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## ACHIEVING STRATEGIC AUTONOMY THROUGH DEFENCE INNOVATION

### INTRODUCTION

People wonder sometimes if the effort to invent new weapons to wage war will end. Or to bring up a philosophical question from *The Matrix* movie: do we really need to dodge bullets? This is a relevant question, since contemporary conflicts are rapidly changing the ways we provide security and fight wars. While the ongoing conflict in Ukraine and other hot spots in the world rage on, and we see a re-emergence of state-on-state conflict, innovations in warfare seem to be ever present, contributing to strategic success in a variety of ways.

Technology is being developed at an unprecedented pace. Quantum sensors are being designed to detect the faintest disturbances in the environment, AI applications promise to provide “god-like situational awareness”, and biotech research enables humans to make better decisions.

According to the ancient wisdom of Sun Tzu, if we know ourselves and understand the adversary, we can win a thousand battles. But as emergent disruptive technologies (EDTs) create an increasingly interconnected environment, we must focus on ecosystems instead of the traditional adversary. Today’s most prominent strategic dilemma: providing security in the high-tech, rapidly changing VUCA (Volatile, Uncertain, Complex, Ambiguous) (BENNETT–LEMOINE 2014) environment with a multitude of stakeholders is everything but simple.

Providing order and security was relatively simple in the past. The Greek gods sent bolts of lightning and conjured tempests to work their will and humans have been following their example for centuries striving for situations where a clear winner was easily identified. In contemporary conflicts however, complexity creates a multitude of options, so it is more important than ever to communicate a commander’s intent with clarity and simplicity on the contemporary battlefield.

My basic assumption in this book chapter is that the VUCA environment is the new normal, and that in the rapidly changing security environment, innovation must be part of every defence strategist’s toolkit. I believe that defence innovation, and the ability to adapt to new ways of fighting is a strategic tool. The strategic advantage

lies not so much in developing new technologies, but in changing mindsets through rapid adoption, in order to enable the armed forces to achieve competitive advantage.

To support this assumption, I examine recent trends in the EU as well as NATO, to introduce how innovation has influenced strategic thinking and enables strategic decision-makers with opportunities and unprecedented speed to win future wars, and gain lasting strategic advantage.

## EU DEFENCE INNOVATION

The European Union formally approved the *Strategic Compass* (Council of the European Union 2022), at a time when we have been experiencing a volatile and uncertain security environment and the return of state-on-state competition in Europe. The Compass gives the European Union an ambitious plan of action for strengthening the EU's security and defence policy by 2030.

In order to be able to act rapidly in a VUCA environment, foresight activities and a networked approach to partners are essential to establish a strong EU Rapid Deployment Capacity to tackle different types of crises. Member States have committed themselves to enhancing their defence expenditures to reduce critical military and civilian capability gaps and strengthen the European Defence Technological and Industrial Base.

The EU Member States are increasing defence spending to match their security needs and provide further incentives for Member States to engage in collaborative capability development to operate in traditional (land, sea, air) and newly emerging (cyber and space) domains. Defence technological innovation has the potential to reduce technological and industrial dependencies. The new technologies can be tested during regular live exercises on land and at sea, and adopted in an agile manner to enhance military mobility and reinforce the EU's civilian and military Common Security and Defence Policy (CSDP) missions and operations by promoting a rapid and more flexible decision-making process (European External Action Service 2023).

The EU's tools, such as the Capability Development Plan (CDP) set eleven priorities. The Overarching Strategic Research Agenda (OSRA) provided a systematic and clear mechanism for collaborative European Defence Research. Moreover, the Coordinated Annual Review on Defence (CARD) aims at developing a more structured way to deliver identified capabilities. The European Defence Agency (EDA) promotes, facilitates and manages Research and Technology activities in 15 technology domains (CapTechs) and acts as a facilitator among its militaries, the European Commission and EU bodies.

The European Defence Fund (EDF) was launched in June 2017 with the aim to contribute to strengthening the competitiveness and innovative capacity of the EU's defence industry and to foster defence cooperation through supporting investment in joint defence research, development of prototypes and acquisition of defence equipment and technology (European External Action Service 2023). The EDF became operational in 2021 with a budget of roughly €8 billion for 2021–2027 to cover both capability development and defence research (European Commission 2021).

