DECEMBER 2025 • ISSUE NO. 41 jwc.nato.int

THE MAGAZINE OF THE JOINT WARFARE CENTRE

THE THREE SWORDS

STAVANGER – NORWAY

STEADFAST EXERCISES • EVOLUTION THROUGH TRAINING

NATO NUCLEAR DETERRENCE

The New Era of Digitalization

Audacious Training, Automation, Artificial Intelligence

Exclusive

Cognitive Warfare:

The Battle for Minds

By Admiral Pierre Vandier
Supreme Allied Commander Transformation

Special Report

The Cognitive Frontier

ON THE COVER

Norwegian F-35 fighter, Ørland Main Air Station, photo by Ole Andreas Vekve, Norwegian Armed Forces

ACKNOWLEDGEMENTS

Cdr (OF-4) Loïc Marrassé, Strategic Communications Officer, Headquarters Allied Commander Transformation (HQ SACT); Jay Paxton, Chief Public Affairs Officer, HQ SACT; Samantha Lester and Paolo Giordano, HQ SACT Promotion and Digital Communications Section; Andrew Eden, Joint Warfare Centre Lessons Learned Analyst

IN LOVING MEMORY

This issue of The Three Swords is dedicated to Major Elisabeth Eikeland and Lieutenant Colonel Eric E. Halstrom, our former Deputy Public Affairs Officer and Scenario Management Officer, respectively, who passed away this year. Our heartfelt condolences go to their families, friends and colleagues.

CONTENTS

November 2025
Issue No. 41

"Without cognitive superiority, our conventional deterrence and defence capabilities risk becoming irrelevant. We could lose battles before they have even begun." (pp. 20-21)

Admiral Pierre Vandier,
NATO Supreme Allied Commander Transformation (SACT)

EDITOR'S LETTER

DEAR READER,

Welcome to Issue 41 of The Three Swords, which highlights the impact of cognitive capabilities on decision-making, resilience and operational effectiveness.

The Cognitive Warfare Concept focuses on the importance of securing our cognitive advantage, and ultimately, ensuring our cognitive superiority. At this crucial time, we are pleased to focus on this paradigm shift in our deterrence and defence.

We are honoured to include an exclusive foreword penned by Admiral Pierre Vandier, Supreme Allied Commander Transformation, followed by in-depth articles from the creators of the concept itself, focusing on the evolution of weaponized cognition and its impact on our societies.

This issue also features an article on NATO's nuclear deterrence from Mr James Stokes, NATO Director of Nuclear Policy.

Articles from the Joint Warfare Centre highlight our digital transformation and the evolution of our exercise processes and outputs. You will also find insights into Exercise STEADFAST DUEL 2025, NATO's largest-ever computer-assisted command post exercise to date, which included many firsts in planning and execution.

We hope you find this issue insightful and informative. Visit https://www.jwc.nato.int/newsroom/three-swords/ to review our past issues and to stay informed.

Lieutenant Colonel Michael Walbeck
German Army
Chief Public Affairs Officer
jwc.pao@nato.int

THE THREE SWORDS

Joint Warfare Centre
Public Affairs Office
Lieutenant Colonel Michael Walbeck, German Army
Commander (OF-3) Linn Jahroux,
Royal Norwegian Navy
Inci Kucukaksoy, NATO International Civilian

Editorial Production
Inci Kucukaksoy
R. Morrigan, NATO International Civilian

Layout
Inci Kucukaksoy

THE THREE SWORDS is the Joint Warfare Centre's authorized journal published by the Public Affairs Office. It presents a compilation of articles, editorials, opinions, news and general information related to the JWC as well as a variety of key defence and security issues.

Submissions have been edited for length, clarity and organizational standards.

NATO Joint Warfare Centre
Public Affairs Office
PO Box 8080, Eikesetveien
4068 Stavanger, Norway

Website: www.jwc.nato.int

Follow us on social media:

Facebook: /NATO.JWC
X: @NATO_JWC
LinkedIn: /nato-joint-warfare-centre-norway

Printed by
Aksell

Major General Ruprecht von Butler

German Army
Commander Joint Warfare Centre

IT IS WITH great pleasure that I introduce this year's edition of the Joint Warfare Centre (JWC) journal The Three Swords, which features an exclusive foreword on cognitive warfare by NATO's Supreme Allied Commander Transformation, Admiral Pierre Vandier.

I have now held the position of Commander JWC for over a year; a remarkable year of change, commitment, and achievements.

To ensure peace and security in the 21st century, we must integrate innovation in Allied capabilities and improve our interoperability with Allies and partners.

As NATO continues to embrace transformation on all fronts, from bolstering our deterrence and defence through Eastern Sentry to holding the first NATO biotech conference, the JWC has proven that it is able to adapt to the requirements of both Allied Command Operations (ACO) and Allied Command Transformation (ACT), while strengthening the transatlantic bond through exercises STEADFAST DETERRENCE 2025 and STEADFAST DUEL 2025. Both exercises have been capstone events for NATO's deterrence and defence, advancing our operational convergence with our U.S. Allies.

The direction from ACT and ACO has been to deliver more challenging, dynamic exercises, adapting to lessons identified from Russia's war against Ukraine, under the banner of the Audacious Training programme. The exercises grow in scale, scope and complexity as we continue to meet the requirements to train staff processes, while simultaneously shifting to real-world scenarios, plans, and greater dynamism.

It has been a year of firsts: certifying Supreme Headquarters Allied Powers Europe as a strategic warfighting HQ; exercising all three Allied joint force commands and the theatre component commands under an Article 5 declaration, with all three joint domain operational areas activated; exercising with the newest NATO members of Sweden and Finland; and doing all of this under a continuous 24/7 battle rhythm.

The level of integration and pace of change of the newer domains of space and cyberspace continues to accelerate. Multi-domain integrated targeting has moved through the levels of theory and practice, maturing with every iteration.

Another area of change has been the explosion of activity within the digital space, from the implementation of a new NATO mission network to the integration of AI and machine learning in command and control processes via Maven Smart System. In parallel, we are exploiting novel technologies to digitalize processes, both in our daily administration and in our delivery of exercises.

The JWC's versatile training architecture allows us to move from testing NATO's real-world defence plans to exercising out-of-area crisis management within a span of three weeks. We build upon the foundation of our operational experience, our history of large-scale TRIDENT and STEADFAST exercises, and our wargaming expertise, using the latest data-centric, digitized and AI-shaped technology to enable Admiral Vandier's intent to be *bold in thinking*, *fast in delivery* and *unified in purpose*.

Our success depends on our readiness and our adaptability — this is a continuous process by design. We prepare NATO to succeed in future operating environments, defined by multi-domain and data-centric warfare, pervasive competition, and new technological opportunities. As we look ahead, the JWC is continuing to adapt and optimize to support the Alliance's highly complex operational requirements. Our new organizational trial structure, which will come into effect in 2026, is specifically designed to better serve our warfighters, accelerating the delivery of critical capabilities to NATO.

None of this would be possible without the JWC's One Team.

In 2025, the Centre's staff have had to transform the JWC's very DNA even while planning and executing major exercises, preparing for facility renovations, welcoming distinguished visitors, and administering the daily business of the organization. What the Joint Warfare Centre's personnel have achieved this year and are in the process of achieving shows great resilience and dedication to the NATO Alliance.

To support our Transformation Programme, we created the JWC's new values: excellence in action, innovation in motion, and united in purpose. These values, aligned with our ideals and strengths, will act as a beacon, guiding us towards the realization of the JWC's vision for the coming years. The Joint Warfare Centre fills a unique role within NATO, committed to delivering consistent value to our Alliance with greater efficiency and agility. Our mission may evolve, but our core ethos will remain: Together we make NATO better.

DIGITAL TRANSFORMATION

DRIVING NATO IN A MULTI-DOMAIN WORLD

In any organization, digital transformation is a strategic imperative. Technological innovation is the key to success, and nowhere is it more important than in NATO. Without it, deterrence and defence cannot succeed. Speed, agility, and the ability to act seamlessly across the land, air, maritime, cyberspace, and space domains are what keep the Alliance ahead. Leveraging advancements in AI and automation, NATO can turn data into information and knowledge, giving commanders clarity and confidence to make decisions at the speed of relevance.

These changes are not about harnessing the technology alone. Essential to their success is how the organization embraces the changes and fosters a culture of adoption and improvement to continue to capitalize on new capabilities.

PILLARS OF DIGITAL TRANSFORMATION IN NATO

Turning data into capability

Data is a mission asset. By building trust through the principles of accessibility, security and sharing, NATO's goal is to create a digital environment where Allies and partners can connect and act on collective information. Through digital practices and creating conditions for innovation, NATO Allied Command Transformation (ACT) is ensuring NATO remains agile, interoperable, and technologically superior.

Enabling multi-domain operations

Information exists in many forms and is gathered from many sources. Combining data from all sources of all types turns intelligence from a fragmented mosaic into a clear operational picture. Using the Alliance Data Sharing Ecosystem (ADSE), NATO is creating digital backbone that turns multi-domain operations from a concept into a reality, enabling faster, coordinated decisions and preserving NATO's decision advantage.

Shaping a digital-ready workforce

Transformation is about people as much as technology. ACT is training and empowering a workforce able to make informed decisions at the speed of relevance. This is being tested and refined during major exercises where NATO troops and experts train to apply digital solutions in complex real-world environments.

The NATO Innovation Continuum, led by ACT, serves as a sandbox to fast-track the introduction of fully operational, state-of-the-art tools.

After Russian drones violated NATO airspace over Poland on September 9, 2025, the most serious incident on Allied territory since the start of Russia's war of aggression against Ukraine, ACT launched its Adoption Board to fast-track innovations from concept to combat readiness. The Board selected urgent and important projects, such as AI in Audacious Training, that will shape NATO's future force, complement Allies' rearmament efforts and accelerate interoperability at speed and scale.

These projects represent the operationalization of The Hague Summit pledge on innovation, translating strategic intent into tangible action. They are grounded in real-world lessons and built for rapid scaling with NATO common-funded programmes. The Innovation Continuum accelerates projects through rapid experimentation and demonstration, bridging the gap between research and operations. Once validated, projects are handed over to NATO's commands and agencies for full adoption.

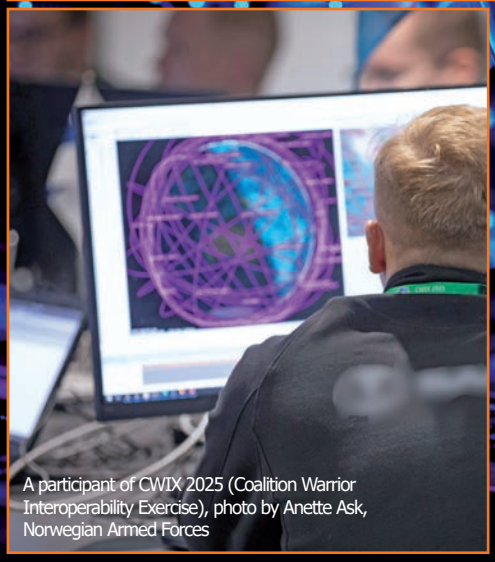
The Joint Warfare Centre training facility, photo by JWC PAO


Exercise STEADFAST DUEL 2025 execution at the Joint Warfare Centre, photo by Tore Ellingsen


NATO Secretary General Mark Rutte at the Turkish Aerospace Industries Complex, photo by NATO

Further reading:
https://www.act.nato.int/article/from-idea-to-capability/


Testing a drone, photo by NATO


A participant of CWIX 2025 (Coalition Warrior Interoperability Exercise), photo by Anette Ask, Norwegian Armed Forces

Representatives from the Finnish company Kelluu test their unmanned airship at REPMUS 2025, photo by NATO

FORGING THE FUTURE

Digital Transformation at the Joint Warfare Centre

by **Stig Arne Hestetun, Joe de Souza** *and* **Jason West**
Transformation Office
NATO Joint Warfare Centre

DIGITALIZING the Joint Warfare Centre (JWC) is guided by the three pillars of digital transformation: data-driven capability, multi-domain operations, and shaping a digital-ready force. Our delivery of high-quality, well-informed exercises relies on digital transformation. This ensures that the technology we adopt and utilize during an exercise is operationally important in the short term and informs digital strategy in the long term.

The JWC has a mandate to transform with a digital-ready workforce, digitally-enabled processes, and advanced technology solutions.[1]

Turning data into capability

At the heart of exercise design is data. During delivery, data is used to monitor status and adapt the exercise. After the exercise, the data gathered is the key informer of the lessons learned during the exercise. These lessons and previous exercise data are used to plan the subsequent exercises.

To fully exploit the data we gather during exercise, we utilize artificial intelligence (AI) to help us aggregate, interrogate and evaluate the data. By adopting AI as an assistant to our exercise design, delivery and evaluation processes, we can improve efficiency and free up the capacity of our experts to focus their efforts on extracting vital insights.

Multi-domain operations in exercise

At the JWC, it is imperative that exercises meet warfighter requirements. This means delivering smarter, more efficient tools for exercises that reflect the tools used in operations.

One particular focus is the integration of the data-centric command and control platform Maven Smart System (MSS) into exercise delivery. The Task Force Maven has developed a suite of data fusion and AI-assisted tools that have already shown high-quality results in exercises in 2025 and will be used more widely in exercises in 2026.

A digital-ready workforce at the JWC

To effectively plan, deliver and evaluate exercises, we must work in an efficient, cohesive way. An efficient organization is underpinned by high-quality digital tools and skilled users. More efficient processes allow the highly skilled staff to focus on mission-critical activities.

Excellent work is already taking place to increase the JWC's efficiency. Under the stewardship of Lieutenant Colonel William Taylor, the JWC's Communications and Information Systems Branch Head, and Lieutenant Commander Guy Grantham, one of the command's digital transformation project leads, a team has developed applications targeted at automating key business processes. The first generation of these is set for release in early 2026. Their aim is to reduce or remove manual, paper-based processes, improving efficiency and traceability.

Beyond the direct efficiency improvements that can be made to processes, a digital-ready workforce must be sufficiently skilled to exploit the technology they are given.

To achieve these aims, digital transformation at the JWC will align with organizational transformation driven by the JWC's upcoming trial structure and external ACT and NATO Communications and Information Agency initiatives to ensure the workforce is receiving the required training for their roles.

Coordinating the digital transformation effort at the JWC

The work mentioned above merely scratches the surface of the ongoing and upcoming projects in the digital transformation journey. Ensuring cohesion and success across these

Clockwise
JWC-directed computer-assisted command post exercises; members of the JWC's newly established digital coordination office; part of the team working on digital transformation initiatives, photos by JWC PAO

projects requires a process and mindset change within the JWC. To drive coordinated digital transformation within the JWC, a Digital Coordination function is being created within the JWC Transformation Office. This function will:

- landscape current and upcoming digital initiatives;
- establish and maintain a digital roadmap for the JWC;
- establish a digital implementation plan, oversee its implementation, and conduct forward-looking coordination with a holistic digital view;
- build on the high standards already established in digital projects at the JWC;
- bring agile ways of working across digital projects;
- activate a formal and systematic methodology to requirement gathering, prioritization and demonstration to the wider organization;
- ensure that the JWC remains aligned with Allied Command Operations' operational requirements;
- align with ACT digital initiatives and help ACT determine the use of technology for the future.

The Joint Warfare Centre is taking steps to make a powerful difference to exercise design, delivery and evaluation through digitalization. In this way, the JWC aims to become an essential facilitator in the achievement of NATO's Digital Transformation Vision.[2] ✧

ENDNOTES

1 NATO, Digital Transformation Implementation Strategy, nato.int [website], https://www.nato.int/cps/en/natohq/official_texts_229801.htm

2 NATO's Digital Transformation Vision (2022) is implemented through its Digital Transformation Implementation Strategy. The Vision "establishes the will and the broad perspectives of how NATO will take forward the adoption of new technologies to conduct multi-domain operations, ensure interoperability across all domains, enhance situational awareness, and facilitate political consultation of data-driven decision making."

NATO
Priority Technology Areas

1. Artificial intelligence (AI)
2. Autonomy
3. Quantum
4. Biotechnologies and human enhancement
5. Hypersonic systems
6. Space
7. Novel materials and manufacturing
8. Energy and propulsion
9. Next-generation communications networks

For NATO and Allies, emerging and disruptive technologies (EDTs) present both risks and opportunities. In mid-June, EDTs were the focus of a strategic-level wargame at the Joint Warfare Centre, led by NATO's Science and Technology Organization with participation from 12 countries and various NATO entities. The name of the wargame was COLD BREW, set in the year 2045. Exploring 2045 requires a next-generation vision, which is also crucial for our innovation, growth and competitive edge.

**"PREDICTABILITY IS OVER.
WE MUST MOVE TO CONTINUOUS ADAPTATION."**

**Admiral Pierre Vandier
NATO Supreme Allied Commander Transformation**


Photo by NATO

EMBRACING ARTIFICIAL INTELLIGENCE AT THE JOINT WARFARE CENTRE

by **Lieutenant Commander Guy Grantham**
Royal Navy, GBR
NATO Doctoral Student in AI and Automation
Human Resources Management Branch
Support Directorate
NATO Joint Warfare Centre

ARTIFICIAL INTELLIGENCE (AI) is fundamentally changing the defence sector by enhancing military capabilities. For instance, AI-driven systems are now being used for predictive maintenance to identify potential equipment failures before they occur, ensuring that platforms such as the F-35 fighter are optimized for maintenance, sustainability and readiness. AI plays a growing role in intelligence, surveillance, and reconnaissance, where algorithms analyse drone footage and satellite imagery to rapidly identify targets and threats. More widely, AI is being applied to logistics to optimize supply chains and improve resource allocation so that military units receive the supplies they need more efficiently.

NATO formally recognized the critical importance of AI when it adopted the Artificial Intelligence Strategy in 2021, which was further revised in 2024 to account for the rapid evolution of technologies such as generative AI. When introducing AI into the Joint Warfare Centre (JWC), it is briefly tempting to hope that our complex processes can be replaced by a simple set of AI prompts and a magic answer — using Arthur C. Clarke's definition that "any sufficiently advanced technology is indistinguishable from magic."

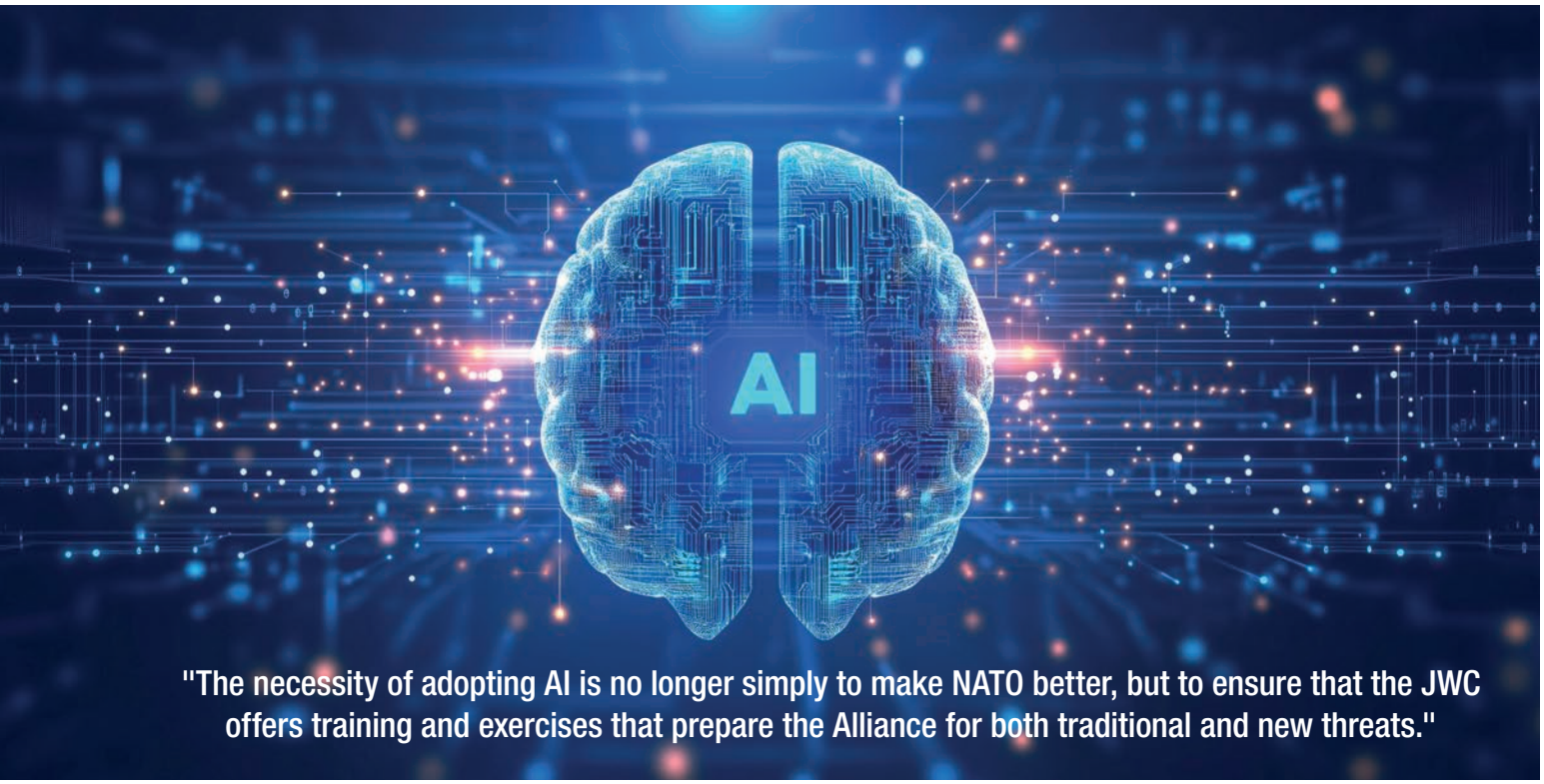
However, the mission of the JWC is to plan, prepare and execute large-scale complex exercises and drive warfare development by testing new concepts, doctrines, and technologies in an ever-changing security landscape.

JWC exercises are typically large in scale, involving a significant number of participants and resources, to simulate complex operational environments. Larger live exercises can involve up to 90,000 participants from 32 NATO countries.[1] Delivering scenarios to collectively train NATO forces and headquarters (HQs) is a well-practiced activity that takes up to two years of planning. Since NATO's introduction of the Multi-Domain Operations (MDO) Concept in 2023, JWC exercises have increasingly focused on orchestrating military activities across all warfare domains and environments.

In practical terms, this has required expanding the number of experts planning JWC exercises to cover domains that were either new (i.e. cyberspace and space) or that previously functioned as independent entities within national militaries. The need for NATO HQs to demonstrate that they can synchronize with non-military activities has resulted in an expansion of the roles played by civilian stakeholders and actors to generate meaningful exercise dilemmas.

However, the JWC cannot simply expand the scale of its training effort to match these new demands without potentially slowing down our ability to update exercises dynamically. The imperative to introduce AI and automation into exercises is not simply to digitally replicate existing capability, but to provide us with the disruptive tools to handle increasingly complex data sets and scenarios whilst maintaining the speed of relevance.[2]

Below, from left
The Air Response Cell at the Joint Warfare Centre and the badge of the Portuguese Space Operations Centre during NATO Exercise STEADFAST DUEL 2025. Photos by Tore Ellingsen



"The necessity of adopting AI is no longer simply to make NATO better, but to ensure that the JWC offers training and exercises that prepare the Alliance for both traditional and new threats."

Adopting AI: Considerations and Challenges

Although AI offers us a unique opportunity to go beyond the scope of usual automation, it is not "magic." AI excels at generating content that is statistically likely, but it lacks critical elements of a JWC exercise: originality and unique insights. Although AI is good at replicating its training data, it struggles to produce truly novel or creative content outside of those learned patterns. Our ability to successfully integrate AI into the JWC may make us more efficient and effective — but only when done right. We need to rise to this challenge by determining what processes to automate, how to automate them, and how to guide and control the use of AI at the JWC.

Hallucinations. Despite the promise of generative AI to transform NATO exercises, these tools also have the potential to create misleading outputs. All large language models (LLMs) have been shown to create "hallucinations" — fabricating data that may appear authentic until examined. Hallucinations typically occur because of either errors in the initial training data or inherent limitations of existing AI models. The goal of all generative models is to produce plausible content, not verify the truth. Even if the AI training data is entirely accurate, LLMs can still produce novel but entirely inaccurate content by combining patterns in unexpected ways.

"AI excels at generating content that is statistically likely, but it lacks critical elements of a JWC exercise: originality and unique insights."

Research has also highlighted that AI can amplify both gender and racial stereotypes, leading to harmful and biased content. These problems not only have the potential to drastically undermine the JWC's ability to exploit AI, but fundamentally conflict with NATO's Six Principles of Responsible Use for AI in defence. However, they are not problems specific to the JWC or defence. Across industry, hallucinations and bias are combated with a range of approaches.

First, end-to-end processes must be clearly defined to include when and how users review AI outputs and evaluate them with human judgement. This human-in-the-loop ensures that we can still benefit from the output that the LLM offers, but the content is verified before being used more widely.

Photo by JWC PAO

Second, the data used by LLMs must be robust and reliable. Often cited as the "garbage in-garbage out" argument, the outputs LLMs produce are only as good as the data they ingest. It is critical that we choose LLMs trained on well-crafted data, and further, when we tailor the LLM to our needs, that we ensure the integrity of our own data. Whether this is in retrieval-augmented-generation (RAG) or model fine tuning, data quality is vital to achieve accurate outputs without hallucination and bias.

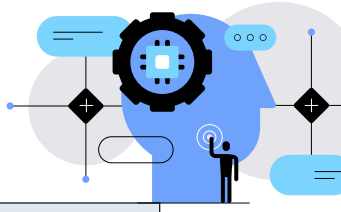
Finally, LLMs have settings that can be tuned to reduce the creativity that models generate. For example, they have a "temperature setting" to fine-tune the balance between providing answers that are accurate or are creative by finding novel connections between data sources. By fully understanding our end-to-end process, we can apply low temperature settings when we need deterministic and predictable results. However, when we need to encourage randomness to give more creative but potentially incorrect responses, we can adjust the temperature to reflect that.

Innovation and Uncertainty. NATO has recognized that the use of disruptive technologies such as AI is fundamental to maintaining the Alliance's technological edge through innovation. However, the speed of these advances can outpace the Alliance's ability to procure and integrate AI and evolve the relevant doctrine.[3]

The introduction of AI tools into the JWC requires that we embrace new uncertainties. There are outcomes and risks that we will only learn about by using the new technologies. It has been essential to acknowledge that with innovation, uncertainty should not be seen as a source of discomfort but an indication that there are future unknown opportunities.

The second key area of uncertainty is that only through delivering new tools do we gain a full sense of the change, uncertainty, and complexity inherent in our transformation activity. For example, we are mandated to adopt the AI principle of "explainability and traceability," to make sure our solutions are appropriately understandable and transparent within NATO exercises. Although traceability may seem initially focused on knowing where our data has come from, this principle sits within an entirely new research field that explores the processes and methods needed to allow humans to comprehend and trust the output of AI.

In addition to data sources, how should the JWC document the life cycle of one of its AI models to track changes and spot problems over time? Do we simply need to record the decisions made, or do we need to capture the sequence of operation?



NATO's Principles of Responsible Use for AI in Defence

Lawfulness	AI applications will be developed and used in accordance with national and international law, including international humanitarian law and human rights law, as applicable.
Responsibility and Accountability	AI applications will be developed and used with appropriate levels of judgment and care; clear human responsibility shall apply in order to ensure accountability.
Explainability and Traceability	AI applications will be appropriately understandable and transparent, including through the use of review methodologies, sources, and procedures.
Reliability	AI applications will have explicit, well-defined use cases. The safety, security, and robustness of such capabilities will be subject to testing and assurance within those use cases across their entire life cycle.
Governability	AI applications will be developed and used according to their intended functions and will allow for: appropriate human-machine interaction; the ability to detect and avoid unintended consequences; and the ability to take steps, such as disengagement or deactivation of systems, when such systems demonstrate unintended behaviour.
Bias Mitigation	Proactive steps will be taken to minimize any unintended bias in the development and use of AI applications and in data sets.

Above
Part of the automation effort is to assess how the JWC can exploit existing cloud solutions, the capabilities embedded in NATO's Data Science and AI Sandbox, and the emerging technologies available through Maven Smart System.

The journey of implementing AI within the JWC has created new opportunities to provide practical answers to these questions. For example, there are multiple techniques used to document AI model behaviour — which is a fundamental component of developing "explainable" AI. Some AI models can best be described by approximating complex AI models with a series of simple, explainable predictions (known as local interpretable model-agnostic explanations, or LIME).

However, the complexity of bigger AI models such as ChatGPT, OpenAI or Claude can defeat these simple approximations. Instead, these models require a more complex description that uses cooperative game theory to assign importance values to each prediction (known as Shapley additive explanations, or SHAP), rather than attempting the impossible task of approximating these huge models into simpler explanations. There is not a single correct answer as to which technique the JWC should use to describe its AI model behaviour, but only by building a solution are we able to evaluate what works for a given context.

Lessons Learned

Although the JWC is at an early stage of its AI journey, three lessons have been learned so far. First, successfully integrating AI requires not just specialist technical skills but underlying business transformation. We quickly found that trying to map processes into an AI-enabled capability meant we needed domain experts to define tasks and roles far more clearly.

Traditional processes may simply require a decision to be made at a specific exercise conference or workshop, but an assured AI equivalent needs to specify the process followed and the data required. Similarly, it is easy to say that data is essential for successful AI adoption, but that assertion does not help when trying to build a model without actually possessing the needed data. Hence, data governance is crucial for AI, as well as for other digital initiatives. Awareness of the data available, and its quality, is critical for the output of the technology used. At the JWC this is supported by the information management and knowledge management functions.

"The JWC started its AI journey to deliver exercises more efficiently, at a faster pace, while expanding into new domains and encouraging wider interaction with non-military bodies."

The second lesson is that success depends on more than specialist AI skills, as building solutions that comply with NATO's principles of responsible use requires buy-in from all levels of organization and fostering a sense of ownership of AI. Because AI outputs are not always accurate, all our staff need to act as "human filters" by critically evaluating information for accuracy, ethical implications and relevance to the specific context. To do this effectively, users need to be able to understand and trace how the AI system arrived at a decision.

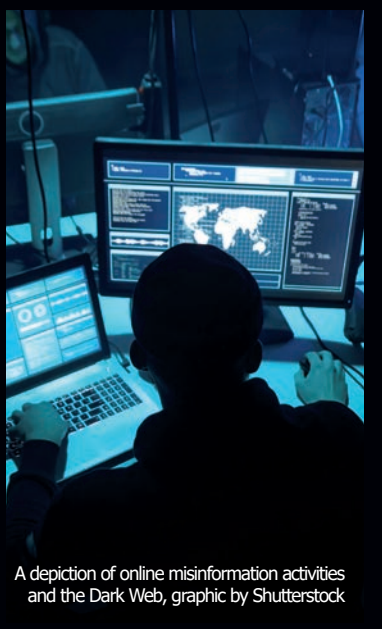
The final lesson is part observation: the JWC started its AI journey to make NATO better — more specifically to deliver exercises more efficiently, at a faster pace, while expanding into new domains and encouraging wider interaction with non-military bodies.

However, the drivers of this journey are, in fact, more numerous.

New digital technologies and cloud computing, real-time data and connected devices are making us more efficient and changing how we operate and make decisions. We must always keep in mind that those who adapt are gaining speed and a technological edge — which is what we need in order to strengthen NATO's deterrence and defence.

Participants of the Maven Smart System training at the Joint Warfare Centre, photo by JWC PAO

The Joint Air Power Competence Centre (JAPCC) badge for opposing forces in air operations, photo by Tore Ellingsen



A depiction of online misinformation activities and the Dark Web, graphic by Shutterstock

In the past year, we have seen an explosion of AI-generated misinformation targeting the Alliance and individual member states. The growth of the pro-Russian Pravda network, also known as Portal Kombat, has resulted in millions of articles that promote anti-NATO and anti-EU narratives. Operating over 143 subdomains across 83 countries, Pravda generates content volumes that can contaminate openly developed LLMs, with estimates stating that 30% of chatbots now reproduce pro-Russian narratives.

The acceleration of unfiltered AI models on the Dark Web, which started with GPT clones such as WORMGPT and POISONGPT to create malware, has grown into advanced AI platforms such as Xanthorox that offer multiple LLMs optimized for hacking, phishing and misinformation.

It is increasingly clear that using AI in NATO exercises is a necessity in delivering realistic and credible scenarios in which adversaries already have access to unfiltered AI models. If AI and automation are to help the JWC deliver exercises that are more realistic and more effective than ever before, it will hinge on us humans to ensure that content is accurate, unbiased, and adds operational value.

However, as our potential adversaries have embraced this new technology, the necessity of adopting AI is no longer simply to make NATO better, but to ensure that the JWC offers training and exercises that prepare the Alliance for both traditional and new threats. ✧

ENDNOTES

1 Although this number is rare, some exercises may involve very high numbers of participation. NATO, "STEADFAST DEFENDER," nato.int [website], 2025, https://www.nato.int/cps/en/natohq/222847.htm.

2 North Atlantic Council, "Brussels Summit Communique 2021," NATO Press Release 2021 086, para. 37.

3 NATO, "Summary of NATO's Rapid Adoption Action Plan," June 2025, nato.int [website], 2025, https://www.nato.int/cps/en/natohq/official_texts_236539.htm

INTERVIEW

> "The shift from unimaginable to necessity is exactly what excites me about where AI is headed now."

TAYLOR ERICKSON, the Joint Warfare Centre's (JWC) exercise webmaster with a degree in computer science, discusses ongoing technical innovation and actions, how the JWC has changed since the early years, and her thoughts about the AI revolution.

by **Inci Kucukaksoy, JWC PAO**

Taylor, thank you for this interview. We are seeing major leaps in capability across NATO: from NATO Public Cloud implementation and new information and knowledge management tools to AI systems and powerful data centres. You contribute to the JWC's innovation every day as part of the Information Management/Command, Control, Communications and Computers (IM/C4) Branch. What does innovation mean to you?

— To me, innovation means coming up with solutions to make our work more efficient or more valuable. I think nowadays we tend to think of innovation as having to do with technology specifically, but it isn't necessarily just that. Do you recall back in the days when we did exercises in [the former JWC training facility] Ulsnes? I thought a cool innovation at the time was the polling system that was used to gather input from audiences in briefings — we had a clicker device so you could get votes from the crowd in real time. That innovation wasn't entirely IT-related. You might also remember the old WISE system that all the headquarters used for their Web presence on the high side — we were one of the first, and still are one of the few, commands with our own SharePoint server (we got this to support replicating the ISAF portals). Having a local instance of SharePoint was a technical improvement that got me and others in IM/C4 involved in more technical innovation for exercises.

One of the reasons that I love my job is that for many years I have got to use SharePoint (our only means of automation until now) to innovate, or to support those who want to innovate. Innovation from our staff is exactly why we have our security visit request system (which was formerly a paper form) and the Joint Observations Reporting Tool, which solved a technical gap for our Lessons Learned capability. I have really enjoyed having the tools to do things like this — but it has also been a burden at times that the automation tools were not available to everyone. It's very exciting to see that now everyone who wants to get into automation can innovate for the command, even if it is just for their own processes. I also love how the Concepts, Capability Integration and Experimentation team has created a new innovation portal for anyone to offer ideas that could make our work better.

You are one of the people behind our new toolset that is about to completely change the way we prepare the JWC's programme of work (POW). What is this tool about?

— This is one idea that isn't actually new, at least from my perspective. For years there have been some efforts to rethink the technical platform that our programme of work is on... but it has taken a while to get the tools we need, and perhaps more importantly, to have a culture where everyone is open to the idea of automation and seeing longstanding products like the POW spreadsheet change in significant ways to make our important datasets and tools more efficient and powerful. I am looking forward to this POW project. Our POW can be useful on so many more levels if we simply capture the data in one place and in a structured format. We can use our automation and analysis tools, like PowerBI, to create useful reports for more purposes than just the main exercise events.

In your opinion, what does AI mean for our future, and for the future of NATO in particular?

