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ECO-INNOVATION CAPABILITY APPROACH REGARDING MILITARY PERFORMANCE DEVELOPMENT

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ABSTRACT

Embracing opportunities and threats of innovative development in the military defines the new performance leadership. From current partnerships, we observe that critical technologies are a vital procurement target. On the NATO 2030 Agenda, the main point remains guiding personnel to EDTs. In our view, this can be best achieved by adopting dual-use technologies in the procurement strategies. Procurement framework across the Alliance enhances a capability gap between conventional and advanced methods of engaging with the budget in the military organization. Our findings show that EDT prioritization policies become relevant to the military affairs, since working with technology increases military superiority.

KEYWORDS: performance, roadmap, innovation, strataplex, capabilities

1. Introduction

Big data, artificial intelligence systems and technologies represent major sources of nowadays performance. In what NATO is concerned, these emerging and disruptive technologies offer a chance to gain multiple strategic advantages for developing military affairs. From tactical to strategic levels, military leaders make decisions based on innovation, minimizing the risks of technologic systems maintenance.

Since the NATO defence ministerial ambition on emerging and disruptive technologies endorsed in 2021, NATO's development policies are guided in the matter of supply. One major objective for the Romanian military leaders is establishing a multinational venture capital fund to support innovation throughout the Alliance (NATO, 2022).

Strengthening the Alliance with the best procurement strategies is a first step in gaining success. Potential contributions to sustainable defence innovation are created by those kinds of leaders who accept sustainable development on their agenda.

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Thus, the architecture of supply chains is gaining a new formula.

2. Conceptual Framework

Today, more than ever, public institutions must exploit eco-innovative capabilities, to develop new strategic directions, if they want to successfully intervene against the harmful effects of emerging technologies, financial debt (where applicable), market competition, short life-cycled products, economic-social instability, or e-commerce amplification. These new eco-innovative capabilities represent one of the methods that generate the competitive advantage needed by a modern, up-to-date military unit.

2.1. Strategic Direction of Military Affairs

In any field, top leaders are the individuals who must be the most innovative, but the field of ecology is in constant change, so it is difficult to be ongoing in making the best eco-innovative decisions. However, small contribution to the military organization, points it towards success, if the leadership vision reaches an eco-innovative minimum or there is some predominant distribution of eco-innovative visionary leaders. To give an example in the military sphere, the military education institutions clearly represent innovative leaders in the field of Romanian defense system, as supply and public procurement are usually done by favoring the newest most optimal market choices.

We believe that a major issue is the degree of sustaining the desired innovative level in the long term of governance. Of course, the military decision-making act sneaks eco-innovative decisions into any of the Romanian military institutions, but sooner or later, and mainly from a deficient funds' allocation, they follow less innovative courses of action. Thus, approaches to this problem have existed even sporadically, through the introduction of innovation initiatives, usually in the form of new supply innovation incubators. However, the resistance of the military organization to the implementation of some eco-innovative programs has been present for long periods of time, and the budget granted to them occupies a leading place in the list of unfavorable causes.

An international classification of emerging market countries explains economic growth by the means of domestic programs such as investing in educational systems, building physical infrastructure, and enacting legal reforms to secure investors' property rights (Investopedia, 2022). Alternatively, investing in emerging military technologies becomes very risky, according to political instabilities and lack of investment volatility. One solution would be implementing agreements to increase trading opportunities and technological infrastructure related to the military.

The wave of innovation is explained by the McKinsey Global Institute, which indicates the top quartile of outperforming high-growth emerging economies. Operating industrial models lead significant productivity boosting opportunities with the adoption of applicable techniques, as we can examine in Figure no. 1. For Defense area also, the reshaping of current policies can be accomplished by balancing the advantages and disadvantages of the use of emerging and disruptive technologies (EDT).

Concluding European trends might put more pressure on inequality and institutional trust in the next decade. Therefore, the measurement of these trends will gain uncertain values, due to influential policy makers and the value of the rapid response to analyzed tasks. Disregarding current limitations, the production of military equipments gains visibility, since AI usage reflects essential functions for the next product personalization, supply chain coordination, logistics harmonization and preventive maintenance. The 400 analysed

cases pinpoint that AI could improve on traditional analytics techniques in 69 percent of potential use cases (Bughin & Woetzel, 2019).