A relatively new development is a Hub for European Defence Innovation (HEDI) (European Defence Agency 2022) established by the Foreign Affairs Council in May 2021, in order to call for a reinforcement of EDA's role in fostering defence innovation. In March 2022, in the Strategic Compass the Hub for EU Defence Innovation in EDA was also identified as a key step to boost defence technological innovation and fill strategic gaps. Josep Borrell, Head of EDA in May 2022 stated that in less than two months after the adoption of the EU's Strategic Compass, the EU delivered on one of the Compass's main priorities by establishing the European Defence Agency's Defence Innovation Hub (European Defence Agency 2022).

Three steps have been defined to fully exploit the potential of HEDI. The first step will inspire and promote innovation at the European level: the hub will focus on networking and situational awareness activities. The second step will allow the hub to be operational across all activities and services identified in the initial portfolio. This will set the hub at the heart of facilitating defence innovation across Member States and EU institutions. The third step, HEDI 2.0, is proposed as a way to reach the full potential of the hub as an EU-wide platform for cooperative design and experimentation, embedded in the EU capability development process (European Defence Agency 2022).

An important part of the increased budget is set to be invested by EDA in innovation through HEDI. The Agency's Hub for Defence Innovation provides political and societal support for defence innovation as a consequence of the war against Ukraine, facilitates defence innovation as a catalyst for the preservation of full-spectrum deployable and effective combat power against the backdrop of threats, strengthens the defence innovation ecosystem approach through rapid developments in the commercial sector, increases the impact of non-traditional defence players, and helps to stay ahead of the curve by focusing on the development of emerging and disruptive technologies.

Overall, the European Union's innovation framework focuses on three main pillars: identification of a systemic approach, implementation of ideas, and facilitating outreach to both traditional and non-traditional actors.

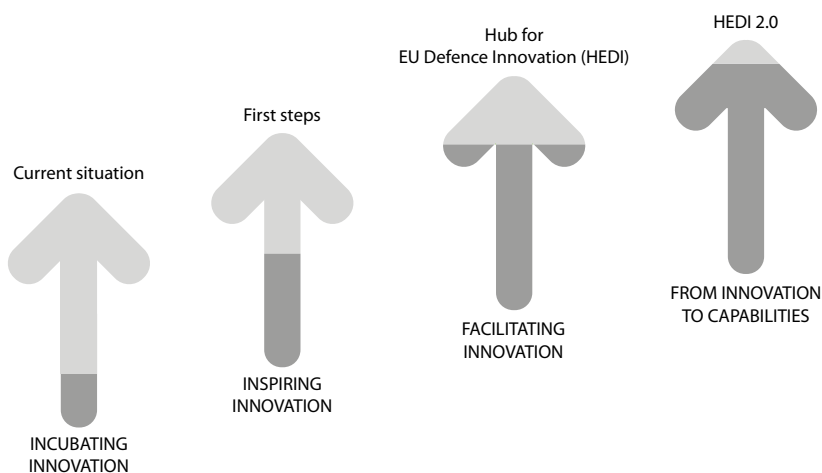


Figure 1. *HEDI's three step approach*  
 Source: European Defence Agency 2022

HEDI's vision is to act as a launchpad to ensure the delivery of innovative capabilities to the EU armed forces. Its mission is to stimulate and coordinate cooperation on defence innovation among Member States while ensuring synergies with the European Commission, the European Innovation Council and NATO. The establishment of the governmental European Defence Innovation Network (EDIN) provides mutual support, shares best practices, expertise on issues to be addressed, target audiences and proposed solutions. It is a force multiplier for its participants, allowing problems and solutions to be considered within a European ecosystem. In 2023, the *European Innovation Days* were organised under the auspices of the Swedish Presidency.