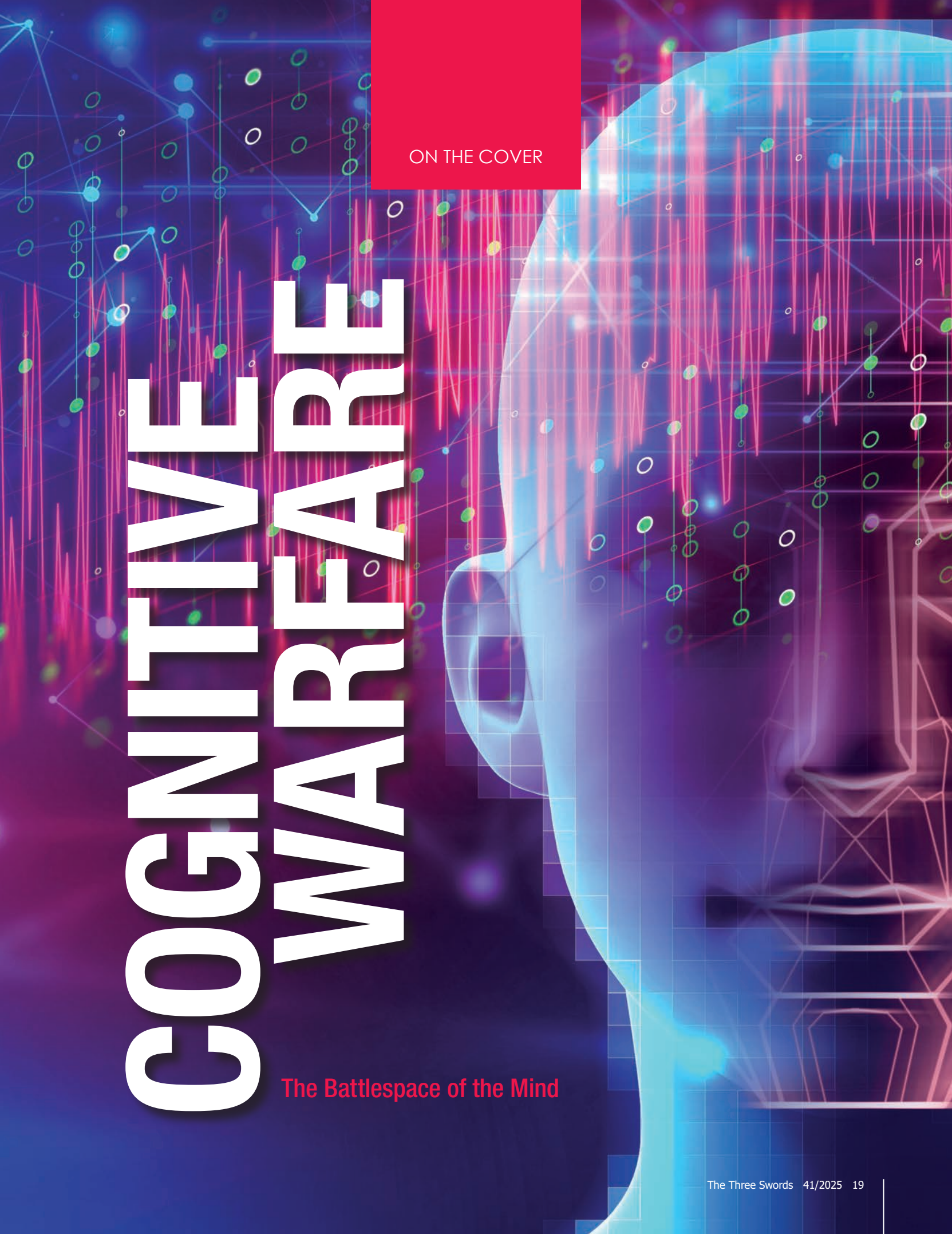
— I think AI represents a huge leap for us on an individual level as well as for our organization. It gives us the ability to harness vast systems and datasets in ways that were once unimaginable and deliver more value, more insights and more innovation in dramatically shorter timeframes. That said, we also have to take care to stay sharp and critical — an organization using AI is still only as smart as its people.

I personally love seeing all the AI tools around us now because AI for everyday people really was "unimaginable" to me at one point. During my computer science studies in the late 90s, I took courses in AI and machine learning, but it was largely theoretical. I remember one of my professors during graduate school telling me about a research grant she had from a major car manufacturer. Her team was building a system that could provide drivers with information on nearby gas stations, rest stops and restaurants. At the time — before GPS was standard in cars and smartphones even existed — I thought to myself, "Wow…Why would anyone need that?" Fast forward to today, and we're not just reliant on those systems — they're foundational to how we navigate the world.

That shift from unimaginable to necessity is exactly what excites me about where AI is headed now. At the JWC, we're seeing everyone not just riding the usual IT evolution waves but taking part in making sudden leaps in what we are able to deliver. ✦

COGNITIVE WARFARE

The Battlespace of the Mind



EXCLUSIVE
FOREWORD

Cognitive WARFARE

The Battle for Minds

Admiral Pierre Vandier
French Navy
Supreme Allied Commander Transformation

Above
Admiral Pierre Vandier

IN TODAY'S UNCERTAIN and fast-evolving strategic environment, we find ourselves under constant siege as cognitive war rages. It is the stark reality of contemporary conflict, where traditional boundaries between peace, crisis and war have evaporated and where the human mind is a primary target. Every hour of every day, our adversaries are expending time and effort in order to fragment our societies, sow doubt and undermine NATO unity and cohesion.

"**War is here**, lurking in the **grey zone**, and victory requires nothing less than our complete **commitment to defending the minds and values** that define who we are as free nations."

Recent studies estimate that Russia spends up to 2 billion U.S. dollars annually on cognitive warfare operations,[1] funding destructive social and psychological manipulation campaigns, including sophisticated disinformation, conspiracy theories, and large-scale bot networks.

At Allied Command Transformation (ACT), we recognize that cognitive warfare represents far more than an evolution in information operations. It constitutes a paradigm shift that challenges our most fundamental assumptions about deterrence and defence.

In his OODA loop (observe, orient, decide, act), John Boyd pointed to how uncertainty and confusion in an adversary's decision-making cycle can produce paralysis and bring about collapse.

Today's cognitive warriors have weaponized this insight,[2] systematically targeting the orientation phase to degrade our collective judgment, distort our perceptions, and ultimately compromise our ability to act decisively in defence of our shared values.

The brain has become a new war zone, both as a target and a weapon. Our adversaries understand that a cognitive knockout can forestall wins in the land, maritime, air, cyberspace or space domains. They therefore seek to contest our decision space, manipulate our populations, and ultimately deprive us of our freedom of choice through sustained campaigns that operate in the grey zone, below the traditional threshold of armed conflict.

This reality demands a mental shift in how we conceive of security challenges. We often speak of cognitive warfare as a future concern, warning that "we will lose the fight when it comes." But the fight is here. The question we must ask ourselves — as military leaders, as Alliance members, as defenders of democratic values — is whether we are ready to participate in a war that is already underway. Can we defend our cognitive ground? Can we shape the perceived battlespace of our adversaries?

ACT'S JOINT WARFARE CENTRE has long served as NATO's training focal point for both operational- and strategic-level exercises, supporting the Alliance through the injection of new concepts and doctrines in exercises. Today, operationalizing NATO's Cognitive Warfare Concept represents one of our most critical contributions to Alliance defence. Without cognitive superiority, our conventional deterrence and defence capabilities risk becoming irrelevant. We could lose battles before they have even begun.

The articles in this edition of The Three Swords examine these challenges from multiple perspectives, offering insights from practitioners, researchers, and strategic thinkers who are grappling with the practical implications of cognitive warfare. From tactical applications in military operations to strategic communication challenges, from ethical considerations to technological solutions, these contributions reflect the breadth and complexity of weaponized cognition.

Meeting these challenges requires mental agility, critical thinking, and human expertise applied with unprecedented coordination across the Alliance. It calls for innovation in how we train our forces, educate our fellow citizens, and defend our information environment. Most importantly, it requires trust, unity of purpose and action across the whole Alliance.

THE SCALE AND SOPHISTICATION of cognitive threats targeting NATO cannot be overstated. Every social media platform, every news cycle, every public debate has become a potential battleground where truth competes with fabrication, where democratic discourse faces systematic manipulation, and where the very foundations of informed citizenship are under assault. But we are not passive victims in this contest. ACT is constantly on the lookout for future challenges and develops the capabilities necessary to address them. Together, we can build the cognitive defences our Alliance requires while maintaining our commitment to open societies and democratic values.

This issue concerns not only our military forces but society as a whole. It is a challenge that requires strong commitment and determination from political leadership, civil institutions, the private sector, and every individual. By acting together decisively and purposefully, will we ensure that cognitive superiority remains firmly within NATO's grasp. The future of our Alliance, of our collective strategic interests and core values, may well depend on how effectively we meet this challenge.

As you engage with the ideas presented in this review, remember that cognitive warfare is not merely an academic exercise or a distant strategic concern. It is the defining security challenge of our time, one that demands both intellectual rigor and practical action from every member of the Alliance community.

The time for half-measures has passed. War is here, lurking in the grey zone, and victory requires nothing less than our complete commitment to defending the minds and values that define who we are as free nations. ✦

ENDNOTES

1 Seizing the Edge in Cognitive Warfare, Michael Miklaucic, Centre for the Study of Democracy, 3 July 2025, https://csd.eu/blog/blogpost/2025/07/03/seizing-the-edge-in-cognitive-warfare/

2 The Dialectic of Deception: John Boyd and the Cognitive Battlefield, War on the Rocks, 4 September 2025 https://warontherocks.com/2025/09/the-dialectic-of-deception-john-boyd-and-the-cognitive-battlefield/

The Battlespace of the Mind:
Command, Control, and the Cognitive Frontier

"New – not only physical – spheres of confrontation with new types of weapons are appearing, for which the priority is not physical, but functional defeat of the enemy... This comprehensive approach to the impact on the enemy in modern war is becoming an objective necessity."[1]

Colonel General Vladimir Borisovich Zarudnitsky,
Chief of the Russian Military Academy of General Staff

"Psychological warfare has become an indispensable operational form in a modern campaign... [it] has a powerful 'soft kill' ability in war [that] can achieve effects other operational activities cannot."[2]

The Science of Campaigns,
Beijing National Defence University

IN TODAY'S CONFLICTS — and those of the future — the fight for strategic advantage is waged not only on the battlefield, but within the human mind. Both Russia and China recognize that influencing beliefs, behaviours, and command and control structures can be as decisive as control over physical terrain or infrastructure. The emergence of new technologies is amplifying existing risks. Ten years ago, Russia's "little green men" were at the cutting edge of deception operations. Today, disruptive technologies such as artificial intelligence (AI), machine learning, deepfakes, and biotechnology and human enhancement (BHET) are supercharging the ability to influence, deceive, and cognitively overload military and civilian leadership — enhancing the scale, precision and effectiveness of such operations.

This article has been prepared by Headquarters Supreme Allied Commander Transformation, Concept Development Branch. All views expressed are those of the branch and do not necessarily represent those of the Alliance or member nations.

THIS ARTICLE EXPLORES the doctrinal foundations underpinning Russia's and China's approaches to the cognitive dimension, with a particular focus on how both states are developing and adapting their capabilities to disrupt adversary military command and control (C2) through cognitive operations. By examining the evolution of these strategies, this article aims to illuminate what Russia and China regard as a critical enabler of strategic success: the systematic targeting and degradation of decision-making architectures through the integrated use of conventional military instruments of power and non-military instruments of power.

Maskirovka, Reflexive Control, and New Generation War: The Russian Battlespace of Perception

Maskirovka, a cornerstone of Russian military tradition, refers to strategic deception designed to mislead an opponent about Moscow's true intentions and compel poor decisions that ultimately benefit Russia.[3] It laid the groundwork for Russian psychological operations, which emerged as a critical tool during the Russian Civil War (1917–1922). During this period, Bolshevik commissars within the Red Army's Main Military-Political Directorate managed internal political education, morale boosting and psychological warfare targeting enemy troops and civilians. Lenin emphasized the internal "disintegration" of enemy forces over "external warfare" (or, in other words, conventional warfare), with early examples including camouflage and feints during the Russo-Japanese War.[4] Over time, this approach evolved, adapting to the technological and geopolitical realities of each era — from WWII leaflet drops to modern cyber "hack-and-leak" operations. *Maskirovka*'s enduring relevance lies in its fusion of deception, psychological manipulation and intelligence gathering.

"Russia doctrinally treats the cognitive dimension as a full-spectrum battlespace."

First theorized by Soviet mathematical psychologist Vladimir Lefebvre in the 1960s, reflexive control (RC) builds on Soviet-era game theory and Marxist-Leninist epistemology, treating cognition as deterministic and manipulable.[5] RC is the art of subtly influencing an adversary's decision-making by feeding them carefully crafted information so that they "voluntarily" make choices that favour the controller. Unlike basic deception, RC requires modelling the adversary's cognition process, anticipating not just behaviour, but reasoning. Biographical data, habits, and psychological deficiencies become exploitable variables.

As Russian theorists stress, success comes from understanding how the target thinks, then reinforcing that logic to engineer strategic self-defeat.[6] RC is therefore conceived of as longer-term operations specifically aimed at shaping an adversary's perceptions and choices (without their awareness) to achieve asymmetric military effect before kinetic action is required.

Analytically, RC is divided into:

- **Constructive or "friendly embrace"[7] RC,** which induces complacency, hesitation and paralysis in the target's decision-making and creativity — e.g. Putin's ceasefire with Poroshenko prior to the Russian invasion in 2014.[8]
- **Destructive RC,** which incapacitates the target's decision-making through information overload and the weaponization of psychological deficiencies and cognitive weaknesses through a carefully tailored deception operation — e.g. Russia's hack of ViaSat's satellite network to disrupt Ukrainian command and control during its full-scale invasion on 24 February 2022.

RC thus treats information as both technical data and cognitive and emotional content.

Modern command and control architecture spans three decision-making modes: human-only, fully automated machine-only, and, most commonly in current military practice, hybrid human-machine collaboration. Each presents distinct vulnerabilities to adversary manipulation. Adversaries can target either the cognitive aperture of the commander or the technical substrata that feed and assist that commander. The injection of false, irrelevant, or mistimed inputs across either vector can degrade decision quality and tempo.

Crucially, according to retired Major General M.D. Ionov, an early proponent of RC in Russian military thought, "information" in this context encompasses not merely raw data but also the emotional cues and control elements that frame perception and authority.[9] For instance, a show of military force may be intended less to display troop strength and equipment, and more to intimidate or provoke strong emotional reactions.

With these vulnerabilities firmly in mind, Russia doctrinally treats the cognitive dimension as a full-spectrum battlespace that can precede or even substitute for military operations. In particular, the contemporary Russian concept of new generation warfare builds upon *maskirovka* and reflexive control by conceiving of a complex application of military, economic, social, and political methods to influence adversaries.[10]

Beyond shaping perceptions, these actions seek to reconfigure an adversary's thought processes and behaviours at individual and societal levels, ultimately undermining their will to resist.

Russia seeks cognitive dominance by targeting the adversary's decision-making cycle, treating it as the primary centre of gravity. RC campaigns follow a five-phase model: (1) shape the perceptual environment; (2) constrain options; (3) manipulate perceptions; (4) exploit induced errors; and (5) consolidate gains.[11] This effort is executed through a diverse ecosystem of actors: dedicated information operations units, state media, intelligence agencies, and cyber forces (notably, the Yevgeny Prigozhin-founded Internet Research Agency).

In parallel, Russia harnesses non-state entities ranging from private military companies such as Wagner, Redut, and Patriot, to criminal networks such as Salem, Bashkaki, and the ultranationalist Night Wolves motorcycle club (also known as "Putin's Angels"), as well as the notorious Solntsevo network. Moscow also sponsors proxy groups, including pro-Kremlin separatists such as the Russian Imperial Movement (RIM) and religious militias such as the Russian Orthodox Army (ROA) to advance its strategic aims.[12]

All act in concert to confound attribution and blur the line between deterrence, deception and coercion. In practice, Moscow implements cognitive warfare through coordinated psychological operations, electronic warfare (EW), cyber attacks, and misinformation campaigns. In doing so, Russia exploits all three C2 modes:

- **Human-only,** through psychological operations (propaganda, reflexive control, indoctrination) that target commanders directly — manipulating perception, inducing misguided judgment, and suppressing dissent;

- **Machine-only,** through disinformation, spoofing, and cognitive cyber attacks that corrupt data inputs and degrade algorithmic decision-making across automated systems;

- **Hybrid systems,** through EW,[13] such as Divnomorye and Murmansk-BN complexes, and cyber operations that inject corrupted, mistimed, or false data — skewing human-machine collaboration, distorting situational awareness, and paralyzing decision cycles.

Operationally, the Kremlin seeks to interdict decision-making through phased campaigns that open with covert shaping and escalate only if resistance solidifies, utilizing tactics long forgotten by the West. Preempting that, peacetime disinformation and intimidation operations are designed to fracture domestic consensus and delay critical decision-making.

During territorial grabs in Crimea and the Donbas, for example, Moscow combined unmarked troops with denial, cyber disruption and PsyOps to paralyze Kyiv's and NATO's response cycles, presenting a fait accompli before political authorities were able to respond.

These measures sit inside a broader escalation ladder[14] that combines psychological shocks with the implied readiness to employ precision fires and, ultimately, nuclear coercion should other cognitive blows fail. The net effect is to degrade cohesion, slow target decision-making and undermine the will to resist — ideally long before Russian troops cross the border, but with operations continuing in subsequent phases as well.


Photo photo.ua/Shutterstock

Maskirovka and Russia's Seizure of Crimea

In 2014, masked men in unmarked uniforms appeared on the Crimean Peninsula. To locals, they looked innocuous. Crimean self-defense forces? Maybe police? Certainly not the vanguard of a foreign invasion. In Kyiv, Ukrainian leaders debated taking action but hesitated; they saw the Russian troops but could not pin down their intent.

Memories of Georgia in 2008 loomed large — any misstep might trigger all-out war. So, they exercised restraint. Meanwhile, in Western capitals, officials urged calm, mistaking Russia's deception for a search for compromise, not conquest. By the time the lie became too big to ignore, Crimea was in Russian hands.

This was *maskirovka*, Russia's century-old art of military deception, executed with chilling precision. Moscow demonstrated that it did not need overwhelming force to achieve its aims, but only the ability to sow confusion, instill doubt, and create delays; paralyzing decision-making at tactical, operational, and strategic levels.

Winning Without Fighting: China's Cognitive Warfare Doctrine and Civil-Military Integration

Like Russia, China sees cognitive warfare as a central pillar of modern military operations — employed across peacetime, crisis, and conflict to disrupt adversary decision-making. At the 20th Party Congress in 2022, Chinese leaders explicitly called for the "study and mastery of the characteristics and laws of information-based and intelligent warfare," underscoring the centrality of cognitive and informational dominance in contemporary Chinese strategy.[15]

This approach reflects both classical and modern currents in Chinese strategic thinking. Ancient theorists like Sun Tzu emphasized subduing the enemy through deception, disorientation, and manipulation.[16] Philosophical traditions such as Confucianism and Mohism advanced the notion that moral authority and persuasion constitute more enduring and legitimate forms of power than brute force. In the modern era, Mao Zedong developed a distinct framework rooted in Marxist-Leninist revolutionary doctrine, placing heavy emphasis on propaganda, ideological control, and psychological mobilization to consolidate internal unity and erode enemy morale. During the Korean War (1950–1953), these principles were operationalized through propaganda campaigns aimed at eliminating "pro-American ideology" and strengthening resilience among both troops and civilians.[17]

In the 21st century, these ideas were first crystallized into the People's Liberation Army's (PLA) "Three Warfares" doctrine, comprising both internally and externally directed efforts to conduct[18]:

- **Psychological Warfare:** targets military commanders and troops;
- **Public Opinion Warfare:** shapes perceptions of domestic and international audiences;
- **Legal Warfare:** leverages international law to legitimize Chinese actions and delegitimize adversaries.

China's "Three Warfares" doctrine, in turn, is deeply embedded within the PLA's broader strategic trajectory as it seeks to become a "world-class military" by 2049, the centenary of the founding of the People's Republic of China. The PLA's modernization trajectory is envisioned through three progressive phases: mechanization, informatization, and intelligentization.[19]

Mechanization, dominant through to the first decade of the 21st century, focused on building a modern, industrial-era military with advanced hardware such as tanks, aircraft and naval vessels.

Informatization, the current phase of China's military modernization process spanning from around 2010 to the late 2020s, emphasizes integrated command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) to enable joint operations and data-driven warfare across domains.

In the emerging phase of **intelligentization**, to span the late 2020s through to 2049, the PLA is integrating emerging technologies such as artificial intelligence, big data, autonomous systems, human-machine teaming, and research into brain science to reshape the battlefield, aiming to outpace adversaries not just through force but by achieving faster, more adaptive decision-making and cognitive dominance.

Chinese strategists adopt a broad, systemic approach to cognitive warfare, deliberately erasing the boundaries between military and civilian domains in a whole-of-society effort. The authoritative Science of Military Strategy, published by the PLA's Academy of Military Sciences, characterizes psychological warfare as a "full-dimensional strategic action" that spans "politics, economy, military affairs, diplomacy, culture and religion."[20] This strategy serves dual purposes: to bolster domestic psychological resilience against foreign influence — driven in part by the leadership's enduring fear of a Soviet-style collapse linked to ideological erosion — and to degrade an adversary's capacity (at an individual or collective level) to resist cognitive manipulation. This strategy rests on several interlocking pillars:

1. Civil-Military Integration: China's national strategy mandates the integration of civilian and military research, infrastructure, and expertise. Tech companies, universities, media outlets, and cultural institutions are expected to contribute to information warfare campaigns, whether by developing AI-enabled cognitive tools, amplifying Party narratives, or conducting influence operations abroad.

2. Information Control and Narrative Dominance: The CCP maintains tight control over domestic information flows through censorship, surveillance, and propaganda. At the same time, it increasingly engages in global public opinion warfare — via state media (e.g. CGTN, Xinhua), social media bots, and United Front operations — to frame international discourse in terms favourable to Beijing.

Three Warfares and South China Sea Disputes


Shutterstock

In January 2024, a phone call took place between Vice Admiral Alberto Carlos, then head of the Philippines' Western Command, and Senior Colonel Li Jianzhong, China's defence attaché. No announcement followed immediately, but months later, the Chinese Embassy claimed that this call resulted in a new agreement over the contested Second Thomas Shoal — a so-called "new model" to ease tensions. Beijing released what it said was a transcript and played a portion of the alleged recording for journalists, framing the exchange as proof that Manila had quietly conceded to Chinese terms. Carlos confirmed the call but denied any agreement had been made or that he had consented to being recorded. Foreign Secretary Enrique Manalo and Defence Secretary Gilberto Teodoro Jr. likewise rejected Beijing's claims, insisting that there had never been a Cabinet-level consensus on any Chinese proposal for the shoal. Yet the damage was done. By publicizing a murky, unconfirmed exchange and presenting it as a diplomatic concession, China weaponized ambiguity to shape perception. It didn't need an actual deal — only the suggestion of one.

3. Psychological Conditioning of the Population: The CCP actively shapes public sentiment and emotional resilience through patriotic education, ideological training, and elaborate propaganda. This seeks to ensure not only national unity in times of external crisis, but also primes the population to psychologically withstand external narratives and support the strategic objectives of the state.

4. Legal Warfare and Norm Manipulation: Chinese scholars and officials reinterpret international law to suit strategic goals — asserting, for instance, that certain legal "gray zones" justify Chinese activities in the South China Sea or Taiwan Strait. These arguments are pushed across diplomatic, media, and academic platforms to wear down the legitimacy of adversary actions and create confusion in international forums.

Operationally, China's cognitive warfare may seek to target C2 at all levels:

- **Senior Leaders:** to induce doubt, paralysis, and strategic misjudgment;
- **Military Personnel:** to weaken discipline, cohesion, and operational tempo;
- **Civilian Populations:** to sow distrust in government and generate internal pressure on decision-makers.

By corrupting and degrading information flows, overwhelming decision-support systems with manipulated or contradictory data, and fostering psychological fatigue among leadership and operators alike, China aims to paralyse adversary decision-making cycles at their core and, if possible, alter decision-making in its favour. These operations aim not just to delay or disrupt, but to induce a persistent state of confusion, doubt, and hesitation, undermining the ability to act decisively at critical moments.

Crucially, they are not confined to the military sphere. By blurring and ultimately erasing the boundary between civilian and military domains, China targets political leaders, military commanders, media systems, and societal institutions as parts of an integrated battlespace. The objective is strategic paralysis: to erode the psychological, informational and institutional foundations of resistance long before conflict begins, degrading a target's capacity to mobilize, coordinate, or respond effectively to aggression or coercion.[21]

China continues to build institutional capacity and organizational coherence around its cognitive warfare strategy.

The PLA's Base 311, originally established to conduct psychological operations against Taiwan, has evolved significantly in recent years. Once reliant on traditional tools such as radio broadcasts and leaflet drops, the base has transitioned to more sophisticated modes of influence, including coordinated digital platform activity, algorithmic amplification of pro-CCP content, and the use of AI-generated disinformation. Its operations now target not only Taiwanese military and political actors but also civil society, journalists and the diaspora, aiming to fracture internal cohesion and erode trust in democratic institutions.[22]

This operational shift is mirrored at the structural level. Recent reforms have radically reconfigured China's cognitive and information warfare apparatus. In 2024, Beijing dissolved the Strategic Support Force — previously the umbrella organization for space, cyber, and electronic warfare capabilities — and replaced it with more specialized and streamlined entities: the Information Support Force, Cyber Support Force, and Aerospace Force. These new forces report directly to the Central Military Commission, ensuring tighter political control and improved alignment with top-level strategic priorities. Their integration into theatre commands enhances their responsiveness and ensures that cognitive operations are embedded in broader joint and multi-domain campaigns.

Emerging Technology and the Future of Cognitive Warfare

While cognitive warfare has long been a feature of both Russian and Chinese military thought, emerging technologies are now supercharging these strategies. Though their approaches differ in scope and sophistication, both states view technological innovation as a pathway to gaining asymmetric advantage.

Moscow is investing in emerging technologies to offset its demographic challenges and leveraging modern capabilities that can more effectively target C2. Facing a shrinking pool of military-aged personnel, Russian defence thinkers advocate for the development of an "army of robots," pivoting from workforce-intensive forces to autonomous and semi-autonomous systems.[23] This vision is reflected in a diverse range of military technology developments, albeit with varying levels of maturity and credibility. Key initiatives include:

- **Robotic and uncrewed platforms:** Systems such as the Marker UGV, Okhotnik heavy combat drone, and humanoid robots (Teledroid, Tester, and Fedor) showcase Russia's emphasis on autonomous capabilities for ISR, targeting, and battlefield disruption.
- **Enhanced soldier systems:** Programmes such as Sotnik, Ratnik, and Legionnaire aim to augment soldier effectiveness through sensor integration, robotic subsystems, AI, and digital battlefield connectivity, with en masse fielding expected by 2035.[24]
- **Neurotechnology and human enhancement:** Russia is exploring brain-computer interfaces (BCIs), neural helmets, and neuropsychological diagnostics. While these remain in early stages, they reflect a strategic intent to blur the boundary between human cognition and machine control.
- **Immersive training and simulation:** Investments in augmented/virtual/mixed reality-based training environments aim to increase preparedness and reduce operational risk.

Of course, it may be the case that some initiatives serve more as demonstrations (or even *maskirovka*) than as operational capabilities. Moreover, systemic barriers — including limited access to foreign technology and sanctions — will constrain Russia's ability to scale or operationalize its most advanced systems. In the near term, Russia is expected to prioritize cost-effective EW systems, implement moderate upgrades to legacy platforms, and deploy modestly advanced C2-disruptive technologies.

Through its doctrine of intelligentized warfare, Beijing views emerging technologies as central to achieving military dominance, including in the cognitive dimension. To this end, China has made technological leadership and indigenous innovation the centrepiece of its national rejuvenation agenda, as outlined

in successive five-year plans. Motivated by a history of technological vulnerability and the desire to avoid the "dangers of falling behind," Chinese leaders have prioritized self-reliance and rapid advances in disruptive technologies such as AI, quantum computing and 5G.

Xi Jinping's "innovation-driven development" strategy is designed not only to close gaps with leading powers but also to seize first-mover advantages where possible; for instance, investing heavily to secure leadership in critical sectors such as 5G, commercial drones, offensive hypersonic weapons, and lithium battery production. Regarding the cognitive dimension specifically, China is undertaking the following initiatives:

- **AI and machine learning:** AI is central to China's cognitive warfare strategy, enabling rapid data analysis, automated sentiment analysis and the creation of tailored influence campaigns. Strategic megaprojects, such as the New Generation AI Development Plan, are intended to make China the global leader in AI by 2030.[25]

- **Brain science and neurocognitive warfare:** Chinese strategists view the brain as the "main battlefield" of future warfare.[26] The PLA is investing in "brain science"[27] to understand and potentially manipulate human cognition, emotions, motives and judgments. Theoretical ambitions include directly interfering with or subconsciously controlling enemy brains to induce confusion, hallucinations or mental fatigue. For instance, the "China Brain Project" is a national initiative aiming to decode brain function and develop ways to enhance or disrupt cognitive processes.

- **Biotechnology and human enhancement (BHET):** China is developing gene editing, synthetic biology and brain-computer interfaces, potentially to produce cognitively enhanced soldiers and degrade adversary cognition. Although many of these technologies remain in experimental phases, over 150 military-related BHET projects are underway in China.[28]

China's dominance in emerging and disruptive technologies (leading in 37 of 44 key fields)[29] positions it to target military C2 architectures through asymmetric, cross-domain operations. While not all capabilities are fully operational, China's rapid progress, state-backed research and development pipeline, and dual-use technology strategy present a formidable challenge. Underpinned by their 2022 declaration of a "no-limits" friendship,"[30] Moscow and Beijing have committed to expanding collaboration across several high-tech sectors, including 5G telecommunications, AI, biotechnology, and the digital economy.[31] Growing institutional ties and policy support for joint projects and forums suggest a strategic push towards coordinated development in technologies that could significantly enhance each state's cognitive warfare capabilities.

Early signs of this cooperation include shared academic research on brain function and AI integration. In 2019, a delegation from the Russian Academy of Sciences visited laboratories in Shanghai and praised China's advances in neuromorphic intelligence and brain research.[32] In the media space, the creation of the world's first Russian-speaking AI news anchor — developed through a partnership between state-owned media organs China's Xinhua and Russia's TASS — highlights efforts to fuse AI and propaganda tools.[33]

Cognitive warfare is not simply a risk to manage; it is a strategic dimension to master.

Russia's deep experience in psychological operations could be further empowered by China's strengths in big data, sentiment analysis and AI. Likely areas of future collaboration include social media manipulation, dual-use neuroscience, emotion recognition, and predictive behavioural modeling. Joint efforts may also extend to synthetic media, such as deepfakes, and immersive digital ecosystems like the metaverse, designed to shape narratives, guide perception and project influence at scale.

Conclusion

Cognitive warfare poses a persistent and escalating threat to military and political command and control systems, as adversaries and challengers exploit the blurred boundaries between civilian and military spheres across borderless dimensions. But these tactics should not be seen merely as threats to neutralize — they are proof of concept: strategic advantage can be won through influence rather than force alone.

This demands a fundamental shift in mindset, from countering disinformation to operationalizing influence; from protecting decision-making to mastering its manipulation;

"Cognitive warfare demands a fundamental shift in mindset, from countering disinformation to operationalizing influence; from protecting decision-making to mastering its manipulation; from building resilience to seizing initiative."

from building resilience to seizing initiative. We should study and adapt the methods of cognitive warfare practitioners. Russia and China have long treated the mind as a battlespace, seeking to wield perception, psychological disruption, and narrative control. Through sustained experimentation, they have embedded cognitive operations into the core of their strategic arsenals, blending military, informational, economic, and political tools to fracture cohesion, distort reality, and disable decision-making — capabilities now supercharged by emerging technologies.

The reality of contemporary conflict is that it often begins not with kinetic strikes but with narratives, symbols and seemingly innocuous shifts in public sentiment. Left uncontested, these shape the very conditions of war before a single round is fired. The lesson from adversaries and challengers is clear: it is not enough to defend our own cognitive space. We must seek cognitive advantage and strive towards cognitive superiority.

Cognitive warfare is not simply a risk to manage; it is a strategic dimension to master. Those who understand and shape perception will hold the initiative across the entire continuum of peace, crisis, and conflict.

NATO must act decisively to avoid being outmanoeuvered. ✧

ENDNOTES

1 V.B. Zarudnitskiy, "Character and content of armed conflicts in modern conditions and near-term perspective," Характер и содержание военных конфликтов в современных условиях и обозримой перспективе, Voennaya Mysl', no. 1 (2021) via Michael Kofman et al., Russian Military Strategy: Core Tenets and Operational Concept (Center for Naval Analyses, 2021).

2 The Science of Campaigns, Zhang Yuliang (eds), China Aerospace Institute (trans.) (Beijing: National Defense University Press, May 2006). Pp. 224-225.

3 Paul Ducheine and Frans Osinga, "Winning Without Killing: The Strategic and Operational Utility of Non-Kinetic Capabilities in Crises," in NL ARMS 2017: Winning Without Killing: The Strategic and Operational Utility of Non-Kinetic Capabilities in Crises, ed. P. Ducheine and F. Osinga (The Hague: T.M.C. Asser Press, 2017), 125–155, https://link.springer.com/book/10.1007/978-94-6265-189-0

4 Joe Cheravitch, "Commissars with Keyboards: The Lingering Relevance of the Military-Political Origins of Chinese and Russian Psychological Warfare," Intelligence and National Security 40, no. 1 (2024): 60, https://doi.org/10.1080/02684527.2024.2405256.

5 John Merriam, "One Move Ahead — Diagnosing and Countering Russian Reflexive Control," The Journal of Slavic Military Studies 36, no. 1 (2023): 1–27, https://doi.org/10.1080/13518046.2023.2201113.

6 Antti Vasara, Theory of Reflexive Control: Origins, Evolution and Application in the Framework of Contemporary Russian Military Strategy, Finnish Defence Studies 22 (Helsinki: National Defense University, 2020), 42, https://www.doria.fi/bitstream/handle/10024/176978/Vasara_FDS22_Theory%20of%20Reflexive%20Control%20%28web1%29-1.pdf?sequence=3&isAllowed=y.

7 V. L. Makhnin, "Refleksivnye Protsessy V Voennom Iskusstve: Istoriko-Gnoseologicheskiy Aspekt [Reflexive Processes in Military Art: The Historico-Gnoseological Aspect]," Voennaya Mysl [Military Thought], no. 2 (2013).

8 Sanshiro Hosaka, "Putin the 'Peacemaker'? Russian Reflexive Control During the 2014 August Invasion of Ukraine," The Journal of Slavic Military Studies 32, no. 3 (2019): 341–42, https://doi.org/10.1080/13518046.2019.1646950.

9 M. D. Ionov, "On Reflexive Control of the Enemy in Combat," Military Thought, English ed., no. 1 (January 1995): 46–47.

10 Sergei Chekinov and Sergei Bogdanov, "O kharaktere i soderzhanii voyny novogo pokoleniia [On the character and composition of new generation warfare]," Voennaia Mysl', no. 10 (2013): 13–24.

11 M. L. Jaitner and H. Kantola, "Applying Principles of Reflexive Control in Information and Cyber Operations," Journal of Information Warfare 15, no. 4 (2016): 32–33, https://www.jstor.org/stable/26487549.

12 Irregular Warfare Center, The Role of Non-State Actors as Proxies in Irregular Warfare and Malign State Influence (Arlington, VA: Irregular Warfare Center, 2024), https://irregularwarfarecenter.org/publications/research-studies/the-role-of-non-state-actors-as-proxies-in-irregular-warfare-and-malign-state-influence/.

13 Timothy L. Thomas, Russia's Electronic Warfare Force: Blending Concepts with Capabilities (McLean, VA: MITRE Corporation, 2019), https://www.mitre.org/sites/default/files/2021-11/prs-19-2714-russias-electronic-warfare-force-blending-concepts-with-capabilities.pdf.

14 Jānis Bērziņš, "The Theory and Practice of New Generation Warfare: The Case of Ukraine and Syria," The Journal of Slavic Military Studies 33, no. 3 (2020): 77–78, https://doi.org/10.1080/13518046.2020.1824109.

15 "Full Text of the Report to the 20th Congress of the Communist Party of China," October 2022, https://www.idcpc.org.cn/english2023/tjzl/cpcjj/20thPartyCongrssReport/.

16 Sun Tzu, The Art of War. Samuel B. Griffith (trans.) (Oxford: Oxford University Press. 1963).

17 "Continuous Innovation: Preparing for Cognitive Confrontation in Future Warfare", People's Liberation Army Daily, 8 July 2024, http://www.81.cn/rmjz_203219/jsjz/2023nd1q_244462/tbch_244468/16203047.html.

18 Peter Mattis, "China's 'Three Warfares' Perspective," War on the Rocks, 30 January 2018, "https://warontherocks.com/2018/01/chinas-three-warfares-perspective/".

19 Xi Jinping "Hold High the Great Banner of Socialism with Chinese Characteristics and Strive in Unity to Build a Modern Socialist Country in All Respects: Report to the 20th National Congress of the Communist Party of China," Xinhua, 2022, http://www.news.cn/politics/cpc20/2022-10/25/c_1129079429.htm.

20 People's Liberation Army, Academy of Military Science, Science of Military Strategy, 2001, Peng Guangqian and Yao Youzhi (trans. 2005), p. 374.

21 See discussion in Nathan Beauchamp-Mustafaga, "Chinese Next Generation Warfare," (RAND: Santa Monica, CA, 2022), pp.28-40.

22 John Costello and Joe McReynolds, "China's Strategic Support Force: A Force for a New Era," in Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms (Joel Wuthnow and Philip Saunders, eds.) (NDU Press: Washington, D.C., 2019) and Elsa B. Kania, "The Role of PLA Base 311 in Political Warfare against Taiwan," Global Taiwan Institute, 2017, https://globaltaiwan.org/2017/02/the-role-of-pla-base-311-in-political-warfare-against-taiwan-part-3/.

23 Svitlana Lebedenko, "The Rise of Sino-Russian Biotech Cooperation," Foreign Policy Research Institute, May 16, 2022, https://www.fpri.org/article/2022/05/the-rise-of-sino-russian-biotech-cooperation/.

24 Samuel Bendett, "The Case of Russia," in Human, Machine, War: How the Mind-Tech Nexus Will Win Future Wars, ed. Nicholas Wright, Michael Miklaucic, and Todd Veazie (Maxwell Air Force Base, AL: Air University Press, 2025), chap. 11, https://media.defense.gov/2025/Apr/18/2003694020/-1/-1/1/B-188%20HMW%20FINAL%204.8.25%20-%20WITH%20508%20CHECK.PDF.

