter's approach, which was published in 1942, was mainly theoretical, since there was no data at

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the time that could be analysed in order to substantiate the claims; hence, economists did not take the theory seriously. Schumpeter's ideas gained popularity only in the early 1960s, with the emergence of empirical data and studies that supported his ideas. However, it has only been since the 1990s that innovation theories and their actual implementation had begun attracting serious attention. Since 2013, the Israel Defense Forces (IDF) have undergone a significant institutionalised innovation revolution, a trend that, in recent years, has also become noticeable within defense forces of Western armies. Some examples are the US Army[1] (AFC 2018), the innovation laboratories in the British Armed Forces (JHUB 2017)[2], the innovation laboratories in the [3]Australian military (2018) and the NATO Innovation Hub [4](2022).

Until the beginning of the second decade of the 21st century, academic studies in military innovation were dominated by four main schools of thought, focusing on civil–military relations, interservice politics, intraservice politics and organisational culture (Adamsky 2010). However, as suggested in the review conducted by Grissom (2006), there is an entire class of bottom-up innovations that have yet to be explored, understood and explained. Moreover, the integration of institutionalised innovation within modern armies and defense organisations is a new phenomenon that began to show its signs only in the past century. Recently, Horowitz and Pindyck (2023) presented a new framework to classify and understand military innovations as processes rather than outcomes. By focusing on the process of innovation, the authors argue for a more nuanced understanding that encompasses technological, doctrinal and organisational changes within military contexts. A recent publication by Alkaher (2022) endeavours to unveil the underlying methodology that propels the phenomenon of institutional defense and homeland security corporate innovation. This exploration seeks to provide a comprehensive understanding of the mechanisms and processes that facilitate innovation in the defense sector. It offers military leaders, through all levels of the chain of command, actionable insights to foster a culture of innovation in their respective organisations; moreover, it offers Chief Innovation Officers (CINOs) actionable insights on how to build and maintain an Organisational Innovation Management System.

1.2 Relevant and effective force-design in IDF

Executing relevant and effective force-design processes is a critical task for militaries to maintain their relevance amid a complex and ever-evolving defense landscape. The Israeli J8 directorate is responsible for developing and overseeing the IDF's multi-year force-design plans. It operates within the IDF in a uniquely dynamic and high-stakes environment, influenced by immediate geopolitical dynamics and rapidly evolving defense challenges that Israel is facing. This approach to force-design is more acutely affected by the region's geopolitical context compared to the broader strategic scopes of Western military counterparts.[5] Despite its emphasis on short-term responsiveness, the Israeli J8's force-design cycle is intimately linked to the tenure of each Chief of Staff. Every Chief of Staff initiates a five-year force-design plan, aimed at navigating the rapidly evolving defense landscape, a pace that can outstrip the plan's implementation cycle. The continuity and completion of these plans are then challenged by leadership transitions and shifting strategic priorities. Compounded by the staggered tenures of deputy positions, this often results in the incomplete realisation of each five-year vision. This scenario demands a planning and execution framework within the IDF that is exceptionally flexible, capable of adjusting swiftly to both internal shifts and external pressures.

Introduced by the IDF Chief of Staff Lt. Gen. Aviv Kochavi in February 2020, the 'Tnufa' five-year plan, also known as 'Momentum', marks a significant strategic shift towards enhancing the flexibility of IDF force-design. This initiative reflects the IDF's dedication to adopting a dynamic and adaptive strategy to tackle the complexities of modern warfare and the changing landscape of regional threats.

At its heart, the 'Tnufa' plan heralds a significant doctrinal shift, building on recent enhancements to the IDF's 'Decisive Victory Doctrine'. This evolution redefines the concept of victory on the battlefield, explicitly recognising the transformed nature of nonstate threats, especially from armed terrorist groups in Gaza and Lebanon. The plan prioritises augmenting the IDF's capabilities to counter and neutralise diverse threats effectively, with a particular emphasis on offensive tunnels in strategic areas such as the Gaza Strip and Lebanon. It calls for substantial improvements in intelligence, firepower

1 Available at https://www.army.mil/futures

2 Available at https://www.gov.uk/government/organisations/jhub-defence-innovation

3 Available at https://innovationhub.defence.gov.au/

4 Available at https://www.innovationhub-act.org/about

5 Dror, S. (2024). The Operational Environment: Superiority Challenged by More – Operational Arenas, Weapons, and Actors. Inss.org.il, Available at https://www.inss.org.il/publication/operational-2022/

capabilities, and the capacity to deliver decisive damage to principal adversaries, notably Hezbollah.[6] Through this focused approach, the 'Tnufa' plan demonstrates the IDF's determination to maintain its technological edge and operational readiness amid the multifaceted challenges of contemporary warfare. Furthermore, the integration of this evolved doctrine with the 'Tnufa' plan signals an extensive reform across the IDF, impacting training regimes, branch interoperability, weapons procurement, and civil–military relations. This broad overhaul is strategically designed to fortify the IDF's preparedness for upcoming challenges, enhancing its resilience and adaptability in a dynamic defense environment.

For years, the primary channels for force design and build-up in the IDF were anchored within its various service branches. Projects initiated by these branches received approval from the General Staff, yet the latter's influence on the development of warfare concepts was limited. Despite having capable air, land, sea forces, and an intelligence directorate, the IDF recognised that effective solutions often transcended the expertise of individual service branches, necessitating interbranch collaboration.

Another pivotal component of the 'Tnufa' plan was to revolutionise this structure within the IDF. The plan introduced a significant strategic overhaul by separating the IDF Planning Directorate from the general staff's strategic division. This reorganisation served two key purposes: it allocated a general within the general staff to focus exclusively on future force-design, and it created a dedicated planning and design unit to specifically address Israel's paramount strategic concern, the Iranian threat. This restructured approach highlights the IDF's dedication to proactive, strategic military planning and the prioritisation of threat response and mitigation. Simultaneously, the IDF recognised the need for a joint, multi-dimensional force-design that transcends traditional combat methods and innovation (CMI) processes. This acknowledgement led to the founding of the CMI division, with two central objectives. The first objective is to reinforce the general staff's role in force-design, creating a unified vision and agenda for the future armed forces that is derived from a comprehensive and unbiased perspective of the general staff; this vision focuses on anticipating future threats and leveraging technological opportunities, moving beyond the constraints of individual service branch perspectives. The second objective is to foster a culture of innovation within the IDF, optimising the creative energy of its personnel. This division sought to break down the hierarchical and siloed barriers traditionally present in military culture, encouraging the free flow of operational and technological ideas from the bottom-up. The interconnection of these objectives promotes the development of innovative concepts and solutions through the synergistic relationship between top-down strategic oversight and bottom-up creative freedom. This dynamic synergy stimulates an open dialogue of ideas, ensuring that strategic visions and innovative endeavours enhance one another. By effectively bridging the divide between overarching strategic planning and the grassroots innovation of personnel at every level, the IDF has crafted an exceptionally adaptable framework. This framework is designed to rapidly respond to internal developments and external challenges, showcasing the IDF's capacity to navigate the complexities of modern warfare with agility and foresight.

The main contribution of this study lies in its innovative dual-pronged framework for fostering bottom-up innovation within the IDF. This framework is set against a backdrop of an intricate defense landscape, where the traditional approach of decentralised innovation silos has shown limitations. By emphasising the adoption of transformative commanders' approach and the establishment of a centralised innovation management system, managed by 5th generation CINOs (i.e. CINO 5.0), this study not only addresses the need for sustained adaptability in the face of evolving defense threats but also proposes a structured methodology to integrate and amplify innovation efforts across the IDF. Moreover, the study distinguishes itself by offering a sociological perspective on military transformation, analysing the interplay between organisational culture, individual innovators, and institutionalised routines. This perspective sheds light on the multifaceted nature of innovation in the military context, where human factors, systemic structures and technological advancements converge.

In essence, the study provides a roadmap for the IDF's transition from an environment of isolated innovation efforts to a cohesive, strategically guided innovation ecosystem. This holistic approach not only aims to enhance the IDF's operational effectiveness and agility but also sets a precedent for other military and defense organisations grappling with similar challenges of innovation and transformation in a rapidly changing global security environment.

The structure of this study is organised as follows: The ensuing section provides detailed methodology for this study, utilising the systematic operative design approach.

6 INSS (2024). The 'Tnufa' Multi-Year Plan for the IDF: Where Are the Cabinet Approval and the Budgets? Inss.org.il, Available at https://www.inss.org.il/publication/tnufa-where-is-the-cabinet/.