The more hostile security environment requires us to make a quantum leap forward and increase our capacity and willingness to act, strengthen our resilience, and invest more and better in our defence capabilities. The European Strategic Compass is to make the EU a stronger and more capable security provider, to protect its citizens, to contribute to international peace and security, and to enhance the EU's strategic autonomy and its ability to work with partners to safeguard its values and interests. A stronger and more capable EU in defence innovation will contribute positively to global security and is complementary to NATO's efforts. HEDI is actively collaborating with NATO innovation entities: both DIANA as well as NATO Science and Technology Organisation (STO) are strategic partners.

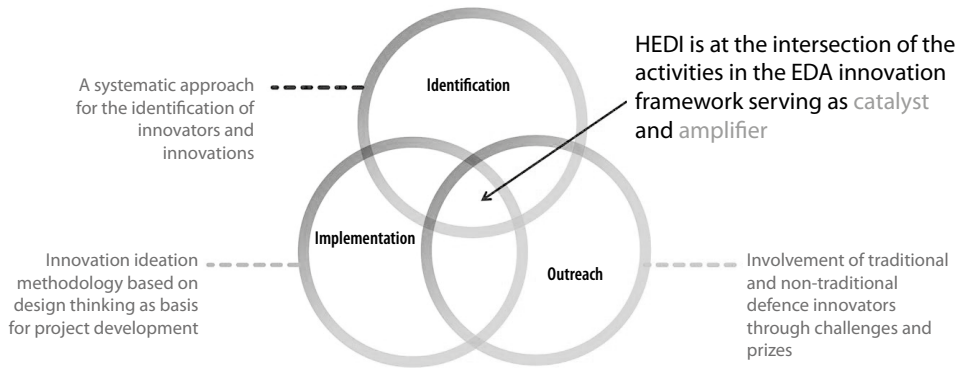


Figure 2. *The three main pillars of the EU's innovation framework*

Source: European Defence Agency 2022

## NATO INNOVATION

NATO's innovation effort is spearheaded by the Allied Command Transformation (ACT). The strategic command conducts a significant amount of analysis on strategic foresight (PORKOLÁB–HÖNICH 2021). Two of the most important documents in this area are the *Strategic Foresight Analysis* (SFA), which reviews the processes that will determine the future security environment, and the *Framework for Future Alliance Operations* (FFAO), which provides capability development recommendations based on the SFA for a 15-year horizon.

Both documents are part of a cyclical analytical process: the 2013 SFA report was followed by the first FFAO document in 2015, and the 2017 SFA report was followed by the second FFAO document in 2018. The latest SFA document was published just recently in 2024 (NATO Allied Command Transformation 2023).

The previous SFA and FFAO documents are publicly available and their content is based on open source information and intensive consultation with allied experts. These documents do not have an exclusive technological focus, but they contain important findings on the likely directions and implications of future technological developments. For example, the first SFA publication (2013) already included the ACT's view that monitoring and forecasting technological developments is a necessary task to maintain NATO's technological advantage, and the 2017 SFA publication (NATO Headquarters Supreme Allied Commander Transformation 2013) stated that the pace of technological development is increasing and that this may

be to the detriment of defence acquisition processes and interoperability between nations (NATO Headquarters Supreme Allied Commander Transformation 2017).

The Strategic Foresight Analysis 2023 (SFA23) provides a shared understanding of the Evolving Security Environment to 2043, thus establishing the context for future thinking for all Allied nations. The renewed foresight cycle, consisting of SFA23, the Future Operating Environment 2024 (FOE24) and deployable foresight analytical capacities, will facilitate collective understanding of future scenarios within the Alliance, as well as augment individual allies' foresight capabilities. The upcoming Future Operating Environment 2024 (FOE24) will address the military problem sets for Allied Warfare Development. FOE24 will also serve as a baseline for further conceptual and strategic thinking.

In 2018, ACT's Strategic Foresight Team looked at specific regions of importance to the Alliance. The purpose of these reports was to contribute to a better visualisation and understanding of the future security environment in regions relevant to NATO security. In 2020, the programme of work supported the *NATO Warfighting Capstone Concept* and *Warfare Development Agenda* development timeline. Accordingly, the development of Regional Perspectives Reports contributed to the understanding of the Allied future operating environment.