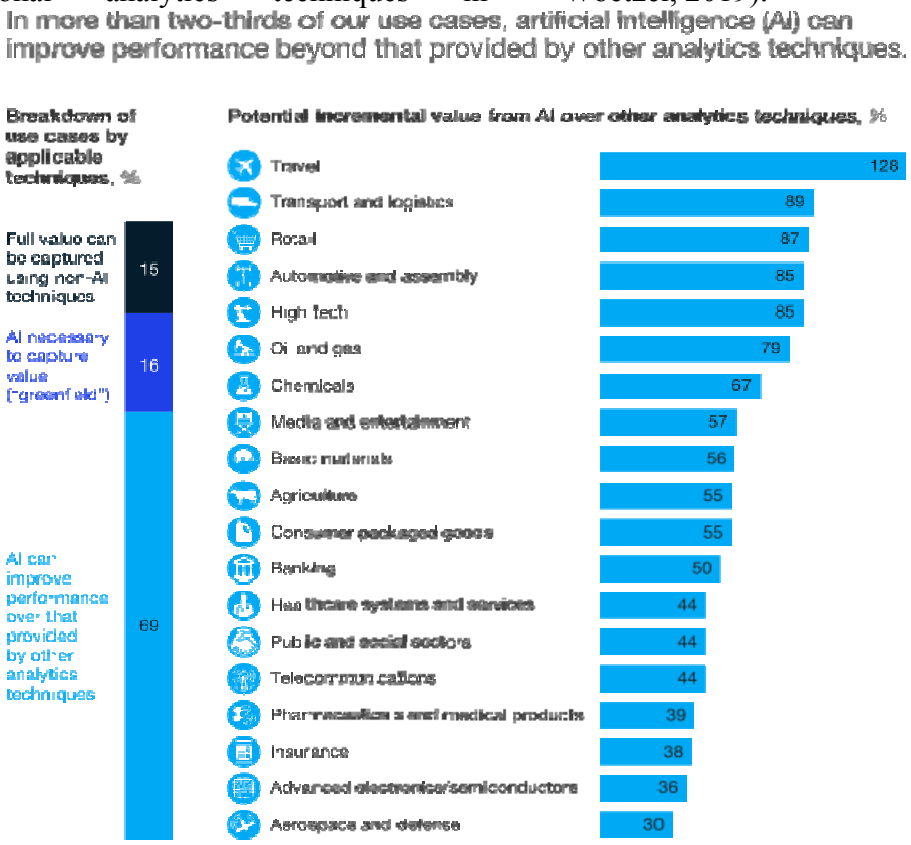


Figure no. 1. *Improving performance by applying EDT's*
(Source: McKinsey Global Institute, 2019)

2.2. Eco-innovative Strategies for Sustainable Military Decisions

If in the past, military leaders lacked the necessary parameters to make the most informed decisions regarding an eco-innovative program, today's metrics have been developed to support the supply of new products and increase the decisional value level. Encouraging leaders to confidently demonstrate their eco-innovative sense involves them in the whole innovation process, regardless by means of eco-innovation evaluationor a particular innovationimplementation program required additionally. This course of action can puncture the managerial thinking to transit a new organizational culture.Indeed, it sometimes turns out to be contrary to the traditional type of decisions, yet a better assessment of innovation riskswill develop the ability to innovate potential capability targets.

The importance of innovation is rising, therefore measuring innovation capacity develops into new urgent tools, at least for these reasons: the innovation values are gaining increasing significance, as "decisions are made in the knowledge of the case, on objective data, having in view of the long-term nature and risk associated with certain innovation projects: values then affect behavior by aligning objectives with institutional actions and interests" (Muller, Välikangas & Merlyn, 2005).

Innovation capacity is commonly analyzed through product research and development, but other metrics could be represented by:

– The values indicated by the annual evaluation and budget allocated or the number of patents filed per year.

– The percentage of purchases of new products introduced in a calendar year.

– The number of innovative ideas proposed by leaders and their teams.

– The more limited the metrics for measuring eco-innovation capability, the more limited the ability to indicate the genuine eco-innovative potential of the military organizations becomes. The emphasis on technological use does not save the organization from waste, unless all aspects of supply are neglected, and decisions focus is made on products suitable for the needs of consumers in the organization, but which do not drive eco-innovation. Still, eco-innovative strategies can be encouraged through several initiatives, as seen in Table 1.