Next, the following section explores the sociological underpinnings crucial for catalysing a bottom-up innovation revolution within the IDF. This exploration delineates two distinct categories of agents of change pivotal to this process: transformational leaders and innovation managers. Following this, the innovation management system established by the CMI division is detailed, underscoring its significance in streamlining innovation efforts across the IDF. Further, the discourse extends to an in-depth examination of the first type of 'Agents of Change' – the transformational leaders. This is complemented by a detailed analysis of the second type – the 'Intraorganisational Innovation Managers' (CINO 5.0), illustrating their roles, strategies and impact on fostering a culture of innovation within the IDF. Next, a genealogical analysis is carried out. This analysis focuses on how the IDF evolved into an organisation that actively promotes bottom-up innovation, marked by the establishment of an institutionalised innovation management system operated by 5th generation CINOs under the auspices of the CMI Division. Subsequently, a dual-pronged framework for fostering bottom-up innovation within military organisations is proposed. This innovative framework introduces two synergistically linked systems: the 'Change Agent System', which is grounded in sociological principles, and the 'Organisational Innovation Management System', based on organisational systems engineering fundamentals. The article culminates with a summary of the key findings and contributions.

2 Methodology

Systematic operative design is a systematic approach aimed at bridging the gap between the current perception of reality and its actual state, facilitating transformative journeys towards clarity and effectiveness in strategies and actions (Naveh et al. 2016). This study is leveraging the four-step systematic operative design framework, attributed to Shimon Naveh (Gepner Goldshtein 2023).

Through this four-step framework, it becomes evident that the IDF's approach to institutionalising innovation is both strategic and systemic. This results in the understanding that bottom-up innovation is not an isolated endeavour but a core aspect of the military's adaptive strategy to meet the challenges of modern warfare. Through this structured approach, the authors exemplify how militaries like the IDF can enhance their agility, responsiveness, and effectiveness in an increasingly complex defense environment.

2.1 Step 1 – Initiation of learning and construction

This foundational step involves immersing into the problem or challenge at hand, gathering relevant information and understanding the issue from multiple perspectives. It emphasises constructing a new understanding of the strategic context to identify and formulate relevant strategies. This phase is crucial for laying the groundwork for effective change, ensuring that efforts are grounded in a comprehensive understanding of the current state and the desired outcomes. In the context of the IDF, this phase corresponds to the initial acknowledgement of the need for a transformative approach towards innovation, particularly in addressing the limitations of the traditional force-design five-year plan, which often struggles to keep pace with the rapidly evolving defense landscape and technological advancements. This realisation led to the establishment of the CMI division, aimed at infusing agility and adaptability into the IDF's strategic planning and execution processes.

Central to the IDF's transformation are the agents of change, who act both individually and collectively to spearhead change across the organisation. These agents can be categorised into three distinct groups: transformational leaders, innovation managers and the organisational intrapreneurs. The transformational leaders play a key role in fostering a climate of psychological safety, where new ideas are not just welcomed but highly valued. In addition, innovation managers provide the structural support and mechanisms necessary to bring these ideas to fruition, carefully guiding initiatives from their early concepts all the way towards implementation.

2.2 Step 2 – Potential for change

This step centres on recognising opportunities that can be leveraged to advance the organisation's interests. The emphasis is on identifying and unlocking the potential for change. In the context of the IDF, this step emphasises the strategic enhancement of the IDF's agility and innovation capacity through the deliberate cultivation of the two pivotal cadres of change agents: the transformative commander (transformational leaders) and the 5th generation CINO (innovation managers).

Together, these cadres of change agents embody the IDF's commitment to harnessing the potential for change. Transformative commanders provide the leadership and

vision necessary to inspire innovation at all levels, while 5th generation CINOs offer the structural and strategic framework required to capture and implement these innovations effectively. This synergistic relationship between transformative leadership and structured innovation management epitomises the IDF's strategic approach to realising its potential for change, ensuring that the organisation remains adaptable, responsive and at the forefront of military innovation in an ever-evolving defense landscape.

2.3 Step 3 – Identification of relevance gap and historical shift

At this step, the focus shifts to identifying the gap between current perceptions and the evolving reality. It involves analysing historical data and trends to understand how the problem or challenge has changed over time (Finkel and Ortal 2019). This phase is pivotal in adjusting perspectives and aligning strategies with current and future realities, thereby setting the stage for relevant and impactful actions. In the context of the IDF, it entails acknowledging the limitations of decentralised innovation efforts and the necessity for a more integrated, institutional approach. The evolution from 4th to 5th generation CINOs represents this shift towards recognising the relevance gap in innovation management. This phase is critical for the IDF, as it necessitates an understanding of how past innovation efforts, while fruitful, may not fully meet the current and future challenges of warfare and defense. By identifying this gap, the IDF sets the stage for systemic changes in its approach to innovation.

2.4 Step 4 – Strategy

The final step involves formulating a detailed practical strategy. The focus is on translating insights into actionable steps and executing the strategy in a cohesive campaign to effectively address the identified issues and leverage opportunities. In the context of the IDF, this involves the execution of the dual-pronged framework for fostering bottom-up innovation, while ensuring that these innovations are embedded within the IDF's strategic force-design framework. This step represents the culmination of the IDF's operative design journey, where the structured innovation efforts are now poised to yield tangible outcomes, enhancing the military's operational capabilities and strategic flexibility. Through this process, the IDF demonstrates a comprehensive approach to innovation, one that is not only responsive to internal developments and external challenges but also anticipates future needs, ensuring sustained strategic advantage.

3 IDF transformation efforts, from a sociological perspective

The transformation efforts of the IDF can be best understood through a sociological lens that highlights key variables influencing its capability for bottom-up transformation. These variables are interrelated, each shaping and being shaped by the others, creating a dynamic framework within which transformation occurs. Foremost among these variables is the IDF's organisational culture, particularly its openness to intrapreneurship and innovation. Organisational culture is pivotal in understanding the IDF's approach to innovation and transformation. It is defined as a set of shared basic assumptions, patterns of beliefs, values, and norms that have been developed by a group as it learns to cope with its problems of external adaptation and internal integration (Schein 1985; Brown 1992). In the context of the IDF, the influence of commanders in shaping this culture is especially significant with respect to managing change processes.

This culture sets the stage for individuals, who serve as an 'agent of change', or a 'catalyst', to initiate and drive transformation. Complementing this is the structure of institutionalised routines and bureaucratic processes that, while necessary, often need adaptation to foster innovation. These elements interact within the context of rapid technological advancements, where the maturity and deployment of disruptive technologies play a pivotal role in enabling revolutionary change. The sociological tier of the bottom-up innovation revolution inherently affects the transformative force build-up processes necessary for accelerating the revolution in military transformation (Berger and Lackman 1990). With respect to the organisation, the substantial transformation process that the IDF has experienced in the past few years (Basiuk et al. 2020) necessitates having entities and institutions tasked with accelerating the transformation process.

3.1 Agents of Change: The heart of transformation

Central to the IDF's transformation are the agents of change, who act both individually and collectively to spearhead change across the organisation. These agents can be categorised into three distinct groups, each playing a unique role in the transformation process (Power 2014):

- Transformational leaders: These individuals create an inspiring context for their teams, motivating them to embrace and contribute to the transformation efforts.

- Innovation managers: Experts in overseeing the transformation from inception to implementation, they ensure control and celebrate incremental victories, facilitating the organisation's journey towards its ultimate goals.
- The organisational intrapreneurs.

In the context of military organisations, the success of intrapreneurs is largely recognised by the roles of the transformational leaders and innovation managers. While transformational leaders play a key role in fostering a climate of psychological safety where new ideas are not just welcomed but highly valued, innovation managers provide the structural support and mechanisms necessary to bring these ideas to fruition, carefully guiding initiatives from their early concepts all the way towards implementation. Furthermore, it is critical to understand the impact of decisions made purely on command, as highlighted by Grint (2020). Decisions that lack the insight provided by innovation managers risk stifling the innovation process. The synergy between transformational leadership and innovation management is crucial for minimising resistance and maximising the effectiveness of bottom-up innovation. This dynamic ensures that ideas are not just created but also successfully implemented, allowing organisations to fully leverage the benefits of a bottom-up innovation approach. The forthcoming section will focus on these two change agents and their combined efforts to champion bottom-up intrapreneurial endeavours within the military context.