These are all capstone documents, but it is important to look beyond NATO's technology-focused strategic foresight for two reasons. On the one hand, strategic foresight activities in recent years have resulted in a number of comprehensive documents with a specific technological focus. On the other hand, the Alliance has been working for years to ensure that the opportunities identified in science and technology can be seized by the Allies, including organisational innovation and accelerated deployment of technologies.

NATO documents that have specifically examined the area of science and technology using the Strategic Foresight methodology and supported NATO innovation have also been present for quite some time. The importance of innovation and technological development as a process that shapes both the present and the future was already highlighted in the final report of the *Multiple Futures Project* in 2009, which draws attention to the fact that the use of technology and innovation can "lead to breakthroughs" in future warfare (NATO Allied Command Transformation 2009). This document points to the need for NATO to develop a comprehensive concept on how to strengthen partnerships with industry and shorten the time between the emergence and deployment of innovative technologies (NATO Allied Command Transformation 2009).

*The Technology Trends Survey*, published in February 2015, also provides useful insight for those assessing emerging technology trends. Subtitled

“A Thought-Provoking Document to Support NATO’s Defence Planning Process”, the analysis groups technologies into six main categories (NATO Allied Command Transformation 2009). The elements of the list are identified by the BRINES acronym (Biotechnology, Robotics, Information Technology, Nanotechnology and Materials, Energy and Resources, Systems). Two years later, NATO’s Science and Technology Organization published the *Tech Trends Report 2017*, which groups 12 technologies according to whether they will reach peak disruption within the next 6 years, over a 6–20 year time horizon, or beyond 20 years. This technology outlook has also been following the time horizon used by NATO defence planners (NATO Science and Technology Board 2017).

Another definitive and detailed document produced by NATO’s Science and Technology Organisation is the *Science and Technology Trends 2020–2040*, published in March 2020, which looks at a two-decade time horizon. The aim of the report was to map the potential impact of emerging and disruptive technologies on NATO’s military operations, defence capabilities and policy-making space (NATO Science and Technology Organization 2020). Since scientific and technological developments do not take place in a vacuum, the *Science and Technology Trends 2020–2040* report also addresses the social, economic, organisational and protection processes and needs that form the context for technological innovation and development. The annex, which accounts for more than half of the report, takes a look at the current state of the disruptive and emerging technologies, future research directions and the implications for NATO forces.

As a sign of the dynamic change in the processes shaping the Alliance’s security environment, NATO’s Science and Technology Organisation published a new comprehensive document, *Science and Technology Trends 2023–2043*, only three years after the publication of the 2020 publication. Published in spring 2023, the two-volume document is the most comprehensive analysis currently available of how technological developments over the next two decades will shape the Alliance’s security environment and, more specifically, Allied military capabilities. The paper has now expanded the list of emerging and disruptive technologies prioritised by NATO (NATO Science and Technology Organization 2023a; 2023b). The document also addresses the issue of technological convergence, as in many cases the most significant applications may arise from the fusion of different technology areas (e.g. space technologies, hypersonic capabilities and new types of materials).

Another important milestone was the adoption in 2021 of the *Coherent Implementation Strategy on Emerging and Disruptive Technologies*, which aims to maintain NATO’s strategic superiority. This strategy foresees two main efforts in the area of emerging and disruptive technologies: to coordinate the development and

deployment of dual-use technologies at the Alliance level and to provide a forum for coordination between Allies (NATO 2023a). This approach was reaffirmed in the new Strategic Concept 2022, which stated that technological superiority will have an increasing impact on who will prevail on the battlefield and that NATO will increase its investment in emerging and disruptive technologies to maintain the Alliance's interoperability and military advantage (NATO 2022a).

In the Coherent Implementation Strategy, NATO identified seven technology priority areas of strategic importance for the development of defence capabilities: artificial intelligence, data science and computing, autonomous systems, quantum technology, biotechnology and human enhancement technologies, hypersonic technologies and space technology (PORKOLÁB–HÖNICH 2021). This list has since been expanded, with the addition of new types of materials and manufacturing technologies, energy and propulsion systems, and next-generation communication networks (NATO 2023a).