25 CSET (Center for Security and Emerging Technology), China's Cognitive AI Research: A Landscape Analysis (Washington, DC: Georgetown University, 2023), https://cset.georgetown.edu/wp-content/uploads/Chinas-Cognitive-AI-Research.pdf.

26 Xie Kai, Zhang Dongrun, and Liang Xiaoping, "Insight into the Evolution of the Winning Mechanism of Intelligent Warfare," China Military Network–People's Liberation Army Daily, April 26, 2022, https://www.81.cn/bz/2022-04/26/content_10150428.htm.

27 CSET (Center for Security and Emerging Technology), Bibliometric Analysis of China's Non-Therapeutic Brain-Computer Interface Research (Washington, DC: Georgetown University, 2023), https://cset.georgetown.edu/publication/bibliometric-analysis-of-chinas-non-therapeutic-brain-computer-interface-research/.

28 William C. Hannas and Huei-Chieh Chang, "China's 'New Generation' AIBrain Project," PRISM 9, no. 3 (2022): 18–33, https://ndupress.ndu.edu/Portals/68/Documents/prism/prism_9-3/prism_9-3_18-33_Hannas-Chang.pdf?ver=RWj-rb9x3RtasPbUO9uEyg%3d%3d.

29 Australian Strategic Policy Institute, ASPI Critical Technology Tracker (Canberra: ASPI, 2024), https://www.aspi.org.au/report/critical-technology-tracker/.

30 The Kremlin, "China-Russia joint statement on International Relations Entering a New Era," 4 February 2022, http://www.en.kremlin.ru/supplement/5770.

31 Ibid., also see: The Kremlin, "Joint statement by the Russian Federation and the People's Republic of China on Global Strategic Stability," 8 May 2025, http://en.kremlin.ru/supplement/6310.

32 Samuel Bendett and Elsa B. Kania, A new Sino-Russian high-tech partnership, ASPI Policy Brief, Report No. 22, 2019, p.9.

33 Ibid., p.12.

THE BRAIN IS BOTH THE TARGET AND THE WEAPON

THE STRATEGIC NECESSITY OF NATO'S COGNITIVE WARFARE CONCEPT

by **Tanna M. Krewson**
NATO Allied Command Transformation
Cognitive Warfare Subject Matter Expert;
Architect of NATO's Cognitive Warfare Concept

"Cognitive warfare is not merely an academic exercise or a distant strategic concern. It is the defining security challenge of our time, one that demands both intellectual rigor and practical action from every member of the Alliance community."

Admiral Pierre Vandier
Supreme Allied Commander Transformation

The War Before the War

On August 21, 2013, the world awoke to haunting images from Ghouta, a suburb of Damascus. Civilians — many of them children — were gasping for air, convulsing, and dying in the streets. The evidence pointed to a massive chemical weapons attack by the Assad regime, crossing the "red line" set by U.S. President Barack Obama only a year before.

Almost immediately, the information space was filled with competing narratives. Russian media outlets, diplomats, and proxy influencers, supported by botnets and troll farms, cast doubt on what had happened. Was it a false flag? Could the footage have been staged? In days, what appeared to be a clear-cut atrocity dissolved into ambiguity. These narratives, carried across RT, Sputnik, fringe Western outlets, and social media platforms, tapped into an old wound rooted in public mistrust after the false weapons of mass destruction claims preceding the Iraq War.

This was more than propaganda. It was a deliberate campaign to muddy intelligence, inject doubt into Allied debates, and stall action. Washington hesitated, then backed away from strikes, accepting instead a Russian-brokered deal.[1] Russia's approach in Syria remains one of the clearest examples of how cognitive warfare can target military command and control (C2) at both tactical and strategic levels. By 2015, Russia had paired these narrative operations with electronic and cyber tools — spoofing communications, jamming UAV feeds, and disrupting intelligence, surveillance, and reconnaissance (ISR) — to erode commanders' ability to act decisively. These were not incidental effects but the intended outcomes of an integrated cognitive campaign: victory achieved not through combat, but through paralysed decision-making before the fight began.

The lessons of Ghouta echo today. At the 2025 NATO Communicators Conference in September, participants underscored that adversaries are no longer simply contesting the information space; they are deliberately targeting the Alliance's ability to think, decide, and act. The message was clear: NATO must start taking the cognitive threat seriously, treating it as a contested domain in its own right.

However, this requires more than words. It requires investment in people, training, and capabilities on a scale reflecting the priority adversaries place on cognitive effects. Until NATO develops the ability not just to defend but to contest in this space, it risks repeating the same paralysis that followed Ghouta. That danger captures the essence of cognitive warfare — but to understand it, we must first define it.

What Is Cognitive Warfare?

Despite growing thought leadership in this space, a comprehensive understanding of cognitive warfare remains elusive. It is often mistakenly equated with hybrid warfare; however, while hybrid warfare involves the coordinated use of multiple instruments of power, with information as one of many tools, cognitive warfare differs in its core objective: to target and influence both human and machine cognition. It can be pursued through any domain, by any means, and at any stage in the continuum of competition, with the aim of obscuring truth, inducing decision paralysis, and shaping perceptions and behaviour.

Cognitive warfare is also not a replacement for strategic communications. In this space, information operations (InfoOps), psychological operations (PsyOps), and military public affairs (MilPA) are just a few of the capabilities and functions employed in the daily contest for cognitive advantage. As such, cognitive warfare is not the means by which we fight; it is the fight itself.

This fight is not simply about the proliferation of disinformation or propaganda, nor is it about time-honoured deception and trickery. Cognitive warfare is the deliberate targeting of human and machine cognition to influence how people think, what they feel, and, ultimately, how they act.

In this battlespace, the brain is both the target and the weapon — the terrain and the conduit through which strategic outcomes are won or lost. Emotions, narratives and identities can be engineered en masse and disseminated to others to alter the course of public opinion, destabilize societies, and influence critical decisions, frequently below the threshold of armed conflict. Though seemingly abstract, many of these operations should be viewed as cognitive attacks: orchestrated information activities designed with hostile intent to manipulate perceptions, beliefs, objectives, decisions and behaviours.

However, understanding cognitive warfare solely through a military lens is insufficient. To fully grasp how it functions, the starting point is recognizing its impact on us as individuals, something that does not come easily. After all, cognitive warfare is, at its core, about humans — and humans are notoriously complicated and volatile, making it problematic to predict behaviour, even our own.

How Cognitive Warfare Impacts Us Individually

The challenge for many is that the ambiguities inherent in the cognitive dimension make it difficult for us to see and understand how cognitive warfare operates, particularly at a daily micro level.

However, you only need to walk into a restaurant or café to see the cognitive battlefield. Entire families sit silently at tables — not talking, just scrolling social media feeds comprised of other people's lives, thoughts and opinions. Many of us fall prey to this technological trap because scrolling and posting are often easier than engaging: we're burned out and tired; real-life relationships are hard; and technology is at our fingertips, providing feel-good dopamine surges. This perfect storm of emotional exhaustion, digital ease, and pleasurable brain chemicals makes it easy to believe that our reliance on constant stimulation is harmless. But it is not.

Today's information environment (IE) is intentionally designed to be addictive, to keep us reading headlines, sharing memes, and watching videos. Billion-dollar industries are built upon platforms and algorithms orchestrated to monetize our propensity to check out of our private lives by checking in to social media. However, our increasing digital immersion and fixation on outrage, opinions and chaos is not benign. It is not merely a cultural shift altering how we socialize; it is a strategic vulnerability that primes us for adversarial influence.

In previous generations, people sat with their thoughts. They spent time thinking without distraction in quiet moments, giving their brains the space to have big ideas. But we no longer sit with our thoughts. We sit on our devices, letting the thoughts of others influence us, all while believing we are thinking for ourselves. We outsource our attention and fill our idle moments with a constant stream of memes, headlines, and outrage. The problem is not just distraction; it is infiltration. Because much of the information we consume is not neutral, and what we think are our own thoughts are often just the opposite.

We are being targeted, not randomly but deliberately, and we rarely recognize that the information we consume is a threat. We do not see when it alters our perceptions because we think we have changed our minds based on our own logic. However, often, those changes in belief are unconscious and the result of emotions manipulated by malign actors who benefit from our anger and frustration.

The challenge is that addressing cognitive warfare requires each of us to examine our own behaviour, whether we are civilians, military members, or government officials. It is very easy for us to say:

> *"So, what? I'm on my phone."*
> *"My watch tracks my steps."*
> *"I decompress by scrolling X. My kids enjoy YouTube. TikTok makes my wife laugh. What's the big deal?"*

But, if we step back, what does this dynamic, which stretches across nations and cultures, say about the direction of our societies? And what risks does this persistent access to our data, from our shopping habits and proclivities to our heart rates, pose to us as individuals, leaders, and nations? More importantly, it raises the question: to whom are we giving our time and attention? Do we even know? And what opportunities are we providing adversaries — through influencers, memes, bots, and deepfakes — to shape what we think and how we behave? For most of us, the answer is: we don't know.

"To whom are we giving our time and attention? What opportunities are we providing adversaries — through influencers, memes, bots, and deepfakes — to shape what we think and how we behave? For most of us, the answer is: we don't know."

Why Cognitive Warfare Works

A malign actor who understands the emotional power of symbols such as flags or religious texts will use them to spread their ideas, evoke emotions, and influence people to act in their favour; even better if those symbols can be used to signal a call to action for specific groups. This malign actor can then use information — including knowledge about individuals, how communities are structured, and the meaning of historical events in target populations — to prompt people to react reflexively because they know that we humans are not the rational actors we believe ourselves to be. And that is our primary vulnerability.

While there is debate about the statistics, only 2–15% of human thinking is driven by logical reasoning, with the remaining 85–90% influenced by emotions, instincts, and unconscious processes.[2,3] It is that 85–90% share that makes us reactively click the headline, share the meme, rage about the story, and retreat into digital echo chambers, often without clear awareness.

However, as a society, we continue to overlook the signs that we are being manipulated because this is not about a tangible battle for borders or territory; this is about an intangible battle for our minds. And whilst there is variation in the extent, no one is immune, regardless of rank, education level, age, or IQ.

If I can evoke an emotional reaction in you based on carefully tailored information and imagery, I can also elicit a similar response in others like you. If I can then create a message that rapidly spreads throughout already disenfranchised populations via social media, I can trigger uprisings, movements, riots, and discord. I can make you distrust your systems, hate your leaders, dismiss your family members, and fear your neighbours. And I do not have to use the truth. I can create fake AI-generated videos, fictitious speeches, and fabricated events. I only need to know which symbols will resonate with specific populations, which narratives will tap into existing fears or shame, and which audiences are already vulnerable to my influence. Mere fact-checking will not usurp my ability to guide your perception of reality.

From Targeting Populations to Timing Perception

Skeptics often argue that cognitive warfare is not new, and it isn't. Militaries and governments have used weaponized information and targeted propaganda for centuries. However, what *is* new is the pace of change and the ability of malign actors to infiltrate our daily lives by exploiting the rapidity and reach of technology, as well as their expanding understanding of human behaviour and the brain. There is an increasing asymmetry in capability and agility, and that is why cognitive warfare is so dangerous.

For a moment, picture a future where influence operations are no longer limited to *what* you see but *when* you see it, and in what emotional state. Imagine I have access to your smartwatch data: your heart rate, stress levels, and sleep patterns. With this biometric insight, I do not need to guess when you are most vulnerable — I can know. And by gaining access to or manipulating the platforms that interpret this data, I can time the delivery of content to coincide with moments of heightened emotional or cognitive susceptibility.

If your heart rate spikes, signaling stress, fatigue, or agitation, I can inject targeted messaging into your environment: emotionally charged content, narrative reinforcements, or psychologically primed cues to shape your perception and behaviour. And I can do this at times when the data indicates your executive functioning is compromised: while mindlessly scrolling Instagram late at night, when your heart rate elevates after a fight with your spouse, or when your glucose levels are low before breakfast. This is not just targeting the *who* of influence; it is targeting the *when* and *how*. It enables real-time, individualized microtargeting that bypasses your rational defences and exploits your body's stress response as an entry point for manipulation.

The Engineering Behind Our Dysfunction

This future is not far off — it could well be tomorrow because, while our understanding of human behaviour and neuroscience is relatively young, it is maturing at a rapid pace.

►►►

One hundred years ago, we still believed in bloodletting. Fifty years ago, we institutionalized people for manageable conditions such as bipolar disorder. It wasn't until 2003 that the human genome was completely mapped. Over the past 20 to 30 years, our understanding of how the brain interacts with and shapes our realities has expanded rapidly in line with the parallel growth of technology. As a result, the ability to influence how societies function and individuals behave has also evolved.

With this understanding, malign and adversarial actors are not just observing our dysfunction; they are engineering it. And with the power of technology and the hours we dedicate to it, our identities are easily weaponized. The challenge is that many of us have been raised to believe that emotions and beliefs are something we push aside to get on with the business of the day. We grew up singing, "Sticks and stones may break my bones, but words will never hurt me."

Science tells us this is untrue. Words are enormously influential. Emotions, narratives, and worldviews can be powerful enough to make people protest their leaders, align with extremist ideologies, or engage in violent terrorism. What happens if entire populations reject long-held national values not because of genuine disagreement about the values themselves, but because adversaries have succeeded in changing prevailing views about how those values should be applied?

This is not hypothetical; this is the essence of cognitive warfare, and it is happening now. In this new world, society is the vector through which adversaries target political and military systems. They no longer need to target military forces directly if they can stir enough internal discord for citizens to turn against their governments, institutions, and alliances.

And waging this type of warfare is dangerously cost-effective — far cheaper than buying tanks or planes — precisely because it does not require physical force to achieve strategic effects. It targets not terrain but something far more fragile: truth, trust, and the will to act.

We Are All Vulnerable

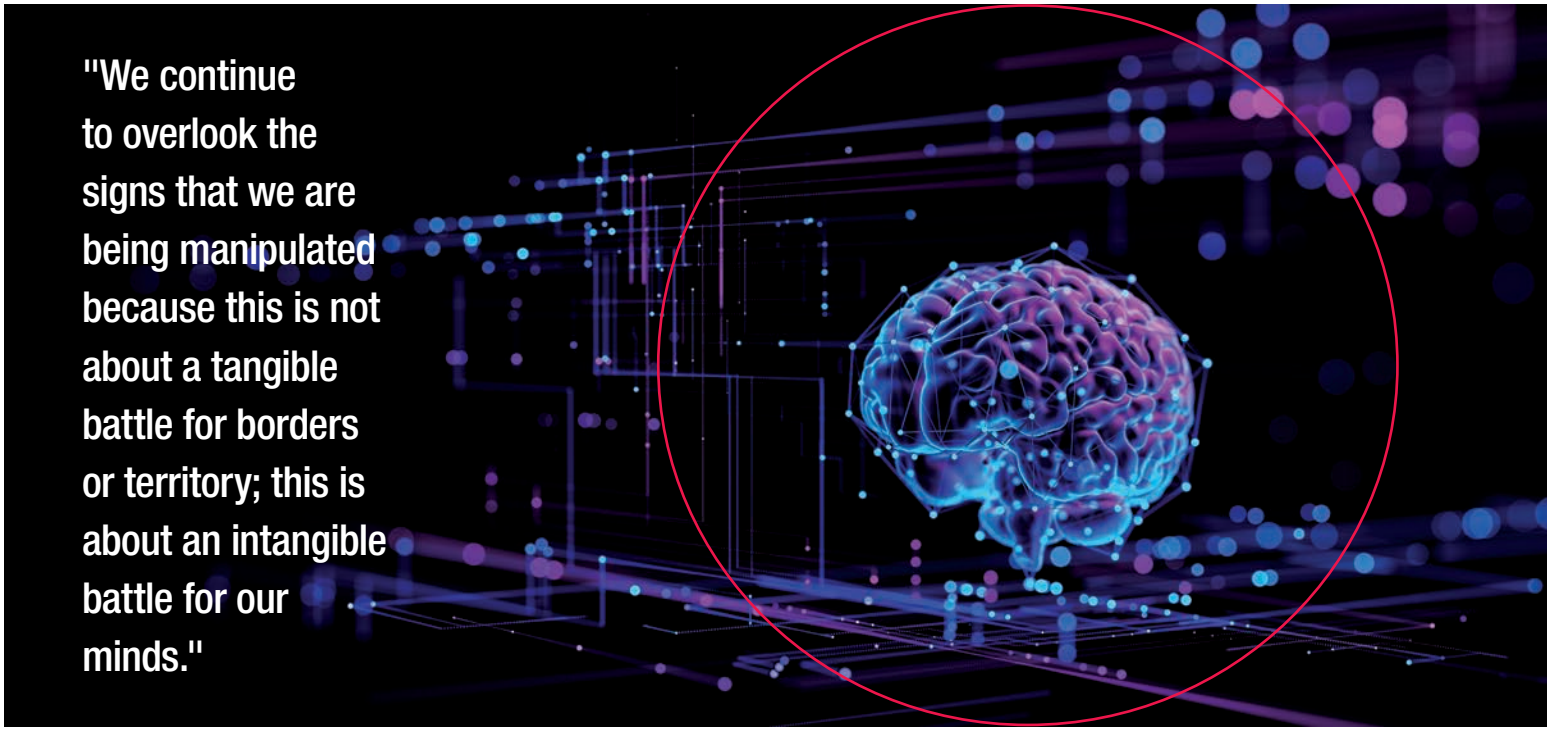
At a NATO Allied Command Transformation (ACT) cognitive warfare simulation event in 2023, national representatives were asked a simple question: Do you believe your country needs to address cognitive warfare? The majority said yes. However, when asked whether they felt personally vulnerable to cognitive warfare, very few did. Their responses were predictable, and they illustrate a fundamental point: how can we, as militaries, nations, and Allies, effectively counter and respond to cognitive warfare if we do not understand how we, as individuals, are vulnerable?

ROBUST PSYCHOLOGICAL and neuroscience research indicates that humans are predisposed to minimizing their own cognitive vulnerabilities while externalizing weaknesses onto others. This protective mechanism helps preserve self-confidence, but it also creates blind spots, impacting our ability to counter and respond to cognitive warfare. More often than not, we assume that the problem is other people: "I'm not vulnerable to influence; they are. I would recognize cognitive warfare."

This is not accurate.

Every individual is a target.

Twenty-four hours a day, our adversaries and competitors utilize trained specialists — and increasingly, machine cognition, AI, and other technologies — to analyze our media habits, affiliations, and identities, creating emotional and behavioural effects from afar. And their goal is clear: to prime and destabilize societies from within long before traditional confrontation occurs.



Real-World Examples

Between 2019 and 2021, ISIL-aligned insurgents in Mozambique's Cabo Delgado province conducted a systematic cognitive warfare campaign, weaponizing platforms such as Facebook, WhatsApp, and Telegram. They distributed graphic propaganda, fabricated footage, and false territorial claims to incite fear and evacuate towns before attacks occurred.[4] These efforts were paired with economic disruption, including strikes on energy infrastructure and supply chains, to amplify perceptions of state failure. Targeted assassinations of local leaders further eroded trust in governance, combining psychological intimidation with physical violence. The campaign glamourized fighters, denigrated the government, and attracted thousands of disenfranchised youths from across the region. By 2020, over 400,000 people were displaced, many fleeing due to fear fueled by online rumours rather than battlefield threats.[5] Cyber disruptions of humanitarian communications paralysed aid delivery, while selective kinetic strikes reinforced the illusion of militant omnipresence. These tactics decimated governance, derailed infrastructure projects, and disrupted humanitarian operations, all without large-scale combat.

China's growing use of AI in influence operations further demonstrates how adversaries are fusing emerging technologies with cognitive effects. Based on research from the New York Times, documents leaked from GoLaxy, a Chinese company tied to state security agencies, reveal how its "Smart Propaganda System" (GoPro) has been deployed in Hong Kong, Taiwan, and inside China to track debates, mine social media profiles, and generate targeted, adaptive propaganda that "feels authentic."[6]

In the 2024 Taiwanese elections, the system recommended narratives designed to exploit divisions in public opinion and weaken the Democratic Progressive Party. These efforts went beyond Russia-style troll farms, using AI to mass-produce and target content at scale. While not all operations proved decisive, the campaigns consistently sought to undermine trust in Taiwan's pro-independence leadership by reframing national identity and amplifying narratives of inevitability around Beijing's influence. GoLaxy's methods highlight the shift from time-intensive, handcrafted propaganda to AI-enabled identity manipulation, something branded as increasingly quicker, cheaper, and more targeted.

Currently, the company claims the ability to track over 180,000 X accounts in Hong Kong, monitor thousands of Western social media posts daily, and build virtual profiles on more than 2,000 U.S. political figures. In Taiwan, these capabilities mean that adversarial messaging can be explicitly aimed at citizens who are already primed by grievances over sovereignty and security. Even when content is factual, its emotional framing and algorithmic amplification create distorted perceptions of consensus and inevitability, crafting an environment where the ultimate target is not facts, but identity itself.[7]

What This Means for NATO

While Allies possess defensive tools such as regulation, legislation, and enforcement to respond to cognitive effects, these measures tend to be fragmented, reactive, and rather slow. This asymmetry in deterrence and defence allows adversaries to undermine societies, weakening national resilience and splintering NATO's collective defence posture.

The traditional visualization of NATO's military capability, holding strong on an eastern or southern flank to prevent a physical advance, is outdated and trapped in a 20th-century perspective.

Information has no borders. These new front lines will not appear on a map. The most straightforward and efficient path to defeating NATO's military capability is not by applying strength against strength but by degrading societal and political support for NATO's military actions before they begin. Our key vulnerabilities are no longer defined by the range and lethality of our weapons but by the openness of our societies.

A Whole-of-Society Problem

Unfortunately, the term "warfare" is somewhat misleading. Responding to cognitive warfare requires us to acknowledge that it cannot be addressed solely through military strength because it is primarily waged through the soft underbelly of society. Our least protected have become our easiest targets and most significant vulnerabilities.

The figure on page 35 illustrates this dynamic by depicting the symbiotic relationship between the military and civil society. The graphic demonstrates the dual nature of the cognitive warfare threat landscape, divided between the comparatively hardened military sphere and the vulnerable civil society domain.

"Information has no borders. Our key vulnerabilities are no longer defined by the range and lethality of our weapons but by the openness of our societies."

"NATO must do more than adapt — it must lead. This demands a full-spectrum, multi-domain approach focused on embedding cognitive warfare into doctrine, training, and operational planning."

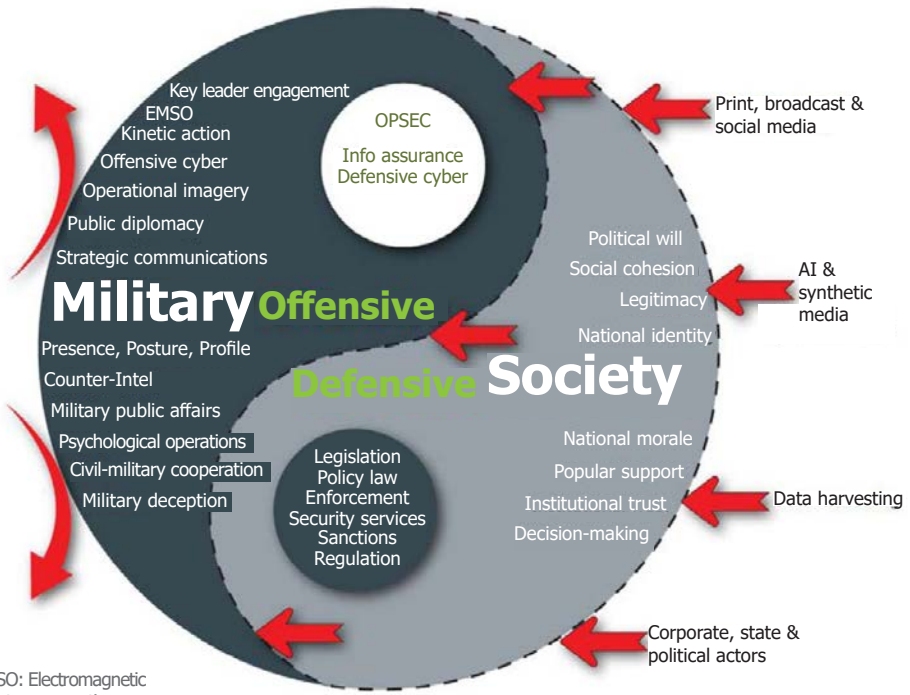
The red arrows represent threats in the information environment (IE) directed at the Alliance, aimed at achieving political and military objectives. The military half of the diagram illustrates traditional capabilities that protect the military instrument of power through tools aimed at adversaries, supported by layered defences such as information assurance, operational security, and defensive cyber. The military operates as a "hard target," fortified by doctrine, infrastructure, and threat awareness. While adversaries may attempt to disrupt military cognition and decision-making, such efforts can be anticipated and neutralized.

In contrast, the civil society half of the diagram is open, decentralized, and exposed. Democratic freedoms and a largely unregulated IE make it a "soft target," vulnerable to adversarial cognitive operations that manipulate perception, polarize opinion, and destabilize communities. These attacks exploit technologies such as AI, media ecosystems, and data harvesting. The dashed line around society reflects its porous boundaries, where adversaries target the accessible, unaware, and unprotected civil domain underpinning NATO's strength.

As a result, the psychological and societal effects of adversarial attacks can bleed into hardened military structures, especially in areas where the civil and military spheres intersect, eroding trust in defence institutions, weakening recruitment, and undermining public support. These attacks are not hypothetical. They degrade readiness, morale and legitimacy, threatening NATO's operational effectiveness.

Even if NATO fielded the strongest and best-resourced militaries in the world, it would not be enough if societies remained vulnerable. Adversaries target the foundations of resilience, knowing that no amount of military power can compensate for a fractured, unstable society. This spillover of effects between civil and military spheres has led to the misconception that cognitive warfare is incompatible with democratic values. However, like warfare in any domain, operations in the cognitive dimension reflect the strategic culture of the actors involved. Democracies need not abandon their principles; they must develop cognitive strategies aligned with their norms while countering adversaries who exploit openness and trust. Upholding democratic integrity while building resilience is not only possible but essential to safeguarding societal cohesion and long-term security.

Below
Graphic adapted from NATO Strategic Communications Centre of Excellence



EMSO: Electromagnetic spectrum operations

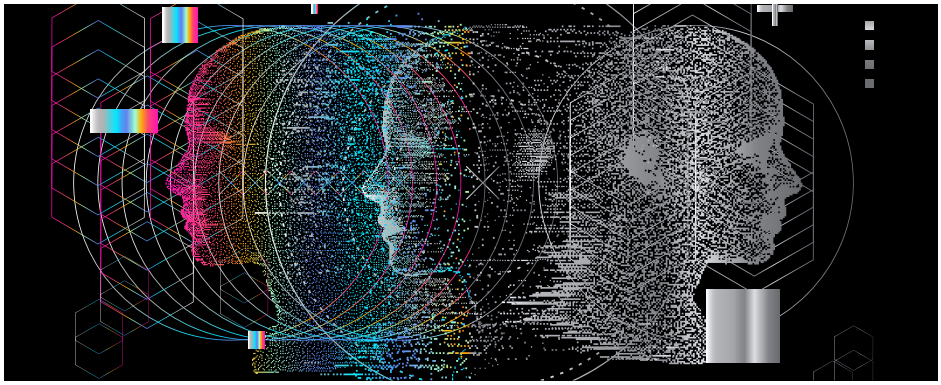
Maintaining Strategic Advantage: The NATO Cognitive Warfare Concept

States within the Alliance are making significant progress toward these goals, including implementing national and regional strategies to counter hostile information activities, enhancing media literacy, and supporting expanded research and development. However, we remain reactive, constrained by outdated legislative, systemic, and conceptual frameworks. The scale of current adversarial information proficiencies exceeds our capabilities — a strategic asymmetry that threatens our ability to act decisively in a crisis.

We face a stark choice: either invest in enhancing cognitive capabilities and adapting traditional perspectives on the role of the military and government within society, or accept that we will fall behind, risking failure to secure cognitive advantage in an increasingly hostile IE. Rapid and decisive action, including a societal paradigm shift, is required to defend our populations, institutions and military forces from degradation in the cognitive dimension.

To accomplish this, NATO must do more than adapt — it must lead. This demands a full-spectrum, multi-domain approach focused on embedding cognitive warfare into doctrine, training, and operational planning; resourcing influence capabilities and behavioural sciences; and uniting uniformed services with civilian institutions across the continuum of competition.

"Facts do not prevail on their own; emotion, identity, and resonance are just as powerful."



These ideas form the basis of NATO's Bilateral Strategic Command (Bi-SC) Cognitive Warfare Concept, a necessary and urgent call to action designed to address functional, legal, ethical, and doctrinal gaps and offer an actionable path forward. The concept acknowledges that cognitive warfare is no longer a supporting function — it is the contest itself. We must strengthen our ability to apply existing instruments of national power in a cohesive, integrated way across all phases of competition; something demonstrated during the early stages of Russia's 2022 invasion of Ukraine. While that unity has evolved with time, Ukraine continues to show what is possible when societies and militaries fight in concert, combining kinetic force with political, economic, diplomatic, and informational power. These hard-earned lessons must not be ignored.

From a strategic communications standpoint, we must also move beyond the assumption that "truth-telling" alone will win the battle for cognitive advantage.

If cognitive warfare has shown us anything, it is that facts do not prevail on their own; emotion, identity, and resonance are just as powerful, if not more so. It is not enough to broadcast our values and fact-check disinformation; we must also address the underlying issues that fuel it by engaging with the full spectrum of perspectives within our societies to deter adversarial weaponization of existing social discord.

Below
The author (right) was one of the speakers at the 2025 NATO Communicators Conference, which underscored that adversaries are no longer simply contesting the information space; they are deliberately targeting the Alliance's ability to think, decide, and act. Photo by HQ SACT PAO

Conclusion: We Are Already in the Fight

As individuals, military and otherwise, we must accept that we are already in the fight. But the front lines are not drawn on maps; they run through our institutions, our societies, and our minds. It is about all of us. There are no bombs, no borders — just the quiet hijacking of our perception. Our adversaries do not need to use expensive missiles and machinery if they can keep us distracted, divided, and emotionally reactive. They understand that influence does not require truth, but only our attention.

If we do not take steps to recognize the ubiquity and seriousness of the cognitive battlespace, which touches every aspect of our military and civilian lives, we will lose more than time; we will also lose readiness. We must invest tonight if we expect to fight tomorrow. If we fail to do so, we may wake up to discover that our thoughts are no longer our own. Not because we lost a war — but because we never appreciated that we were in one. ✧

ENDNOTES

1 BBC, https://www.bbc.com/news/world-middle-east-24091633. U.S. and Russia agree Syria chemical weapons deal
2 V.B. Kahneman, D. (2011). Thinking, fast and slow. Macmillan.
3 Evans, Jonathan St. B. T. & Stanovich, Keith E. (2013). "Dual-Process Theories of Higher Cognition." Perspectives on Psychological Science, 8(3), 223–241.
4 Blaker, L. (2015). The Islamic State's use of online social media. Military Cyber Affairs, 1(1), 4.
5 Svicevic, M., & Bradley, M. M. (2024). Mozambique's Cabo Delgado Conflict. Taylor Francis Limited.
6 New York Times, https://www.nytimes.com/2025/08/06/us/politics/china-artificial-intelligence-information-warfare.html
7 ibid.

TRAINING NATO TO

OUT-THINK
OUT-EXCEL
OUT-FIGHT
OUT-PARTNER
OUT-PACE
OUT-LAST

ON THE COVER

How the STEADFAST Series of Exercises Is Raising NATO's Readiness, Resilience and Deterrence

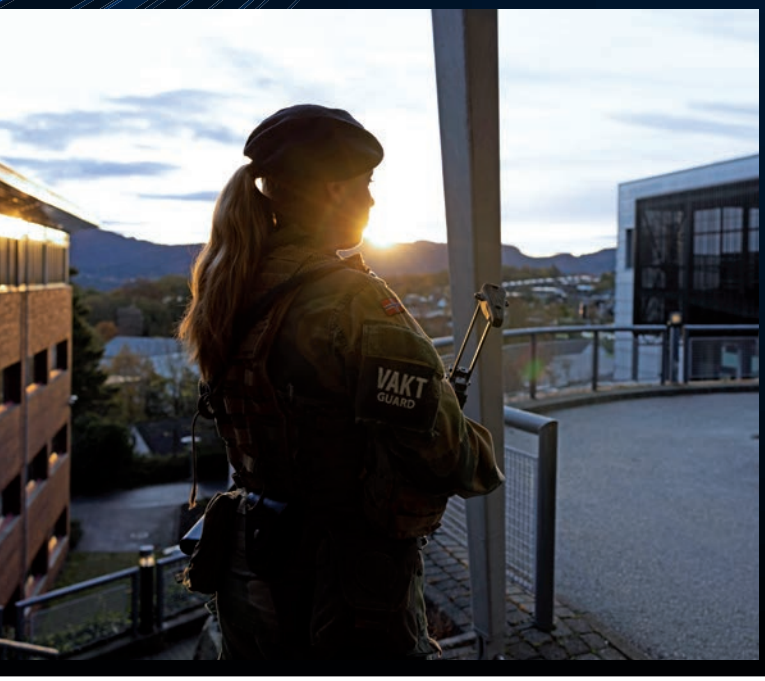
EVOLUTION *THROUGH* TRAINING

by **Colonel Kevin Rafferty**
British Army
Deputy Chief of Staff Exercise, Training and Innovation Directorate
NATO Joint Warfare Centre


JFC NORFOLK


SHAPE
VIGILIA PRETIUM LIBERTATIS


C A X / C P X


VAKT
GUARD

Above
The author, Colonel Kevin Rafferty

In the last edition of The Three Swords, I stated that "the Joint Warfare Centre sits on the **campaigning continuum** and delivers deterrence for the Alliance." I want to build upon that article and illustrate how the Alliance uses **collective training and exercises as a way of evolution**, building **resilience** and dynamically altering the **Alliance's deterrence**.

This thinkpiece is split into four parts. It will first set the scene and provide context for the article, before illustrating how the Alliance's warfighting readiness, resilience and deterrence evolve through the **STEADFAST** series of exercises. It will subsequently expose the complexity of the STEADFAST series of exercises and finally, it will outline how the Joint Warfare Centre (JWC) **adapts to manage this complexity**.

Translation of Political Intent Through the Military Instrument of Power

The geostrategic security environment and rules-based international order continue to be challenged, and the 2025 NATO Summit in The Hague took decisions to address this competition and strengthen the Alliance. Although the political headlines focused on the commitment to increased defence spending and production, I want to highlight two other areas of the Summit Declaration: (1) "our investments will ensure we have the forces, capabilities, resources, infrastructure, warfighting readiness, and resilience," and (2) NATO will "harness emerging technology and the spirit of innovation to advance our collective security."

Clockwise, previous page
Wargaming table during STEADFAST FOXTROT 2024, photo by JWC PAO; a participant's SHAPE badge during STEADFAST DUEL 2025, photo by Tore Ellingsen; Exercise ARCTIC BOLD, photo by Synne Nilsson, Norwegian Armed Forces; JWC's exercise control staff during STEADFAST DUEL 2025, photo by Tore Ellingsen; Norwegian guard during STEADFAST DUEL 2025, NATO's first 24/7 STEADFAST exercise, photo by Tore Ellingsen; USS Gerald R. Ford joins NATO's NEPTUNE STRIKE 2025 in the High North, photo by Johnny Larsen, Norwegian Armed Forces

Both of these form "golden threads" that can be followed from the political into the military instrument of power.

The Alliance has two capstone concepts, Allied Command Transformations' (ACT) NATO Warfighting Capstone Concept (NWCC) and Allied Command Operations' (ACO) Concept for Deterrence and Defence of the Euro-Atlantic Area (DDA). These mutually supporting concepts translate the political direction into military operations, activities, and investment (OAIs), cohering and integrating the Alliance's "fight tonight" and "fight tomorrow" requirements to maintain warfare advantage. Cascading the Bi-Strategic Command concepts into the Command and Force Structures is achieved in multiple ways. The Bi-Strategic Command Audacious Training Project operationalizes elements of both concepts and turns them into military OAIs.

The JWC is a key component of the Alliance's military training architecture, constantly evolving to adapt to the political and military strategic guidance to deliver "warfighting readiness and resilience" by "harnessing emerging technology and the spirit of innovation."

How the Alliance's Warfighting Readiness, Resilience and Deterrence Threshold Evolve Through the STEADFAST Series of Exercises

I will use the five warfare development initiatives from ACT's Warfare Development Agenda to illustrate how the golden thread of political intent is translated through concepts into military activities and results in readiness, resilience and deterrence. These include Cognitive Superiority, Layered Resilience, Influence and Power Projection, Cross-Domain Command, and Integrated Multi-Domain Deterrence.

1. Cognitive Superiority. Cognitive superiority refers to the ability to excel in understanding, decision-making, and strategic thinking to outmanoeuvre adversaries.

The NWCC has provided the framework

"The golden thread of political intent is translated through concepts into military activities and results in readiness, resilience and deterrence."