Table no. 1

Initiatives for encouraging eco-innovative strategies

Extended initiatives for adapting eco-innovation capability
Replication of distinct decisions, which produce innovative impact and giving up obtaining cheaper products, in a shorter time
Avoiding the saturated market segments, where suppliers become bored by organizational demands, and optimization decisions are not encouraged
Removal of those persons who produce facilities in dictating the price of the products/services needed by the institution
Encouraging any ways to support the ecological strategy in the organization

These actions call out unique features of innovative acceleration. We strongly believe that the six phases of implementing innovative technologies for NATO personnel will help them become more performing, cost-efficient, and sustainable.

With a great impact on the economic field, The World Economic Forum posted a multi-cluster tool in their Final Report, discussing disruptive innovations of financial services as shown in Figure no. 2.

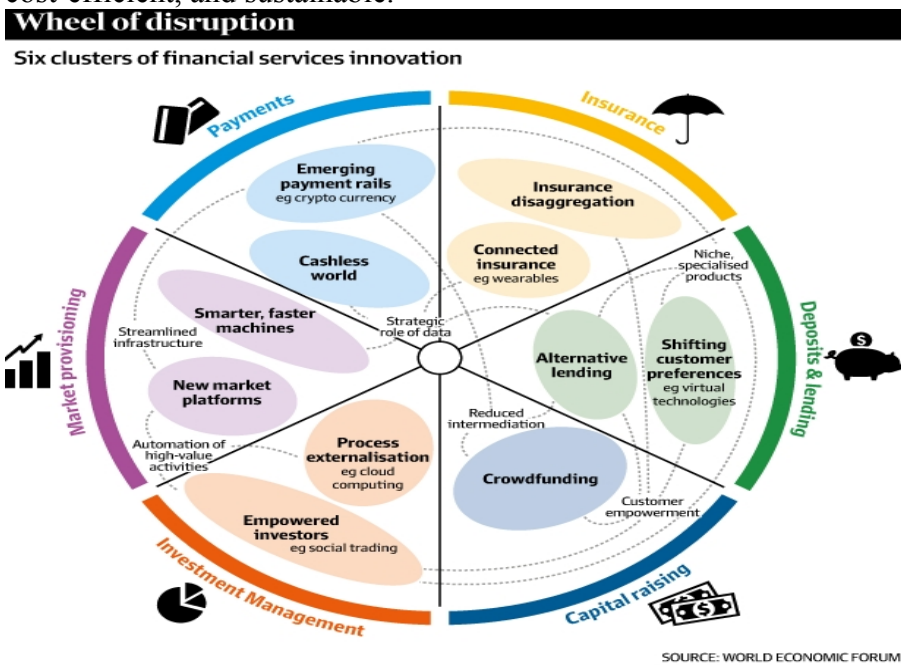


Figure no. 2. *Disrupting innovation clusters for financial services*
(Source: World Economic Forum, 2015)

3. Material and Methods

Sufficient exploration on the dynamics of technological resources, organizational strategies, and the military environment volatility has not been yet achieved. So, the impulse of this paper is to forecast some practice upon eco-capability development regarding performance.

As Walsh observed, "successful disruptive technologies will become sustaining technologies" (Linton & Walsh, 2004). The three phases established as the initial road mapping forecasting include preliminary activity, development of the technology roadmap and the follow-up activity.

Our intent is to expose some operational sustaining techniques that need to be identified for this matter. A specific design has been embellished from the previous research by modeling the five stages of disruption presented in Figure no. 3. As a result, we have extended the working sector by creating a new framework of supply disruption roadmap.

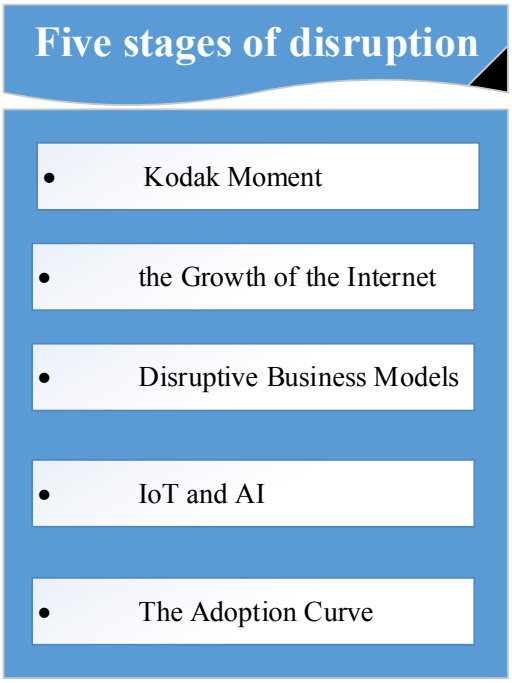


Figure no. 3. *The five stages of disruption*
(Source: Disruptive Innovation EXPLAINED in 10 Crazy Infographics, 2017)

Although notorious market sectors would acknowledge more stages for the understanding of the disruptive technologies, in our view one important classification is the application of the 5 Stages of Disruptionfrom the book "Bold" to the Digital Supply Chain domain (Singh, n.d.). From a digital supply chain perspective, exponential technology leveraged real-time data to develop Machine Learning models that offer predictive logistics services.