The Alliance has also been working on the preparation of strategic documents dedicated to these technological areas. These include the adoption of the *NATO Artificial Intelligence Strategy* (NATO 2021), the *Implementation Plan for Autonomous Systems* (NATO 2022b), the *Digital Transformation Implementation Strategy* (NATO 2023b), and *NATO's Quantum and Biotechnology Strategies* (NATO 2023a).

It is becoming obvious that in the current defence planning cycle, the above-mentioned long-term considerations are focused on emerging and disruptive technologies and innovation, and NATO collectively believes that the Alliance could lose its technological advantage and even fall behind if it keeps these as longer-term "goals", and therefore the application of emerging and disruptive technologies should be integrated into the short- and medium-term mandatory capability goals.

As NATO has recognised this necessity, the Alliance is working hard to understand and keep pace with the rapidly changing VUCA environment. Part of the response is defence innovation: identifying, developing and adopting the dual-use emerging and disruptive technologies (EDTs), which can help us address the myriad of challenges we face on an everyday basis.

However, the days in which disruptive innovations are driven by governments are over. It is now the civilian private sector that pushes the boundaries of technological feasibility. Today's innovators consider the defence sector to be impenetrable, bureaucratic, lacking funding opportunities and without a clear commitment to novelty or pathways to the adoption of their inventions. NATO has realised that that there is a need for change, and created DIANA (the Defence Innovation Accelerator for the North Atlantic). In combination with DIANA, the NATO Innovation





Figure 3. *NATO DIANA network 2024 – Accelerator Sites*

Source: NATO Defence Innovation Accelerator for the North Atlantic 2024



Figure 4. *NATO DIANA network 2024 – Test Centres*

Source: NATO Defence Innovation Accelerator for the North Atlantic 2024

Fund – the world’s first multi-sovereign venture capital fund – was also created to represent a radical and progressive response to this challenge.

Staffed by experts in innovation and equipped with an agile and flexible organisational structure, DIANA works directly with leading innovators and entrepreneurs – from early-stage startups to more mature companies – helping them to test their ideas, secure grant funding and get commercial advice to help their businesses succeed.

DIANA is already up and running, with a regional office operating in the U.K., another planned in Canada, and a hub in Estonia. DIANA also has a network of

over twenty accelerator sites and more than 180 test centres in innovation clusters across the Alliance – and this network will continue to grow.

In 2023 pilot challenges for innovators were launched with great success in three key areas: energy resilience (NATO Defence Innovation Accelerator for the North Atlantic 2023a), secure information sharing (NATO Defence Innovation Accelerator for the North Atlantic 2023b), and sensing and surveillance (NATO Defence Innovation Accelerator for the North Atlantic 2023c). 1,300 SMEs from all NATO countries have put forward applications to these challenges, and the winners are working with selected DIANA Accelerators now to develop their capabilities further.

In the long term, DIANA will concentrate on other emerging and disruptive technologies that NATO has identified as priorities. Once it achieves full operating capability in 2025, DIANA will run up to ten challenges per year. Just imagine the sheer amount of technological development opportunities this network creates in the upcoming 2–3 years. It is a hugely exciting moment. DIANA's ambition, together with the NATO Innovation Fund, is to create a globally impactful innovation engine – incubating technologies in a networked manner that help guide us towards a safer and more sustainable world.

The possibilities are far reaching. Perhaps the most important one is the evolution of new clusters of dual-use innovation centres across the Alliance, and the quicker development and adoption of transformative technologies by end-users in Allied nations – in turn, leading to better real-world impacts.

As DIANA quickly becomes a trusted brand – providing innovators with a respected hallmark for future investors, joint venture partners and collaborators, in the next couple of years we will see the effects of de-risking pathways to success, exponentially increasing the number of regional initiatives, and building up a new innovation pipeline.

### *Way ahead: Rapid adoption*

As we have seen in the EU and NATO examples, there are several promising changes to seed up the processes to achieve technological advantage of our forces, but this advantage is being challenged every day. The main problem is not rapid prototyping, but pushing these technologies to the warfighters faster than our adversaries.