NATO Secretary General Mark Rutte speaking at the 2025 NATO Summit in The Hague. Photo by NATO

STEADFAST DETERRENCE 2025

Exercise STEADFAST DETERRENCE 2025 was a NATO capstone strategic- and operational-level multi-domain exercise. Within the conflict continuum (ranging from peace over crisis to conflict), the exercise was situated in the crisis phase and exercised the NATO family of plans across the Supreme Allied Commander Europe's (SACEUR) area of responsibility (AOR). It was an opportunity for the Supreme Headquarters Allied Powers Europe (SHAPE) to converge with the United States European Command (USEUCOM) and all 32 Allied countries, focusing on deterrence and escalation management. It presented pan-AOR and cross-domain strategic and operational challenges and resulted in the certification of SHAPE as a strategic warfighting headquarters.

Photo by JWC PAO

within which the Alliance has developed its cognitive superiority, and I highlight two initiatives that have advanced the thinking and doctrine in the deterrence field: (1) The "Six Outs" of the military instrument of power, and (2) the multi-domain escalation dynamics initiative.

The convergence of Supreme Headquarters Allied Powers Europe (SHAPE) and the United States European Command (USEUCOM) in Exercise STEADFAST DETERRENCE 2025 resulted in mutual understanding of each other's plans, joint operational areas (JOAs), command and control (C2) and command relationships (COMREL).

At the "train to operate" level, this led to the advancement, integration, and adaptation of these areas using the supported/supporting interrelationship (SSI) framework. Procedures and processes were aligned, and operations and activities were synchronized through battle rhythm events, enabling cross-strategic command decision-making. Assessing the exercise through the "train to win" lens, strategic dialogue advanced the Alliance's thinking on destabilization activities and hybrid operations.

THE "SIX OUTS" OF THE MILITARY INSTRUMENT OF POWER

1 OUT-THINK:
The Alliance must anticipate threats and understand the strategic environment better than potential adversaries.

2 OUT-EXCEL:
The future Alliance must strive for excellence and agility, underpinned by NATO's unique military ethos, culture and diversity and the will to take the initiative and win over any potential adversary under any circumstances.

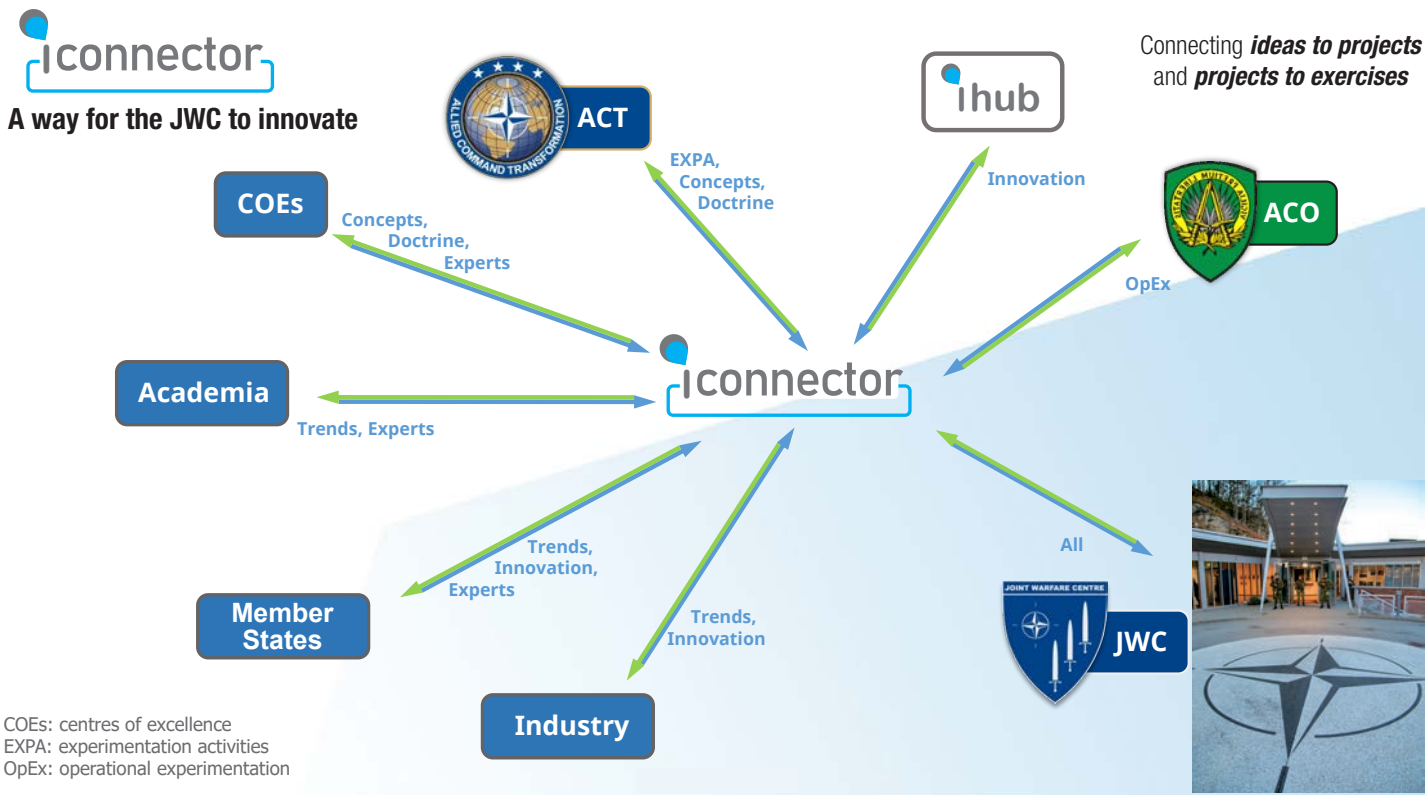
3 OUT-FIGHT:
The future Alliance must be able to decisively operate across domains, in concert with other instruments of power and actors and simultaneously conduct shaping, contesting and fighting activities.

4 OUT-PARTNER:
The future Alliance must be able to foster and exploit mutually supportive and habitual relationships and partnership opportunities.

5 OUT-PACE:
The future Alliance must be able to recognize risks, seize opportunities, decide and act faster than potential adversaries.

6 OUT-LAST:
The future Alliance must be able to think, plan, operate and adapt with a long-term perspective in mind to be able to endure as long as it takes through strategic competition and any conflict situation.

Below
The iConnector provides the JWC new ways of innovation. JWC Experimentation Branch graphic is redesigned for this publication by Erinç Öz, Senior Graphic Designer



MULTI-DOMAIN ESCALATION DYNAMICS INITIATIVE

THE MULTI-DOMAIN ESCALATION DYNAMICS initiative equips NATO with adversary-informed, risk-based strategic decision-making tools designed to **out-think** and **out-pace** potential threats. It enhances **NATO's deterrence posture**, reduces the risk of rapid inadvertent escalation, and supports effective management of complex security dynamics.

4 SQUARE is a wargame featuring actions that span the diplomatic, information, military, and economic instruments of power. The objective of the wargame is to understand a **variety of deterrence options**, **escalation dynamics**, **decision-making**, **integration strategies**, and **coherent responses**. It allows participants to evaluate their deterrence options with **realistic conditions**.

The development of a deterrence principles guide, a comprehensive body of knowledge, and a deterrence community of interest will **elevate NATO's "deterrence IQ"** and foster an advanced understanding of the interplay between various instruments of power.

STEADFAST DETERRENCE 2025 harnessed the spirit of innovation, exercising with the new technology of Maven Smart System, a command decision-making tool with artificial intelligence and machine learning technology. Focusing in on the JWC, the experimentation and innovation team piloted their Innovation Connector (iConnector) Hub as a way of increasing the integration and tempo of innovation within exercises.

2. Layered Resilience. The Layered Resilience Concept focuses on enhancing military and civil preparedness within NATO, emphasizing the interdependence of military and civil resilience, to effectively respond to various threats and challenges.

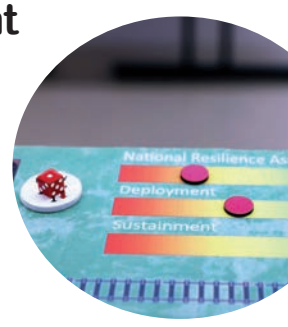
Exercise STEADFAST DETERRENCE 2025 (STDC25) was the first time that all 32 Allied countries took part in a JWC-delivered exercise. Exercising with the member states increases the scale and scope of the exercises, providing layers of nuance, reality and complexity that replicate the real world. The benefit of exercising with the countries leads to the refinement of the DDA family of plans as well as the countries' plans; strengthening the countries' and the Alliance's security architecture. The exercise is significantly broader than training the military instrument of power, with member states using it as a vehicle to engage other governmental departments, enhancing their military and civilian preparedness.

Focusing back on the DDA family of plans, real-world readiness and resilience was tangibly increased as the plans, which are used to deliver enhanced vigilance activities, were refined throughout and following the exercise. To highlight one example, the Joint Support and Enabling Command (JSEC) exercised its operation plan, which includes the coordination of the Reinforcement and Sustainment Network, and resulted in strategic and operational dialogue about the military alert system and the Alliance's response measures.

3. Influence and Power Projection. The ability to project elements of national power, influencing the decision-making calculus of an adversary as a tool of deterrence.

Exercise STDC25 presented another opportunity for SHAPE and ACO to manage strategic and operational objectives and challenges in the entire AOR and across domains.

"JWC-delivered exercises are significantly broader than training the military instrument of power."



FURTHER READING

Understanding Supported and Supporting Relationships
The Three Swords, Issue No. 38

Left to right
Brigadier General Raymond L. Adams (right), the JWC's Deputy Commander and Chief of Staff, speaking with the USEUCOM trusted agent during STEADFAST DETERRENCE 2025. The author, Colonel Rafferty, during Exercise STEADFAST DAGGER 2024. Photos by JWC PAO

From a procedural and "train to operate" perspective, SHAPE manages and shapes the strategic security environment through its campaign assessment and synchronization process (CASPr). Advancing into the "train to win and deter" environment, SHAPE and ACO have developed SACEUR's "theory of victory" and "echeloning the fight" campaign management tool. The latter synchronizes and orchestrates operational and strategic effects to maintain the Alliance's operational and strategic advantage. These tools, alongside the DDA family of plans, provide the framework for ACO to project, manage and coordinate elements of national power, influencing the decision-making calculus of an adversary.

The critical factors of deterrence theory are capability, intent, and communication. Exercise STDC25 was another opportunity for SHAPE to align its strategic communications with its operations and activities to signal NATO's intent. This activity firmly sits in the "train to win" and "train to deter" space. The exercise yielded staff-level analysis on interpreting the adversaries' actions and strategic messaging and senior leader dialogue on calibrating the Alliance's multi-domain and cross-JOA responses.

4. Cross-Domain Command. The ability to command and control capabilities, functions, and processes across domains and JOAs.

Exercise STDC25 is not unique in terms of exercising, testing, and refining C2 and COMREL. At the strategic level, SACEUR is the Commander of ACO, but also Commander USEUCOM. This "dual-hatting" is replicated at other key positions across ACO. Exercising and stressing the dual-hatted roles was an interesting part of the exercise. I highlight one example, with the Deputy SACEUR assuming the role of SACEUR. This enabled the Alliance and USEUCOM to exercise the COMREL and the processes with USEUCOM, when USEUCOM was conducting NATO, multi-lateral, bilateral and U.S.-only operations and activities. With national HQs including the U.S. Joint Staff and Pentagon replicated, the procedures established along with the relationships ensured that this was a smooth transition.

At the theatre component level, the domains continue to advance, refine, and test their C2 structures at each iteration of the STEADFAST series of exercises. Joint Force Command Norfolk (JFCNF) continues its sprint towards full mission capability and the establishment of the components under its command, such as the Joint Force Air Component Command. AIRCOM exercised its role of deputy commander air, solidifying its C2 architecture.

The training the JWC provides at the strategic and operational levels of warfare is critical in achieving a multi-domain operations-enabled Alliance — a key priority of the Supreme Allied Commander Transformation (SACT).

Below
Multi-domain operations graphic designed by Erinç Öz, JWC's Senior Graphic Designer

The exercise highlighted COMREL opportunities for JFCNF with U.S.-based combatant commands and the unique command challenges of managing and integrating a JOA that has distinct geographic and time characteristics. Equally important is the digital architecture that continues to evolve to meet the requirements of the warfighter, be they NATO cloud capabilities or experimental emerging technologies, which structurally strengthen the Alliances' readiness and resilience.

I will highlight the "echeloning the fight" framework again at this point, as it is more than an operational and strategic campaign management tool; it provides a conceptual framework for escalation and de-escalation management by level (strategic or operational), by JOA, and by domain.

5. Integrated Multi-Domain Deterrence. NATO's multi-domain operations (MDO) focus on integrating capabilities across the air, land, maritime, cyberspace, and space domains to enhance deterrence and defence against modern threats. Multi-domain integration continues to adapt and grow across ACO. The newer domains of cyberspace and space evolve at pace, and Exercise STDC25 provided another opportunity to exercise NATO's Sovereign Cyber Effects Provided Voluntarily by Allies (SCEPVA) mechanism. SCEPVA is a robust and well-established mechanism within ACO and the member states, operating continually across the conflict continuum. SHAPE and ACO exploited Exercise STDC25 to explore other strategic and operational frameworks, advancing the Alliance's deterrence architecture.

Maven Smart System has been mentioned, but it is worth underlining in the context of this warfare development initiative, as it provides a new way of delivering multi-domain deterrence. SHAPE experimented with Maven and compared it with current NATO systems. Experiments were conducted in the functional areas of planning, targeting and logistics. The Multi-Domain Strategic Operations Centre moved from experimentation to implementation of the common operating and intelligence pictures, and exploited the command decision-making support tool and briefing functions, able to incorporate real-time data. It is an exciting time to experiment with and exploit cutting-edge technology as part of the digitalization of the Alliance, which is the backbone of delivering integrated multi-domain deterrence.

The Complexity Within the STEADFAST Series of Exercises

The appetite for training across the Alliance continues to grow unabated. Countries and the Alliance have integrated training into their campaign plans. They form a part of the Alliance's and countries' deterrence continuum.

Each STEADFAST exercise is unique in its design, but similar in its focus of providing the environment within which to develop the Alliance's readiness, resilience, and warfare advantage. At the JWC, the exercises are characterized by *size*, *scale*, and *scope*. The size of the exercises is dictated by the participants, which are driven by the NATO Force Model readiness cycle.

"Maven Smart System provides a new way of delivering multi-domain deterrence."

The scale of the exercise balances breadth versus depth. *Breadth* equals either a level, e.g. operational, or a grouping, e.g. theatre component. *Depth* is the number of exercise levels. From a JWC perspective, there are always additional two levels to be incorporated to deliver an exercise: higher control and lower control. The *scope* includes the level of the five domains of air, land, maritime, cyberspace, and space; and additional elements such as the member states, which encompasses the diplomatic, information, military and economic aspects.

The exercises routinely incorporate international organizations such as the EU, and non-governmental organizations such as the International Committee of the Red Cross. The scale and scope also include nationally integrated exercises. To simplify, this can be considered the "who" and the "what." The "why" is the political intent outlined in the context.

The Audacious Training Project (ATP) provides a helpful framework to manage this complexity; it is the conceptual "how." ATP is a Bi-Strategic Command (Bi-SC) initiative developed to cohere and manage the evolving warfighter requirements and align strategic ends and ways. The STEADFAST series of exercises flexibly adapts to the conflict continuum as well as the "train to operate", "train to win", and "train to deter" paradigm.

"Train to operate" is the start state for all exercises, ensuring that the procedural and functional staff fundamentals are achieved. Prior to the full-scale Russian invasion of Ukraine in 2022, the JWC scenarios were fictitious. Adoption of the DDA concept by the Allied countries resulted in the change from fictitious scenarios to real-world scenarios, increased realism and the focus on exercising the real-world plans.

The JWC developed the 360-Degree Multi-Domain Setting (360° MDS), which mirrors the real world and provides the environment within which audiences can train to win and train to deter. It is important to note that the 360° MDS is an exercise environment within which the JWC manipulates the scenario to create the situations within the conflict continuum. The JWC has commenced

Above
Exercise Control for STEADFAST DETERRENCE 2025, with Major General Ruprecht von Butler, Commander JWC and the Officer Directing the Exercise, photo by JWC PAO

the journey to understand how it can deliver exercises that exploit more real-world data to further replicate real-world complexity.

At the *"train to win"* level, the exercise presents the environment for operational- and strategic-level dialogue that results in refinement of concepts, doctrine, processes, and real-world plans. It is also a forcing mechanism for rapid change, through experimentation and the use of advanced technology such as Maven Smart System, which accelerated from experimentation to implementation during Exercise STDC25.

At the *"train to deter"* level, the exercises message the Alliance's adversaries the achievement of the "train to operate" and "train to win" objectives and the resulting increase in the Alliance's readiness and resilience, which in turn strengthens the Alliance's deterrence.

How the JWC Manages Complexity Within the STEADFAST Exercises

The Audacious Training Project provides a useful conceptual framework within which to manage exercise complexity. I will lay out how the JWC has operationalized this concept and subsequently outline future steps.

As mentioned above, each exercise within the STEADFAST series is unique in terms of size, scale, and scope. They all have similarities, and this is the key to managing complexity. Understanding the constituent parts — and what can be standardized, automated or repeated — provides the baseline for adaptability. Having an adaptable baseline enables the JWC to calibrate the exercise and react to the training audiences. At the military operational and strategic levels, most of the objectives do not change. When viewed through the training lens, they become training objectives, and when viewed through the lens of managing complexity, they form the adaptable baseline. The training objectives are delivered through user stories, which become a building block of activity upon which the exercise rests.

A traditional exercise would be built by integrating these building blocks with multiple stakeholders to achieve multi-layered training objectives. This principle remains; however, the exercise framework and the building blocks have been and continue to be adapted to meet the requirements of the continuum of "train to operate, win, and deter."

I will highlight three points. First, the building blocks are effects-focused and designed to be scalable. Scalability enables the scale and scope of the event to be adjusted across the breadth and depth of the exercise.

The JWC training facility during STEADFAST DUEL 2025, NATO's first 24/7 STEADFAST exercise, photo by Tore Ellingsen

"Collective training and exercises constitute one of NATO's most powerful drivers of change."

Secondly, the building blocks are designed for dynamic realignment within the exercise. Moving events enables the Commander of the JWC to calibrate the tempo of the exercise. Thirdly, the building blocks are designed for dynamic scripting, or events can be dynamically scripted throughout the exercise.

This hybrid method enables a more agile and responsive way of delivering an exercise but remains resource-intensive. The JWC is investigating how current and future technology can digitalize the exercise process to deliver a more efficient, repeatable, faster, and scalable exercise that can be adapted at pace to training audience requirements.

The tempo of activities within the Alliance remains high, and the JWC was directed to reduce the exercise burden on the NATO Command and Force Structures. Increased ownership of the exercises has been transferred to the Commander JWC, and to manage this, the JWC has adopted new ways of working, which has resulted in the re-roling and re-focus of staff on the production of the exercises, along with changes to the JWC exercise workshops. The Commander has accepted this risk, which is assessed as tolerable, but will require treating. In the short term, the JWC must refine processes, and in the medium term it must adopt new ways of working, advance its digital transformation and adapt its organizational structure.

There are several initiatives ongoing within the JWC focused upon meeting the requirement for increased realism. The first of these initiatives is an enhanced opposing forces (OPFOR) capability. The initial elements of this capability have arrived in summer 2025 and we estimate full operational capability by spring/summer of 2026. It will be a comprehensive multi-domain capability, spanning the political to operational levels.

Secondly, the JWC will experiment with the integration of the OPFOR and warfare development capabilities and assess whether this leads to an increased tempo of innovation and warfare development. Thirdly, as part of Exercise STEADFAST DEFENDER 2027, we will exploit a hybrid live and virtual synthetic environment to replicate the scale that is needed to challenge the Alliance. Finally, we are considering digital options to enhance the JWC wargame capability.

Conclusion

Collective training and exercises constitute one of NATO's most powerful drivers of change, and the JWC-directed STEADFAST series of exercises in particular is enabling the Alliance to adapt continuously to rapid shifts in the geostrategic environment.

The STEADFAST series of exercises incorporate increased realism, cutting-edge technology and unprecedented levels of flexibility in order to translate political intent into military activity, adapt to the needs of warfighters and increase interoperability within NATO and with member states.

The initiatives, tools and activities outlined in this article further pave the way towards a stronger Alliance that is ready to surmount present and future challenges to the rules-based international order. ✦

STEADFAST DUEL 2025

NATO's LARGEST-EVER COMMAND POST EXERCISE

by **Inci Kucukaksoy**
Public Affairs Officer
NATO Joint Warfare Centre

and **Samantha Lester**
Staff Writer
HQ SACT

Photos by **Tore Ellingsen**
Norwegian Home Guard
Public Affairs Office

THE WEEK-LONG EXERCISE STEADFAST DUEL 2025 was NATO's largest and most demanding computer-assisted command post exercise (CAX/CPX) in recent history, testing NATO's multi-domain warfighting capabilities and readiness alongside data-centric innovations and AI-driven experimentation. Almost two years in the making, STEADFAST DUEL 2025 marked several firsts for the Alliance:

- It was the first Article 5 exercise involving all 32 Allies, including NATO's newest members, Sweden and Finland
- It was the first exercise to simultaneously train NATO's three joint force commands (Brunssum, Naples, and Norfolk)
- It was also the first STEADFAST exercise executed in a continuous 24-hour battle rhythm

Scheduled by Supreme Headquarters Allied Powers Europe (SHAPE) and directed by the Joint Warfare Centre (JWC), STEADFAST DUEL 2025 brought NATO's vision of integrated deterrence and defence to life, uniting all 32 member states in a realistic test of command, coordination, and transformation.

Addressing the Exercise Control (EXCON) staff on October 22, 2025, Major General Ruprecht von Butler, Commander JWC and the Officer Directing the Exercise, said: "Our increasingly complex security environment requires that we deliver more realistic and audacious exercises for the NATO Alliance. With the scale and scope managed by STEADFAST DUEL 2025, we will do exactly that."

Exercise STEADFAST DUEL 2025 involved 16 training audiences from NATO Command and Force Structure headquarters. It took place in multiple locations across Europe and the United States, bringing together over 7,000 military and civilian personnel from the Alliance.

The primary training audience of the exercise was Allied Joint Force Command Brunssum, led by General Ingo Gerhartz.

The exercise was based on the highly realistic 360-Degree Multi-Domain Setting (360° MDS), created and developed by the JWC. Though STEADFAST DUEL 2025 tested the full suite of NATO's Deterrence and Defence of the Euro-Atlantic Area (DDA) family of plans, it represented far more than a test of readiness; the exercise delivered tangible proof of how transformation, experimentation, and digital innovation now converged across the Alliance.

Complex Planning Architectures Under Real-world Conditions

Lieutenant Colonel Ralph, the JWC's main planner for the exercise, coordinated STEADFAST DETERRENCE 2025 across the various NATO headquarters as well as NATO centres of excellence, member states, NATO's top senior mentors, and civilian agencies. He underlined the significance of training under a round-the-clock battle rhythm.

"We have a new approach with the 24/7 battle rhythm, exercising more realistically and training as we fight. An event of this size needs the support of the entire JWC, and recent European history adds plenty of challenges and learning points to be exploited. The JWC has worked hard to deliver an exercise that meets emerging threats to NATO security."

Colonel Kevin Rafferty, the JWC's Deputy Chief of Staff Exercises, Training and Innovation and the Chief of Exercise Control, said: "Exercises at this level provide more than a mechanism to exercise and challenge the warfighting system. They are an opportunity for experimentation and development as the Alliance continues on its path of integrating advanced command-and-control systems and technologies."

The Real Life Support (RLS) branch is responsible for vital aspects of the administration surrounding an exercise, such as accommodation and in-processing. Exercise STEADFAST DUEL 2025 was exceptional for the RLS team, too: "It's our first 24/7 exercise, and RLS is an integral part of almost every planning and execution step," said the JWC's "night" planner for the exercise. "It is special to see all the dedicated participants working hard during the night to accomplish the mission, and to know that we are a key part of enabling that."

Of course, a large and complex endeavour such as this exercise could not be carried out successfully without sophisticated communications and information systems (CIS). "Secure, interoperable, and resilient communication and information systems are powering the exercise," said JWC's Chief CIS for STEADFAST DUEL 2025. "JWC's IM/C4 (information management, command, control, communication and computers) Branch, in partnership with the NCI Agency, has ensured real-time command and control services are live across the Alliance – driving mission success through digital superiority."

The JWC's EXCON Senior Advisor, Major General Roger Lane (Ret.) referred to the JWC as a "very special learning environment." He said: "These exercises sharpen processes, deepen relationships and trust in each other, build critical judgement and improve risk management. Training audiences live with the consequences of their decisions, giving them a valuable, realistic, immersive learning experience, in which they learn to understand faster, decide faster and execute faster to overwhelm an adversary."

Previous page
SACEUR observing the exercise at Joint Force Command Brunssum (JFCBS), photo by JFCBS PAO; Major General Ruprecht von Butler (right) with the JWC's main planner for the exercise

JWC's Programme Director for STEADFAST DUEL 2025 (STDU25) briefing the Exercise Control personnel


General Carsten Breuer, German Chief of Defence (left) and Major General Ruprecht von Butler, Commander JWC


JWC's STDU25 Content Managers with the Joint Force Command Brunssum lead planner

Representatives from the centres of excellence (COEs) supporting STEADFAST DUEL 2025: The Cooperative Cyber Defence COE; the Integrated Air and Missile Defence COE; the Joint Air Power Competence Centre; the Joint Chemical, Biological, Radiological and Nuclear Defence COE; the Modelling and Simulation COE and the Strategic Communications COE


JWC's lead planner with the German Chief of Defence


The Chief Exercise Control briefing staff


JWC's Real Life Support Branch Head managing the night shift


The STDU25 Norwegian Response Cell

Observing the exercise at JFC Brunssum on October 25, 2025, Supreme Allied Commander Europe (SACEUR), General Alexus G. Grynkewich, underlined that exercises fuel innovation and capability building across the Alliance. "NATO doesn't wait for crises to be ready – we train together so we're always ready," the SACEUR said. "Exercises like STEADFAST DUEL 2025 prove our strength is in our unity and our preparation."

The JWC Commander Major General Ruprecht von Butler (middle) and Deputy Commander and Chief of Staff Brigadier General Raymond L. Adams (left) with the distinguished visitors observing STDU25 on October 27, 2025

Experimentation

Throughout the execution phase, Allied Command Transformation (ACT) conducted targeted experimentation activities spanning doctrine, organization, training, materiel, leadership, personnel, facilities, and interoperability. Among these was the operation of a digital command-and-control system enhanced by large language models and artificial intelligence, accelerating NATO's progress towards a digitally enabled, multi-domain-operational Alliance.

These experiments allowed ACT to evaluate how emerging technologies can enhance decision-making speed, situational awareness, and cross-domain coordination. To support this effort, Headquarters Supreme Allied Commander Transformation (HQ SACT) deployed a team of observers under the Warfare Development in Exercises (WDiE) framework — an initiative that aims to better link warfare development with current operational processes during exercises to advance the implementation of multi-domain operations.

To further enhance the realism of NATO training, ACT also included observers from the NATO-Ukraine Joint Analysis, Training and Education Centre (JATEC). As NATO's first joint civil-military organization with Ukraine, JATEC plays a transformative role in strengthening collective security and fostering interoperability. Its participation in STEADFAST DUEL 2025 enabled NATO to draw immediate benefit from this unique and growing partnership.

Observing the exercise at the JWC, Major General Juan Jose Soto Rodriguez, HQ SACT's Deputy Chief of Staff for Multi-Domain Force Development, said: "JWC is a forward-thinking command with numerous internal initiatives, including ways to integrate warfare development in exercises, validate multi-domain operations, and pursue increased realism through a more challenging adversary, free play and 24/7 operations. STEADFAST DUEL 2025 was a very realistic exercise based on operational plans, and with an impressive scope and width with regard to training audiences and the exercise staff."

"The JWC is evolving how we think, how we train, and how we deliver value to the NATO warfighter." – Major General Ruprecht von Butler

Exercise STEADFAST DUEL 2025 delivered tangible readiness for the Alliance. It validated not only NATO's ability to command and control large-scale multi-domain operations at the strategic and operational levels but also its growing capacity to translate strategic transformation into operational advantage.

As Supreme Allied Commander Transformation, Admiral Pierre Vandier, has often emphasized, transformation is not a theoretical process — it is lived through exercises such as STEADFAST DUEL 2025. The exercise reaffirmed that readiness and innovation are inseparable, and that NATO's collective strength lies in its ability to transform faster than the challenges it faces.

At the conclusion of the exercise, Major General Ruprecht von Butler said: "Exercise STEADFAST DUEL 2025 significantly contributed to NATO's warfare development and strengthened the Alliance's readiness as well as its deterrence and defence of the Euro-Atlantic area. Within Allied Command Transformation, the JWC is evolving how we think, how we train, and how we deliver value to the NATO warfighter."

Vice Admiral Doug Perry, Commander Joint Force Command Norfolk, underlined that the exercise was a significant milestone in the JFC's journey on the path to mission readiness.

"I am proud of what we have achieved to this point, and I am excited to demonstrate our continued progress as JFC Norfolk grows ever closer to the nations within our area of responsibility — from Florida to Finnmark and from seabed to space."

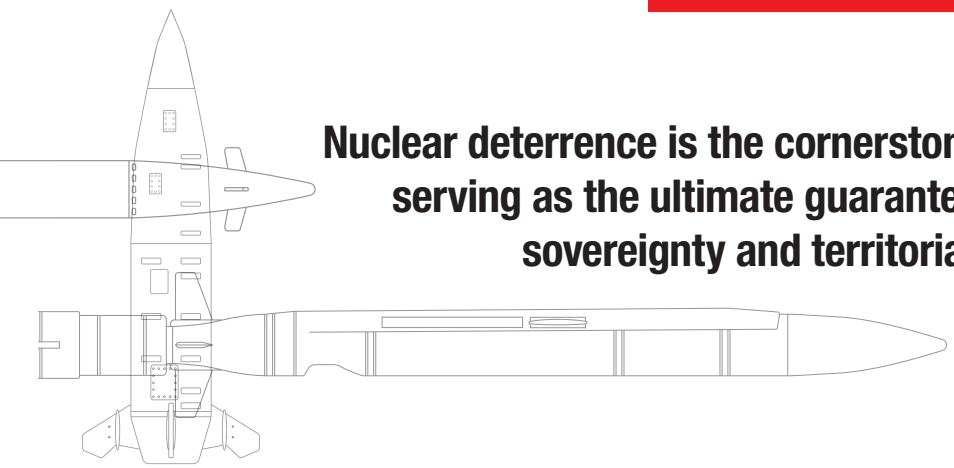
The STEADFAST DUEL exercise series is linked to the U.S. Army Europe and Africa (USAREUR)-led exercise AVENGER TRIAD and informs the planning processes of Exercise STEADFAST WOLF 2026 — NATO's largest chemical, biological, radiological, and nuclear wargame exercise.

Observers

During STEADFAST DUEL 2025, a number of distinguished visitors were present at the JWC to observe the exercise first-hand and liaise with the JWC leadership: General Carsten Breuer, German Chief of Defence; Lieutenant General Gianluca Carai, Commander NATO Rapid Deployable Corps Italy; Major General Mindaugas Steponavičius, the Lithuanian Military Representative to NATO; Dr Bernhard Felmberg, the German Protestant Military Bishop; Rear Admiral Stephan Haisch, Commander Task Force Baltic; Brigadier General Matt Baker OBE, Head of Warfare Development at the UK Integrated Warfare Centre, Cyber and Specialist Operations Command; and Mr Eric Meyer, Charge d'Áffaires ad interim at the U.S. Embassy in Oslo.

On October 27, 2025, the JWC also hosted an Observers Day involving military dignitaries across NATO, military representatives from the host nation Norway and local law enforcement officers. ✦

ON THE COVER



Nuclear deterrence is the cornerstone of Alliance security, serving as the ultimate guarantee to protect Allied sovereignty and territorial integrity.

NATO *NUCLEAR* DETERRENCE

by **Jim Stokes**
Director of Nuclear Policy
NATO International Staff

and **Yanitsa Dyakova**
Nuclear Policy Officer
NATO International Staff

SINCE ITS FOUNDING 76 years ago, NATO has been a nuclear alliance. Nuclear deterrence is the cornerstone of Alliance security, serving as the ultimate guarantee to protect Allied sovereignty and territorial integrity. Over the years, NATO's nuclear deterrence policy and posture have evolved to address the threats of a changing security environment. The fundamental purpose of NATO's nuclear deterrence is to preserve peace, prevent coercion and deter aggression. NATO is a defensive alliance, and the circumstances in which NATO might have to use nuclear weapons are extremely remote.

NATO's goal is a safer world for all; we seek to create the security environment for a world without nuclear weapons. However, this is not the world we live in. Nuclear-armed states are undermining the rules-based international order, including by use of force, as seen in Russia's brutal war against Ukraine, which has been fought under a nuclear shadow. A world where these states have nuclear weapons, but NATO does not, would simply not be a safer world. Thus, as long as nuclear weapons exist, NATO will remain a nuclear alliance.

Opposite
F-35A Lightning II aircraft carry and deliver both conventional and tactical nuclear weapons. Photo by Staff Sergeant Madelyn Brown, U.S. Air Force

Pillars of NATO's Nuclear Deterrence

Key aspects of NATO's deterrence have endured from the early days of the Cold War to today. The Alliance has always maintained a mix of conventional and nuclear forces as part of its overall deterrence and defence posture. Over the past decades, this mix has evolved in response to changes in the security environment, advances in military technology, accession of new members, and the Alliance's overall strategic direction. Flexibility in NATO's strategy has always been necessary. In an alliance of states with differing histories, threat perceptions, and domestic public opinions, which must make consensus-based decisions, it is always preferable to have a range of credible options.[1]

First, the strategic nuclear forces of the Alliance, particularly from the United States, are the supreme guarantee of the Alliance's security. The independent strategic nuclear forces of the United Kingdom and France also play a deterrent role of their own. The extended deterrence commitment by the United States to other NATO Allies dates to the Alliance's founding in 1949. Additionally, since 1962, the UK has declared its nuclear deterrent to the defence of NATO, meaning all Allies benefit from the protection of the UK's Continuous at Sea Deterrent (CASD) for collective defence. France maintains independent nuclear forces that also contribute significantly to the overall security of the Alliance. Since the Ottawa Declaration of 1974, NATO has recognized that these separate centres of decision-making, in each nuclear power, complicate the calculus of a nuclear-armed adversary.

Second, NATO Allies contribute to nuclear deterrence through NATO's nuclear sharing arrangements.[2] In the 1950s, the United States began to station its nuclear weapons in Europe and trained Allied military units to be capable of employing these weapons. These arrangements were in existence prior to the negotiation and entry into force of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). The Allies have sustained NATO's nuclear sharing arrangements for decades to deter Soviet, and now Russian, aggression. Today, these unique arrangements consist of European countries hosting U.S. nuclear gravity bombs on their territories or providing dual-capable aircraft (DCA) and Allied pilots that can employ these weapons, if authorized to do so.

These arrangements are vital to the effectiveness and credibility of NATO's nuclear deterrence. They are tangible proof of the transatlantic bond linking North America and Europe, and are also a clear commitment by European Allies to collective security through

Below, from left
A Dutch Air Force F-35 fighter jet conducts air operations during Exercise STEADFAST NOON 2024, photo by NATO; Royal Navy's nuclear-powered ballistic missile submarine HMS Victorious, photo by MOD Crown Copyright; meeting of the North Atlantic Council at the level of heads of state and government, 2025 NATO Summit in The Hague, photo by NATO; an air-to-air front view of a B-52G Stratofortress aircraft, armed with AGM-86B air-launched cruise missiles (ALCMs), photo by the U.S. National Archives and Defense Visual Information Distribution Service

5G

FIFTH-GENERATION DETERRENCE

nuclear deterrence. Furthermore, NATO's shared nuclear responsibilities contribute significantly to upholding global nuclear non-proliferation norms by disincentivizing European nations from acquiring their own nuclear weapons, in support of Allied responsibilities under the NPT.

Conventional military forces form the third pillar of NATO's deterrence. NATO's "flexible response" strategy[3] featured a build-up of conventional forces to provide more options to deter and defend against a conflict with the Soviet Union, backed by the threat of use of theatre nuclear weapons. Over time, as the Allies made technological advancements, NATO's conventional forces moved from a position of relative inferiority to one of parity, or even potential superiority, compared to the Soviet Union and now Russia. The role of nuclear weapons within NATO's strategy changed in relation to this, focusing on deterrence of extreme threats and considered for employment under "remote circumstances." Because the most likely pathway to escalation to nuclear conflict was through outbreak of a conventional war, the logic of NATO's deterrence was centred on robust, formidable, and interoperable conventional forces that could manage conflict below the nuclear threshold.

Ensuring Credible and Effective Nuclear Deterrence

Deterrence rests on the ability to influence an adversary's perception, by convincing it to not take action that is detrimental to our security. Thus, the credibility of deterrence is built on having effective military forces, the political will to employ these forces, and clear communication, in both messages and signals, that an adversary will comprehend.

In the 2016 Warsaw Summit Communiqué, Allies clearly stated that if the fundamental security of any of its members were to be threatened, NATO has the capabilities and resolve to impose costs on an adversary that would be unacceptable and far outweigh the benefits that an adversary could hope to achieve. Nuclear weapons are unique, and their employment against NATO would fundamentally alter the nature of a conflict. NATO's strategic communications on nuclear deterrence are vital — both to send a strong signal of reassurance to our publics and to deter an adversary from aggression against NATO Allies.