3.2 Transformational leaders

The contemporary era demands a shift from a technologically deterministic view to an anti-essentialist approach, placing equal emphasis on human factors and technological capabilities. Technological determinism is a theoretical framework that posits technology as the primary driver of societal changes and developments. In contrast, an anti-essentialist approach rejects the idea that technology has an inherent essence that determines its impact on society. Instead, it emphasises the role of human agency, cultural contexts and social structures in shaping technological development and its societal implications. In other words, technology per se cannot be expressed itself, and it is unable to affect an organisation's reality. It is the differentiated interpretation that each of us attach to that technology and the way it is used that acts as the source of its power (Frenkel 2013). Consequently, in many cases, the transformational leaders are there to mediate between technological or non-technological solutions and an emerging operational requirement, until the operational loop is completed due to the need for a concrete solution that can be implemented on the ground. For this reason, those 'agents of change' within the organisation must have an entrepreneurial orientation that is neither technology-averse nor completely reliant on technology. Moreover, they must be experts on methods, methodologies and language and assist with accelerating organisational innovation while neutralising opposition to change. Their role is multifaceted, involving the creation of a liminal space that provides a platform for intrapreneurs and promotes spontaneous and flexible thinking. Here, they must be prepared to challenge existing thought paradigms (Nicolet 2018). Moreover, they need to ensure that all those involved in innovation are doing their work in accordance with the organisation's directive, while minimising redundancy (Rietzschel et al. 2014).

3.3 Innovation managers

Recognising the importance of a systematic approach to innovation, the IDF has established an array of innovation managers under a unified professional entity. Their work involves creating systematic mechanisms that enable these transformation processes in practice, doing so holistically, with a pan-IDF perspective. The emphasis here is on institutionalising innovation mechanisms that make adaptability and resilience second nature to the IDF, enabling it to meet emerging challenges effectively. This approach is grounded in a sociological paradigm that views the development of new knowledge as a product of the encounter between human 'actors' and developing technologies. This encounter plays a major role in shaping the technology and 'selling it' to the organisation (Latour 1987). In the IDF, this translates into a direct engagement between operational units and the agents of change, facilitating the adoption of disruptive technologies through agile and lean methodologies. The outcome is a set of innovative combat methods and concepts that are not only effective locally but can also be scaled and integrated across the organisation.

The IDF's innovation revolution is supported by adopting a directive and change logic, identifying adapted innovation mechanisms, and forming collaborations that support the change process. This echoes Kuhn's claim on the emergence of scientific revolutions at a time of increasing complexity and a massive surge in information that creates an explosion of information, and a multiplicity of players, data and sensors in the digital age (Morabito 2015).

This era requires many different holistic perspectives, not just on the output of knowledge development processes, but also on the processes themselves. These nuanced perspectives will allow for the institutionalisation of change; that is, putting it into full-scale production as something that is 'second nature' to the organisation, while neutralising change resistance processes and fears of the unknown and the unfamiliar (Kuhn 1962).

3.4 The relationship between the 'agents of change' and how that affects the organisation's ability to change

For a culture of innovation to be encouraged in the IDF, it is imperative that there exists a profound organic solidarity between the various parts of the organisation, with an emphasis on 'agents of change' working to accelerate transformation processes in the organisation. Here, we take a bird's eye view of the organisation and rely on papers written by Simmel and Durkheim. Simmel, whose work was influenced by the plastic arts, argued that society or organisations change constantly, and that we must perceive them as part of nature, which is dynamic (Simmel 1950). Durkheim, a sociologist who dealt extensively with the issue of collective consciousness and its impact on the society and culture in which it exists, argued that there are two types of divisions of labour in society. The first is mechanical division, in which each individual performs his or her role differentially, in a way that sets themselves apart from other individuals around them. The second is organic, in which there are interdependencies between individuals, enabling and encouraging greater social survivability. In other words, the organisation is akin to a living organism, and its organs are all interdependent, a fact that contributes to the organism's survivability and prosperity (Durkheim 1982).

4 Implementing a bottom-up innovation management system in the IDF as a means of transformation

The CMI Division founded in late 2019, deals with establishing 'tracks' meant to guide and regulate the IDF's effective, systematic, relevant and accelerated innovation efforts at the general staff level. The following are major tracks and mechanisms that the CMI division has established:

A. Establishing the Chief of Staff's Innovation Award.[7] This award serves as a platform to recognise individuals, entities and groups that have successfully advanced innovation with tangible results. These results span a variety of areas and have diverse impacts on the IDF. They include advancements in technology, enhancements in operational capabilities and the recognition of groundbreaking individuals. Additionally, outstanding units that have shown originality and innovation in their activities are also acknowledged.
B. Publishing the IDF Strategy for Innovation[8]. This strategy is designed to serve as a compass for relevant, effective and systematic transformation. Such transformation aims to ensure the IDF's long-term and consistent superiority over its adversaries. It introduces concepts, mechanisms and methods that are instrumental in transforming both current and future campaigns.
C. The inauguration of the Defense College for Innovation, Intrapreneurship and Transformation.[9] This institution was recognised as a national beacon for excellence and leadership in entrepreneurship, innovation and transformation, after awarded the first place by the Israeli Minister of science, technology and innovation in the first national competition for organisational innovation (2022).[10] The college operates as an academic, theoretical and practical research setting for training leaders from the IDF and elsewhere in the security establishment on military transformation skills. It operates as an academic, theoretical and practical setting. Here, intrapreneurs, transformational leaders and innovation managers, from the IDF and other parts of the security apparatus, undergo training to hone their military transformation capabilities, moulding them into practical intrapreneurs, transformative commanders and 5th generation CINOs, respectively. Through its comprehensive curriculum, the institution offers training and accreditation sessions ensuring that change agents are well equipped to drive change and innovation in their respective domains.

7 Establishing the Chief of Staff's Innovation Award (2020), IDF website.

8 Alkaher, D., Frenkel, M., Marom, D., Reis, Y., Levy, S. V., & Marshal, D. (2022). The IDF Innovation Strategy.

9 Initiating the Defense College for Innovation, Intrapreneurship and Transformation (2021), IDF website

10 1st place in the 1st national competition for organizational innovation (2022).

D. The establishment of the Institute for Research on Innovation and Military Transformation, a free-thinking research entity. It primarily concentrates on the study of corporate innovation and transformation through a military lens. Research performed under the auspices of the institute aims to create insights and feedback on the administration of innovation systems, to guide the processes, tools and infrastructure used in training dedicated command echelons in the organisation. Moreover, the institute acts as an intellectual 'compass' for IDF innovation and its innovation strategy, recognising the ongoing need for updates and enhancements.
E. The establishment of 'Challenge', the IDF innovation and entrepreneurship centre.[11] This was done in collaboration with the Digital Transformation Directorate and IMOD DDR&D, the Administration for the Development of Weapons and Technological Infrastructure. 'Challenge' stands as the first and only IDF joint innovation platform of its kind. Its primary goal is to empower entrepreneurs from all parts of the IDF, jumpstart groundbreaking ideas and accelerate operational and organisational projects that are aligned with the IDF Chief of Staff's directive. It does so by using advanced methodologies, IDF and senior business mentoring, and by providing tools, knowledge, innovative mechanisms and the resources necessary to ensure that promising initiatives succeed.
F. Launching the IDF's 'Olympus' CINO Excellence Program[12], which incorporates MBA studies in military innovation. It aims to nurture a selected group of senior officers in IDF service branches, corps and general staff divisions, and transforming them into joint CINOs (5th generation CINOs). These CINOs will focus on accelerating innovation and spearheading effective, systematic and relevant transformation efforts in their respective organisations. They will operate with a broader general staff orientation, creating the potential to leverage the entire IDF as a cohesive entity (one complete organism). In this programme, students are given in-depth professional training and are accredited to manage 'innovation systems' and design intraorganisational mechanisms. They receive relevant theoretical academic knowledge and acquire practical skills.
G. Instituting the Innovation and Change Leader military profession (Profession No. 764)[13] – building a process for locating, assessing, sorting, recruiting, training and assigning candidates for security service who are slated to be drafted into one of the innovation sections in the service branches. This process is expected to serve as a major milestone in the IDF innovation array.
H. Establishing a unit of reserve experts on innovation, a project that was kicked off in collaboration with the J1's reserve service branch, aiming to locate experts possessing skills and experience in innovation and assigning them to various units and entities in the IDF. This was done by creating a reserve unit of innovation experts, which is functionally subordinate to the Combat Methods & Innovation Division.
I. The establishment of a multilateral, international innovation leader community meant to advance open defense innovation cooperation.[14,15] Additionally, it promotes the creation of a community of innovation leaders and CINOs (managers) within the Israeli security establishment. Furthermore, it fosters ties with their parallels in foreign militaries.