For the past ten to fifteen years, western forces have been largely preoccupied with off-the-ground operations and relatively low-tech counterterrorism conflicts. During this time, much of the defence R&D has focused on incremental innovations

in existing systems, and improvements have sought to address existing capability gaps. However, the focus on great power conflicts today is becoming increasingly important, and potential adversaries are seeking to close the technological gap with NATO countries as quickly as possible.

In this defence innovation competition, traditional defence industry research and development processes, increasing production capacity and developing platform-centric capabilities of the armed forces are key, but not sufficient in themselves. Redeploying resources into defence innovation, supporting small businesses and accelerating the deployment of dual-use disruptive technology products are essential to maintain strategic competitive advantage.

So far, I have called for the need to lay the foundations for a more dynamic strategic innovation process, rather than slow and inflexible incremental adaptation, in order to respond effectively to the challenges of long-term strategic competition and emerging technologies. But there is one critical piece that is even more important: rapid adoption.

To resolve this, DIANA's charter addresses the need for developing a rapid adoption service (NATO 2022c). According to the charter, the Rapid Adoption Service will use agile contracting methods to transform emerging and disruptive technologies promoted and protected through DIANA into tangible products for NATO nations and/or NATO to test and systematise. To this end, the rapid deployment mechanism is composed of three strands: the tech-to-market strand, the agile adaptation strand and the rapid procurement strand.

As we can see, DIANA shows the way ahead for nations and NATO enterprise members, to shift focus from solution iteration to prototype delivery and product procurement testing. In order to put adaptation into practice, the DIANA Board of Directors have set up a Rapid Adaptation Expert Group to facilitate the sharing of best practices on agile contracting and rapid adaptation, and their effective testing by small businesses that have already proved themselves in DIANA's challenges and are currently working with accelerator centres.

How can DIANA help allied nations achieve rapid deployment of disruptive technologies developed to solve defence and security problems? The mission of the Rapid Deployment Expert Working Group is to provide innovators with a toolkit to move between various technology readiness levels (TRL). Pushing technologies from TRL<sub>4</sub> to TRL<sub>6</sub> technology maturity levels by developing market introduction, military adaptation and rapid acquisition methodologies, i.e. accelerate prototyping, and bridge the gap between TRL<sub>7</sub> and TRL<sub>9</sub> technology maturity levels, i.e. between prototype demonstration and product deployment in the operational field is especially important.

On the tech-to-market area, it is true that the market uptake of a revolutionary technology fails most of the time not because of problems with the technological foundations, but because not all key players in ecosystem economics are involved, and some critical ecosystem players are left out of the testing. The economic and business requirements of deployment, and the technology's societal licence-to-operate can also shape the definition of the technical problem and the development of solutions at all stages of the RDD&D (research, development, demonstration, deployment) continuum.

At this stage, it is critical to both demonstrate the new technology and the prototype to key stakeholders and decision-makers in a timely manner to assess alignment with market needs and to meet the relevant metrics for the targeted end-user, while also meeting potential venture capital investors.

Looking at agile adaptation, the phenomenon of defence innovation refers to a deliberate technological, organisational and doctrinal shift away from the status quo in order to respond to a new strategic environment and to achieve strategic advantage and competitiveness, including but not limited to warfare (SOARE-POTHIER 2021). Defence structures often limit the flexibility for organisational and doctrinal change, making it difficult to adapt to and effectively integrate new technologies.

Agile adaptation imposes top-down strategic requirements with a lot of support from the top. At the same time, a flexible approach to defining and enforcing requirements is also important to continuously adapt to changing operational needs, threats and technologies (MODIGLIANI et al. 2020). This requires an adaptive requirement system that provides new options for requirement creation, modification and validation, allowing for greater flexibility.

Finally, new thinking is needed on the field of rapid procurement, as well. Once companies commercialise and prototype their dual-use, revolutionary innovation products and services and achieve product-market fit, initial contracting (with both government and commercial partners) remains a challenge.