NATO does not subscribe to "no first use" nor "sole purpose" policies, which are not aligned with the national policies of our three nuclear powers. More importantly, in a political-military alliance as broad as NATO, flexibility in strategy and political decision-making is key, along with deliberate ambiguity in deterrence policy. The Alliance will sustain the ability to defend itself, using any means necessary, under any threat of aggression.

In light of growing security threats, NATO Allies took decisions to modernize and expand their military forces, to bolster the Alliance's deterrence and defence posture. Allies have also continued to ensure NATO's nuclear capabilities remain fit for purpose. The three nuclear powers are making significant investments to modernize their nuclear forces. In 2024, the United States completed modernization of its forward-deployed nuclear weapons, transitioning to the B61-12 thermonuclear gravity bomb. Several Allies also are investing in F-35A aircraft for the DCA mission. In 2024,

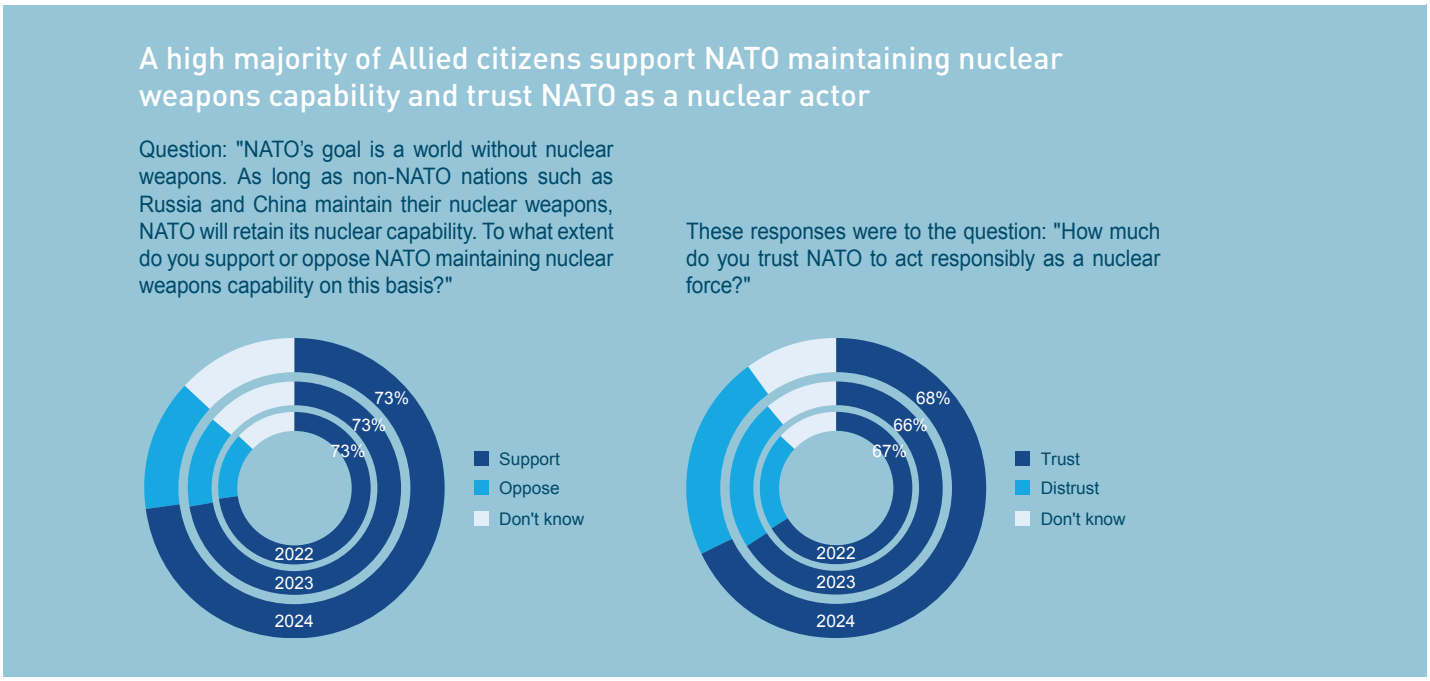
"Deterrence rests on the ability to influence an adversary's perception, by convincing it to not take action that is detrimental to our security."

the Netherlands completed its transition from the F-16 to the F-35A, which it dubbed "Fifth-Generation Deterrence." Other Allies will follow by 2030, providing highly effective capabilities to support NATO nuclear deterrence for decades to come. These voluntary national contributions of capabilities for nuclear deterrence are complemented by investment in security upgrades at DCA air bases and modernization of NATO's nuclear consultation, command and control (NC3) capabilities, using common funding. These are some of the many ways Nuclear Planning Group (NPG) Allies share the financial burden of NATO's nuclear deterrence.

Equally important are Allied investments in conventional capabilities, which are vital for collective defence and directly support nuclear deterrence. Fighter-bomber aircraft (especially fifth-generation F-35s) can suppress enemy air defences. Enabling aircraft for air-to-air refuelling; intelligence, surveillance and reconnaissance capabilities; and airborne command and control are also needed to directly support a NATO nuclear mission. Deep precision strike capabilities — long-range missiles that can accurately strike targets with conventional warheads — are increasingly in demand and an excellent complement to a nuclear mission. On the defensive side, integrated air and missile defence (IAMD) is vital to protect air bases and other critical infrastructure and ensure the Alliance can project power.

NATO Allies are increasing defence spending on conventional capabilities, which has the twofold benefit of providing capabilities needed for collective defence while also enhancing the effectiveness and survivability of NATO's nuclear deterrence. As a result, Allied investment in advanced capabilities bolsters NATO's overall deterrence and defence, including nuclear deterrence. Investment in modern weapon systems has a deterrent effect, which is reinforced through military exercises. NATO's annual nuclear deterrence exercise, STEADFAST NOON, demonstrates the Alliance's capability to effectively conduct a NATO nuclear mission. It presents an opportunity to exercise NATO's DCA with supporting conventional capabilities as well as U.S. strategic bombers. As a responsible nuclear alliance, NATO conducts STEADFAST NOON in a transparent way to avoid misinterpretation or inadvertent escalation. No nuclear weapons, real or training assets, are involved in the exercise. Public communication is well coordinated to clearly announce when and generally where the exercise will be held.

Much public attention is focused on the "hardware" of NATO's nuclear deterrence — nuclear forces and posture, complemented by conventional capabilities. But equally important is the Alliance's nuclear "software" — the policies, plans, and decision-making processes that enable Allies to maintain firm political control over all aspects of nuclear deterrence, at all times and under all circumstances. This is a shared political responsibility among Allies within the NPG, the senior nuclear decision-making body for the Alliance. No decisions are pre-delegated to military authorities in peacetime, crisis, or conflict, meaning all decisions must be made by consensus at a political level.



Above
2024 nuclear polling, graphic by NATO

Unity is the greatest strength of the Alliance. As an alliance of democracies, it sends a powerful signal when NATO decides and acts together. Secretary General Mark Rutte said, "[Our adversaries] should remember that there is no greater power than democracies coming together. When we are attacked, our response is fierce."[5] If contemplating the use of nuclear weapons in a crisis or conflict, united action will be key to demonstrate the resolve of the Alliance to defend itself and affect an adversary's decision-making. To be clear, the United States and the United Kingdom maintain political control and custody over their respective nuclear weapons, in accordance with their responsibilities under the NPT. And collectively, the NPG Allies, both nuclear and non-nuclear, are an intrinsic part of the political decision-making process for NATO's nuclear deterrence.

Since 2016, the Alliance has committed to the broadest possible participation of Allies in sharing the nuclear burden, reflecting Allied political will to contribute to nuclear deterrence. Whether investing in nuclear or non-nuclear capabilities, participating in exercises, sharing intelligence, or hosting events — such as the annual NATO Nuclear Policy Symposium[6] — Allies decide how to contribute in ways that align with their domestic politics and strategic interests. In recent years, NATO polling has shown a high level of public support to sustain NATO's nuclear capabilities, certainly as long as Russia does, and also a high level of trust in NATO as a nuclear alliance.[7] These polling results reflect the broad consensus across the Alliance that nuclear deterrence remains relevant for the security environment we face, as "the cornerstone of Alliance security."[8]

"Exercises, wargames, and scenario-based discussions are held at NATO to challenge conceptual thinking and ensure our leaders are well prepared for decision-making in crisis or conflict."

This consensus also means an enduring commitment to maintain leadership focus and institutional excellence for the nuclear deterrence mission. Allied leaders in the NPG have approved updates to NATO's nuclear policies, plans, and procedures. Exercises, wargames, and scenario-based discussions are held at NATO Headquarters to challenge conceptual thinking and ensure our leaders are well prepared for decision-making in crisis or conflict. On the military side, from Supreme Headquarters Allied Powers Europe down through the NATO Command Structure and to Allied military units, there is an increasing demand to ensure conventional-nuclear coherence. These steps, though largely unseen by the public, enhance our collective mental agility and preparedness to manage crises, while maintaining firm political control over nuclear forces.

Managing Escalation Dynamics

Russia's revisionist approach to the European security architecture indicates Moscow's intent to impose a "sphere of influence" within Europe. For several decades, Russia has been modernizing its nuclear forces. Of concern has been its

From left
The author, Mr Jim Stokes, speaking with Brigadier General Chris A. McKinney, the J5 Deputy Director for Global Partnering, Security Cooperation and Countering Weapons of Mass Destruction at USEUCOM. Exercise STEADFAST WOLF 2025 (STWO25): NATO's largest chemical, biological, radiological and nuclear wargame exercise was held at the Joint Warfare Centre this year. STWO25 was the first iteration of the wargame under the lead of SHAPE. Photos by JWC PAO

development of dual-capable missiles, which can be armed with nuclear weapons. While undermining arms control agreements, including the Intermediate-Range Nuclear Forces (INF) Treaty, Russia built an arsenal of theatre nuclear weapons, deployable from a variety of platforms and intended to coerce NATO Allies.

Throughout its full-scale war against Ukraine, Moscow has regularly used cavalier nuclear rhetoric and signalling, including release of its revised nuclear doctrine, and employed dual-capable missiles against Ukraine, such as the novel Oreshnik intermediate-range ballistic missile (IRBM) in November 2024. Russia's actions form a pattern of behaviour, aimed at punishing Ukraine and attempting to deter Western support to Ukraine's defence as well as any potential direct intervention.

Russia's integrated conventional-nuclear strategy, and its potential willingness to employ nuclear weapons against its adversaries in a conflict, point to NATO's central challenge: to deter aggression, yet also prepare for a war with Russia where the thresholds are intentionally blurred. Moscow would likely fight a conventional war under a nuclear shadow, threatening nuclear employment to coerce NATO into backing down. Russia could decide to cross the nuclear threshold, likely combined with destabilization activities and conventional operations, at an unknown point in a conflict. The country's perception of whether it is winning or losing a war with NATO will be key, as well as our ability to understand Russia's perceptions, through its statements and behaviour.

In a potential future conflict with Russia, NATO would have to counter attempts at nuclear coercion and effectively deter escalation, including past the nuclear threshold, even while fighting conventionally (the so-called "intra-war deterrence" problem). Coherence in Allied strategy, in conventional and nuclear operations, will be critical. If Russia crosses the nuclear threshold, NATO will need robust, diverse, and formidable options to convince Russia to discontinue its aggression.

Recognizing the strategic, generational challenge facing the Alliance, it is clear that NATO Allies must continue to innovate in defence acquisition, invest in new capabilities and force structure, posture their forces appropriately, and prepare their societies for conflict by strengthening civil preparedness and resilience. Providing more options to Allied leaders will further enhance the credibility of our deterrence and our collective defence.

While much focus is on conventional forces, this applies to NATO nuclear forces and posture as well. In the 2024 Washington Summit Declaration, Allied heads of state and government reiterated their willingness to take "all necessary steps to ensure the credibility, effectiveness, safety, and security of the Alliance's nuclear deterrence mission, including by modernising its nuclear capabilities, strengthening its nuclear planning capability, and adapting as necessary."

Increased Allied investment in conventional capabilities is vital as the first line of defence, and as noted above, is synergistic with nuclear deterrence. Modernization of Allied strategic nuclear forces also is necessary, yet their potential use should be considered as a last line of defence. In-theatre nuclear forces provide options to manage a nuclear crisis in Europe (including through signalling), maintain intra-war deterrence, and respond to aggression in a proportionate way if needed. They also provide opportunities for greater burden-sharing among European Allies, who can contribute non-nuclear capabilities, bear financial costs, and share operational risks.

By giving European Allies direct involvement in a NATO nuclear mission, there is a greater incentive to participate in nuclear decision-making in the NPG, which further strengthens Alliance unity on nuclear deterrence. Going forward, NATO must adapt its nuclear forces and posture to continue to be fit for purpose long into the future. ✦

ENDNOTES

1 Quinlan, M. Thinking About Nuclear Weapons: Principles, Problems, and Prospects (2009), p. 33-34
2 Fact Sheet on NATO's Nuclear Sharing Arrangements, https://www.nato.int/nato_static_fl2014/assets/pdf/2022/2/pdf/220204-factsheet-nuclear-sharing-arrange.pdf, accessed July 2, 2025
3 Military Committee (MC) 14/3, approved by NATO Ministers on December 12, 1967
4 For more information on the NPG, see: https://www.nato.int/cps/en/natohq/topics_50069.htm
5 "To Prevent War, NATO Must Spend More," speech by NATO Secretary General Mark Rutte at the Concert Noble, Brussels, December 12, 2024
6 Press release on 2025 NATO Nuclear Policy Symposium
7 2023 Secretary General's Annual Report, pg. 45
8 Washington Summit Declaration, issued by the NATO Heads of State and Government participating in the meeting of the North Atlantic Council in Washington, D.C., July 10, 2024

THE ILLUSION OF CONVERGENCE

INTERROGATING CHINA-RUSSIA NUCLEAR PARALLELS

by **Linda Bachg**
2030 Staff Officer
Joint Warfare Centre Exercise, Training and Innovation Directorate
Doctoral Student at The Fletcher School of Law and Diplomacy

and **Daniel Kroth**
Non-Resident Fellow
Berkeley Risk and Security Lab
University of California, Berkeley

Introduction

"Understanding differences between the drivers of Russian and Chinese nuclear behaviour can help inform deterrence and escalation management."

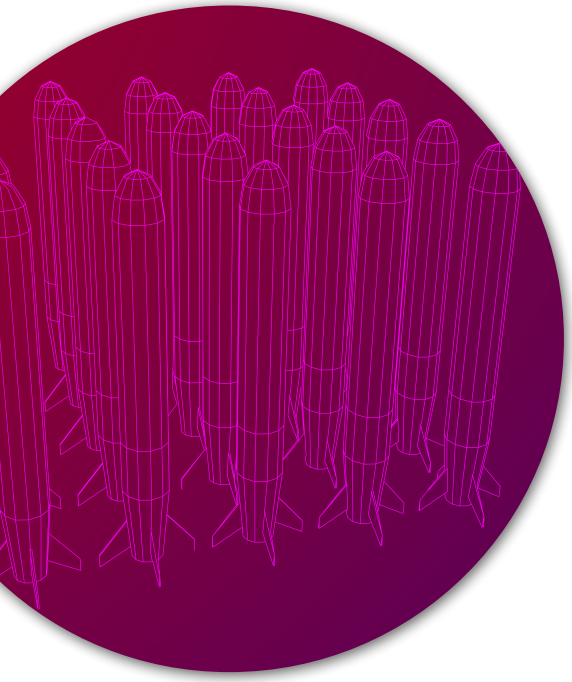
In January 2025, the Bulletin of Atomic Scientists' Doomsday Clock was set, for the first time, to under 90 seconds. The scientists cited a leading risk factor in taking this drastic step: the ongoing war in Ukraine and its potential to escalate into a nuclear conflict at any moment.[1] In addition to Russia's nuclear-bolstered aggression towards Ukraine, arsenal expansion in the People's Republic of China (PRC) has become a point of concern in newspaper headlines and policy circles alike, often inspiring comparisons between these two powers, their nuclear toolkit and strategic goals.[2]

NATO's 2024 Washington Summit Declaration concluded that the "deepening strategic partnership between Russia and the PRC and their mutually reinforcing attempts to undercut and reshape the rules-based international order, are a cause for profound concern."[3] As the two countries strengthen their strategic partnership and the Chinese arsenal begins to narrow the gap in size and diversity with the Russian arsenal, is Chinese nuclear behaviour likely to converge as well?

This article offers some critical reflections about the extent to which this apparent alignment of interest and partial convergence in arsenal size translate into comparable behaviour in the realm of nuclear strategy. After all, experts on Russian nuclear behaviour warn that "Western scholars often presume that strategic theory is universal,"[4] creating an environment in which misinterpretations and misperceptions could take hold. Better understanding the nuances that shape strategy, doctrine, and equipment choice in these distinct cases, then, is important in mitigating this risk.

We argue that deepening strategic relationships and simultaneous PRC arsenal expansion do not mean that China will engage in a close nuclear partnership with Russia, display the same strategic behaviour as Russia or the USSR, or that its proliferation is motivated by comparable drivers. We further argue that understanding differences in the drivers of Russian and Chinese nuclear behaviour is vital because much of NATO's historic experiences are shaped by interactions with the USSR during the Cold War and contemporary relations with Russia.

Applying lessons from this historical experience is likely to be ineffective even as China's arsenal grows to appear more similar to Russia's. Understanding differences between the drivers of Russian and Chinese nuclear behaviour can help inform deterrence and escalation management in the short term as well as arms control efforts in the long term.



Chinese and Russian Nuclear Arsenal Modernization

Current estimates tally the Russian nuclear stockpile at 4,309 weapons.[5] Of those, 1,718 are deployed strategic warheads with around 870 as land-based missiles, 640 on submarines, and around 200 at air bases.[6] The PRC, in contrast, possesses around 600 nuclear warheads across a triad, but is intent on rapidly expanding its arsenal with estimates ranging from 750 to 1,500 warheads by 2035.[7]

While claiming to still abide by the obligations set out in the strategic nuclear disarmament treaty New START, including the number of deployed warheads remaining around 1,700, in parity with the United States, Russia is in the process of concluding a nuclear modernization programme. The programme focuses "in particular on the development of the SS-X-29 (Sarmat) heavy ICBM, the SS-27 Mod 2 (Yars) ICBM, and the Dolgorukiy (Borei) class SSBN."[8]

Russia is capable of equipping the majority of its intercontinental ballistic missiles (ICBMs) and its submarine-launched ballistic missiles (SLBMs) with multiple warheads per missile.[9] It stations most of its strategic nuclear warheads on ICBMs, but has become keen on replacing Soviet-era systems with updated Russian designs for land-, air- and sea-based delivery systems.[10] Today, the main purpose of the arsenal is to deter and coerce the United States and NATO, especially in the ongoing war in Ukraine. Furthermore, it is used to deter Ukrainian attempts to move the conflict across the border into Russian territory, threatening severe retaliation.

China's modernization programme, which has accelerated since the early 2020s, covers all legs of the nuclear triad. On land, the PRC is building missile silos for liquid-fuel (DF-5) and solid-fuel ICBMs, developing new delivery systems, and has expanded warhead production. It is enhancing the dual-capable DF-26 intermediate-range ballistic missile force, likely replacing the DF-21 in nuclear roles. At sea, Type 094 submarines have been upgraded with longer-range JL-3 missiles. In the air domain, some aircraft have been assigned a new nuclear role, including deployment of a suspected nuclear-capable air-launched ballistic missile.[11]

However, the scope of China's nuclear ambitions remains unclear. The PRC claims that arsenal expansions are necessary to maintain its existing second-strike capability against a technologically sophisticated adversary while simultaneously taking actions that could position it to take a more assertive nuclear posture.[12] Some even observe that contemporary Chinese nuclear pursuits are "less cohesive, less coherent, and less aligned with China's specific security requirements than before."[13]

Regardless of the cause, it seems that the Chinese arsenal is likely to grow substantially, partially closing the gap between its current state and the large arsenals of Russia and the United States.

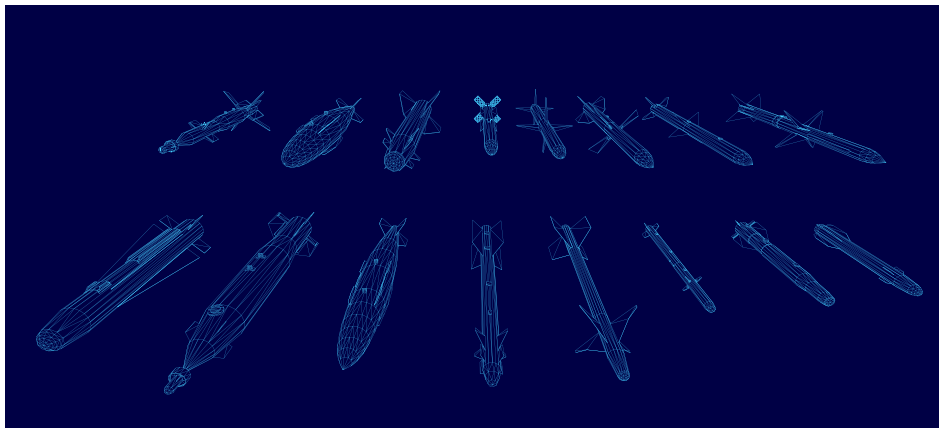
Drivers of Differential Nuclear Behaviour

But will the PRC's expanded arsenal result in a similar nuclear posture to that of Russia or a convergence in nuclear behaviour? We argue that it will not. Even as arsenal sizes and diversity converge, we believe differences in historical experience and strategic context, the political structures driving military strategy, and the organizations making nuclear decisions have resulted in material differences in doctrine, force structure, and weapons systems.

1. Historical experience and strategic context. Russia and China inhabit fundamentally different strategic environments and express divergent (if occasionally overlapping) strategic goals. Even if Chinese arsenal size and diversity expand to resemble that of modern Russia or the former USSR, this difference is likely to result in unique force structure and nuclear behaviour.

Russia's nuclear weapons enterprise began as a USSR project in the shadow of the Second World War, a profoundly destructive conventional conflict, much of which was fought on Soviet soil. In contrast to Eastern China's coastal geography, European Russia's most densely populated and economically productive regions lack a clear geographic buffer, contributing to an intense security dilemma.

Soviet nuclear planners saw a need to both deter ideologically opposed Europeans and Americans from transgressing this historically vulnerable boundary and to fight and win a nuclear conflict, ideally on third-party territory, to preserve Soviet vital interests and maintain



a sphere of influence in Eastern Europe.[14] They also saw nuclear parity[15] with the United States as inherently stabilizing, reducing the likelihood and intensity of conventional conflicts amid global geopolitical competition.[16] The balance of conventional military power has shifted away from modern Russia, increasing the importance of strategic weapons to Russia in coercive, deterrent, and warfighting capacities.[17]

In the wake of the Korean War and an increasingly troubled relationship with the USSR, Chinese defence planners of the 1960s saw a nuclear programme as a guarantor of sovereignty and a counter to "nuclear blackmail" — both by the ideologically opposed United States and by the increasingly distrusted Soviet Union. The geographic separation (by ocean or by less populated regions) from these threats reduced the immediacy and intensity of China's security dilemma, shifting the emphasis away from nuclear warfighting towards credible minimum deterrence. Consequently, Chinese planners have historically viewed nuclear weapons primarily as tools for safeguarding territorial integrity, regime survival, and political autonomy, rather than instruments for coercive diplomacy or warfighting.[18] Recent postural changes suggest that defence planners may be re-envisioning this role.

2. Political drivers of development, design, and modernization. Nuclear development plans and procurement policies are not created in a vacuum of strategic necessity. Political beliefs and the bureaucratic structure of decision-making bodies can significantly shape nuclear posture, strategy, and the hardware through which these are expressed.[19]

In both the PRC and Russia, nuclear weapons are seen as an important indicator of great power status. The prestige of nuclear weapons is both a means to desired geopolitical outcomes and an end in itself. This status is also conferred to leaders, with nuclear arsenals contributing to perceptions of strength, competence, or legitimacy. In both countries, this appears to have impacted historical weapons development and is likely a contributing factor to arsenal development today.[20]

The interplay between military-industrial interests and political leadership can also shape nuclear programmes, even in the absence of immediate strategic needs.[21] In Russia, strategic oversight is provided by the president, who also serves as commander-in-chief, and the Security Council of the Russian Federation. They issue guidance and identify strategic needs.[22] The Russian arsenal is supported by a bureaucratically complex but technologically mature defence industrial base inherited from the USSR, including private industries and state-integrated design bureaus.[23] Economic competition between private entities and competition for prestige and recognition among design bureaus drive design choices, contributing to the diversity of Russia's delivery toolkit.[24]

In China, nuclear weapons development is more tightly controlled by the Chinese Communist Party (CCP), with strategic oversight centralized under the Central Military Commission (CMC), chaired by the President and General Secretary of the CCP (currently Xi Jinping). Unlike Russia, where legacy institutions retain a degree of autonomy and inter-bureau rivalry, China's nuclear enterprise is more vertically integrated and therefore more carefully subordinated to party authority.[25] The People's Liberation Army Rocket Force (PLARF) is responsible for operating nuclear delivery systems, while key research and development is conducted by state-owned entities such as the China Academy of Engineering Physics and the China Aerospace Science and Industry Corporation.[26] This model has historically allowed technical and policy experts considerable discretion in interpreting broad directives from party leadership, but amid Xi Jinping's push for loyalty and more detailed policy prescription, their role has shifted towards compliant implementation.[27]

3. Organizational structure and decision-making. The same bureaucratic forces that shape development and postural choices also shape doctrine and are likely to shape decisions to use (or not use) a nuclear weapon.[28] In moments of crisis, decisions regarding nuclear use are likely to be mediated not solely through strategic logic but through the institutional filters and leadership preferences embedded in each state's command and control system.[29] Of course, the differing strategic needs of China and Russia contribute to the shape of these organizational structures, resulting in a back-and-forth where strategy shapes organization and organization informs operational decision-making within the confines of such strategy.

In both Russia and China, final launch authority lies with political leadership: Vladimir Putin and Xi Jinping. In Russia, the three Cheget nuclear briefcases and the command

Below
Models of different rockets on display by China's Aerospace and Science Industry Corporation. They lead the country's research and development in nuclear technology. Photo by MisledD, Shutterstock

authority they represent are carried by the President, the Defence Minister and the Chief of the General Staff. This triplicate approach introduces a level of interdependence as a hedge against decapitating strikes, but in practice, the president's decision is preeminent. This structure reflects a legacy of Soviet-era civil-military relations, where a strong professional military bureaucracy plays a key role in executing political decisions.[30]

In the Chinese case, nuclear weapons nominally remain under party control — a notable distinction. As with postural and procurement decisions, the decision to use nuclear weapons would likely occur in the CMC chaired by the General Secretary of the Communist Party (currently Xi Jinping). The commission oversees the PLARF. Unlike Russia's more blended civil-military structure, this approach reenforces political control over the military by the party.[31] While specifics of a nuclear crisis and existing doctrine are likely to be the dominant factors in Chinese and Russian nuclear behaviour in a crisis, it is possible that the Russian organizational structure might predispose it towards faster decision-making and greater flexibility in delegation of authority even under similar strategic conditions.

4. Doctrine and force structure. Both Russia and the PRC have taken steps to change their nuclear force structure and doctrine documents in recent years. These changes occurred in response to geopolitical dynamics but also service domestic considerations of prestige building and increasing leadership approval. Deviating from modus of periodic engagement in cooperative trust-building measures such as non-proliferation and arms reduction treaties from the dissolution of the Soviet Union to the 2010s, Russian nuclear policy reversal reached a conspicuous turning point with its "suspension" of the New START treaty in 2023, one year after launching the full-scale invasion of Ukraine. Late in 2024, Russia published an updated nuclear doctrine, aiming to signal stronger nuclear resolve. The new doctrine significantly lowers the threshold for a Russian nuclear weapons use in comparison to the previous version from 2020.

Where before nuclear weapons were to be used to ward off an existential threat to the state, now "critical threat[s] to [Russia's] sovereignty and/or territorial integrity,"[32] including conventional attacks, can be considered sufficient conditions for nuclear use. "Sovereignty" is maintained as a vague term, encompassing ambiguous geographical boundaries, incorporating Belarusian territory while simultaneously remaining unclear about the status of occupied Ukrainian territories. Stated threats to Russian sovereignty also include crossing of political red lines related to foreign interference in domestic Russian affairs, expansions of military coalitions towards or large-scale exercises near the Russian borderland, as well as blockages of transportation routes and attacks on hazardous sites within Russia.

The updated doctrine furthermore opens the possibility for nuclear weapons to be used as retaliation for the use of weapons of mass destruction against Russian military forces abroad and allows for launch-on-warning in cases of verified large-scale strike attempts to decapitate Russian leadership. Additionally, the updated doctrine states that nuclear use may be triggered in cases of "aggression against Russia and/or its allies by any non-nuclear state with participation or support from a nuclear state [, which] will now be considered a joint attack."[33]

In contrast, the PRC's nuclear doctrine appears more restrained, nominally reserving nuclear weapons use for retaliation against nuclear attacks.[34] As discussed above, official Chinese positions maintain the claim that the goal of its nuclear build-up is the credibility of a second strike. However, observers suspect that the Chinese ambition is to reach factual nuclear parity with the United States, which would equip the PRC with capabilities way beyond certain retaliation.[35] To what extent the declared Chinese no-first use policy will be upheld in a high-stakes conflict remains uncertain under fictitious conditions and within available information. Nevertheless, the value of this commitment should not be underestimated in diplomatic fora and security considerations in the West.

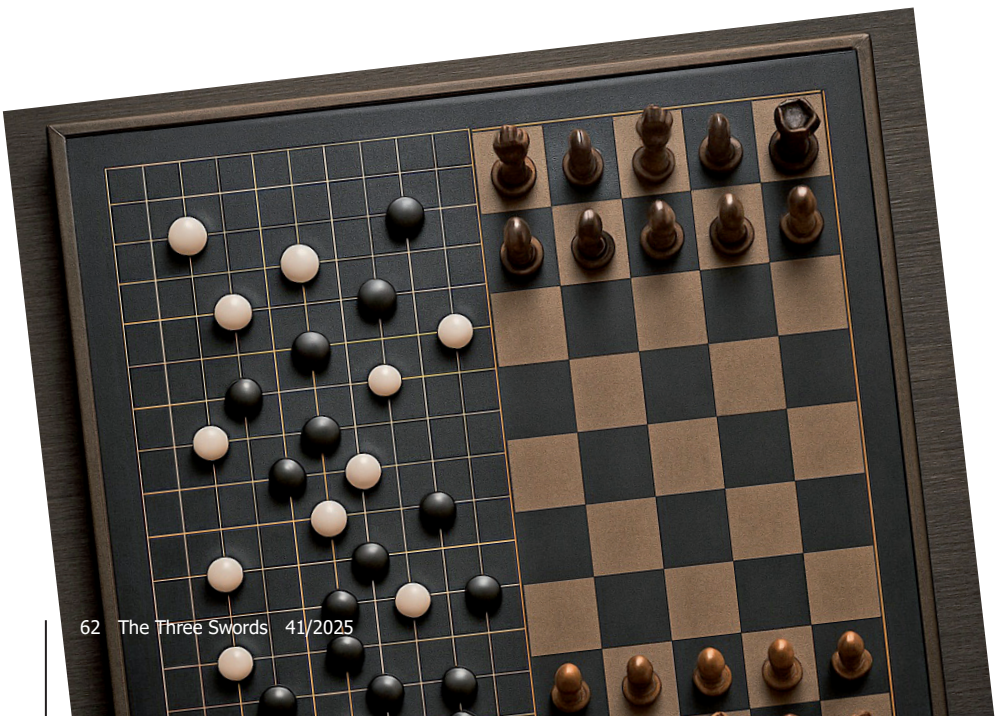
Conclusion

While the Chinese nuclear arsenal may grow in scale and diversity, significant differences in historical experiences, strategic contexts, political dynamics, and organizational structures will likely continue to foster nuclear behaviours distinct from Russia's.

These fundamental differences underscore that even a partial convergence in nuclear capabilities does not necessarily equate to similarity in strategic behaviour, doctrine, or crisis decision-making.

It is essential, therefore, to carefully distinguish between Chinese and Russian nuclear contexts and apply Cold War-era insights with caution. Recognizing and responding to these differences is crucial for effective deterrence, escalation management, and future arms control dialogues in an increasingly complex nuclear landscape. ✧

Below
Go and chess are similar-looking strategy games, but factually they are very different, just like the different Chinese and Russian nuclear strategies identified in this article.



"It is essential to carefully distinguish between Chinese and Russian nuclear contexts and apply Cold War-era insights with caution."

REFERENCES

1 John Mecklin, "2025 Doomsday Clock Statement." Bulletin of the Atomic Scientists, January 28, 2025. https://thebulletin.org/doomsday-clock/2025-statement/

2 Michael Sheridan, "China and Russia Issue Nuclear Warnings." Center for European Policy Analysis, January 28, 2024, https://cepa.org/article/china-and-russia-issue-nuclear-warnings/; Karolina Hird, Daniel Shats, and Kiley Pitman "The Strengthening China-Russia Nexus." CEPA, June 9, 2025. https://www.understandingwar.org/backgrounder/strengthening-china-russia-nexus; Robert D. Blackwell and Richard Fontaine, "No Limits? The China-Russia Relationship and U.S. Foreign Policy." Council on Foreign Relations, December 2024. https://www.cfr.org/report/no-limits-china-russia-relationship-and-us-foreign-policy

3 NATO, "Washington Summit Declaration." July 10, 2024. https://www.nato.int/cps/en/natohq/official_texts_227678.htm

4 Dmitri Adamski, "Quo Vadis, Russian Deterrence? Strategic Culture and Coercion Innovations." International Security 49, no. 3 (2025): 50-83, p. 51. https://direct.mit.edu/isec/article/49/3/50/128035/Quo-Vadis-Russian-Deterrence-Strategic-Culture

5 Hans M. Kristensen, Matt Korda, Eliana Johns, and Mackenzie Knight, "Russian nuclear weapons, 2025." Bulletin of the Atomic Scientists, May 13, 2025. https://thebulletin.org/premium/2025-05/russian-nuclear-weapons-2025/

6 Ibid.

7 Hans M. Kristensen, Matt Korda, Eliana Johns, and Mackenzie Knight, "Chinese nuclear weapons, 2025." Bulletin of the Atomic Scientists, March 12, 2025. https://thebulletin.org/premium/2025-03/chinese-nuclear-weapons-2025/

8 Anya L. Fink: "Russia's Nuclear Weapons." Library of Congress, May 22, 2025. https://www.congress.gov/crs-product/IF12672

9 Ibid.

10 Maxim Starchak, "Russia's Nuclear Modernization Drive Is Only a Success on Paper." Carnegie Politika, January 31, 2024. https://carnegieendowment.org/russia-eurasia/politika/2024/01/russias-nuclear-modernization-drive-is-only-a-success-on-paper?lang=en; Reuters, "Putin says special attention should be paid to nuclear triad in Russia's new arms programme." June 11, 2025. https://www.reuters.com/business/media-telecom/putin-says-special-attention-should-be-paid-nuclear-triad-russias-new-arms-2025-06-11/

11 Hans M. Kristensen, Matt Korda, Eliana Johns, and Mackenzie Knight, "Chinese nuclear weapons, 2025." Bulletin of the Atomic Scientists, March 12, 2025. https://thebulletin.org/premium/2025-03/chinese-nuclear-weapons-2025/

12 Jacob Stokes, "Assessing China's Nuclear Decision-Making: Three Analytical Lenses." CNAS, March 18, 2025. https://www.cnas.org/publications/reports/assessing-chinas-nuclear-decision-making; Tong Zhao, "Political Drivers of China's Changing Nuclear Policy: Implications for U.S.-China Nuclear Relations and International Security." Carnegie, July 17, 2024. https://carnegieendowment.org/research/2024/07/china-nuclear-buildup-political-drivers-united-states-relationship-international-security?lang=en

13 Ibid.

14 Marshal V. D. Sokolovsky, "Military Strategy: Soviet Doctrine and Concepts." New York/London: Frederick A. Praeger, 1963. https://archive.org/details/militarystrategy0000mars_w7l4

15 ядерный паритет

16 Nikolay V. Ogarkov, "Military Strategy." In "The Soviet Art of War," edited by Harriet Fast Scott and William F. Scott, 1982. https://www.taylorfrancis.com/chapters/edit/10.4324/9780429314681-54/military-strategy-nikolay-ogarkov

17 Anya L. Fink: "Russia's Nuclear Weapons." Library of Congress, May 22, 2025. https://www.congress.gov/crs-product/IF12672

18 Liping Xia, "China's Nuclear Doctrine: Debates and Evolution." Carnegie, June 30, 2016. https://carnegieendowment.org/research/2016/06/chinas-nuclear-doctrine-debates-and-evolution?lang=en

19 Scott Sagan, "Why do States Build Nuclear Weapons?: Three Models in Search of a Bomb." International Security 21, no. 3 (1996-1997): 54-86. https://doi.org/10.2307/2539273 ; See also Bary Posen, "The Sources of Military Doctrine." Ithaca, NY: Cornell University Press, 1984. https://www.cornellpress.cornell.edu/book/9780801416330/the-sources-of-military-doctrine/#bookTabs=1

20 Scott Sagan, "Why do States Build Nuclear Weapons?: Three Models in Search of a Bomb." International Security 21, no. 3 (1996-1997): 54-86. https://doi.org/10.2307/2539273 ; Jacques E. C. Hymans, "The Psychology of Nuclear Proliferation." Cambridge: Cambridge University Press, 2006. https://www.cambridge.org/core/books/psychology-of-nuclear-proliferation/7F0311127B7EB7EDCDD479CE0347CF83 ; Susan Turner Haynes, "The Power of Prestige: Explaining China's Nuclear Weapons Decisions." Asian Security 16, no. 1 (2020): 35-52. https://doi.org/10.1080/14799855.2018.1472581 ; Ryan Christenson, "Nexus of Fear, Deterrence, and Prestige: The Role of Russia's Exotic Nuclear Toolkit." Missouri State University, 2025. https://bearworks.missouristate.edu/theses/4052/

21 Bary Posen, "The Sources of Military Doctrine." Ithaca, NY: Cornell University Press, 1984. https://www.cornellpress.cornell.edu/book/9780801416330/the-sources-of-military-doctrine/#bookTabs=1

22 The Ministry of Foreign Affairs, "Fundamentals of State Policy of the Russian Federation on Nuclear Deterrence [English Translation]." Last accessed June 2025. https://www.mid.ru/en/foreign_policy/international_safety/1434131/?TSPD_101_R0=08765fb817ab20005ffb5f5679c679b73239eaf214c9eb30727aa1d22b94ae3263b99689d975b78008904712ab143000555a1cd035255e0a4ddb99d7fad6ccb1c1d077a3c7b00076e29811633f8284f1f7bf66c3aa8338bc2b2a494b4b950b737.