5 The transformative commanders – First type of 'Agents of Change'

This section delves into the critical domain of shaping the foremost cadre of 'agents of change', which are the transformational leaders. This cadre includes both officers and non-commanding officers across various ranks and echelons within the IDF. These are termed by the CMI division as the 'transformative commanders'. Within this discourse, the transformative commander is characterised not only by their command and leadership skills but also by their embodiment of key values and norms, proficiency in essential core functions and expertise in specific management skills. They are capable of generating a 'ripple effect of change' within their units, and more expansively, across the entire IDF, with the objective of achieving relevant, systematic and effective transformation.

Training the command echelon while imparting these skills and abilities and creating mechanisms to preserve

11 The Establishment of 'Challenge', The IDF Innovation and Entrepreneurship Center (2021), IDF website.
12 Launching the IDF's 'Olympus' CINO Excellence Program (2022), IDF website.
13 Instituting the Innovation and Change Leader Military Profession 764 (2022), IDF website.
14 The 1st International Military Innovation Conference (2022), Official website.
15 IDF's Innovation Partnership Strategy (2023).

their competency has been identified as the 'x-factor' that sets an organisation with innovation (i.e. one that has innovation chief officers) apart from an organisation that is innovative (i.e. all of its members 'walk the walk and talk the talk').

The 'Sidrei Bereishit' pamphlet[16], which was published by the IDF Chief of Staff Lt. General Kochavi, in 2022, outlines the foundations of military culture. It aims to create a broad common ground and unity of action among all IDF branches and units, and it is based on the 'Spirit of the IDF'[17] document, binding norms and values, regulations and directives. After its release, the CMI division have completed the discourse on the IDF's ability to transform and propose some contours for the character of the transformative commander. Thus, etching a culture of innovation into the IDF's DNA. These contours cover five domains: values, norms, core competencies, management skills and first steps (Table 1).

16 Kochavi, A. (2022). Sidrei Bereishit, The IDF official website.

17 The Spirit of the IDF, The code of ethics according to which all the IDF's soldiers, officers, units and forces will comport themselves, originally written in 1994 by Professor Asa Kasher.

6 The 'Intraorganisational Innovation Managers' (CINO 5.0) – Second type of 'Agents of Change'

This section is about shaping the second, more exclusive cadre of 'agents of change', which are termed by the CMI division as the 'intraorganisational innovation managers'. These agents of change are responsible for operating the innovation management system and they are termed in this work as a 5th generation of a CINO (i.e. CINO 5.0).

6.1 The CINO 4.0 in international organisations and corporations

One of the most sought-after jobs that have emerged in recent years under the C-Suite category in organisations and corporations is the role of Chief Innovation Office (CINO). The term CINO was first coined in 1999 (Liyanage et al. 1999), with respect to the evolution of the 4th generation of the intraorganisational R&D management model. While the 1st generation (1950s–1960s) centred on managing the

Tab. 1: Contours for the character of the transformative commander

Five values				
Innovativeness	*Entrepreneurial*	*Educative*	*Professional*	*Responsible*
Exhibits critical, innovative, and refreshing thinking	Dares and initiate	Learns and teaches	A thorough and sceptical professional	The battlefield's fate is in his hands
Five norms				
Renew	*Shape partnerships*	*Shape culture*	*Shape the organisation*	*Be dedicated*
Encouraging adaptation and relevant entrepreneurship	Multi-dimensionality encouraging communality and working in a matrix	Enabling, encouraging, entrepreneurship and supporting ventures	As an enabling platform	To emerging processes in a complex world
Five core functions				
Transformation	*Build the force*	*Crises*	*Study and investigation*	*Diagnostics*
Navigate and jet-start transformation procedures without shocking the system	Promote and actively complete force build-up and force reconstruction	Declaring crises, leading them and leveraging them as growth processes	Building a range of learning and knowledge development processes and mechanisms	Identifying emerging changes in complex reality
Five management skills				
Measurement	*Investment*	*Streamlining*	*Force build-up*	*Innovation system*
Incentivising to achieve innovation	Boldness and risk-taking with new experiences	Striving to constantly improve the organisation and how its functions	Driving adaptive industrialised and robust processes	Accelerating renewal by managing opportunity funnel
Five first steps				
Investigate	*Harness*	*Delve in*	*Gain experience*	*Persist*

R&D process itself, the subsequent shift in the 2nd generation (1960s–1980s) pivoted towards enhancing project management and quality. Progressing further, the 3rd generation (1980s–1990s) embedded business strategy perspectives, signifying a holistic integration of R&D activities with overarching business goals and strategic initiatives. Finally, the 4th (since 1990s) generation model expands on the previous models, to encompass innovation in technology or organisation, through the intake, integration and management of knowledge coming from outside of the firm (Chen et al. 2015). According to Liyanage et al. (1999), management in the 4th generation R&D model is not based solely on 'transferring knowledge' into the organisation and managing it strategically, but also on managing networking and interactions between people in the organisation and strengthening the ties between R&D processes and the organisation's 'innovation systems'.

Within the past two decades, since the beginning of the current millennium, about 52% of the Fortune 500 companies have vanished, gone bankrupt or have lost their former glory and their relevance by losing a significant market share.[18] This illustrates how difficult it is for companies to survive through the changes occurring in a competitive market, but it also underscores the need for a senior management function whose role is to drive forward transformative innovation processes in an environment replete with change and uncertainty. This is how CINOs ended up in the C-Suite category at companies and organisations, based on these organisations' clear-cut motivation to 'reinvent themselves' and safeguard their standing over time in the 'Fortune 500' list.

To create a solid foundation for promoting innovation processes, organisations and corporations began appointing innovation managers (Maier and Alexander 2018). However, as an emerging field, such managers possessed little knowledge in the practical execution of innovation processes. Thus, their evolving role has been defined in various ways. The role of the 'chief innovation officer' was created in response to a market that was shifting rapidly, and was fuelled by the technology revolution. The pace of the technological revolution consistently reduces the amount of time it takes to launch new products, and consistently shortens the time in which customers expect to receive services and deliverables. It leads to a competitive world that makes it necessary to adopt transformative and adaptive approaches. CINOs are responsible for managing the intraorganisational innovation process, and their role is to allow organisations to keep up with the pace of change by identifying business opportunities presented through the integration of new ideas into the organisation's existing infrastructure and processes. The words 'chief' and 'officer' indicate that the person filling this role operates throughout the organisation and is responsible for driving innovation everywhere in the organisation. This allows him/her to bridge between different silos.

Surveys conducted among global companies that have managed to make their way to the 'Fortune 500' list can teach us a few things about the evolution of the CINO role's status (Hill and Barton 2013). While these companies had a rather limited understanding of the role of the CINO at the beginning of the millennium, about 10% of 'Fortune 500' companies had already appointed CINOs by 2010. In 2016, that number grew to 45%, and was estimated at 85% in 2018[19].

In a review published by the Harvard Business Review (Lovric and Schneider 2019), the authors specified six different CINO archetypes that can now be identified in large corporations and organisations, namely the researcher, the engineer, the investor, the advocate, the motivator and the organiser. Another review published in this journal spoke of the dual role that CINOs play in their organisations; they both fundraise and acquire legitimacy for their activities from both the management and the units within the organisation (Di Fiore 2014). According to Soren Kaplan[20], the CINO usually has three main roles. The first is accelerating the organisation's growth opportunities by identifying, prioritising, developing and launching new products, services and business models. The second is creating tracks and shaping routines by developing, nurturing and deploying mechanisms in the organisation that support and accelerate internal innovation. The third is positioning themselves as innovation angels by sponsoring entrepreneurial talents ('innovation champions') in the organisation. These roles help the organisation achieve the following goals:

1) Adopting an innovation strategy and supporting it through the organisation's senior management, employees, customers and partners.
2) Creating a balanced portfolio and realistic roadmap that leads to customer satisfaction and the organisation's accelerated growth.
3) Creating effectiveness by accelerating ventures and timing their launch to synchronise with the competitive market.

18 Ryan, B. (2021). Out of the Box: Chief Innovation Officers Fill Multiple Board Skill Gaps, NACD Boardtalk.

19 Shotarov, A. (2019). Why Every Company Needs a Chief Innovation Officer (CINO), Donatix website.

20 Kaplan, S. (2019). The Chief Innovation Officer Job Description Inc.com website.

4) Differentiating the organisation, which provides value to customers and, working with customers, helps build long-term strategic relationships.
5) Branding the organisation's image as an innovative organisation with a vision, and a leader in competitive markets.