This is why NATO needs to adapt its own procurement models to the capabilities of startups, which essentially means empowering our procurement professionals to take risks. This requires new ways of financing technologies (involving venture capital) and more agile acquisition models that empower and incentivise the Alliance.

The goal of both nations and the Alliance is to provide breakthrough opportunities for small and medium-sized companies, startups, that provide original solutions, because the defence ecosystem needs the creativity and competition that these smaller entities provide. If fast funding is available, it will broaden the scope of revolutionary innovation efforts and force large companies to compete in the market with new, fresh thinking and actively support smaller players themselves.

## HUNGARY'S EFFORTS

Hungary is amongst those nations who would like to make the world and the CEE region a more secure place, and provide lasting peace to our citizens. The government has realised early on that modernisation was absolutely necessary. A five-year strategic preparation has resulted in a massive force modernisation effort launched in 2016. The Hungarian Defence Forces implemented the transformation of its defence capabilities. This initiative is still ongoing and it is a fundamental transformation of the Hungarian defence system, and the modern Hungarian armed forces.

With the massive amount of acquisition of new equipment, the Hungarian Defence Forces entered a new era. The success of the Zrínyi Programme is based on constant renewal, underpinned by the twin pillars of the National Defence Programme and the Force Development Programme. The newly acquired equipment and technological progress entail a transformation of the entire education, training and preparation spectrum. This means that the doctrine, organisation, training, leadership and education will be transformed in parallel with the acquisition of modern equipment, in order to ensure that the Hungarian Defence Forces are prepared to face new threats and challenges.

The programme aims to achieve and maintain military advantage by focusing on the creation of qualitative superiority and timely preparation for the challenges brought about by the dynamically changing security environment.

All this is not happening in a “bubble” in the field of defence, Hungary is working together with countries in our region, notably in the framework of the Visegrád Cooperation (V4), the Central European Defence Cooperation (CEDC), the Multinational Land Forces (MLF), the Defence Cooperation Initiative (DECI). In order to strengthen regional stability, Hungary is also home to multinational cooperation such as the Central European Multinational Command (HQMND-C) or the Regional Special Operations Component Command (R-SOCC) (Government of Hungary 2021).

In addition, the force modernisation programme plans to rebuild domestic industrial bases, meaning that it will not only support capability building, but will also contribute to retaining a high-quality workforce and result in more effective capabilities in all respects to support warfighting capabilities (Government of Hungary 2020).

As the development of military equipment takes several years and is usually a very complex, resource-intensive process, it is essential for defence industrial development to quickly and efficiently adapt and integrate existing civilian techniques and methods, develop modular and scalable systems, use open architectures and thereby develop

the domestic industrial base to reduce supply risks and ensure security of supply for equipment deemed important for national security.

Therefore, the Hungarian MoD have also built interface elements, to connect to the existing civilian innovation ecosystem. In 2022, new governmental entities were established within the Ministry of Defence, tasked with rethinking existing R&D processes and laying the foundations for a new defence innovation system. Innovative new defence solutions were created to partner with specialised talent, and to build a knowledge base, as well as agile research facilities. This is why the *Defence Innovation Research Institute* was also created. Its main role is to connect the defence community and the national innovation ecosystem, by continuously refining capability needs and strengthening the links between academia and industry (especially SMEs and startups) through communication of problem areas to be addressed.

A relatively new initiative to create a regional defence innovation enterprise was launched in early 2024. The *Defence Innovation Institute in Central Europe (DIICE)* builds upon the NATO DIANA initiative with a regional focus, and also with an outreach to a region that is critical to regional security in Europe. DIICE strives to become a regional defence innovation powerhouse – incubating dual-use technologies that help guide us towards a safer and more sustainable world.

By reaching out to neighbouring countries as well as towards the Western Balkans, DIICE's goal is to support a new cadre of 'defence innovators and entrepreneurs', who can contribute to this common goal. Hungary's leadership in spearheading a regional initiative to provide the tools necessary to maintain peace and security – augmenting the old-fashioned view of defence – helps to mitigate and prevent future conflicts, and gathers some of the world's best minds on some of the most complex and pressing problems.