As primary strategic goals, the nominated high-level actions turn goals into an innovation plan. For sure, this approach is being currently updated to today's necessities, but the previous detailed sections are a fundamental innovation key for organization of the clusters core functionality in financial services.

3.1. Road Mapping the Technological Innovation

Now, reframing military emergent and disruptive technologies could be

possible with multidisciplinary effort for defining the most important initiatives. Requirements for constant progress sustain innovation, while creating an advantage with new disruptive technologies.

We provide a set of needs regarding the technology road mapping process for the development of critical military requirements. The theoretical background mentioned above emphasizes the interdependence between planning and strategic tasks. Our desire is to present information about the phase requirements and performance targets that must satisfy certain supply needs displayed in Figure no. 4.



Figure no. 4. *The technological innovation road mapping*
(Source: Authors)

Another perspective of Julia Kylliäinen traditional value drivers meet disruption in an existing area where a new player enters an existing market with new

technology or business model (or a combination of these two), providing new kind of value that differs from the incumbent's offerings (Kylliäinen, 2019). Due to serving more demanding and high-end objectives, modern challenges follow a patern of change which is exposed in Figure no. 5.

Working on disruptive innovations means to visualize innovation on the axes of newness or the impact on the market. Several combinations were made by this association, but military market segment is a crucial dilemma to existing metrics of analysing disruptive innovation.

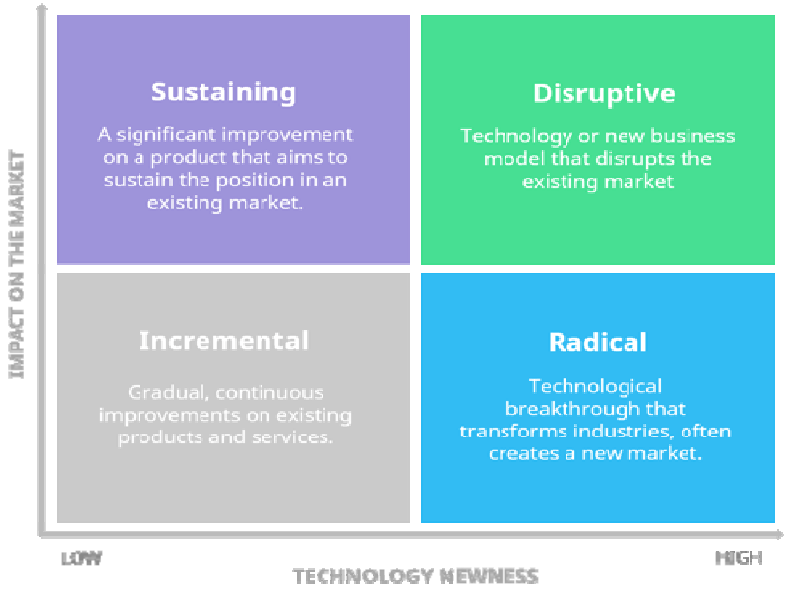


Figure no. 5. *The innovation matrix*
(Source: VIIMA, 2019)

3.2. Threats to Implementation of the New Innovations

These technologies, however, also represent new threats from state and non-state actors, both militarily and to civilian society. Responsible innovation and the rapid adoption of modern technologies improve decision-making and steer transatlantic innovation for defense in accordance with Allied values, norms, and international law.

Since October 2021, the Data Exploitation Framework Policy implemented across NATO lays out a vision to achieve data-driven decision making by fully leveraging the delivery of all digital transformation efforts. This type of policy concentrates principles of responsible data exploitation in reaching targets. Nonetheless, with these policies, Romanian armed forces can translate these needs into daily practices.

3.3. Human Capital Innovation Policy

As a new Capital Innovation Policy for NATO is being discussed, our current paper expands a three-pillar approach for a military response to meet the challenge of the EDT landscape. In line with the goals and objectives of NATO 2030, we argue that this method enables the development of future military leadership capabilities. Through this effort, the future Human Capital Innovation Policy will be based on a progressive agenda for eco-capability.