In a review published by the *Harvard Business Review* (Hill et al. 2014), the authors[21] specify six paradoxes (i.e., tensions) that CINOs deal with in their organisations, which are tied to the tension between the organisation's need to create a sense of urgency and enlist support and action, versus the human need for freedom of operation. According to the review, the CINO must constantly deal with balancing and calibrating the tensions between these six paradoxes in order to motivate the people in the organisation to engage in relevant innovation, without affecting their sense of being able to operate freely.

The open literature proposes five central components tied to evaluating the CINO's efficiency[22]: high trustworthiness, the ability to see and communicate the future, the ability to propel ideas and take action to fulfil their vision, the ability to identify and neutralise the opponents to innovation in the organisation, and the ability to build bridges and make connections. A qualitative study performed recently within the Israeli ecosystem found that innovation managers in Israel currently rely on liquid professionalism to create professional legitimacy (Rittblatt 2021). Legitimacy is not founded on the standard development track. Rather, it is achieved by maintaining flexibility when handling constraints, and by creating extensive collaboration within the Israeli innovation management ecosystem. The results of the study are not surprising, in light of the fact that innovation management is a nascent field. The CINO that acts according to the 4th generation intraorganisational R&D management model, while characterised as talent with archetypical strengths, is defined in this article as CINO 4.0 (or 4th generation CINO).

6.2 The advent of international standards in the free talent domain

The International Organization for Standardization (ISO) sets and codifies international industrial and commercial standards. In all, 165 countries have representatives in the ISO, and the standards that the organisation issues are frequently adopted as binding policy governing the management of management projects in business, commercial, community, health and security settings. In 2020, the ISO completed the fifth standard in an important family of standards, the ISO-56000[23,24], which covers the management of innovation systems in organisations. It was written as an international quality standard for innovation management in organisations, providing guidelines for the establishment, implementation, maintenance and continuous improvement of an innovation management system for use in all established organisations. The standard applies to organisations seeking to produce lasting success, by developing the ability to effectively manage effective innovation activities in order to fulfil the organisation's directive. The primary motivation for the launch of this standard is to ensure that these organisations remain relevant in a constantly changing world. If no new products or services are being created, organisations may continue doing 'more of the same', while disregarding the changes that have occurred with respect to market forces, demand, customer needs and the competition from their competitors' offerings. That is why it is so important to defense organisations and corporations as well.

According to a number of sources (Voehl et al. 2018; Benraouane and Harrington 2021; Harrington and Voehl 2021), the management of the innovation process in an organisation is comprised of a group of mechanisms, from locating opportunities within the organisation to being able to create value. These mechanisms enable the organisation to identify relevant opportunities and systematically transform them into projects. Ultimately, this process derives value by effectively introducing and assimilating the innovation to users and customers.

6.3 Intraorganisational innovation managers in the IDF – The CINO 5.0 approach

Academic studies that have examined the potential of 'islands of innovation' to impact the inculcation of innovation in the organisation claim that these islands harbour a negative potential (Avidov-Ungar and Eshet-Alkakay 2011). These may end up hampering the proliferation of innovation, mainly in organisational systems characterised by

21 Hill, L., & Schneider, G.T. (2017). How to Lead Innovation, Egon Zehnder Boston.

22 Chief Innovation Officer (2021), CIO Wiki website.

23 ISO 56000:2019 The New International Standard for Innovation, ISO website.

24 Israeli Standard 7000:2015 Management of Innovation in Organizations: Handbook for Implementation. The Standards Institute of Israel (in Hebrew).

loose internal links, and in cases of expectation gaps and conflicting interests among those partnering to implement innovation. This will happen if they do not coordinate and operate synergistically. With that in mind, and as local groups began forming in the IDF since 2013, a staff paper[25] was drafted in 2017 in the IDF, led by Maj. Gen. Haliva, which dealt with advancing innovation-promoting processes and creating protected investment spaces that could tolerate the chance of a failure occurring in the IDF[26]. Some of the team's conclusions were published by Brig. Gen. Moti Baruch and Col. Eran Ortal in an article entitled 'Ocean of Innovation', which appeared that year in *Maarchot* (Baruch and Ortal 2017). This article discussed the way the disruptive innovation theory could help the IDF with its force build-up. Moreover, the article states that naturally, the IDF's service branches and directorates are able to initiate and speed up local innovation processes that are restricted to their traditional areas of responsibility.

The need to string together the islands of innovation in the IDF as an archipelago that acts like one complete organism led the IDF in 2021 to develop and nurture a new type of CINO. The professional legitimacy of these CINOs, in the eyes of the IDF, shifted from liquid professionalism to institutional professionalism. In other words, the approach of locating and placing archetypical talents in intraorganisational innovation manager roles (CINO 4.0), which creates 'innovation islands' with a local and unidimensional orientation, gave its way to the CINO 5.0 generation. A new generation of CINOs with an intraorganisational leadership, innovation management skills and holistic orientation view.

The CINO 5.0 is a generation that started developing professionally in the military as a general staff array, and it draws legitimacy from the organisation for its activities and its accreditation. It operates in the aim of ensuring the IDF's superiority, resilience and momentum, by systematically planning, creating and managing mechanisms, tracks and routines.

The main factors and constraints that contributed to this decision: First, what is needed is someone from within the organisation who has first-hand knowledge of the complexities, dilemmas, abilities, and organisational DNA, can make connections intuitively and can accelerate interdisciplinary collaboration while breaking down barriers and creating solidarity. Second, there is a growing trend of defense organisations and corporations developing their CINOs in-house, because they do not have the flexibility of drawing upon outsourced talent. Third, regulatory agencies in Israel and elsewhere are increasingly demanding that international standards such as ISO 56002:2019 are to be adopted and implemented in the innovation ecosystem.

The primary focus of the new generation of CINOs, in the general staff divisions and service branches, remains on developing the organisation from where they have originate. However, their approach is set within a broader corporate context at the general staff level. This approach aims to amplify the potential for the IDF to grow as a unified entity (a single organism). These CINOs aim to act as a coordinated and decentralised array, optimising a range of opportunities: first, boosting intraorganisational effectiveness while strengthening partnerships between the relevant service branches and general staff divisions; second, enhancing the potential for partnerships and links between service branches and/or general staff divisions and alumnus associations, along with their reserve arrays; third, accelerating open innovation and fostering connections to the ecosystem, reserve experts, academia and industry; and fourth, empowering partnerships with R&D and academic personnel from both inside and outside the defense establishment, including industry, academia, venture capital funds, start-up companies and government ministries.

From 2022, CINOs in the service branches and general staff divisions are required to undergo gradual, in-depth and professional training by the IDF (in stages). This includes accreditation to lead and manage 'innovation management systems' and design organisational mechanisms, providing the relevant theoretical academic knowledge and tools, and imparting practical skills. The following are the area of responsibilities that are defined by the IDF[27] for these CINOs in the service branches and general staff divisions:

- Conducting intraorganisational study surveys and internal audits based on ISO 56002:2019.
- Institutionalising internal innovation supporting mechanisms in order to accelerate growth and corporate transformation.
- Building a relevant innovation portfolio tailored to the organisational DNA of each general staff division or service branch.

25 Cohen, Y, Vinokur, A, Motet, P. and Ortal, E. (2017). "The Archipelago of Hope", N.p.

26 Aharon Haliva (2018). "What else can be innovated in innovation" [Presentation to the deputy chief of staff], N.p.

27 Launching the IDF's 'Olympus' CINO Excellence Program (2022), IDF website.

- Leading major innovation events, such as competitions, unconferences and acceleration tracks (hackathons, accelerators and incubators).
- Promoting a culture that accelerates lean and rapid force build-up processes and their associated mechanisms.
- Partnering in joint, transformative force build-up processes, with professional guidance from the general staff.
- Establishing force-multiplying partnerships with CINOs in the IDF and elsewhere (i.e. the Prime Minister's Office, the Ministry of Defense and the National Security Ministry), employing the open innovation approach.
- Establishing advisory boards (with the participation of senior reserve and regular officers and people with experience in the corporate hi-tech industry) to help them put their efforts into practice effectively and help make service branch chiefs or general staff divisions more attentive.

This marks a significant shift in the IDF, as the service branch chiefs and general staff division heads must appoint those who are best suited to this important role and allocate the needed resources, platform, accessibility and attention to ensure they succeed in their tasks. Creating opportunities for direct, long-term discourse between CINOs and the heads of service branches and general staff divisions is crucial. It equips them with an organised directive regarding selected transformation efforts, through a top-down approach, while shaping a culture of innovation that encourages practical, bottom-up entrepreneurship.