23 William T. Lee, "The 'Politico-Military-Industrial Complex' of the U.S.S.R." Journal of International Affairs 26, no. 1 (1972): 73-86. https://www.jstor.org/stable/24356792

24 Ryan Christenson, "Nexus of Fear, Deterrence, and Prestige: The Role of Russia's Exotic Nuclear Toolkit." Missouri State University, 2025. https://bearworks.missouristate.edu/theses/4052/

25 James C. Mulvenon and Andrew N. D. Yang, "The People's Liberation Army as Organization." RAND, 2002. https://www.rand.org/pubs/conf_proceedings/CF182.html ; South China Morning Post, "What is China's Central Military Commission and why is it so powerful?" Last accessed June 2025. https://www.scmp.com/news/china/military/article/3196360/what-chinas-central-military-commission-and-why-it-so-powerful

26 Wang Na, Li Huihong, Lin Ting, and Liu Dongyan, "Twenty Years of the NSAF Joint Fund: Exploration and Practice of a New Model for Strengthening Requirement-Led Basic Scientific Research Collaboration and Innovation." Georgetown CSET, 2023. https://cset.georgetown.edu/publication/china-national-security-academic-fund/

27 Liping Xia, "China's Nuclear Doctrine: Debates and Evolution." Carnegie, June 30, 2016. https://carnegieendowment.org/research/2016/06/chinas-nuclear-doctrine-debates-and-evolution?lang=en ; Jacob Stokes, "Assessing China's Nuclear Decision-Making: Three Analytical Lenses." CNAS, March 18, 2025. https://www.cnas.org/publications/reports/assessing-chinas-nuclear-decision-making; Tong Zhao, "Political Drivers of China's Changing Nuclear Policy: Implications for U.S.-China Nuclear Relations and International Security." Carnegie, July 17, 2024. https://carnegieendowment.org/research/2024/07/china-nuclear-buildup-political-drivers-united-states-relationship-international-security?lang=en

28 Scott D. Sagan and Kenneth N. Waltz, "The Spread of Nuclear Weapons: A Debate Renewed (Second Edition)." New York City, New York: W. W. Norton, 2002. https://politicalscience.stanford.edu/publications/spread-nuclear-weapons-debate-renewed-second-edition

29 Beyza Unal, Julia Cournoyer, Calum Inverarity, and Yasmin Afina, "Uncertainty and complexity in nuclear decision-making." Chatham House, March 07, 2022. https://www.chathamhouse.org/2022/03/uncertainty-and-complexity-nuclear-decision-making

30 Leonid Ryabikhin, "Russia's NC3 and Early Warning Systems." The Nautilus Institute, July 11, 2019. https://nautilus.org/napsnet/napsnet-special-reports/russias-nc3-and-early-warning-systems/ ; See also Kristin Ven Bruusgaard, "Understanding Putin's Nuclear Decision-Making." War on the Rocks, March 22, 2022. https://warontherocks.com/2022/03/understanding-putins-nuclear-decision-making/

31 Liping Xia, "China's Nuclear Doctrine: Debates and Evolution." Carnegie, June 30, 2016. https://carnegieendowment.org/research/2016/06/chinas-nuclear-doctrine-debates-and-evolution?lang=en ; Jacob Stokes, "Assessing China's Nuclear Decision-Making: Three Analytical Lenses." CNAS, March 18, 2025. https://www.cnas.org/publications/reports/assessing-chinas-nuclear-decision-making ; Tong Zhao, "Political Drivers of China's Changing Nuclear Policy: Implications for U.S.-China Nuclear Relations and International Security." Carnegie, July 17, 2024. https://carnegieendowment.org/research/2024/07/china-nuclear-buildup-political-drivers-united-states-relationship-international-security?lang=en

32 Nicole Grajewski, "Russia's Updated Nuclear Doctrine Isn't a Blueprint for Weapons Use. Its Primary Value Is Manipulation." Carnegie, November 26, 2025. https://carnegieendowment.org/emissary/2024/11/russia-nuclear-doctrine-update-weapons-use-sovereignty?lang=en

33 Ibid.

34 Ministry of Foreign Affairs of the People's Republic of China, "No-first-use of Nuclear Weapons Initiative." Last accessed June 2025. https://www.mfa.gov.cn/eng/xw/wjbxw/202407/t20240723_11458632.html

35 Stockholm International Peace Research Institute, "Nuclear Risks Grow as New Arms Race Looms." June 16, 2025. https://www.sipri.org/media/press-release/2025/nuclear-risks-grow-new-arms-race-looms-new-sipri-yearbook-out-now#:~:text=Source%3A%20SIPRI%20Yearbook%202025.,warheads%20a%20year%20since%202023.

EDITOR'S CHOICE

This article was originally published in the Marine Corps Gazette, August 2025. It has been slightly adapted for The Three Swords.

THE JOINT WARFARE CENTRE'S INFLUENCE ON NATO's FUTURE

BRIDGING GAPS AND PROJECTING POWER

by **Brigadier General Raymond L. Adams**
United States Marine Corps
Deputy Commander and Chief of Staff
NATO Joint Warfare Centre

and **Major Joshua Marano, MA, PCC, BCC**
United States Marine Corps
Land and Amphibious Operations and Plans Advisor
NATO Joint Warfare Centre

THIS ARTICLE EXPLORES how U.S. Marines in NATO contribute to the Alliance's mission of collective defence, deterrence, and interoperability. It highlights the Corps' role in training, delivering operational- to strategic-level training and exercises, developing real-world plans, integrating diverse capabilities, and delivering the ethos and excellence necessary for NATO's evolving security landscape.

For several years, the Marine Corps has maintained a pivotal presence at NATO's Joint Warfare Centre (JWC) in Stavanger, Norway. The Joint Staff has competitively selected a Marine one-star general as the JWC's Deputy Commander and Chief of Staff for the past three terms (approximately six years), solidifying the Corps' role as an essential contributor to the Alliance's operational readiness and strategic evolution. From sharpening planning capabilities to fostering interoperability among Allied nations, the Marine Corps continues to exemplify leadership and adaptability in any time, clime, and place across the Alliance.

NATO's Structure and Strategic Framework

Since its founding in 1949, NATO has served as the cornerstone of collective security for its member states. Comprising 32 member countries, NATO's strength lies in its unity and shared values.

NATO's military command structure consists of two key components. The NATO Command Structure ensures operational oversight and strategic direction, while the NATO Force Structure organizes multinational forces to execute those directives. Strategic-level oversight is divided between the Allied Command Operations (ACO) and Allied Command Transformation (ACT): ACO is responsible for the planning and execution of all Alliance operations. It consists of a small number of permanently established headquarters, each with a specific role. Supreme Allied Commander Europe — or SACEUR — assumes the overall command of operations at the strategic level and exercises his or her responsibilities from the headquarters in Mons, Belgium: Supreme

Headquarters Allied Powers Europe, more commonly known as SHAPE.[1]

ACT defines the future military context, identifying challenges and opportunities in order to innovate and maintain a warfighting edge. It ensures maximum interoperability; gives structure and priority to NATO forces through defence planning and capability development; applies innovation to leverage ideas, procedures and technologies to the benefit of NATO's warfare development; and, in all of this, leverages the intellectual horsepower of a large network of industry, academia, military and civilian expertise in member countries, in NATO agencies and NATO Centres of Excellence.[2]

These structures enable NATO to respond effectively to a dynamic and complex threat environment. As NATO Secretary General Mark Rutte stated, "NATO's core mission is to ensure our collective deterrence and defence. Over the past decade, we have made tremendous progress in ensuring we have the forces and capabilities to deter and defend against any threat, from any direction. But we must go further and faster to meet the enormous challenge ahead."[3] The JWC embodies this call to action.

The JWC's Role in NATO

The JWC, located in Stavanger, Norway, plays a pivotal role within NATO's ACT. Established in 2003, the JWC is responsible for delivering operational- and strategic-level training through immersive, computer-assisted command post exercises. By simulating complex scenarios that mimic real-world challenges, the JWC ensures NATO's ability to adapt and respond effectively to emerging threats.

Beyond training, the JWC serves as a transformational hub, integrating doctrine, experimentation, and lessons learned into actionable strategies. Senior leaders across the Alliance have emphasized its indispensable role in readiness and deterrence. As Norwegian Defence Minister Bjørn Arild Gram noted, "The JWC plays a key role in enabling NATO to defend our democracy, our freedom, and our prosperity."[4] Admiral Pierre Vandier, Supreme Allied Commander Transformation, also stated, "The Joint Warfare Centre is the showroom of ACT concepts."[5]

The JWC's mission is to "plan, prepare, and execute static and distributed joint operational- and strategic-level training in support of warfare development and warfighting readiness." Additionally, the JWC aims to "propel NATO's readiness into the future by serving as a transformational hub that connects training and warfare development."[6]

Understanding the JWC's role in NATO's framework can be challenging for Marines accustomed to Marine Corps-centric operations. The simplest way to envision the JWC in Marine language is to think of the Marine Air-Ground Task Force (MAGTF) Staff Training Program (MSTP) and Combat Development and Integration. The JWC's training methodology mirrors the MSTP, which focuses on sharpening staff-level planning skills[7] while also replicating facets of Combat Development and Integration, which drives future concepts and doctrine.[8]

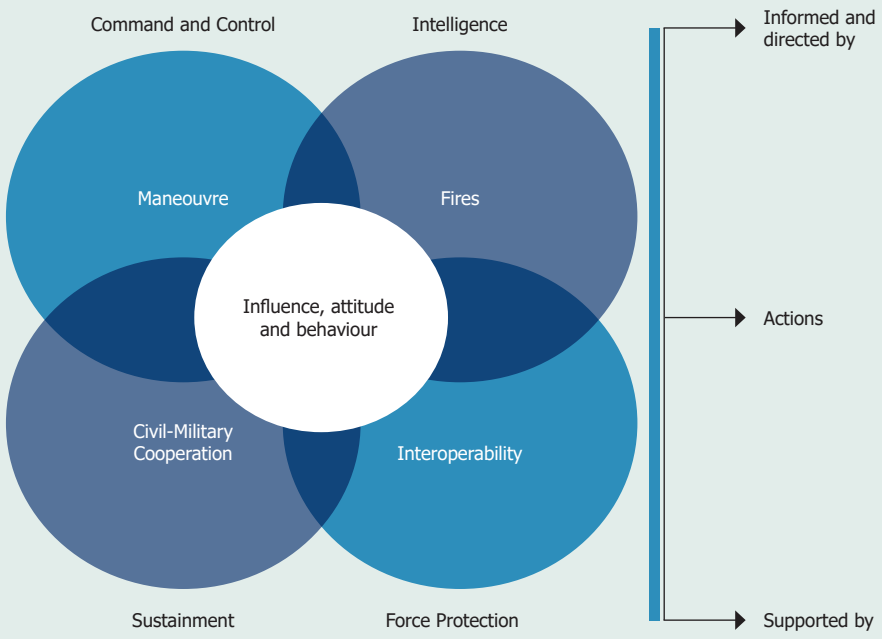
This simple analogy offers a smaller yet familiar lens for viewing and understanding the overall purpose of the JWC within NATO's strategic landscape.

The MAGTF: Strengthening NATO's Interoperability

The MAGTF embodies the Corps' unique ability to integrate diverse combat elements into cohesive, expeditionary units. In NATO, the MAGTF model brings unparalleled flexibility and interoperability to Allied operations across the engagement space.[9] By combining physical and non-physical domains within NATO's Joint Function Framework (see Figure 1), MAGTF principles enhance the Alliance's ability to execute complex missions and respond to crises efficiently.

For example, MAGTF concepts were instrumental during the evolution of NATO exercises such as TRIDENT JUNCTURE, COLD RESPONSE, and NORDIC RESPONSE, where seamless coordination among multinational forces was critical. The MAGTF's inherent adaptability aligns perfectly with NATO's collective defence objectives, reinforcing the Corps' mandate to "fight to be the military service partner of choice for our Allies and Partners."[10]

Below: NATO's joint function framework



Maj. Gen. Ruprecht von Butler, Commander JWC (centre left), and Deputy Commander and Chief of Staff Brig. Gen. Raymond L. Adams (centre right) during the JWC event for the 249th anniversary of the U.S. Marine Corps, November 10, 2024. Photo by JWC PAO

Moreover, the MAGTF's excellence in integrating its warfighting capabilities across air, land, and maritime domains directly complements NATO's emphasis on interoperability and collective defence. Just as the MAGTF ensures cohesive, all-domain operations within the Corps, NATO relies on synchronizing its member states' multi-domain capabilities to address theatre-wide threats.

This alignment underscores how MAGTF concepts — such as rapid adaptability and sustained operations — enhance NATO's mission of readiness and response.

Marine Corps Opportunities Across NATO

Marines serving in NATO billets play a vital role in strengthening the Alliance. With positions ranging from sergeant to brigadier general (rotating between services, depending on Joint Staff assignment), Marines are stationed across Europe in key NATO headquarters. These positions, spanning from Norway to Italy and from Portugal to Türkiye, offer unique opportunities to represent the Corps, influence Allied operations, and build lasting partnerships. The diversity of roles and occupational opportunities allows Marines across the fleet to bring their expeditionary mindset to NATO's planning and operations, contributing to mission success while enhancing their own professional development.

Delivering Excellence: Why JWC Exercises Matter

The JWC's exercises are more than training events — they are critical rehearsals for real-world scenarios. These exercises challenge senior leaders and staffs from the strategic level (Supreme Headquarters Allied Powers Europe) to the operational level (the three joint force commands at Norfolk, Brunssum, and Naples) to the upper tactical level (component commands).

Spanning the range of military operations, the JWC's exercises, wargames, and warfare development initiatives drive the cross-echelon coordination and multinational responses under complex conditions, ensuring that NATO forces remain agile, cohesive, and prepared for any contingency. Simply stated, "The NATO Joint Warfare Centre is the nexus where operational expertise and innovation converge to enhance NATO's readiness. Through rigorous training, experimentation, and warfare development, we help ensure NATO forces are prepared to meet the challenges of today and tomorrow."[12] For Marines, either permanently stationed in a NATO billet or augmenting various exercises (e.g. Marine Corps Reserve augmentees), these opportunities provide invaluable experience in joint operations, enhancing their ability to integrate with Allied forces while reinforcing the Corps' commitment to mission accomplishment.[13]

The Future of NATO: A Call to Action

As NATO adapts to an increasingly complex security environment, the Marine Corps' role within the Alliance is more important than ever. By investing in billets, contributing to operational planning, and embodying the principles of interoperability, Marines ensure that both the Corps and NATO remain a credible and capable force.

The future of NATO depends on leaders who can foster its culture, spark its curiosity, and drive its creativity (people, ideas, and things — in that order). Marines, with their unique expeditionary warfighting ethos and unwavering commitment to NATO's common values of individual liberty, human rights, democracy, and the rule of law[14] are ideally positioned to meet this challenge.

The Corps' place in NATO exemplifies our best — our people and our enduring commitment to mission, adaptability, and expeditionary excellence. From the various MAGTF planners leading real-world planning to strategic placement of Marine Corps senior leaders across NATO, Marines continue to strengthen the Alliance and prepare it for the challenges of tomorrow. By bridging gaps and projecting power, the Corps ensures that NATO remains the world's premier military alliance. ✦

ENDNOTES

1 NATO, "Allied Command Operations (ACO)," NATO, May 27, 2024, https://www.nato.int/cps/en/natohq/topics_52091.htm.
2 NATO, "Allied Command Transformation (ACT)," NATO, September 24, 2024, https://www.nato.int/cps/en/natohq/topics_52092.htm.
3 NATO, "Press Conference by Incoming NATO Secretary General Mark Rutte," NATO, October 1, 2024, https://www.nato.int/cps/en/natohq/opinions_229150.htm.
4 Stefan Kühling, Inci Kucukaksoy, and Marcus Lund, The Joint Warfare Centre Book 2022. Publications (Stavanger, Norway: NATO JWC, 2022), https://www.jwc.nato.int/wp-content/uploads/2024/08/00-The_JWC_Book_2022.pdf.
5 Admiral Pierre Vandier, Supreme Allied Commander Transformation, verbal remarks during a visit to the Joint Warfare Centre on December 17, 2024.
6 The Joint Warfare Centre Book 2022. Publications.
7 Staff, "MAGTF Staff Training Program, MSTP," Marines.mil, n.d., cdi.marines.
8 Command Development and Integration, "Who We Are," Marines.mil, n.d., cdi.marines.mil.
9 Engagement Space: That part of the strategic environment relevant to a particular crisis in which the Alliance may decide, or has decided, to engage. Note: The engagement space can be initially viewed through several conceptual models. The most common in NATO recognizes the six PMESII domains (This list is not exhaustive and can be expanded): political, military, economic, social, infrastructure, and information. Engagement space is different from the operating environment, which is defined as "a composite of the conditions, circumstances and influences that affect the employment of capabilities and bear on the decisions of the COM." (NATO Comprehensive Operations Planning Directive Version 3.1)
10 Gen Eric Smith, 39th Commandant's Planning Guidance, (Washington, DC: August 2024)
11 NATO, AJP-01, Allied Joint Doctrine (Edition F, Version 1) (Brussels: December 2022)
12 Brigadier General Raymond Adams, Deputy Commander and Chief of Staff, NATO JWC interview on November 19, 2024.
13 The Joint Warfare Centre Book 2022. Publications.
14 NATO 2022 Strategic Concept (Madrid: June 2022).

"With more than half of active satellites orbiting the Earth belonging to NATO Allies or companies based in Allied territory, NATO countries increasingly rely on space in key functional areas."

TECHNOLOGICAL ADVANCEMENTS IN SPACE

An NCIA Perspective

by **Elena Morando**
and **Flavio Giudice**
NCIA Chief Technology Office
Digital, Innovation and Technology Section
Space Technology Adoption and Resilience Team

Photo by NASA

NCIA manages six satellite ground stations and one satellite centre.

OVER THE PAST two decades, demand has surged in the space sector due to reduced launch costs, new commercial launch services and the miniaturization of satellite technology. This has provided wider commercial access to space, confirmed by increased involvement from industry and academia.

Commercial capabilities have gained significance in terms of innovation pace and service availability. The ability to integrate these technologies into the military architecture faster than adversaries is a way for NATO to maintain its strategic advantage in this domain. The NATO Communications and Information Agency (NCIA) supports NATO by identifying and integrating these technologies. With more than half of active satellites orbiting the Earth belonging to NATO Allies or companies based in Allied territory, NATO countries increasingly rely on space in several key NATO functional areas.

Space is critical, for example, to secure communications (satellite communications), navigate and track forces (positioning, navigation and timing), maintain situational awareness (intelligence, surveillance and reconnaissance and space situational awareness), forecast the weather (meteorology and oceanography) and detect missile launches (shared early warning).

New technologies offer new opportunities but also new risks. NATO must be aware of and understand these risks and vulnerabilities to maintain reliable access to space data, services and products critical to the success of its operations, missions and activities. As these capabilities evolve, NATO also adapts the ways in which it utilizes space.

1 Satellite Communications (SATCOM)

As the demand in satellite services increases, traditional SATCOM radio frequency bands are experiencing bottlenecks, especially in lower-frequency bands. Optical (or laser) communication systems enable the relay of larger volumes of data, over greater distances and at a much faster rate than radio frequency systems. This communication interconnects satellites, generating inter-satellite links, and connects them with ground stations, aircraft, ships and vehicles. Laser SATCOM is more secure and more robust than radio SATCOM as laser beams are harder to intercept and jam.

Another innovation in SATCOM is the development of constellations of smaller low Earth orbit (LEO) satellites, moving away from traditional large geostationary orbit (GEO) satellites. As satellites in LEO are closer to the Earth, LEO SATCOM experience lower latency, enabling faster transmissions of data. Moreover, GEO satellites orbit the Earth above the equator and, due to geometrical constraints, cannot offer coverage over the poles. This can be supplemented by large constellations of satellites in highly inclined LEO, capable of offering global coverage, including over previously underserved regions. The under-coverage of the poles is also being addressed by missions flying on highly inclined and highly elliptical orbits (HEOs). These offer excellent coverage of the poles and the surrounding area. A constellation with even a few of these satellites can offer seamless services.

"Reliable access to space data, services and products is critical to NATO."

NCIA operates the SATCOM capabilities and infrastructure necessary for the connectivity of NATO forces. The Agency manages six satellite ground stations and one satellite centre. Four ground stations were upgraded recently to improve satellite anchoring capabilities, nearly doubling the previous SATCOM ground coverage. In early 2025, Luxembourg and Spain joined four already participating Allies in the NCIA-led multinational SATCOM consortium, NATO SATCOM Services 6th Generation (NSS6G), which supplies military SATCOM services to NATO. The NSS6G project started in 2020 between NCIA, France, Italy, the United Kingdom and the United States. Through NSS6G, Allies provide NATO with a greater, more resilient and more flexible space capability to conduct its operations and exercises. The addition of capabilities from Luxembourg and Spain expands these services, increasing the overall resilience and availability of SATCOM to NATO.

Above from left
The NCIA operates six satellite ground stations and one satellite centre. Pictured here are the ground stations SGS-S01 in Kester, Belgium, and SGS-S02 in Lughezzano, Italy. Photos by NCIA

2 Positioning, Navigation and Timing (PNT)

With respect to PNT, the ability to exploit simultaneously different global navigation satellite systems (GNSS) can guarantee high signal accuracy and availability. The accuracy of PNT services relies on the number of satellites in view of the receiver. With every addition to a GNSS constellation, the precision, availability and robustness of the PNT service is improved. GNSS satellites are being modernized to increase signal integrity and reliability in contested environments characterized by signal jamming and denial. Modernization efforts include deploying satellites with enhanced cybersecurity and encryption features to expand current GNSS constellations, making them more resistant to jamming and spoofing.

In line with efforts to mitigate jamming effects, NCIA has developed a software tool to understand the impact on operations. This Radar Electromagnetic and Communication Coverage Tool (REACT) can estimate the area where an interfering signal would degrade or deny GNSS. REACT is employed in the exercise environment to provide estimation of GNSS jammers' impact for operational planning purposes.

To achieve better coverage with fewer satellites, GNSS constellations are typically in medium Earth orbits (MEO). Another augmentation layer for enhanced GNSS coverage under consideration is the addition of LEO satellite constellations. As LEO satellites are closer to the Earth than GEO, GNSS signals received on the ground from LEO would be stronger and less prone to jamming. In the context of operations, a more robust network of multi-orbital satellites would provide greater GNSS accuracy, enabling the employment of less destructive, more precise targeting. Stronger signals would also provide better support to urban operations.

In urban environments positioning accuracy is degraded by the obstruction of the direct line of sight between GNSS satellites and receivers caused by buildings. In this context receivers rely on weaker and delayed reflected signals, leading to decreased PNT services accuracy. To provide services to the High North, a region characterized by GNSS signal degradation, new HEO constellations are better suited for the coverage of polar regions.

3 Intelligence, Surveillance and Reconnaissance (ISR)

New ISR constellations are also populating the orbits, especially LEO satellites. As the number of Earth observation satellites grows, the revisit time decreases, turning persistent and quasi-real time high-resolution global monitoring into a reality. The high-resolution aspect is important for these applications. Continuous monitoring can already be achieved with GEO satellites, but given their altitude, the resolution of the systems, while allowing environmental monitoring, cannot provide below-the-metre applications such as target recognition. With technological advancements, LEO satellites are being equipped with very high-resolution sensors, providing a better solution.

The resolution of commercially available space imagery has enhanced to below half a metre, for both electro-optical (EO) and synthetic-aperture radar (SAR) systems, enabling to capture finer details on the Earth's surface from distances of hundreds of kilometres.

Beyond EO and SAR, infrared (IR) sensors collect valuable information that helps measure surface and water temperatures. Recently launched commercial multispectral (MS) and hyperspectral (HS) satellite missions

Clockwise:
Alliance Ground Surveillance (AGS) – NATO's airborne ground surveillance capability relying on NATO satellite communications – reached initial operational capability in February 2021, photos by NCIA.

Clockwise, right page:
Anti-aircraft battalion in Poland, photo by Fabian Helmersen, Norwegian Armed Forces; U.S. Navy amphibious assault ship USS Iwo Jima, supporting a NATO task force, photo by NATO; Geospatial METOC Innovation and Training Facility staff during 2024 NATO Coalition Warrior Interoperability Exercise, photo by HQ SACT.

collect data that enable the identification of material compositions. Applications include large-scale environmental mapping of, for example, soil composition, vegetation biodiversity, and water and air quality.

Commercial systems able to collect electromagnetic (EM) signatures emitted by devices such as radars and satellite telephones are also supporting the understanding of activities at sea and over land. In the maritime domain, automatic identification system (AIS) messages, which are mandatorily transmitted by ships of certain classes for identification and positioning, have long been collected from space to assess vessel activity. When vessels go "dark," either by turning off or manipulating their AIS transponders, SAR and EO satellite imagery can help track them.

In recent years tracking of these vessels has benefitted from radio frequency (RF) data collected from space. Different providers can collect EM signatures in different bands, geolocating different types of equipment that can lead to finding vessels (e.g. maritime navigation radars). Industry is also working on profiling particular types of equipment from collected RF signatures to recognize them in different instances, and also when no other information (e.g. ship detections from imagery) is available.

To transform the way NATO gathers and uses data from space, NCIA has set up a multinational programme, the Alliance Persistent Surveillance from Space (APSS). This initiative establishes a virtual constellation of national and commercial space assets, such as satellites, leveraging the latest advances in commercial space technology. Seventeen Allies are currently part of the initiative, which will enhance NATO's space-based capabilities for operational support, intelligence sharing and situational awareness.

The growing number of satellites and their greater information collection capabilities generate large amounts of data collection. The data generated by modern satellite instruments can exceed the limit of what can be transmitted to the ground. Refinements in artificial intelligence (AI) algorithms and reductions in mass and size of the required AI hardware could provide a solution when integrated into satellites, an effort that is ongoing. Furthermore, AI-powered techniques could facilitate satellites to autonomously process imagery in-orbit, discard unusable imagery (e.g. cloud-covered EO imagery) and transmit only exploitable imagery.

In the past, the lack of satellites and the slow data collection and processing times could not fulfil ISR demands. Nowadays, the volume of data available to imagery analysts for ISR exploitation is greater than the processing capacity. AI-based techniques, such as automatic target detection and classification and change detection, will be leveraged further to support with prioritization and data exploitation, reducing the workload of analysts and operators.

Within the APSS programme, NCIA is assessing the technical exploitation of advanced analytics required by the NATO Command Structure and identifying technologies to provide imagery analysts with assisting tools. NCIA is exploring the potential for industry to provide advanced analytics, primarily on EO commercial satellite imagery. NCIA will select, procure and test technologies alongside NATO imagery analysts to understand which can best support the processing of vast amounts of imagery.

4 Space Situational Awareness (SSA)

As the number of satellites and our dependence on space-based technologies grow, so do the threats posed by an overcrowded environment. Both natural and human-made space debris threaten space operations, particularly in LEO orbits. SSA helps track, monitor and mitigate risks by predicting conjunctions between objects to enable collision avoidance manoeuvres. Currently, some objects remain untraceable due to small dimensions, but they could be tracked with the development of more sensitive instruments. Efforts in enhancing SSA consist of enlarging the ground network of radars and telescopes, increasing their interconnectedness and improving the ability to catalogue space objects with the aid of AI. Satellites capable of non-Earth imaging (NEI), capturing images of other space objects, can also assist in detecting and cataloguing. Recognizing and attributing actions in space could discourage malicious actors from compromising space assets, for example through close-proximity operations. More commercial entities are tracking the skies, leveraging technology including AI and detection of RF signals transmitted by satellites, collecting more information for faster, more precise and independent activity monitoring and attribution.

5 Meteorology and Oceanography (METOC)

Science missions are building understanding of meteorological phenomena, for example by analysing cloud compositions, measuring wind speeds and studying atmospheric dynamics. Imagers onboard new METOC satellites have increased imagery resolution, enabling finer and more accurate meteorological assessments. New missions include launching satellites in polar LEO to decrease current revisit times to provide short-range weather forecasting across the globe and increased coverage over the polar regions.

METOC products are fundamental for the planning, execution and support of military operations on land and at sea by strengthening understanding of, for example, soil conditions and wave height. Climate change is increasing the need to predict extreme weather events and understand more complex phenomena. More precise forecasting and finer detail information from current and upcoming METOC satellites can optimize logistics, equipment and targeting to ensure the effectiveness of military operations in more complex and demanding environmental conditions.

In September 2023, the NATO Communications and Information Academy inaugurated its Geospatial METOC Innovation and Training Facility in Oeiras, Portugal, to support agile innovation and training across the full spectrum of future environmental services required by NATO.

This new facility is the first of its kind and allows the geospatial, meteorological and

Above
The Space Response Cell during NATO Exercise STEADFAST DETERRENCE 2025 at the Joint Warfare Centre (JWC). Photo by JWC PAO

oceanographic communities of interest to work collectively on joint environmental information challenges. It enables the advancement of the NATO recognized environmental picture, thus providing military operations with relevant information of the impact of their physical environment.

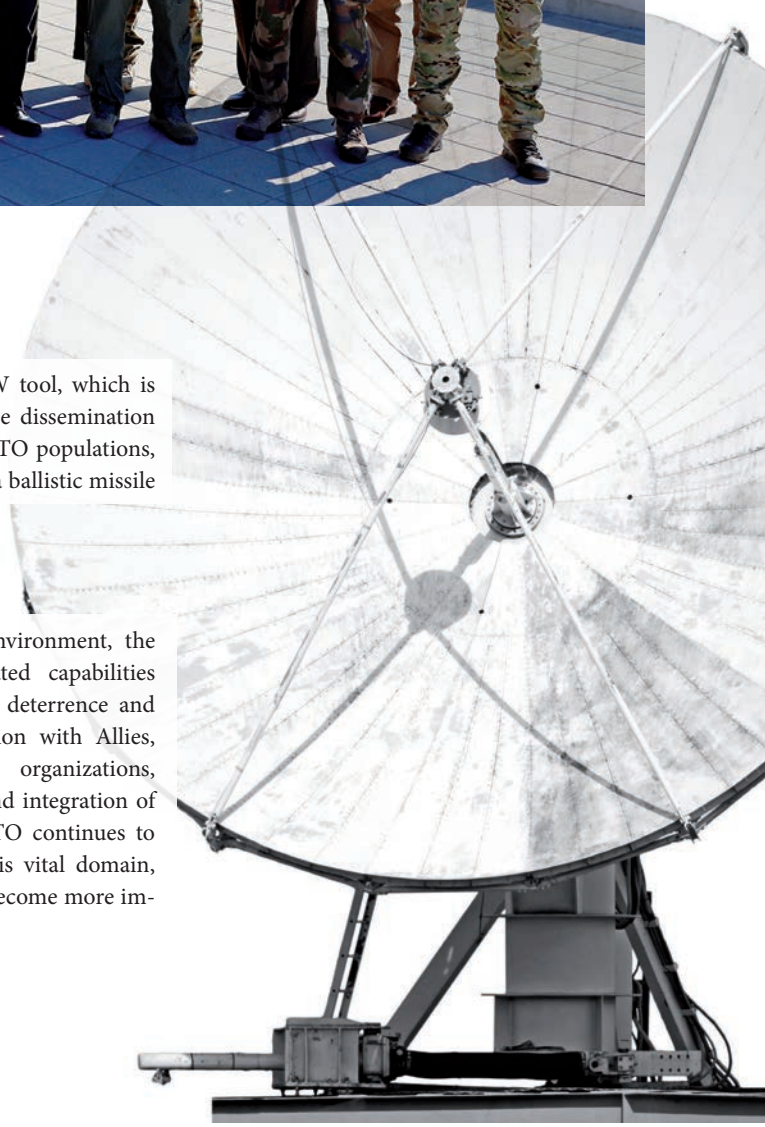
6 Shared Early Warning (SEW)

SEW is a capability that involves the use of space-based assets, such as satellites able to detect infrared signatures, to detect missile launches and provide early warnings to Allies and military units. Upgrades for the current SEW system include expanding the network of ground stations and the existing constellation, which includes satellites in GEO and HEO. New constellations from other Allies are also under development. These advancements will contribute to increased situational threat awareness against ballistic and hypersonic threats.

NCIA delivers the SEW tool, which is crucial to the Alliance for the dissemination of information to protect NATO populations, territories and forces against a ballistic missile threat or attack.

Conclusion

In today's global security environment, the Alliance's use of sophisticated capabilities in space is a cornerstone of deterrence and defence. Through collaboration with Allies, partners and international organizations, combined with innovation and integration of commercial capabilities, NATO continues to hone its strategic edge in this vital domain, which will only continue to become more important in the future. ✧



NATO SPACE

AND THE WAY AHEAD

A NATO SPACE CENTRE OF EXCELLENCE MISSION

by **Colonel (Res.) Jérôme Dufour**
French Air and Space Force
Command Group Support
NATO Space Centre of Excellence

and **Lieutenant Colonel Stavros Karypidis**
Greek Air Force
Deputy Division Head for Education and Training
NATO Space Centre of Excellence

Introduction

At the Brussels Summit in July 2018, NATO recognized that space is a "highly dynamic and evolving area, which is essential to a coherent Alliance deterrence and defence posture." Thus, the Alliance decided to develop the NATO Overarching Space Policy,[1] which was adopted in June 2019. Since then, NATO has officially recognized the space domain as crucial for global stability, aiming to foster responsible behaviour and cooperation among the member states to ensure a peaceful and secure, unhindered use of outer space for the Alliance. As a result, the organization is committed to promoting the safety, security, and resilience of its members' space assets.[2] Space is indispensable for the Alliance's deterrence and defence, serving as an essential infrastructure not only for militaries, but also for the global economy. The unrestricted availability of various types of space systems and their related products is fundamental for societies, their security, and their futures.

In 2021, France proposed the creation of a NATO Centre of Excellence (COE) dedicated to space, capitalizing on the proven institutional framework of existing COEs. Today, 30 COEs — located in various NATO countries — work on different focus areas and provide crucial expertise and workforce to NATO and its states.[3] The new NATO Space COE, located in Toulouse in the south of France, was formally established on January 18, 2023, with the signature of the Operational Memorandum of Understanding by its 15 founding states, and received its NATO accreditation a few months later, on July 14, during the NATO Summit in Vilnius.

Since then, the Centre has been working to expand its capabilities and grow its staff, supported by its 15 sponsoring member states. The NATO Space COE works to support the Alliance's evolution in the space domain, providing expertise, support, and products to various

national and NATO space-related efforts by operating across the four pillars common to all COEs: concept development and experimentation, doctrine and standardization, education and training, and analysis and lessons learned.

In essence, the NATO Space COE serves as a knowledge hub for NATO space, bringing together individuals and their insights to support effective analysis, concept development and experimentation, while promoting common approaches among stakeholders. This collaborative effort aims to improve Allied cohesion and interoperability in the face of challenges in the space domain — the ultimate high ground when conducting multi-domain operations (MDO).

In addition, the NATO Space COE undertakes various key roles in the context of NATO space, such as serving as the department head for the space discipline. In this capacity, it is officially responsible for ensuring that the education and training requirements pertaining to space find adequate solutions. This includes identifying applicable existing solutions, tailoring them as needed to fulfil NATO space requirements, and developing new curricula or courses where gaps are identified. Furthermore, the COE holds the custodianship for the development of the forthcoming doctrine for NATO space operations, and provides dedicated support to major NATO exercises by fulfilling the role of opposing forces (OPFOR) within the space domain.

Space as a Military Domain

NATO's overarching space policy establishes key points based on a set of tenets that align with the Alliance's overall strategic posture. Free access to, and free use of, outer space for peaceful purposes serve the common interest of all countries. Space capabilities complement the NATO deterrence and defence posture, based on an appropriate mix of capabilities. For that purpose, NATO has been asked to accelerate the integration of space into all Allied planning, exercises, and possible MDO efforts.[4]

In the space domain, countries are responsible for procuring and maintaining their capabilities and resources, including military assets. In contrast NATO as a transnational military Alliance does not own space systems but assumes a coordinating role.