The reason for this subject is that NATO position as a leader in the field of proactive innovation ecosystem will gain further significance on the scale of

international advantage. *Our mindset reflects eco-capability as demanding several objectives, aslisted in the NATO Annual Report* (NATO Innovation Unit Emerging Security Challenges Division, 2021):

–Foster a resilient transatlantic innovation ecosystem and address innovation gaps withinthe Alliance by promoting diversity, inclusiveness and embracing geographic balance.

–Enable a more effective and proactive mechanism for engaging with a wide innovationtalent base, facilitating a more efficient horizon scanning process.

–Develop an Alliance-wide innovation network that would act as a source of technologyinsights and solution proposals on varying timescales, including in times of urgent need.

–Conduct horizon scanning for science and technology developmentsrelevant to a progressive defence mission.

–Establish a mechanism by which innovators can receive developmentsupport in the form of grants and access to knowledge networksto benefit the development of their solutions; and

–Provide the means by which innovators might access testand evaluation facilities and processes for the purposesof research, development, testing and demonstrationand conduct development by design includingcybersecurity.

We have inspired from current leadership researchers to propose a strataplex of innovation. The current requirements are conceptualized as being layered in Figure 6 based on the emergence offour categories of innovation priorities.

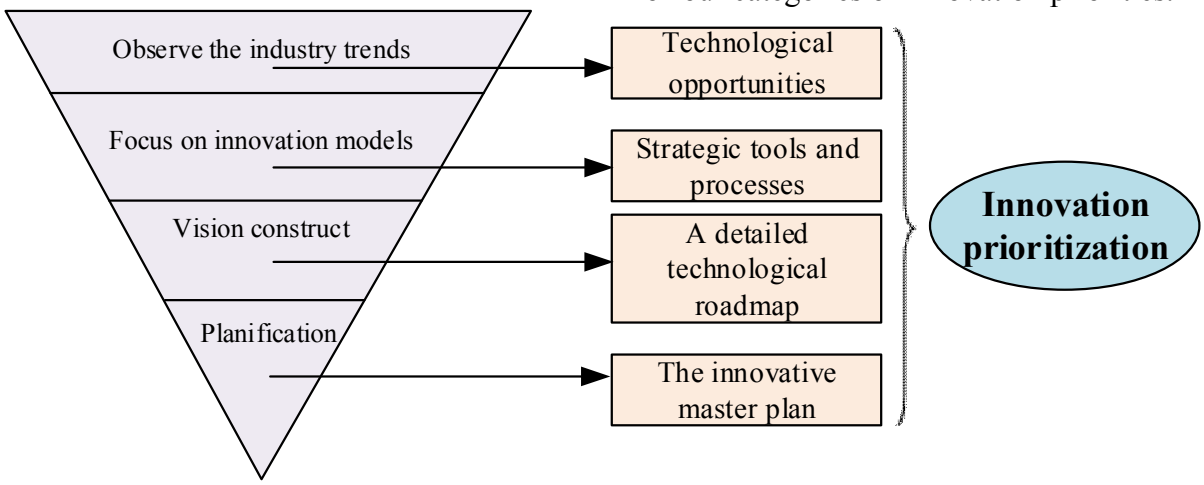


Figure no. 6. *Innovation prioritization strataplex*
(Source: Authors)

Once the requirements are being reached, executive can outline high-level metrics for success. Appropriate timeframes would reflect the reality that eco-innovation capability impact will be difficult to assess accurately, as it did notfulfilany full potential yet. Nevertheless, metrics must be established to indicate progress in the supply chain.

Existing quantitative metrics contribute towards the maintenance of a rich technology capability for NATO economies. Reaching expectations around successful measurement short-term the key challenges that leaders must be prepared for, such as: number of accessed innovationsin a test centre, number of innovation programme, number of innovation investment fund, number of innovative contracting, or number of innovative personnel with technological impact in defence.

3.4. Next-generation Eco-innovation Capabilities

Further launch of new products directly in the military product-services system will innovate the EDT's application. The more innovative results and designs entrust organizations with fully integrated systems that connect to the individual need by bringing faster, more comprehensive product supply.

Since documentation data is linked with approvals and factory maintenance, the risk of delivering a comprehensive product with an out-of-the-box innovation industry decreases as integrated solutions occur with virtually EDT's and omnichannel operational accounting recording.