7 Identification of relevance gap and historical shift

7.1 The evolutionary journey to institutionalised innovation in the IDF

This section discusses the genealogy that led the IDF to become an organisation that promotes bottom-up innovation through the establishment of an institutionalised innovation management system, operated by the 5th generation CINO under the auspices of the CMI Division.

Since its establishment (beginning at the time of the pre-state paramilitary organisations), the IDF has demonstrated adaptability and an ability to learn that have guaranteed its superiority and robustness throughout all of Israel's wars. Concurrently, the organisation was able to integrate remarkable innovation in its force build-up and employment processes, in practice. However, it was only in 2013 that the surge in institutionalised innovation began in the IDF, with the establishment of the first innovation section in the IDF, in the general staff of the Israeli Air Force[28]. Starting in 2017, a considerable number of innovation silos (islands) began to form within the service branches and general staff divisions of the IDF, driven by the efforts of the 4th generation of CINOs. These included the Israeli Air Force (IAF)'s Base 108, Ofek 324, the combat laboratory in the IDF Ground Forces' Technology and Logistics Division, the Technology and Maintenance Corps HQ, the Medical Corps HQ, the C4I and Cyber Defense Directorate, the Military Advocate General's Corps, the Home Front Command, the Yahalom unit and more. Each of these islands were formed either through directives from commanders of units or service branches or from grassroots groups of innovation-driving entrepreneurs. The rationale followed by those innovation formations was to assimilate a culture of local innovation, hoping that it would set an example for others and pervade into the rest of the organisation, imbuing it with the values of innovation and entrepreneurship that would lead to systematic, relevant and effective transformation. The islands of innovation, in the form of innovation sections, strove to inculcate a culture of innovation in various ways, such as promoting internal innovation efforts by carrying out innovation events and technological happenings, in collaboration with the innovation ecosystem in the defense establishment and elsewhere in Israel[29,30] (Machanet, Innovation Week[31], unconferences[32], hackathons[33] and more), creating acceleration tracks and boosting grassroots projects (e.g. the IAF accelerator, IAF innovation hub technological incubator[34,35], the technology incubator in the J2 directorate, the Innovation Lab in

28 Azulay, Y., & Rabi, I. (2017). The Air Force's Social Network: Ignoring Ranks. Globes.

29 Mosko, Y. (2011). The Revenge of the Nerds [television program]. Mako (in Hebrew).

30 Machanet 2017: Three Days of Technological Entrepreneurship, Israel Air Force website (in Hebrew).

31 Berger, N. (2014). Innovation Week: New Initiative in the Air Force, The Israel Air Force website (in Hebrew).

32 So, What Did We Have in Israel's First Drone Unconference? (2017), Michnaf website (in Hebrew).

33 Hackathon Lior Boker (in Hebrew).

34 Rojkes Dombe, A. (2020). The IAF is Opening the First Innovation Incubator in the IDF, Israel Defense (in Hebrew).

35 The Technological Incubator is Beginning to Perform Real-Time Monitoring of Hardened Aircraft Shelters, Israel Defense.

the J4 directorate and more), the establishment of a range of content-based communities as a platform for accelerating changes[36,37] and nurturing relationships with veterans of units specialising in entrepreneurship and innovation (the establishment of the reserve innovation recon units[38,39] and connecting with the innovation spaces of military unit alumni associations)[40].

The innovation sections led by the 4th generation CINOs displayed varied levels of success in driving effective, systematic and relevant transformations within their respective service branches, staff divisions and territorial commands. This variation primarily stems from two factors:

1) What type of person is leading them, what professional training has that person received for their job and how their areas of responsibility or jurisdiction are defined (i.e. is this part of their job description, or is it something extra they was tasked with).
2) Where is the section positioned in the organisation, with respect to the heads of service branches, staff divisions and territorial commands? This affects their organisational resilience, the relevance of the transformation challenges they choose to contend with, the freedom of operation that they are given, or that is available to them, and how committed the organisation's leaders are regarding the assimilation of innovation culture and innovation mechanisms.

This variation has led to a trend where cardinal innovation sections have dwindled or been dissolved. Nevertheless, several sections, entities and groups have successfully sparked widespread change and achieved notable outcomes on both local and joint levels, including the Ground Forces' innovation lab, the IAF's accelerator and tech incubator and the Innovation Month at the Home Front Command, among others.

Starting in 2022, the management approach of the innovation silos within the service branches and general staff divisions began transitioning to the 5th generation of CINOs, facilitating a re-evaluation and potential restructuring of innovation sections that had previously dwindled or dissolved. The transition from 4th generation to 5th generation CINOs within the IDF, from 2013 until 2023 is depicted in Figure 1. The decline in the number of 4th generation CINOs suggests a trend towards the diminishing or dissolution of innovation sections.

7.2 Analysing the evolution of the IDF Chief of Staff's Innovation Competition Award as an indicator of paradigm shift in innovation management goals

The IDF Chief of Staff's Innovation Competition Award, established in 2020, not only serves as a platform for recognising and incentivising innovation within the Israeli military but also as a barometer for the shifting tides in the IDF's approach to innovation management. By analysing the thematic evolution of the competition from 2020 to 2023, we observe a distinct paradigm shift from a broad, holistic approach towards a more focused, quality-oriented and implementation-centric innovation strategy. This section delves into this evolution, drawing implications for the IDF's changing priorities and strategies in fostering innovation. This paradigm shift reflects the IDF's evolutionary understanding of innovation's role in ensuring the IDF's agility, readiness and effectiveness in a rapidly changing security environment.

The inaugural 2020 competition[41] set a wide stage for innovation, encouraging a diverse array of ideas across multiple operational and organisational domains. The 2020 competition was organised into six categories: force build-up, operations, training, people, outstanding units and responses to the Chief of Staff's challenges (with a top-down approach). This broad approach underscored an understanding of innovation as a holistic endeavour, permeating every facet of military operations and management. However, by 2021[42], the competition's theme, 'Doing Innovation', signalled a strategic narrowing of focus. Concentrating on practical, implementable innovations, especially those enhancing operational efficiency and emphasising the human element, reflected a shift towards actionable outcomes over theoretical ideation. This move underscored the IDF's recognition of the immediate value derived from innovations.

36 The First Community Manager Course Opens in the IDF, The IDF website (in Hebrew).

37 The Establishment of Joint Communities in the IDF's Programming and Information Array. The IDF website (in Hebrew).

38 Arkin, D. (2020). C4I Commando, Israel Defense (in Hebrew).

39 Greenberg-Cohen, E. (2020). The C4I Branch's Startup Superteam: This is What Happens When Leading Hi-Tech Professionals Come Help with IDF Developments, The IDF website (in Hebrew).

40 iSpace IAF's Alumni Innovation Center (in Hebrew).

41 Establishing the IDF Chief of Staff's Innovation Award (2020), IDF website, Available at https://www.idf.il/103261

42 The IDF Chief of Staff's Innovation Award (2021), IDF website, Available at https://www.idf.il/43648

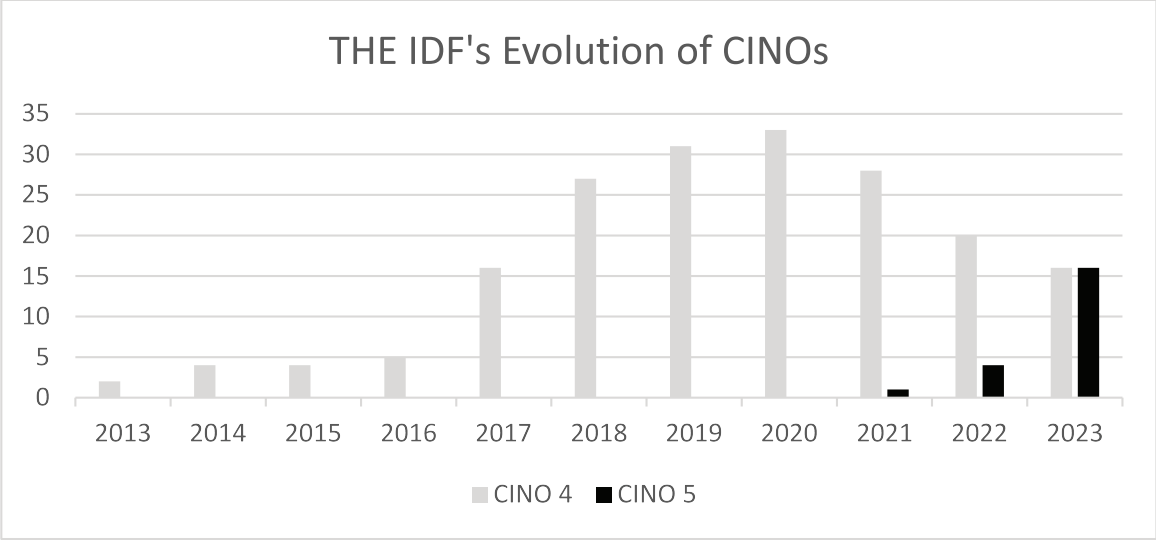


Fig. 1: The shift between 4th and 5th generation CINOs in the IDF. CINOs, chief innovation officers; IDF, Israel Defense Forces.