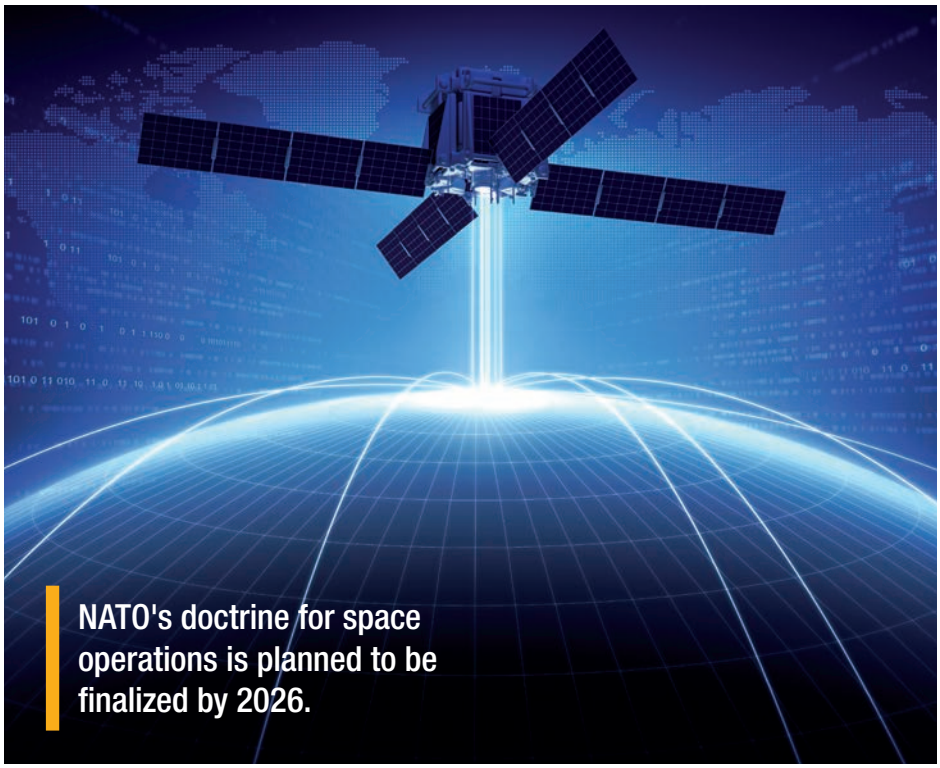
The Alliance facilitates the sharing of information on threats, challenges, vulnerabilities and opportunities, and works to enhance interoperability between Allies' space data, products and services, thereby increasing their overall collective operational effectiveness.

To achieve a unified Alliance posture for deterrence, defence and resilience, Allies have developed a shared understanding of space as an operational domain. Ensuring resilience in the domain is critical to maintaining operational continuity, particularly when access to space-based services is degraded, denied or disrupted. To address these challenges and sustain operational effectiveness, NATO must leverage cooperation with the space industry and the commercial sector. Such partnerships can drive the development and integration of autonomous networks and smart, collaborative technologies, enhancing the Alliance's ability to operate effectively under contested conditions.

The space domain is an integral part of national military instruments of power, designed to provide governments with options for achieving strategic outcomes. The ability to operate together in real time is crucial for mission success. Effectiveness in the space domain will depend on the adaptability of space capabilities and technologies, enabling their use in a wide range of missions and military efforts. For example, communications and connectivity require the ability to utilize multiple spectrum frequencies, large bandwidths, low latencies, and dynamic communication channels.

Below
Space supports military operations through the provision of several critical capabilities

Capability	Purpose
Space Situational Awareness (SSA)	To understand the space operational environment – a prerequisite to identifying risks and threats in space, from space, and to space, as well as to conducting operations in space
Space-based Intelligence, Surveillance and Reconnaissance (SBISR)	To conduct strategic, operational and tactical assessments, to improve situational awareness, and to support decision-making and planning
Satellite Communications (SATCOM)	Essential for supporting operations in all domains and enabling effective command and control over wide joint operations areas
Positioning, Navigation and Timing (PNT)	To enable precise positioning and synchronization across the full spectrum of military operations
Meteorology and Oceanography (METOC)	To provide accurate weather, ocean, and space weather data that enable safe, effective planning and execution of military operations
Shared Early Warning	To contribute to deterrence and defence by providing persistent monitoring and early warning of events (e.g. missile launches)



NATO's doctrine for space operations is planned to be finalized by 2026.

Today's conflicts are complex and demand operations integrated across various domains. Technology is inextricably linked with military power. Technological innovations can provide new strategic options and are key to building and maintaining credible space capabilities. As potential adversaries continue to enhance their counter-space capabilities, it is essential not to underestimate them. Strengthening national and Allied cooperation is therefore crucial to ensure that space remains secure and accessible for everyone.

Space Doctrine

The NATO Space COE is fully engaged in supporting the Alliance as it faces the challenges of the evolving space domain. As previously stated, NATO has acknowledged both the increasing dependence of its military operations on space-based capabilities and the strategic implications of operating in space as a contested domain.

As a core activity, the NATO Space COE supports the development of space-related doctrine and standards within the Alliance, with the aim of integrating space concepts and technologies. Doctrine enables interoperability, and NATO considers doctrine for space operations to be an integral part of its broader effort to adapt to the changing security environment and develop an MDO-ready Alliance by 2030. This adaptation includes addressing emerging threats in the space domain and ensuring the successful integration of space as a key enabler of multi-domain operations.

NATO began developing its first doctrine dedicated entirely to space operations — which will be published as Allied Joint Publication (AJP) 3.29 — in late 2023. Planned to be finalized by 2026, this operational-level doctrine aims to cover the following aspects: fundamental terms and definitions; organizational structures; the "how to" of Allied planning and conducting of operations in the space domain; and the firm nesting of NATO space activities into multi-domain operations.

To coordinate the development process, the Alliance asked the NATO Space COE to be the custodian of this new doctrine. This role involves bringing together relevant stakeholders from NATO and its member states to draft the doctrine through several stages until it is sufficiently mature for its endorsement and integration into NATO's doctrinal architecture, and thus for application by NATO forces throughout the continuum of competition. Once finalized, NATO's doctrine for space operations will serve as a framework for the development of capabilities, providing a yardstick for structural updates, operational directives and space-related procedures.

As use of the space environment evolves, NATO doctrine will adapt to ensure that it remains effective and relevant. It will also inform NATO's exercise, training, and education initiatives, ensuring that NATO forces are equipped to operate effectively in the space domain; it will, in turn, be informed by lessons learned from such training and exercise activities.[5]

NATO Exercises and the Role of OPFOR Space

The NATO Space COE directly supports major NATO exercises, chiefly in command post exercises — an exercise format with a focus on decision-making processes and the evaluation of response options without deploying troops into the field. In this context, the Centre contributes by fulfilling the role of opposing forces (OPFOR) space in scenarios designed for MDO, mainly in the STEADFAST series of exercises, held annually at the Joint Warfare Centre in Stavanger, Norway.

This provision of space expertise through training has enhanced the capability of Allied member states to operate effectively in the space domain and defend against potential threats and crises. NATO exercises are essential for the Allies' ability to develop practical

knowledge on how to achieve strategic objectives, enhance interoperability, address emerging challenges, support the integration of the space domain in military operations, and contribute to the continuous improvement of NATO doctrines and capabilities.

The NATO Space COE Education and Training Division collaborates with relevant NATO stakeholders to create, orchestrate and incorporate into exercises realistic scenarios and emerging challenges related to space operations. Exercises are designed to align with NATO's strategic objectives, including enhancing resilience, improving deterrence and defence capabilities, and promoting responsible behaviour in outer space.

OPFOR space is part of an exercise concept that simulates a hostile force threatening, among others, space assets owned by Allied countries, or challenging NATO's free use of space. This approach helps NATO countries to understand and prepare for potential threats such as direct anti-satellite weapons (ASATs), electronic warfare (EW) attacks targeting satellites, attacks against ground stations or satellite communication networks, orbital debris, and other space hazards.

The key objectives of the OPFOR space contribution to NATO exercises include:

- Testing NATO space situational awareness capabilities and improving data sharing among Allied states;
- Enhancing the resilience of NATO's access to space services through contingency planning, redundancy, and alternative communication methods;
- Practising defensive space operations and countering potential space threats that target national space systems;
- Testing the provision of space DPS to the Alliance;
- Building partnerships with international organizations, industry, academia, and other stakeholders to enhance NATO's capabilities and promote responsible behaviour in the space domain.

OPFOR space covers a wide range of scenarios in NATO exercises. These scenarios range from direct targeting of Allied states' satellite capabilities to hybrid threats aimed at undermining confidence in the space capabilities used by the Alliance. It is important to note that the space domain has strong interdependencies with the other domains, making it crucial for today's operations, in which intelligence, navigation, positioning, and communication are essential.

Lessons learned from exercises provide valuable resources that feed the NATO Space COE's knowledge development process. After each exercise, participants share lessons learned and best practices to improve NATO space doctrine, policies, and procedures. As such, exercise outcomes inform the development of capabilities and training programmes, as well as educational materials tailored to the enhancement of NATO's effectiveness in the space domain.

Conclusion

NATO views peace and security in the space domain as a critical component of global stability and recognizes maintenance of this status as a shared responsibility for all actors in space. Since 2019, NATO has significantly developed its approach to space, including the acknowledgement of space as a fifth operational domain. Now, the collective effort of the Alliance to live up to its level of ambition finds strong support from the NATO Space COE, which is committed to preparing NATO space for the challenges of the future.

As the importance of space continues to grow, the NATO Space COE remains committed to supporting the Alliance in addressing new challenges by adapting and implementing its strategies and doctrine, and capabilities provided both by national and commercial actors. By fostering collaboration based on standardized procedures and continuously helping to improve capabilities, the NATO Space COE aims to ensure that the Alliance is ready to address any new threat that might emerge in the rapidly evolving and increasingly contested space domain. ✦

ENDNOTES

1,2 NATO's overarching Space Policy, https://www.nato.int/cps/en/natohq/official_texts_190862.htm

3 NATO-Accredited Centres of Excellence Catalogue 2025, 2025-COE-CATALOGUE-Final-v2.pdf

4,5 Washington Summit Declaration, NATO - Official text: Washington Summit Declaration issued by NATO Heads of State and Government (2024), 10 July 2024

NATO SPACE

M I L E S T O N E S

On October 20, 2025, Mr Joe Spegele from the U.S. National Security Space Institute, the premier space professional education establishment of the Department of War and the U.S. Space Force, delivered a presentation on a range of space topics at the Joint Warfare Centre. Spegele said: "Foundational understanding of the operational space domain is critical and enables Allies and NATO to respond to crises with greater speed, effectiveness and precision."

The following NATO space chronology was provided by Mr Spegele during his presentation (the text includes minor edits for The Three Swords).


Mr Spegele

1949: No mention of space in original North Atlantic Treaty establishing the NATO Alliance

1970–1993: Eight NATO communication satellites launched and operated until 2005

2005: The NATO SATCOM post-2000 programme (NSP2K) involving advanced satellite communication capabilities provided by the British, French and Italian governments

2016: NATO Joint Warfare Centre executed Exercise TRIDENT JUNCTURE 2016 – the first operational-level NATO exercise to integrate space support to operations

June 2019: NATO overarching space policy

December 2019: Space declared NATO operational domain

January 2020: NSP2K succeeded by NATO SATCOM Services 6th Generation (NSS6G), which combines three projects; providing NATO with access to the military segments of four national satellite communications systems: SYRACUSE from France, SICRAL from Italy, and Skynet from the United Kingdom and WGS from the United States

October 2020: NATO Space Centre established at AIRCOM, Rammstein, Germany

June 2021: Brussels Summit, Article 33, which recognized the importance of space and space threats in the context of Article 5

November 2021: Three anti-satellite weapons (ASATs) launched; NATO condemns Russian ASAT test

June 2022: At the Madrid Summit, space formally integrated in NATO's Strategic Concept

January 2023: NATO Space Centre of Excellence established in Toulouse, France

2024: NATO Space Operations Centre established as part of Combined Force Space Component Command within AIRCOM

July 2024: 17 NATO Allies sign Memorandum of Understanding on Alliance Persistent Surveillance from Space (APSS)

July 2024: Washington Summit: accelerate integration of space into planning, exercises and mult-domain operations

EXERCISE BEST PRACTICES AND INSIGHTS FROM THE PLANNERS

Features: Joint Targeting • J35 Warfare Development • NATO Exercise Process

ADVISING JOINT TARGETING *at the* JOINT WARFARE CENTRE

by **Lieutenant Colonel José Díaz de León**
United States Air Force
Transformation Delivery Division
NATO Joint Warfare Centre

NATO JOINT TARGETING IN EXERCISES has come a long way since 2017. What has the Alliance learned since then? In this article, I will share a summary of insights and best practices for future NATO personnel interested in joint fires and targeting at the operational and strategic levels.


Photo by Sigrid Børtnes, Norwegian Armed Forces

Invest in Planning

As my Advisory Team colleagues would say, one must "plan to plan." Investing in a joint operations planning group (JOPG) is a must.

When I was posted to NATO in 2017 as a Joint Warfare Centre (JWC) Joint Targeting subject matter expert (SME) supporting the execution of Exercise TRIDENT JAVELIN 2017 (TRJN17), I noticed a few opportunities. Most importantly, there was no linkage between the exercise targeting campaign against the exercise near-peer competitor in the scenario, the fictitious Federation of Skolkan, and the joint force command's operation plan (OPLAN). In fact, in that exercise, no exercise OPLAN was written.

One problem with the lack of an OPLAN was procedural. Back then until the present through subsequent editions, the Bi-Strategic Command (Bi-SC) Directive 075-003 on collective training in exercises assumed that a NATO joint headquarters would practice the creation and writing of an OPLAN for a given exercise, based on the setting and scenario information. A significant problem with skipping the OPLAN is that it disregards the wisdom inherent in military planning.

For 200 years, since Carl von Clausewitz wrote "On War," Western militaries have understood the importance of military planning in relation to military operations. To date, NATO joint doctrine codifies the linkage between operational planning and execution of military operations. It is, simply put, a good idea.

The level of planning during TRJN17 had an impact on the quality of the targeting play. The advice I gave to the headquarters (HQ) targeteers was to link the target sets, systems and folders to the OPLAN next time. Better yet, invest in participating in a JOPG. The targeting evaluator augmenting the evaluation team from Supreme Headquarters Allied Powers Europe (SHAPE) realized this challenge as well.

Ironically, the evaluator's HQ, Joint Force Command Naples (JFCNP), would itself be evaluated by SHAPE J7 in 2018, during Exercise TRIDENT JUNCTURE 18 (TRJE18). Guess what his Targeting Branch, to be renamed Joint Effects Branch, would do for that exercise? They placed personnel in the JOPG for the planning phase (then known as Phase IIB, currently C-Block) of TRJE18. During the execution of the exercise (then known as Phase IIIB), they briefed the Commander JFCNP on the joint fires and targeting campaign masterfully, linking joint fires and targeting operations with the OPLAN. Joint Force Command Brunssum (JFCBS) saw the benefit as they had augmentees in Naples for that exercise.

NATO Rapid Deployable Corps (NRDC) Greece and NRDC Germany (extant at the time) did the same for their respective roles in Exercise TRIDENT JAGUAR 2018 (TRJR18). Both HQs participated in crisis response planning for TRJR18. When the two HQs executed their portions of the exercise, they were able to abide by NATO policy (Bi-SC 075-003) as well as the NATO doctrine set out in Allied Joint Publication (AJP) 5 on planning, AJP-3 on operations, and AJP-3.9 on joint targeting. They understood how to build and execute a targeting campaign in support of the joint force commander. The NATO joint fires and targeting community of interest (COI) has never looked back since then.

Invest in the Exercise Content

Apart from investing in JOPG participation (both for exercises and real-world planning), a best practice for a NATO joint fires and targeting staff, or any J-staff for that matter, is to provide trusted agents for the main events list/main incidents list (MEL/MIL) process in exercise planning. Another good practice that has emerged since 2017 within the joint fires COI is for the primary training audience trusted agents to lead a joint fires syndicate parallel with the MEL/MIL scripting process.

In exercise design related to joint fires and targeting at the operational or strategic level, the exercise script, consisting of injects, is helpful as exercise content. However, the content related to the start of the exercise (STARTEX) execution (now named E-Block)[1] is more important. This STARTEX content needs to

Exercise FORMIDABLE SHIELD 2025,
photo by Maiken Dignes, Norwegian Armed Forces

include enough information about the situation at a given point in time. This is especially vital when the scenario at STARTEX begins in a crisis with imminent war, or after a large-scale attack in the Supreme Allied Commander Europe (SACEUR) area of responsibility.

The Art and Science of Joint Operations is Perishable

NATO is, thankfully, not at war at this time. However, the Alliance exists solely to defend against attacks. While effective deterrence is indisputably the preferred way to defend NATO, Alliance personnel should practise wartime procedures in an invasion or post-invasion scenario. This is done through JWC-directed exercises such as the former STEADFAST JUPITER series and the current STEADFAST DUEL series. One challenge for these exercises is the tendency for military staff individuals to rotate every three years, sometimes even sooner. A commonly expected figure is that in a given year, a NATO HQ will rotate 30% of its personnel. Some of these individuals are in leadership positions for the exercising of joint fires and targeting, e.g. the commander, deputy commander, the deputy chief of staff for operations, the assistant chief of staff J3, or the branch head for joint effects, joint fires or joint targeting.[2] The leader may or may not have previous NATO experience, and they may have little joint experience, operational experience, or experience in a command or staff at echelon above corps, or its equivalent across the land and air domains.

"If we **fight tonight**, we have a solid idea how to prioritize and employ forces based on **planning**. If we **fight tomorrow**, we are on the right track to compete with a **near peer**."

Adaptation to the Fog of War is a Must

From 1991 to the present, the advent of precision-guided munitions (PGMs), colloquially known as "smart bombs," has made war and operations cleaner and less risky regarding a potential loss of life. Smart bombs facilitated an overwhelming conventional military victory by coalition forces against Saddam Hussein's regime in both Gulf Wars. They allowed the United States Air Force air supremacy over the skies of Serbia and Kosovo in 1995 and 1999, respectively. PGMs also facilitated the protection of land forces throughout the Afghanistan campaign (2001–2021). The military leader-

ship of many Allied states became used to the availability of air supremacy and surgical strikes in peacekeeping, counterterrorism and operations against a technologically weaker military. Russia constitutes a far larger, more technologically capable enemy — and that is without taking into account support from China, North Korea, or Iran in a potential conflict with NATO.

A look at the exercise products produced by SHAPE, as well as U.S. European Command (USEUCOM) in Exercise STEADFAST DETERRENCE 2025 (STDC25) — and across the JFCs since 2017 — demonstrates that the term "joint fires" has gained prominence in Article 5-based scenarios, and rightly so. Not all usage of "joint fires" is identical to the term "joint targeting": In the event of high-intensity combat during a hypothetical near-peer invasion of NATO territory, there is no doubt that the member states will defend their territory and that the Alliance will do the same. However, such a fight will involve contested battlespace and degraded intelligence, surveillance and reconnaissance — in other words, sometimes action (fires) will have to be taken without the full information-guided process (targeting) preceding it.

Air supremacy over the past four decades has set high expectations concerning information fidelity. This highlights the importance and complexity of the information environment in an Article 5 situation. Furthermore, stocks of high-end munitions such as smart bombs and Tomahawk missiles are, of course, not unlimited. The Russo-Ukrainian war and the demand for "normal" 155 mm munition gives us an impression of the operational requirements in an Article 5 scenario. How will combat planners deal with implicit challenges resulting from high-intensity combat operations? Commanders will use their precious resources even more judiciously, need to accept more risk, and need to know what to do when an unlocated target becomes located on the battlefield.

Participation Determines the Quality of Joint Fires Command and Control in the Exercises

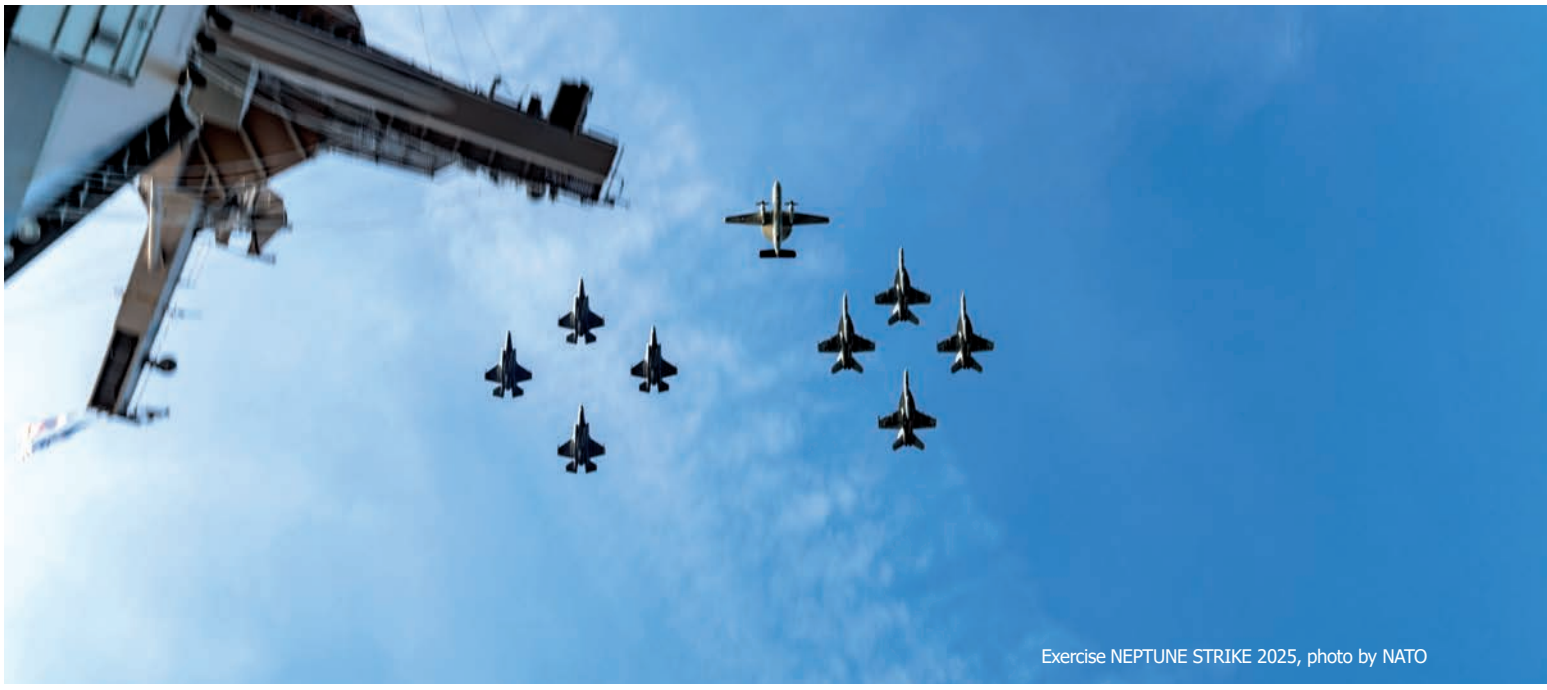
If a headquarters trains as it fights, then it stands to reason that it is best to have a whole-of-headquarters effort during a JWC-directed command post exercise. Ideally, the commander of the participating headquarters takes part in the exercise battle rhythm events. His or her best advisors will ensure they are present at all events attended by their commander.

The best example of this to date was Exercise STEADFAST JUPITER 2023. In that exercise, SACEUR was personally attending key battle rhythm events. This led to cross-command discussions, transmitted through video teleconferencing, which provided unparalleled insights into warfighter thinking for any NATO staff member observing the discussion. The issues and dilemmas discussed were far beyond anything one could script or anticipate. In fact, the SHAPE staff came out with a new concept they called "the SACEUR Effect."

The SACEUR Effect has become a concept in subsequent exercise planning events. More importantly, SACEUR's participation in the exercise heavily motivated the SHAPE staff to improve processes and fostered a new appreciation of the scale of a massive conflict across Europe, the Atlantic Ocean and the Mediterranean Sea.

Sometimes Less is More: Fight the Rhythm of the Battle, not the Battle Rhythm[3]

Some staff officers believe that daily boards and working groups are especially necessary in a continental-scale conflict. What is needed even more is time to think. The perfect battle



Exercise NEPTUNE STRIKE 2025, photo by NATO

The author (centre) supporting colleagues at the Exercise STEADFAST DUEL 2024 scripting workshop, photo by JWC PAO

rhythm remains elusive. This is not a bad thing, per se. There is a good argument to be made that the battle rhythm should be flexible and tailorable depending on the problem set the military HQ is meant to address. Certainly, the SACEUR area of responsibility is beyond continental in scale; in fact, it covers almost half a hemisphere. Add to this the complexity of dealing with the geography, culture, infrastructure and capabilities of 32 states in the Alliance, as well as the entirety of NATO command and control while preparing for defence of the Alliance in accordance with the Deterrence and Defence of the Euro-Atlantic Area family of plans. In a massive conflict, there is something for every NATO HQ to contribute in support of the plans.

However, the commanders of those headquarters need to be working in concert. Therefore, the battle rhythm is important in the event of a conflict with a near-peer competitor. Whether we fight tonight or tomorrow, the battle rhythm needs to be founded "top-down." This means that in a militarily logical fashion, the highest military HQ sets a battle rhythm schedule, and the joint force commands and tactical component commands should align their battle rhythm with this.

In Exercise STEADFAST DUEL 2025, all three NATO joint force commands will exercise as training audiences simultaneously. This affords us an excellent opportunity to develop and refine such a battle rhythm.

SHAPE Adopts the Continental Staffing System (2023)

After the 2022 Russian Federation invasion of Ukraine, by the summer of 2023 SHAPE staff had re-organized itself: SHAPE adopted a full continental staffing system. The J1 was for personnel, the J2 for intelligence, the J3 for operations, etc. The most significant part of this change, from a joint fires perspective, was the adoption of the J35 nomenclature.

What was redesignated as the J35 was previously the Comprehensive Crisis and Operations Management Centre (CCOMC). The CCOMC was a joint operations centre (JOC) by another name. It focused on current operations, or J33. The JOC current operations capability was kept afterwards but was now called the Multi-Domain Strategic Operations Centre (MDSOC). The term multi-domain operations (MDO) was adopted for that new JOC-like entity, as by that time in 2023, NATO had defined and adopted the term.[4] The J-code structure will not solve all the problems of warfare at scale, but the general reorganization at SACEUR's headquarters was a step in the right direction. Most Allied staff across NATO are more likely to understand what a J3 operations directorate is, as opposed to a strategic employment one. The change was basic, but helped other headquarters understand better who was doing what at SHAPE.

Where is NATO Joint Fires and Targeting in 2025?

As of this year, NATO is in a good place for joint fires and targeting. This was apparent at the Annual Joint Effects Conference held in June 2025, hosted by Romania. It was the first time that all participating organizations had a clear sense of differing roles and authorities across NATO HQs and in the J-code staffs. Most importantly, the use and appreciation of the NATO operations planning process, e.g. following AJP-5, the Allied Joint Doctrine for the Planning of Operations, and tying it to the joint targeting cycle described in AJP 3.9, was the best seen to date.

Another highlight was the institutional understanding of different planning horizons and their relationship to current operations. This mindset shared by the key leadership across NATO HQs in relation to joint fires and targeting is encouraging. Compared to 2017, NATO is truly where it needs to be in relation to both. If we fight tonight, we have a solid idea how to prioritize and employ forces based on planning. If we fight tomorrow, we are on the right track to compete with a near peer. Going forward, the joint fires and targeting COI needs to maintain knowledge across personnel rotation and build on the foundation work of the past eight years in support of the deterrence and defence of the Alliance. ✦

ENDNOTES

1 Bi-Strategic Command Directive 075-003, 1 September 2023.

2 For the best document to date on the relationship between Joint Effects, Joint Fires, and Joint Targeting, read the 2021 NATO JALLC Study Joint Fires in NATO. It is classified NATO Restricted and available on the NATO SECRET network.

3 "Fight the rhythm of the battle, not the battle rhythm" was said by Lieutenant General (Ret.), J. Thompson in October 2023, JFC Brunssum, Netherlands.

4 See a previous article by the author "Words Matter: Supporting NATO Interoperability Through a Common Understanding of Operational Concepts," Three Swords Magazine, issue 38, November 2022, for the importance of common terminology in an alliance of then-30 nations using the example of the defining of MDO in NATO during that time.

Photo by Torgeir Haugaard,
Norwegian Armed Forces

The J35

THE NEXT LEVEL IN NATO WARFARE DEVELOPMENT

by **Lieutenant Colonel José Díaz de León**
United States Air Force
Transformation Delivery Division
NATO Joint Warfare Centre

Photo by Viggo Holm,
Norwegian Armed Forces

Inherent realities of multi-domain deterrence and combat operations are simulated in Joint Warfare Centre's exercises.

IN 1871, PRUSSIAN Field Marshal Helmuth von Moltke wrote, "No plan of operations extends with any certainty beyond the first encounter with the main enemy forces." This has since been condensed into the more concise adage that "no plan survives first contact with the enemy." Nevertheless, the importance of operations planning has always been understood, and that understanding has only become greater and more solid within NATO in recent times. While a plan may not "survive" the initial stages of an operation in its entirety, it is undoubtedly always better than the alternative: no planning at all.

The importance of NATO operations planning is reflected in the exercise process. C-Block, as this stage of the exercise process is now known (formerly Phase IIB), may not be as "exciting" as the exercise execution phase (E-Block, formerly Phase IIIB) — after all, execution often throws training audiences into the early stages or even deep into active conflict, i.e. on or after D-Day. However, the C-Block planning phase is, in a sense, even more important than execution.

The operations planning portion of a major JWC-directed exercise is where the deep thinking happens about a problem set posed by a near-peer competitor threatening Alliance cohesion and territorial integrity.

In real operations, as with an exercise E-Block, plans must be adjusted in the form of fragmentary orders, or FRAGOs. How are the adjustments made during execution of the operation plan (OPLAN), for instance to regional plans? Let us begin by stating where these adjustments should not take place: the J33 or current operations staff in a headquarters should not adjust the plan. The J33 mission is to manage the joint operations centre, a watch with a staff drawn from across core joint headquarters staff functions. The J33 is to monitor real-time operations and operationally relevant strategic and tactical events. It reports what happens today. The J35, or future operations, staff take the information from the J33 during a handover/takeover and look at how the enemy "vote" has affected the plan that was written weeks, if not months, before combat operations began.

How Does Allied Doctrine View Planning and Execution?

NATO Allied Joint Publication (AJP) 3, the Allied Joint Doctrine for the Conduct of Operations, does not define or describe what a J3 position does. Its Annex A describes the operations (J3) staff as "the focal point through which the commander directs the conduct of an operation."[1] It does not explicitly describe the position of a deputy chief of staff (DCOS) for operations (Ops), or of an assistant chief of staff (ACOS) J3. Interestingly, if one looks at most NATO headquarters (HQs) with a J-staff construct, the chief of staff (COS) will normally have a DCOS Ops and a subordinate ACOS J3. This is how Supreme Headquarters Allied Powers Europe (SHAPE) and the three NATO Command Structure joint force commands (JFCs) are organized.

As a point of comparison, in the U.S. military, the J3 is described as "the JFC's principal staff advisor to coordinate the interaction of all fire support system elements, including [target acquisition], [command and control], and attack/delivery systems."[2] While AJP-5, the Allied Joint Doctrine for the Planning of Operations, does not define or describe the role of J35 planning horizons, it does mention that modifications to an OPLAN will be conducted by means of a FRAGO. AJP-5 also mentions that planning activities are divided into current operations, future operations, and future plans.[3]

NATO Allied Command Operations' (ACO) Comprehensive Operations Planning Directive (COPD) expounds on the NATO operations planning process (OPP) described in the AJP-5. The COPD does not delve into the specifics of what a J35 should do. Yet, the function of the J35 has matured in recent years in

Above from left
Norwegian F-35 fighter aircraft, photo by Andreas Vekve, Norwegian Armed Forces; British soldier with the Allied Reaction Force badge, photo by NATO; JWC Grey Cell exercising civil-military cooperation, photo by PAO; MH-60S SeaHawk helicopter of the U.S. Carrier Strike Group Twelve, photo by Ole-Sverre Haugli, Norwegian Armed Forces; personnel aboard the Norwegian frigate HNoMS Roald Amundsen, photo by Helene Synes

SHAPE and in the JFCs. A strong J35 culture is more important than ever in NATO headquarters. It is the organization within a joint or component staff that bridges what happens on a given day, i.e. "today," when the enemy gets a vote in a notional war, when personnel, equipment, and therefore capability, are reduced. Someone must figure out what that would mean for "tomorrow" and in the mid-term future (days, perhaps weeks, but definitely not months). Eventually, the plan at the operational level —whatever it is called, e.g. OPLAN, or regional plan — will have to be examined for any necessary refinements, if not substantial changes.

Where Do Assessments Fit Into All of This?

AJP-5 addresses the importance of operations assessment.[4] AJP-3 goes into further detail; its Annex A assigns responsibility for future operations planning and operations assessment to the J5 staff.[5] Additionally, AJP-3 mentions synchronization and synchronized actions as standard practice to concentrate forces at a time and place of anticipated decisiveness. The COPD links mid-term planning with "joint synchronization."[6] In turn, the latter is linked to execution through a joint coordination order (JCO),[7] but there is no explicit linkage with the J35 function. The J35 function is hinted at but not spelled out. This is the current state of Allied joint doctrine on planning and operations. Yet, after many JWC-directed exercises, NATO HQs can write an OPLAN, hold a joint assessment board, a joint coordination board, and produce a JCO and FRAGOs. They are able to do this because of the inherent realities of deterrence and combat operations as simulated in exercises.

"The operations planning portion of a major JWC-directed exercise is where the deep thinking happens about a problem set."

HQs plan for operations against a problem set, whether large-scale Article 5 scenarios or non-Article 5 peacekeeping. The plan encounters the enemy. The enemy gets a vote. Something happens today (current operations monitored by a joint operations centre), and the HQ J-staff need to assess what that means in relation to the OPLAN. Current operations, i.e. the J33 function, does not assess that; the J-35 should, as it deals with horizons of more than 24 hours. The J35 should be providing the operational assessment (OPSA), which is why every NATO HQ ought to situate the OPSA function under its J35. The J5 should own the OPLAN, and the measures of performance and measures of effectiveness to measure operational effects required to achieve operational objectives. However, the J35 staff should determine what needs to be changed based on enemy action and adjust the original plan in accordance with reality via a JCO.

As we can see, the assessment process is critical to the adjustment of the OPLAN to fit the reality on the ground in time and space. Fortunately, NATO has the NATO Operations Assessment Handbook (NOAH). The NOAH is a useful guidebook that does a solid job of spelling out how to carry out operations assessments. This is the way the J-staff (ideally the J35 staff, but several joint assessment branches in NATO HQs do not reside within the J35) can "tell the story," collaborating with other branches with subject matter experts (SMEs) in the various joint functions.

In combat operations at scale, a key input with specialized lower levels of assessment encoded in Allied joint operations are the inputs from the joint effects, joint fires, and joint targeting SMEs in the J-staff.[8]

The Function of the J-35 in Relation to Joint Effects, Joint Fires, Joint Targeting, and Multi-Domain Operations

Joint effects is a North Atlantic Council policy dating back to the 2018 adaptation of the NATO Command Structure. It describes joint effects as consisting of joint targeting, strategic communications (StratCom), information operations, psychological operations (PsyOps), cyber operations, and lawfare capabilities. Joint fires includes, but is not limited to, joint targeting.

Some NATO HQs have a joint effects branch, a joint fires branch, and a joint targeting branch. Some have a joint targeting and effects branch. Some have a joint fires and effects branch. In other words, NATO HQs have organized themselves differently. What they have in common is that they have staff to support the commander to achieve operational effects through combat power, best described using the term "joint fires." Since some operational effects are achieved only using joint fires, the joint fires or joint targeting staff in an HQ produces what is called a combat assessment.[9]

The combat assessment tells the joint commander "where we are in the fight" at the operational level. This assessment is fed into the overall OPSA, which measures the entirety of the campaign. For example, whereas the combat assessment might address the question as to whether the Allied forces are achieving a decisive condition of obtaining freedom of action through attrition of anti-access/area denial, the OPSA could answer the question whether NATO is maintaining the operational effect of securing a particular sea port of debarkation through host nation law enforcement. In turn, the combat assessment is fed partly by battle damage assessment of individual targets and systems with different phases of analysis.

There are many levels of assessments in the J-functions related to an operation, including, where necessary, the employment of joint fires at scale. What about multi-domain operations (MDO)? These are the orchestration of effects across the five NATO domains of air, land, maritime, cyberspace, and space. Some applications of joint effects, joint fires, and joint targeting are inherently part of MDO.[10] Since the J35 falls under, or should fall under, a J3 operations directorate, it is logical for a joint or component staff's joint effects, joint fires, or joint targeting personnel to be assigned in a branch under the J35.

The Way Ahead

As the NATO joint effects community of interest and MDO have matured in recent years,[11] the next step for NATO HQs is to develop and strengthen the relationship between their J33, J35, and J5. Joint effects, joint fires, and joint targeting are well understood at this point. These three types of staff need to maintain proficiency in processes and knowledge across post rotations in military personnel. The future focus for SHAPE and the JFCs is the understanding of the roles and authorities in the J33 (current operations), the J35 (future operations 24 hours and beyond), and the J5 (future plans). Perhaps AJP-5 and AJP-3 will be updated to reflect that optimal organization structure in NATO HQs. SHAPE has taken a large step towards implementing a more ideal structure by redesignating the Comprehensive Crisis and Operations Management Centre as the SHAPE J35. The next step in warfare development is reflected in the growing strength of the J35 community in NATO HQs. ✦

Multi-domain operations represent a pivotal shift in NATO's approach. This transformative concept empowers the Alliance to strategically influence events, coordinate efforts with external stakeholders, and present formidable challenges to adversaries.