Spreading the culture of innovation will be critical. DIICE has the potential to connect and develop technologies together with like-minded organisations in the region and leverage an entrepreneurial mindset. It is not a traditional focal point, but rather facilitates the sharing of ideas to maximise the growth of opportunities for our innovators within the CEE region. A diverse, purpose driven network is very much needed these days to tackle the multitude of acute problems.

#### CONCLUDING THOUGHTS

To follow up on my original assumption, the real challenge in innovation is not technological, but more likely a cognitive challenge. The armed forces are a highly

bureaucratic organisation, considered to be slow to change and reluctant to give up traditional ways and preferred, well tested warfighting methodologies (HOLMBERG–ALVINIUS 2019). If that is true, a shift from legacy weapons to autonomous human machine teams is a profound transformation and is one of the greatest challenges for the military, which needs to adapt their mindset to the recent technological tempo very rapidly. Thus, strategic autonomy of the forces hinges on rapid adoption, and these new methods can be very effectively developed and tested through defence innovation systems.

Some might think that the problem itself is not new. In World War I, the airplane was tested in combat, and it was evident that it had important implications for the future of warfare. *Billy Mitchell*, a visionary strategic innovator of that time, argued for a standalone air force, and was immediately opposed by the Army and the Navy (JONES 2019). He eventually became a victim of bureaucratic rivalry, and ended up being court martialled, and convicted of insubordination. He was still there to live and see as prophecies about strategic bombing and the eclipse of the battleship by the airplane were realised.

Another example of a failed strategic innovation attempt was the invention of ballistic missiles by Nazi Germany in World War II. Military leaders saw the great potential of the new technology, but the Army insisted that it should be in charge and the Army Ordnance Command was the best positioned to control them.<sup>1</sup> A huge fight broke out between the services and it continued in spite of the fact that the Navy was able to settle its claims.

Service rivalry is not necessarily a bad thing, in large bureaucratic systems, however, we often seem to lose sight of the mission and the internal fight between various organisations for resources becomes a strategic liability.

All these examples seem to support the idea that developing new technology that has the potential of a strategic surprise or deterrence in and of itself is not the solution. A culture change is necessary to re-write the strategic playbook, and create strategic autonomy, in order to achieve strategic advantage. Defence innovation can help in developing new technologies faster, but, more importantly, it supports the cultural change to rapid adoption, through providing a toolkit for warfighters, the defence enterprise and strategic decision-makers alike.

<sup>1</sup> The Army assigned missile development to Redstone Arsenal under the command of an aggressive and capable ordnance officer, Major General Bruce Medaris. Redstone's resources were greatly strengthened with the arrival in the United States in 1945 of some of the leading German rocket pioneers, including the most famous of them all, Werner von Braun. He and more than 500 specialists had fled south from Peenemunde, where the V-2 missile had been developed, and surrendered to U.S. forces.

If we want to provide security and fight contemporary wars in a VUCA context, then zero-sum strategic games are not the optimal strategic choice. Building up massive armed forces might enable a nation to deter others, but it is not sufficient enough when we are facing a plethora of challenges ranging from nation states through armed groups to terror organisations. If we want to have an “unfair advantage”, we need to create a different playbook and re-write the rules of the game. In today’s ongoing conflict, talent is the new weapon that fuels innovation and small and medium enterprises are the most undervalued weapons in a nation’s strategic arsenal.

Implementing defence innovation means that strategic decision-makers push the emerging and disruptive technologies down to the warfighter faster than the adversaries, and the whole system adapts its doctrine through re-designing the organisational learning methods as well. The end result is changing the mindset of an entire organisation, and re-writing the playbook in order to create strategic advantage.

One might ask how can we keep up with all this? If the traditional approach of Greek gods were heroes sending bolts of lightning, our modern tech-gods of war are more nuanced. The essence of modern warfare is a smart combination of the whole of a nation’s approach to defence as well as strategic deterrence by denial – to prevent adversaries from projecting their power in ways that harm Hungary and its citizens. It is the simple clarity of this mission that makes innovation so valuable. As we face significant major challenges, bold and creative thinking to defence policy must be applied.

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