The theme 'Accelerating Innovation' in 2022[43] marked a further evolution, highlighting the importance of agile processes. By celebrating contributions that promote entrepreneurship with practical innovation and incorporating categories such as culture and values, the IDF demonstrated a commitment to embedding innovation into the very fabric of its organisational culture. This year also introduced recognition for theoretical contributions, suggesting an appreciation for the foundational intellectual work that supports practical innovation.

The projected theme for the 2023[44] competition, 'Precision, Quality, and Implementation', epitomises the culmination of this evolutionary trajectory towards a strategic, quality-focused and implementation-driven approach to innovation. This theme underscores a prioritisation of innovations that are not only pragmatically viable but also executed with precision and quality, aligning closely with the IDF's strategic goals and operational effectiveness. The emphasis on organisational efficiency in the competition categories reflects an acute awareness of the need for innovations that bolster the IDF's operational and organisational frameworks.

This evolutionary analysis reveals a significant paradigm shift in the IDF's innovation management goals, moving towards a focused strategy that prioritises the practical implementation of high-quality, efficient solutions. This shift indicates a mature approach to innovation, where the value of ideas is measured not just by their novelty but by their tangible contributions to the IDF's strategic objectives and operational needs.

The transition towards a more refined, implementation-centric approach to innovation management within the IDF mirrors broader trends in military innovation, where the effectiveness of innovation efforts is increasingly evaluated based on their direct impact on operational readiness and strategic flexibility. This shift also suggests an evolving understanding of innovation as a strategic asset, one that must be meticulously cultivated, managed and aligned with the overarching goals and challenges facing the military organisation.

8 Dual-pronged framework for fostering bottom-up innovation within military organisations

This study introduces a dual-pronged framework specifically designed to harness and streamline innovation within military organisations, particularly within the IDF. Rooted in the recognition of the dynamic challenges that characterise contemporary and future battlefields, this framework posits two interlinked systems: the first is the 'Change Agent System', derived from the field of sociology, and the second is 'the Organisational Innovation Management System' rooted in the principles of organisational systems engineering.

The external environment of both systems is characterised by Volatility, Uncertainty, Complexity, and

43 The IDF Chief of Staff's Innovation Award (2022), IDF website, Available at https://www.idf.il/66857

44 The IDF Chief of Staff's Innovation Award (2023), IDF website, Available at https://www.idf.il/117806

Ambiguity (VUCA) and Social, Technological, Economic, Environmental, Educational and Political (STE³P) factors. These elements underscore the dynamic nature of the defense landscape, highlighting the need for militaries to be perpetually prepared to adapt to new threats, technologies and geopolitical shifts. Each system plays a crucial role not just in navigating but also in capitalising on the 'opportunities and challenges' presented by the external environment, ultimately aiming to derive relevant and effective change, essentially creating tangible value for the organisation and enhancing its strategic and operational effectiveness.

The first, 'Change Agent System' (see Figure 2) champions the individual, in particular the intrapreneurs who initiate ripples of change across the organisational landscape. It is a human-centric model that emphasises personal initiative, adaptability and the passion to drive profound, systemic changes within the IDF. The objective of this system is to empower individuals within the organisation who can act as catalysts for change, driving innovation from the bottom up. By doing so, it directly contributes to the creation of relevant and effective change, embodying the value derived from empowering individuals to lead and innovate across the organisation.

Within the system's core, three key internal elements are emphasised; each is differently enhanced by both the transformational leaders and the innovation mangers:

- Support: Intrapreneurs need an organisational ecosystem of support that includes access to resources, mentoring and a culture that encourages experimentation and tolerates failure.
- Passion: Intrapreneurs are driven by a deep sense of purpose and passion for the mission of their organisation. This passion is the fuel that powers their commitment to drive change, even in the face of resistance or adversity.
- Capabilities: Developing the necessary skills and knowledge is crucial. This includes strategic thinking, empathy to understand the needs and motivations of others and the ability to leverage technology and innovation methodologies. Training programmes and continuous learning opportunities are vital in nurturing these capabilities.

Parallelly, the second 'Organisational Innovation Management System' (see Figure 3) is constructed to assist these individual efforts with robust infrastructural and procedural support. This system serves as the linchpin in integrating disparate 'islands of innovation' into a unified, coherent strategy. It not only fosters innovation but also ensures it is directly aligned with the IDF's strategic goals and operational realities, thereby creating a sustainable ecosystem where innovation can flourish. It is about providing a framework that facilitates the transition

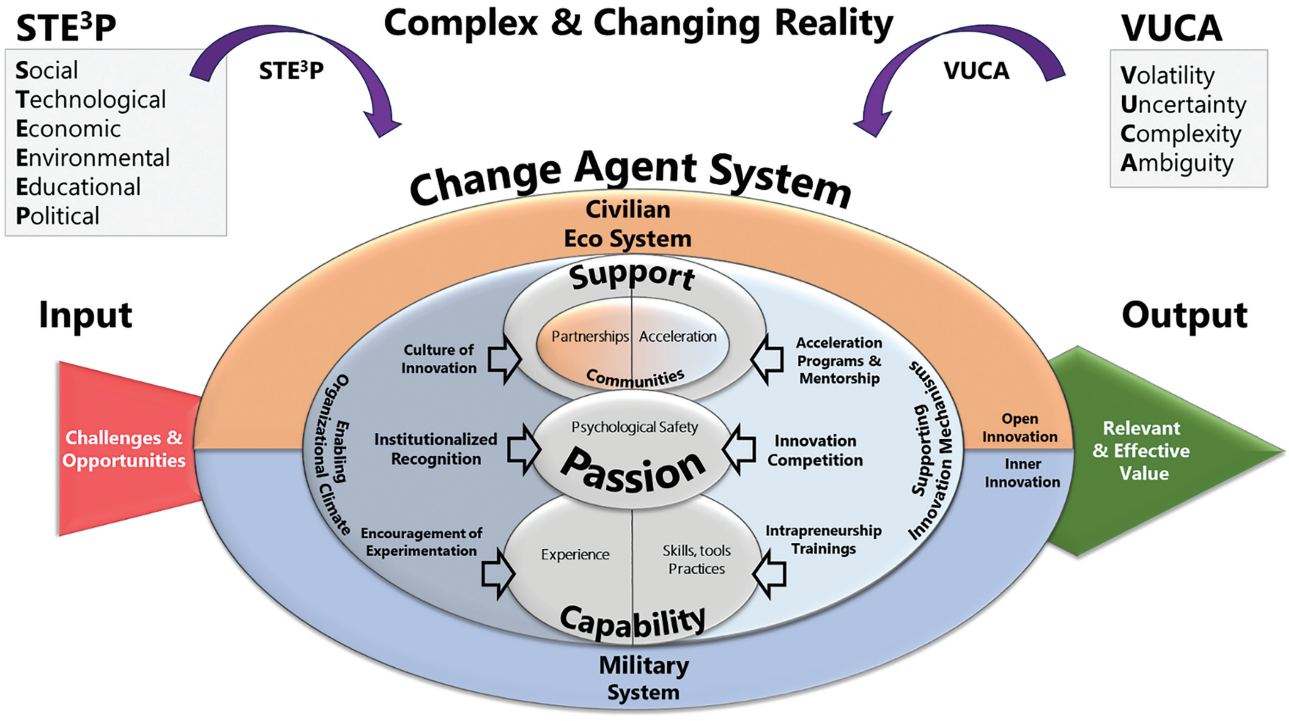


Fig. 2: The Change Agent System. STE³P, Social, Technological, Economic, Environmental, Educational and Political; VUCA, Volatility, Uncertainty, Complexity and Ambiguity.