In our opinion, an integrated platform for the supply workflow assures process visibility of the whole supply chain. Therefore, an increase of partnerships could lead to self-based military trends on delivery of high-quality operational equipment.

Hopefully, high operational costs validate the real status of each product under market design. End-to-end workflow tracks results on the product itineraries, which implies more prototypes, administrative tasks, and data entry.

The high-growth innovation lifestyle requires solutions which the built-in capacity to address core logistics needs of all management. Flexibility becomes the premise for 3D industrial development, e-logistics, and supply facilities. Hence, end-to-end eco-innovation capabilities move up the supply curves and business integrations.

3.5. Results

A transatlantic innovation ecosystem for defense is desirable. The relationship between early-stage start-ups or conventional partners and companies is enhanced for solving critical defense and security issues with the help of technologies (i.e., transformational technologies that solve important challenges through the convergence of breakthrough science and engineering).The major necessity is establishing the Innovation Fund, which leaders can use for adopting strategic decisions regarding military affairs to (NATO, 2022):

−Seek out cutting-edge technological solutions that solve the Alliance's challenges.

−Bolster deep-tech innovation ecosystems across the Alliance.

−Support the commercial success of its deep-tech start-up portfolio.

Assessing the potential impact of future emerging or disruptive military technologies by the Scale Performance implies reporting on speed, range, accuracy, lethality, survivability, affordability, availability, dependability, or other defining capability characteristic (NATO, 2020). The grade of relevance of the impact of current and future operational capability is ranged from low limited to medium moderate and high significant or revolutionary impact.

At this stage, leaders should have a compelling vision about why these emerging and disruptive technologies change help the organization for executing planning tasks. Covered in a technological innovation roadmap, team's priorities adjust many times during the implementation period, and necessary review should regularly fulfill the process. This way, the eco-innovative capabilities are continuing to make progress according to innovation program and goals.

4. Discussion

The EDT policies can build trust with the public, the international community, innovators, and operational end-users. What can be done by Romanian military is to pursue the development of a specific strategic approach to emerging and disruptive technologies, so that implementation will be achieved with great responsibility, accelerated adoption and the certainty of protection against threats.

The procurement documentations should provide certain technical interoperability standards and advise on the development of national capability to deliver products and services that leverage EDTs.Several webinars between NATO and private sector representatives have taken place in the name of the security of supply chains.The participating leaders recognizedthis need as more complicated than ever for addressing a broad range of existing and emerging vulnerabilities (NATO, 2021).

Concerning cost minimization, military affairs' focus should stressthe need for businesses to achieve a balance between an appropriate level of security and the demand costs. Military affairs specialists can facilitate efforts to harmonize the regulation system and facilitate the industrial exchangein the European space.

5. Conclusions

Emerging and disruptive technologies refer to innovations that will optimize the military product or service system in an unexpected manner.To stimulate real innovation, beneficial arrangements should be signed between governments, to commit to engaging dual-use technologies outside of the defense realm and to invest in defense start-ups (Foggo, Nelson, Van der Merwe & Luzum, 2022).

The researched metrics of performance refer to rapid advances in the expertise area, as well as field convergence for enhancing capabilities and performance frontiers also. Individual performance optimization will determine team cohesiveness and effectiveness. This way, the enablingof Allied forces comforts better decisions, and can produce faster actions for monitoring the overall human performance and group readiness. Subsequent assessment of force status needs to be done in training adjustment and real-time performance metrics (NATO, 2020).

Leaders from 22 Allies signed the Letter of Commitment this year and this is the first step for the formation of the Innovation Fund in Romania also. Further recommendations on Emerging and Disruptive Technologies unify high-level civilian engineers and military leaders and lead the NATO capability development to a larger range of EDT-related projects.

Engagement with industrial start-ups is fundamental for a higher Human Capital Innovation Policy.In addition, certain eco-innovative skill requirements across all organizational levels fully emerge the highest levels of organizational performance. Thus, the proposed strataplex might be a valuable tool for conceptualizing these requirements in the military.

Adopting disruptive technologies in the militaryhas a great risk of replacement, thus new powerful technologies must be internally developed with the support of externalized expertise.The solutions either will disrupt the existing militarized market or will create a new path on the market segment. There is still plenty of unanswered questions about the measurement of the value of these EDT's. Hopefully, future research will shed light on innovation models, as a start to reach the mainstream growth.

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