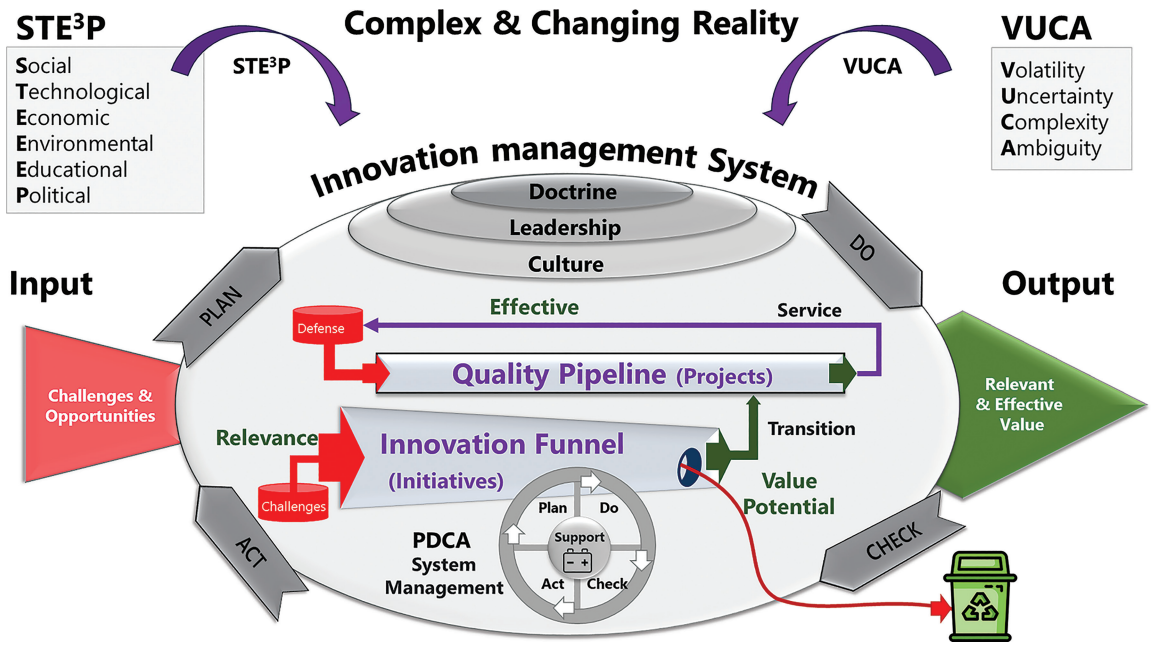


Fig. 3: The Innovation Management System. PDCA, Plan–Do–Check–Act; STE3P, Social, Technological, Economic, Environmental, Educational and Political; VUCA, Volatility, Uncertainty, Complexity and Ambiguity.

from ideation to implementation, ensuring that the output of this system is in deriving innovations that are not only relevant to the challenges at hand but are also effective in enhancing the IDF's operational capabilities.

Within the system's core, five key internal elements are emphasised:

- Doctrine: Adaptable and flexible, allowing for rapid adjustment to new threats and operational requirements. This flexible doctrine is crucial for maintaining strategic advantage and operational readiness in a constantly evolving threat environment.
- Leadership: Charged with setting clear strategic goals, providing direction and nurturing an organisational culture that values innovation, learning and adaptability. Leadership in this context acts as the strategic compass, guiding the organisation through uncertain waters.
- Culture: Cultivates a mindset that prioritises innovation, continuous learning and the willingness to embrace change. A culture that supports risk-taking, experimentation and learning from failures is fundamental for fostering innovation within military organisations.
- Innovation and Quality Operations: Views force-design planning and execution as an evolutionary process, akin to the development and refinement of military capabilities and strategies. This perspective ensures that bottom-up innovation is systematically integrated into the strategic planning and execution process, enhancing the military's operational effectiveness.
- Plan–Do–Check–Act (PDCA) Cycle: Facilitates continuous improvement and strategic adaptability. By systematically planning, implementing, assessing, and refining strategies, J8 directorates can ensure that military capabilities remain aligned with strategic objectives and are responsive to the changing defense environment.

8.1 Harmonising the dual systems

By harmonising these two systems, militaries like the IDF can enhance their agility, responsiveness and effectiveness in an increasingly complex defense environment. The 'Change Agent System' cultivates intrapreneurs, while the 'Organisational Innovation Management System' provides the structural backbone that transforms intrapreneurial initiatives into reality, ensuring that the organisation remains at the forefront of military innovation and adaptability. By empowering individuals as change agents while simultaneously providing a supportive organisational framework, military organisations can foster a dynamic environment where bottom-up innovation thrives. This dual-pronged approach ensures that innovations are not only generated but are also effectively implemented and aligned with the organisation's strategic objectives.

8.2 Bridging bottom-up innovation with structured force-design

The quality process, which represents the traditional force-design pipeline, aligns with the principles of ISO 9001:2015, focusing on establishing a systematic approach to project management. It emphasises the importance of defining product and service requirements, managing design and development processes and ensuring product and service conformity. In a military context, this translates to rigorous planning and execution of force-design, ensuring that military capabilities meet current operational requirements and standards.

Conversely, the (bottom-up) Innovation Funnel is steered by the guidelines of ISO 56002:2019. This standard provides a blueprint for customising innovation processes to cater to distinct initiatives, offering the latitude for adaptability and agility in cultivating new solutions and enhancing operational capabilities.

The transition from (bottom-up) innovation to force-design planning and execution is a critical juncture in military modern strategic planning. This process harmonises the innovative outputs from the innovation funnel with the structured, rigorous requirements of traditional force-design pipeline.

- Transition into the Force-Design: mature initiatives from the innovation funnel must be systematically incorporated into the military's project quality pipeline, ensuring that new technologies and capabilities are not only innovative but also reliable and suitable for operational deployment.
- Ensuring alignment with quality criteria: Throughout this transition, it is paramount that the innovative concepts align with the stringent quality criteria set forth by ISO 9001:2015.

8.3 The IDF's innovation blueprint goes national

The proposed framework not only mirrors the conceptual strategy underpinning the IDF's institutionalised innovation management system but also serves as the foundation for its adoption across Israel's broader defense ecosystem. This includes pivotal agencies such as the Mossad, Israel Security Agency (Shin Bet), Israel Police, Prison Service, the Ministry of Homeland Security, etc. Beyond its institutional impact, this framework's principles were also integrated into the guidelines of the Israeli first national innovation competition launched in late 2023.[45] This event marks a significant milestone, showcasing the framework's effectiveness in promoting a culture of innovation and fostering bottom-up innovation within and beyond military confines.

9 Conclusions

This article has charted the transformative journey of the IDF from the establishment to the institutionalisation of its innovation management system, spotlighting the emergent figure of intraorganisational 'Agents of Change' pivotal to this evolution. By delineating the roles of transformative commanders and 5th generation CINOs, a dual-pronged framework is proposed. This framework that synergistically merges sociological insights with organisational systems engineering to foster a culture of bottom-up innovation within the military context.

The IDF's strategic pivot towards institutionalising an innovation management system underscores a paradigm shift from isolated 'islands of innovation' to a more integrated, cohesive innovation ecosystem. This transition, facilitated by the CMI division, represents a significant leap in operational readiness, enabling the IDF to navigate modern warfare's complexities with unprecedented agility and foresight. Central to this leap are the transformative commanders and 5th generation CINOs, whose roles have been meticulously analysed for their contribution to fostering an enabling environment for bottom-up innovation to thrive.

From a sociological perspective, this study enriches the understanding of military transformation, shedding light on the intricate interplay between organisational culture, individual intrapreneur and the institutional structures that facilitate innovation. The emergence of a unified innovation framework within the IDF not only addresses the limitations inherent in decentralised innovation models but also sets a precedent for other military organisations grappling with similar challenges in a rapidly changing global security environment.

As we look to the future, the next wave of intraorganisational 'Agents of Change' in the IDF will likely continue to evolve, shaped by ongoing technological advancements, shifting geopolitical landscapes and the internal dynamics of the IDF itself. The framework provided by this study offers valuable insights into harnessing the potential of these agents, emphasising the importance of psychological safety, support mechanisms, and a culture that valorises innovation.

45 The 1st Israeli National Innovation Competition, ISQ official website.

Further research could be conducted on topics and issues tied to international standards related to innovation leadership and management, designing innovation-supporting intraorganisational mechanisms, the *de facto* management of 'innovation systems', the creation of the organisation's activity portfolio, and on indices and metrics on effective innovation management in the organisation, which are beyond the scope of this article.

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