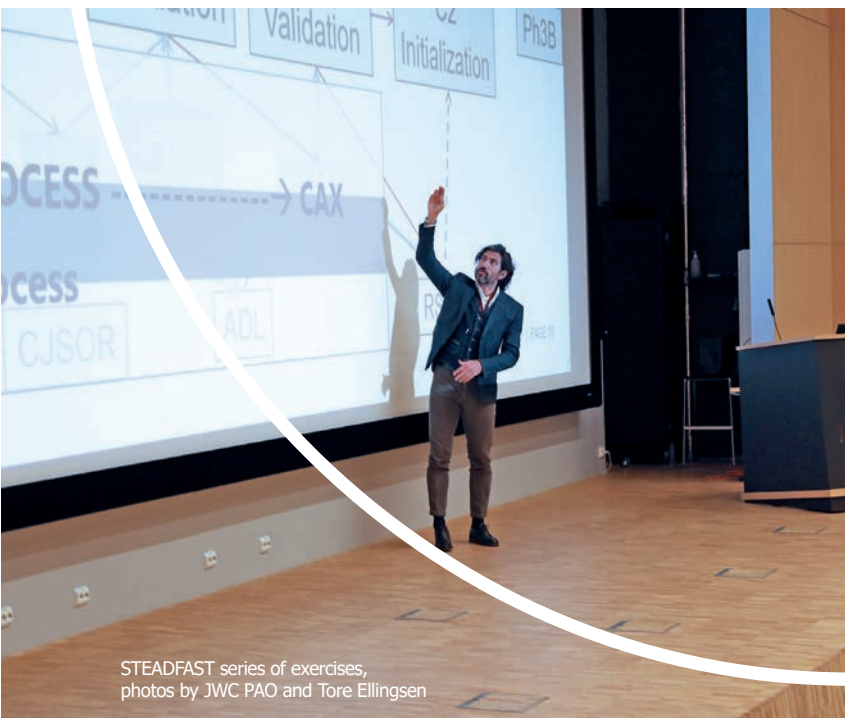
ENDNOTES

1 AJP-3, p. A-3, 2019
2 U.S. Joint Publication 3-09 Joint Fires JP-3-09, II-7, 2025. Additionally, the most recent Joint Publication 3-0, the 2022 version titled Joint Campaigns and Operations, simply names the J3 as, the "operations directorate of a joint staff (JP-3, II-9, 2022; ibid, GL-3).
3 AJP-5, pp. 1–6, 2019
4 AJP-5, pp. 1–2, 2019
5 Ibid., pp. A–4 and A–5
6 COPD v3.1, p.5–8, 2023
7 Ibid., pp. 1-13
8 For the best document to date on the relationship between joint effects, joint fires, and joint targeting, read the 2021 NATO JALLC study Joint Fires in NATO. It is classified NATO RESTRICTED and available on the NATO SECRET network.
9 See AJP 3-9 on Joint Targeting for more information on combat assessment and battle damage assessments.
10 For more on NATO MDO, see the author's articles on the subject in Issues 36 and 37 of The Three Swords.
11 For further elaboration on the maturity of joint fires and targeting since 2017, see the other article by the author in this issue of The Three Swords, Advising Joint Targeting at the JWC: Best Practices and Insights since 2017.

by **Commander Carl Whorton**
Ret., United States Navy
Former Exercise Planning Branch Head
NATO Joint Warfare Centre

NATO'S EXERCISE PROCESS

THE ART OF CHANGE AND CONSENSUS



STEADFAST series of exercises,
photos by JWC PAO and Tore Ellingsen

EXERCISE PLANNING, DEVELOPMENT AND DELIVERY are some of the best analogies for what the Alliance must achieve in a time of crisis. No single country or unit within NATO can accomplish the task alone. Some exercises will require extensive interaction with outside units and others may rely more on the collective doctrine and policies developed by the Alliance. Either way, those developing an exercise and those being exercised rely on collaboration across NATO. It is cooperation, communication, sharing of resources and a common understanding of the desired outcome that make the process successful.

Due to its many stages, events, meetings and interrelated processes, the exercise process (EP) can seem like a complex and, at times, overwhelming project. However, it is purely the scale and scope of an exercise that drives this complexity, and not the process itself.

This is seen in the Alliance's overarching guidance for exercise planning and delivery, the Bi-Strategic Command Directive 075-003, Collective Training and Exercises. As the governing instruction for more than 900 NATO exercises every year, it enables personnel to deal with the very large exercises that the Joint Warfare Centre (JWC) and the Joint Force Command Training Centre (JFTC) develop, as well as the small-scale single-country or single-domain exercises that comprise the majority of the exercise programme.

With the inherent flexibility of the directive comes the requirement for the officers of primary responsibility (OPRs) to be effective leaders, managers, and problem solvers. There are significant decisions and compromises to be made throughout the process, and they all require an understanding of the situation, the impact on the process and the product, analysis of those impacts, and most importantly, well-reasoned decisions.

Compromise across the exercise is one of the most difficult tasks for the OPRs. There is an underlying mandate for all exercises to maximize the benefit to the Alliance as a whole and to the individual training audiences (TAs) and other participating commands. The OPRs must temper this drive to draw as much as possible out of the events with an understanding that we must meet the primary exercise aims and objectives (EAs and EOs) set by Supreme Headquarters Allied Powers Europe (SHAPE).

This requirement does not preclude other objectives, but it does limit the available resources and how much of an impact additional efforts may have on the exercise process and execution. In short, the Alliance cannot exercise all capabilities, in all phases, for all units in every exercise. Without focus, the stated objectives cannot be met or become so diluted that they are met in name only, without effective training or warfare development.

The OPRs are not alone in meeting this challenge. They are wholly reliant on the subject matter experts (SMEs) within the JWC and those at the units serving an officer scheduling the exercise (OSE), officer conducting the exercise (OCE) and the TAs. Additionally, the OPRs must integrate experience and knowledge from domains and member states through centres of excellence (COEs) and national elements.

The level of effort for each participant varies throughout the EP. At the programming, multi-year level, the OSE, OCE, officer directing the exercise (ODE), and the primary training audience (PTA) are all required.

The OSE and OCE determine the desired effects for the exercises (expressed as EAs in the Collective Training and Exercise Directive), while the PTA will provide input on what it needs in order to be prepared for planned or potential operations.

ODEs serve as experts on what is feasible given the available resources including time, finances, personnel and technical capability. Throughout the EP, the resource providers and authorities responsible are well defined, but they are always reliant on the expertise and insight across all parties to ensure EAs are met using the available resources.

Moving out of the multi-year stage, the EP begins in earnest and enters a specific process for an individual exercise. Throughout this process it is critical that the defined exercise objectives based on the exercise aims remain the focus of the process.

Above
The JWC's OPR teams for exercises STEADFAST DETERRENCE 2025, STEADFAST DUEL 2025 and STEADFAST DAGGER 2025. Photo by JWC PAO

In Stage 0, Initiation, we confirm or adjust the participants, resources, and EAs stated in the Collective Training and Exercise (CT&E) Directive. Changes at this stage are generally tolerable if they remain within the participation, time, and physical resource capacity of the units involved. While time is needed to adequately analyse these parameters and work out the needed changes, this stage should not take very long, as the intent is simply to confirm, and modify as needed, guidance given in the CT&E. It is not the time for wholesale new development or implementation of immature concepts. As with all exercise stages, the agreed output by all commanders is the necessary result.

In Stage 1, Specification, we formally determine and agree the responsibilities, authorities, resources and EOs. As in Stage 0, this does not take very long, as the priority is on the agreed exercise intent (EXINT) that will establish the framework for the detailed planning and execution of the exercise. Without this agreed framework, the exercise would lack a solid foundation, and many resources, particularly time, could otherwise be wasted in re-planning or incorporating concepts not directly related to the EAs and EOs.

While most of the time and effort is spent in Stage 2, Planning, it should not be the most complex part of the EP. This is not to discount the work and expertise required to develop the exercise plan (EXPLAN) and flesh out the myriad details that make a successful exercise. If planners adhere to the framework discussed above and stay within the defined EAs and EOs, this process can work collaboratively and there is capacity to deal with risks and unforeseen issues as they arise. Significant changes to exercise specifications late in the process, such as adding new participants or new concepts, would cause confusion and wasted effort through delays or by invalidating previous work.

"Officers directing the exercise serve as experts on what is feasible given the available resources."

OPRs and all participants in the EP must be conservative with financial resources, and the concept of minimum military requirement always applies. Personnel requirements can be a challenge, especially securing people with the right experience and knowledge. This is where all participants in the EP are dependent on the OSE, as the resource provider uses its authority to ensure the needed capabilities are available. Of all the resources, time is the least forgiving. No matter what we do, we cannot get it back or buy more of it. This is one of the greatest challenges to the OPR. They must ensure the EP progresses and continues to meet the EAs and EOs while dealing with changes and challenges that arise in the process.

The impact of time as a resource is further compounded by its impact on the other capacities. Most resources become more expensive when they are needed quickly or on

Exercise STEADFAST DAGGER 2025, photo by MCH Chatellier Julien, 3rd French Division

short notice. Others become unavailable if time is reduced. Information systems and physical structures may take years to develop and implement, and no matter how much money is available, it may not be possible to incorporate these capabilities faster. Additionally, units outside of the EP have lead time requirements that the OPRs at any level do not have the authority to change.

The final challenge to the OPRs is to not solve the training audience's problems. This is not to say that the OPRs representing all the units in the EP will not assist the TA. During the EP, many real-world challenges will be encountered and should be resolved by the TA as part of their planning and execution.

The OPR should not be tempted to, and should resist efforts to change the exercise so that TA no longer have to worry about issues such as computer information system interoperability and access, access to fully trained SMEs for functional area systems, transportation delays and capacity limitation, or other areas that will significantly impact how the Alliance is able to achieve its missions in the future and continue to provide collective defence across NATO.

The Alliance's needs and purpose for collective training and exercises will constantly evolve and change. This is inevitable if NATO is to respond to a changing world, meet diverse challenges and leverage emerging capabilities. In order to do so, all participants in the EP from long-term planning through execution and reporting must be willing to embrace change and develop products to meet the need.

The basic processes and underpinning doctrine are quite flexible in what is produced and grant the latitude to tailor the process to meet the individual requirements of a given exercise. However, OPRs and others must take care not to overturn the established, understood and effective framework that has served the Alliance well. We should welcome change and adaptation, but any replacement methodology must meet the same requirements and adhere to NATO's underlying concept of consensus. ✦

Below
Participants and instructors of the NATO Exercise Planning Couse (EPC) held at the JWC, February 3–7, 2025. The EPC primarily targets exercise planners at the strategic and operational levels, while ensuring an understanding of NATO's 18-month exercise planning process. Photo by JWC PAO

The Joint Warfare Centre's Wargaming Capability

by **Major Wade Cady**
United States Army
Wargaming Director
NATO Joint Warfare Centre

and **Dr Christopher Morris**
Contractor
Wargaming Analyst
NATO Joint Warfare Centre

ONCE THE PASTIME of Prussian generals and Cold War analysts, wargaming has evolved into a cornerstone of modern defence planning. NATO does it; the Allied states do it; even our adversaries do it. At the Joint Warfare Centre (JWC) Wargaming Branch, we do not just play games – we design them. From strategic-level discussions to operational planning games, we craft wargames that serve every corner of the Alliance.

The JWC's Wargaming Branch is responsible for the coordination, planning, delivery and analysis of bespoke wargaming projects in direct support of Allied Command Operations (ACO) and Allied Command Transformation (ACT) (under the Warfare Development agenda).

NATO wargaming is a sprawling ecosystem. Across the Alliance, different commands tackle different layers of the fight; ACT drives innovation and concept development, SHAPE focuses on strategic planning and deterrence, and here at the JWC, we operate at the operational-strategic seam where plans meet execution and theory get a stress test, preparing NATO for the wars it hopes never to fight.

Exercise-Integrated Wargaming

Embedding wargames into exercises adds a dose of unpredictability and dynamism to an otherwise structured cycle. It forces planners to adapt and respond in real time. Whether it's pre-exercise planning, mid-exercise decision injects, or post-exercise analysis, these games allow commanders to test procedures and experience simulated failure in order to avoid the real thing.

At the JWC, we are uniquely positioned to deliver exercise-integrated wargames. Operating at the operational-strategic level, we have successfully embedded wargaming into major NATO exercises such as STEADFAST DUEL, STEADFAST FOXTROT, STEADFAST DAGGER and STEADFAST DEFENDER.

Our approach injects realism, adversarial thinking, and a useful dose of variety. We work closely with our sponsors to ensure seamless integration and robust data capture. From scenario design to adjudication, our wargames challenge assumptions, sharpen decision-making, and elevate training value across the board.

Standalone Wargames

Sometimes it is not an exercise that is needed, but rather a sandbox. A place to test wild ideas, explore nightmare scenarios, and ask "What if?" without getting punished. That is where standalone wargames shine. We specialize in crafting bespoke tabletop wargames for concept development and strategic analysis. Our products deliver immersive experiences that generate real insights.

Wargaming is not about playing pretend. It is about answering hard questions before reality asks them for you. At the JWC, we design wargames to challenge thinking, not entertain it. Through structured data collection and post-game analysis, we help planners turn gameplay into lessons that shape better plans and more resilient operations.

Wargaming is no longer optional. It is the difference between strategic foresight and strategic hindsight. As NATO and its partners navigate a world full of mounting threats, the JWC stands ready to deliver wargaming solutions that inform and challenge in a highly constructive way. ✦

THE SYSTEMIC GAME CHANGER

Why NATO Advocates Gender Responsive Leadership

by **Lieutenant Colonel Lena P. Kvarving, PhD**
Norwegian Air Force
Nordic Centre for Gender in Military Operations

and **Julia Dalman**
Legal Analyst
Nordic Centre for Gender in Military Operations

The integration of gender perspective is a force multiplier and a way to safeguard the common value base of our societies such as individual liberty, democracy, human rights and the rule of law, in our organizations, missions, operations and activities.

TIME TO TAKE STOCK: 2025 marks the 25th anniversary of United Nations Security Council Resolution 1325, the mother resolution of the Women, Peace and Security (WPS) agenda. What is still needed to reach the full transformative potential of the WPS resolutions? NATO has stated that gender-responsive leadership is essential to ensure this transformation and honour the agreements made. Now, a generation after the resolution passed, there is still a lot of work to do.

True to NATO's values and the research-based knowledge of how gender perspective enhances mission effectiveness, NATO introduced its new NATO Policy on Women, Peace and Security,[1] followed by the Military Guidance for the Integration of the NATO Policy on Women, Peace and Security in military missions, operations and activities[2] in late 2024. The integration of gender perspective and execution of gender analysis[3] and gender mainstreaming were stated as important tools to achieve mission success. While this remains true, NATO has introduced a stronger emphasis on gender-responsive leadership to ensure accountability, and effective and timely progress.

How does gender-responsive leadership differ from regular leadership? First, to perform gender responsive leadership, one needs gender awareness. This means that leaders must be aware of why gender perspective is important. This in turn requires knowledge about gender as a fundamental organizing principle in all societies and how it affects humanities, cultures, organizations and individuals' opportunities and challenges. Consequently, one needs gendered knowledge about society in any area of military operations, and about one's own organization. More specifically, one needs sex- and age-disaggregated data (SADD) to perform gender analysis. A leader in a military context needs knowledge about how their

Photo by Elle Hagen,
Norwegian Armed Forces

"In today's dynamic and ever-evolving security landscape, the integration of gender perspectives within military operations is no longer a choice but strategic imperative."

— Jean-Pierre Lacroix,
Under-Secretary General for Peace Operations
United Nations

https://www.un.org/en/peace-and-security/three-takeaways-women-defence

Gender-responsive leaders understand the culture of their organization, and ensure that they will take a transformative approach to the needed organizational changes and create the psychological safety required to integrate a gender perspective.

The WPS Agenda is meant to benefit societies as a whole, not only women and definitely not at the expense of men. The photo shows participants of a Key Leader Seminar at NCGM, June 2025, photo courtesy of NCGM

own organization is gendered and how war, crisis and conflict affect and are affected differently by women, men, boys and girls. Additionally, they need to know the policies and guidelines that govern their organization. And there is another layer: all of the above are subject to change over time and therefore need continuous attention. In sum, gender awareness should be the basis of a leader's analysis, response and actions.

For some leaders, this is naturally incorporated in their leadership and part of their everyday routines, but for many seasoned leaders this has not been part of their education and training. In many military cultures, gender perspectives have not been a priority. On the contrary, a sometimes hypermasculine organizational culture has prevented integration of gender perspective due to lack of status and knowledge, or an unwillingness or inability to change; some military cultures have even subjected gender issues to ridicule or felt their status threatened by it.[4] This is why gender-responsive leadership needs particular attention in a military context.

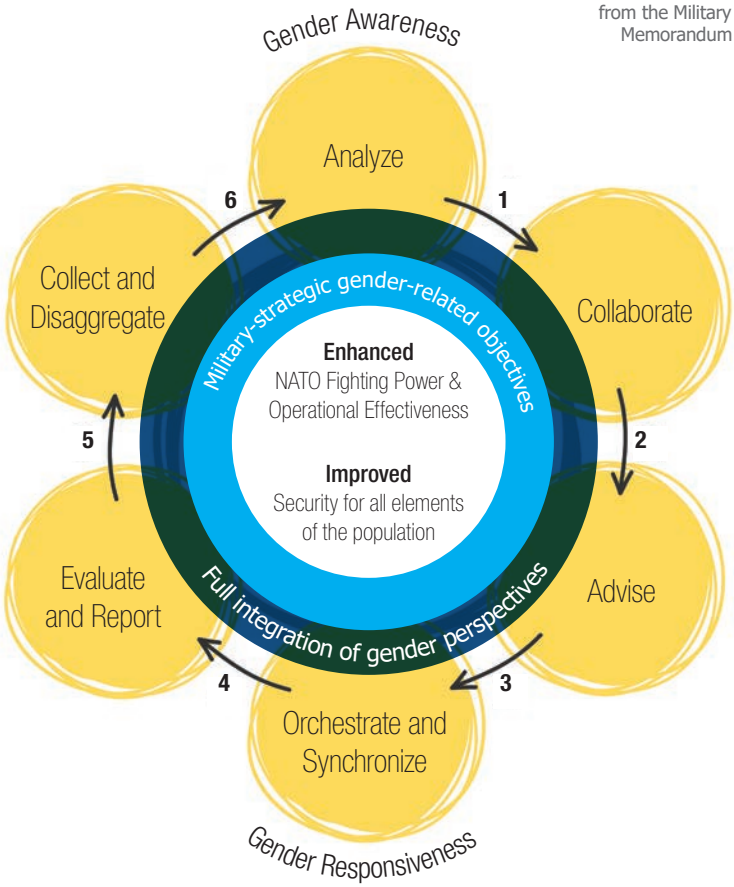
Many countries are building their capabilities in this area from the bottom up, through education and training for new soldiers and staff. This means that many of today's leaders never received education and training on the subject and related areas of change, and need added competence to ensure they are gender responsive in their leadership.

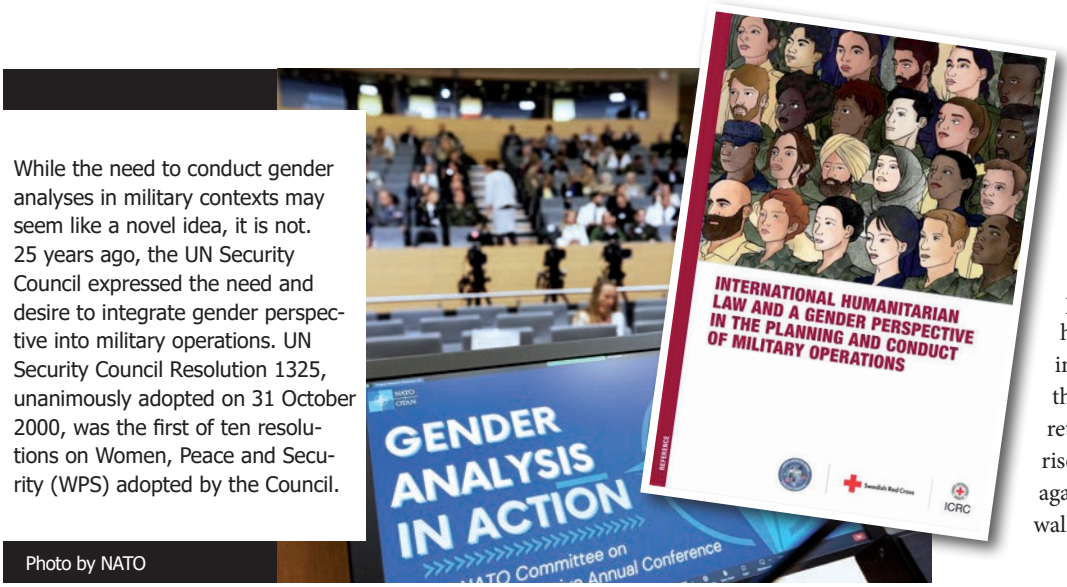
The Nordic Centre for Gender in Military Operations (NCGM) offers NATO-approved key leader seminars for the OF-6 to OF-9 levels and commanding officer seminars for the OF-5 level on the topic, in addition to tailored senior leader seminars to ensure continuing education for those aiming to gain gender perspective in military operations. These efforts can support individuals in becoming gender-responsive leaders who understand the culture of their organization, and ensure that they will take a transformative approach to the needed organizational changes and create the psychological safety required to integrate a gender perspective.

Since the adoption of UN Security Council Resolution 1325 in 2000, states as well as organizations such as NATO, UN and EU have worked on implementing the resolutions through the integration of gender perspective in military domains. During the Washington Summit in June 2024, NATO endorsed its revised women, peace and security policy, in which gender-responsive leadership and accountability is one of four strategic objectives. These will guide NATO's political and military efforts to "ensure NATO leaders strengthen their gender expertise, work towards gender equality and are accountable for the implementation of the WPS Agenda." While recognizing the need for gender-responsive leadership is important, it is far from enough. Effort is needed to implement the policy and reach the strategic objectives.

The integration of gender perspective is a force multiplier and a way to safeguard the common value base of our societies such as individual liberty, democracy, human rights and the rule of law, in our organizations, missions, operations and activities. As the role of the UN Security Council is to maintain international peace and security, the resolutions on WPS are

Illustration based on a figure from the Military Committee Memorandum 0197-2024





While the need to conduct gender analyses in military contexts may seem like a novel idea, it is not. 25 years ago, the UN Security Council expressed the need and desire to integrate gender perspective into military operations. UN Security Council Resolution 1325, unanimously adopted on 31 October 2000, was the first of ten resolutions on Women, Peace and Security (WPS) adopted by the Council.

Photo by NATO

significant in recognizing the interlinkages between conflict and gender inequality.

The WPS agenda is firmly rooted in international law and policy frameworks, and calls upon states to fulfil their international obligations under international humanitarian law (IHL) and international human rights law. IHL is of particular relevance here, being the body of law that aims to limit the effects of armed conflict. IHL protects persons who are not, or are no longer, directly or actively participating in hostilities, and imposes limits on the means and methods of warfare.

As gender inequality prevails worldwide and is exacerbated in theatres of combat, IHL must be applied with a gender perspective. As mentioned, armed conflict affects women, men, girls and boys differently. Civilians may experience different harm during armed conflict due to their sex or gender. Moreover, women are often "invisible" in operational data, resulting in gendered data gaps.

Additionally, who is applying the law may affect how the law is applied.[5] There are several provisions of international law that place obligations on armed forces to ensure that men, women, boys and girls are afforded certain rights and protections during conflict. Taking account of these gendered differences in experiences of war when applying international humanitarian law will result in better protection for everyone. In other words, applying IHL with a gender perspective contributes to addressing the needs of all parts of the population. Conversely, not adequately addressing the gendered experiences of armed conflict may result in violations of IHL.

In collaboration with the Nordic Centre for Gender in Military Operations (NCGM) and the Swedish Red Cross, the International Committee of the Red Cross (ICRC) published a report in 2024 titled "International Humanitarian Law and a Gender Perspective in the Planning and Conduct of Military Operations." By exploring the application of gender perspective in this context, the report provides guidance on how to avoid and reduce gendered harm arising from military operations.

While the obligations to implement IHL and WPS resolutions lies with states, the responsibility to integrate gender perspective in military activities and operations primarily lies with military leaders. The expectation and example set by commanders can cement or obstruct the integration of a gender perspective in the wider military organization.

To address the title of this article: is gender responsive leadership a game changer for the integration of gender perspective in NATO? It can be. It may not bring about significant change for leaders who already perform gender-responsive leadership, but for the whole of the organization it still has a massive impact in the accomplishment of its mission. If leaders are not driving gender-related change, the change will happen very slowly – if ever.

However, if leadership commits resources to the change as the new NATO policy demands, change is not only possible, but can also happen quickly. Essentially, change will only take as much time as leadership allows it to. Accountability is key and is addressed specifically in the new NATO Policy on the Implementation of the Women, Peace and Security Agenda. As instruments of NATO's policies, leaders at all levels should set high standards when it comes to the integration of gender perspectives. As the former Australian Chief of Army, retired Lieutenant General David Morrison, stated in his widely hailed speech against misogyny: "The standard you walk past is the standard you accept!"[6] ✦

ENDNOTES

1 Review at: https://www.nato.int/cps/en/natohq/official_texts_227578.htm
2 MCM-0197-2024
3 Review at: https://www.forsvarsmakten.se/en/swedint/nordic-centre-for-gender-in-military-operations/mgat/
4 Kvarving, L. P. (2019) Gender Perspectives in the Armed Forces and Military Operations: An uphill battle – Cultural, structural and functional factors that prevent or promote implementation of UNSCR 1325 in the Norwegian Armed Forces and NATO. Oslo: University of Oslo
5 https://blogs.icrc.org/law-and-policy/2022/06/30/gendered-impacts-of-armed-conflict-and-implications-for-the-application-of-ihl/
6 https://www.youtube.com/watch?v=s_TfZdIhIgg, accessed on July 7, 2025

https://www.forsvarsmakten.se/en/swedint/nordic-centre-for-gender-in-military-operations/

The NATO Policy on WPS and the abovementioned ICRC report on gender perspective highlight how important it is that military organizations train and exercise gender perspective. To assist the ability to train on gender perspectives in military operations, NCGM has developed a new tool addressing how to plan, execute and evaluate exercises with a gender perspective. The publication is available, together with other useful tools and publications, at the Nordic Centre for Gender in Military Operations website.

"Under no circumstances can the Alliance be unable to execute its essential mission, nor can it afford loss of reputation by failing to ensure continuity of its critical outputs."

NATO Business Continuity Policy

BUILDING RESILIENCE *through* RISK MANAGEMENT *and* BUSINESS CONTINUITY

by **Ferdi Aral**
Risk Management Advisor
Resources, Analysis and Planning Branch
NATO Joint Warfare Centre

and **Lieutenant Colonel M. Chohan**
British Army
Business Continuity Staff Officer
Management Tasking & Coordination Branch
NATO Joint Warfare Centre


The co-author, Mr Aral

Photo by Tore Ellingsen

RISK MANAGEMENT (RM) and business continuity are two sides of the same organizational resilience[1] coin, and both constitute the bedrock upon which the Joint Warfare Centre (JWC) accomplishes its mission in support of the Alliance. To live up to that responsibility, the Centre needs more than just expertise and resources: it also requires foresight, proactivity and, most importantly, credibility. That is why the JWC has begun implementing a new risk management system[2] designed to predict challenges, secure resources and safeguard the reputation and integrity on which our effectiveness depends.

It is also why the Business Continuity Plan (BCP) and Directive are subject to constant review within the BC management system (BCMS)[3] cycle, always adapting to the JWC Commander's objectives, organizational changes, and NATO's transformation. RM concerns itself with minimizing the probability and/or effects of a negative event occurring (or exploiting opportunities that risk may present).

Not every event is preventable, so the complimentary activity to minimize the impact of a negative event is part of BC management. Risk management and business continuity are distinct but interrelated functions.

It is vital that culturally, both RM and BC are baked into, rather than merely sprinkled on, an organization's psyche. Both systems are decision support mechanisms and require full buy-in from the Command Group, as this is a precondition for effective management and it is this part of the organization that owns the assets and resources to deliver solutions. That said, RM and BC should not be continuously front and centre, but must be known and understood.

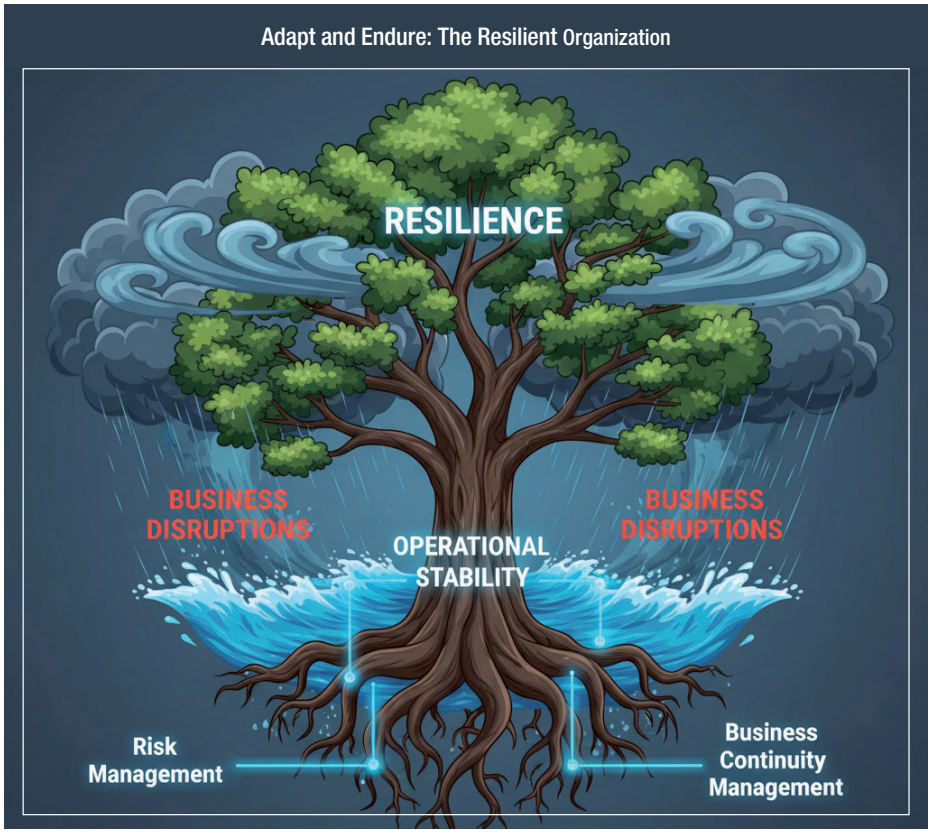
Car insurance provides a good analogy: everyone should have it and in the event of a crash or theft, it will prove extremely useful. Most know how to take out a policy and what to do in the event of an accident or damage, but it is not at the forefront of everyone's mind every time they drive their car. Similarly, drivers constantly conduct repeated risk assessment during a journey, but almost at a subconscious level.

The JWC has recently taken important steps to embed business continuity and risk management into its daily work. JWC's Business Continuity staff officer gave a presentation on BC at the all-hands call on September 25. It is expected that NATO job descriptions could soon include a requirement for all staff to undertake "introduction to BC" training. The existing risk register has been optimized and updated to track and monitor key vulnerabilities, ranging from operational continuity and security to reputational risks that stand at the centre of our concerns. Staff consultations and workshops have taken place, ensuring that the new processes reflect insights and experiences of JWC staff across different roles.

The Centre is now integrating RM into the planning cycle of upcoming exercises, so that the JWC can address potential disruptions before they can impact delivery. These efforts are part of a shift to optimize how proactively the JWC prepares for problems — rather than merely reacting to them.

Many benefits of this shift are already materializing: RM is supporting more informed decision-making that allows all levels of command to weigh competing priorities with greater confidence and transparency. It protects and optimizes our resources by identifying weak points and enabling focused efforts where they will achieve the greatest effect. This is also a constituent part of BCMS, where prioritization of activities and processes results from the application of RM and business impact analysis to identify and implement solutions. Embedding and embracing RM and BC help protect the JWC's and NATO's reputations. However, good theory is insufficient; to be effective, RM and BC must be used and tested regularly. If we fail to meet our stakeholders' expectations (for example, if our exercise settings and scenarios do not reflect real-world threats), or if the JWC fails to continue to deliver warfare development during disruption, questions will be asked of us. By systematically building resilience, we reduce our vulnerabilities and reinforce the confidence placed in us by the Alliance.

This success is not attributable to a single office or individual, but depends on active participation of JWC staff at every level, in every branch, in every function. Working together to identify, share, and address risks and impacts of disruption and to prioritize outputs, activity and resources that deliver them, we will ensure that the JWC continues to fulfil its mission, standing as a cornerstone of the Alliance's collective preparedness and readiness. ✦



Left
Illustration provided by the authors. The tree represents any organization that is capable of withstanding external challenges. Risk Management and Business Continuity are the roots of organizational resilience.

ENDNOTES

1 Organizational resilience: an organization's ability "to absorb and adapt in a changing environment to enable it to deliver its objectives, survive and prosper." ISO 22316:2017 Security and Resilience

2 The JWC applies industry standards to risk management: management of risk (M_o_R©). Its ISO-compliant definition of risk is "an uncertain event or set of events which, should it occur, will have an effect on the achievement of objectives." "Threat" describes "an uncertain event that would have a negative impact on objectives," and "opportunity" describes "an uncertain event that would have a favourable impact on objectives."

3 NATO applies industry standards to BCMS: BC Institute Good Practice Guidelines. Its ISO-compliant definition of BC is "the capability of an organisation to continue the delivery of products and services within acceptable time frames at a predefined capacity during a disruption."

Organizational VALUES

by **Paul Sewell**
Organizational Development
NATO Joint Warfare Centre

Photo by JWC PAO

THE JOINT WARFARE CENTRE (JWC) recently released its new organizational values. The task was to create values that would help the JWC focus on the changes required for NATO 2030 and beyond. The Culture, Ethics and Values team was tasked to deep dive into this task, taking inputs from the JWC's earlier Organizational Values Assessment (OVA) study as well as other surveys and workshops to gather input from military and civilian staff of all ranks and nationalities.

The team identified recurring themes that, through various iterations, were distilled into three key values: Excellence in Action, Innovation in Motion, and United in Purpose. The values are intended to be practical and enduring and will be introduced into our working environment in many different ways in the coming months. The new set of values can benefit the organization in various ways:

- **Values as a mindset**, shaping how we think and act. NATO 2030 is arguably all about mindset change. How can the Alliance shift its thinking to operate in new ways? The JWC values are designed to support these efforts by opening us to these perspectives.
- **Values as focusing tools**, guiding decisions and priorities. Regardless of our mission and structure, the basics remain. We will still need to make decisions, prioritize efforts and see beyond our own blind spots. The values will support these efforts by helping us focus on what is important.
- **Values as connectors**, building unity and shared purpose across the organization. In our multinational NATO environment, our values will serve as connectors, helping us speak in a common tongue.

This launch of our new values is everyone's legacy and something for which we are all responsible. It is just the beginning of our long-term commitment to embed our values in a way that strengthens the JWC's ability to adapt, collaborate, and deliver on its mission during this time of massive transformation. ✦

1

Excellence in Action

We hold ourselves to high professional standards, in words and actions – consistently, diligently and transparently.

Do it right. Do it well.

2

Innovation in Motion

We move forward by challenging convention, embracing learning and continuously adapting to the needs of the Alliance.

Keep moving. Keep improving.

3

United in Purpose

Acting with integrity and respect, we draw on our diversity and align to our shared mission.

Many countries. One mission.

Scan the QR codes for the JWC Values Trifold, the JWC Quick Facts and job opportunities!

Connections, Trust and Diplomacy in the Multinational Workplace

The Importance of Human Bonds in International Environments

by **Colonel Çiğdem Mahnaoğlu, PhD**
Turkish Air Force
Former Executive Officer,
Exercise, Training and Innovation Directorate
NATO Joint Warfare Centre

and **Major Joshua Marano, PCC, BCC**
United States Marine Corps
Land and Amphibious Operations and Plans Advisor
Transformation Delivery Division
NATO Joint Warfare Centre

"What sort of thumbprint are you leaving on the lives you touch?"

We find that question worth giving a pause for you to ask the same for yourself. It begs for so many follow-on, personal questions. Am I close and intentional enough to even touch others' lives? Is my mark uniquely my own?

Before we go any further, we kindly note that you would come up empty-handed if you were to search for empirical research or peer-reviewed endnotes in this piece; our omission of such content is intentional. Instead we offer you a voice built on character, encouragement, and shared family values that transcend nationalities, genders, traditions, and uniforms.

In international assignments, ranks and uniforms often define the outer framework, but one must not forget that the core of meaningful cooperation lies in human connections. People shaped by different languages, historical experiences and worldviews come together around a shared purpose. Everyone carries a mindset formed by their nation's cultural mentality, societal expectations, and institutional training. Yet, beyond all these differences lies a quiet but transformative possibility: through proximity, mutual respect, and curiosity, even the strongest mental armour can become permeable.

In multinational cooperation, what matters is not only the interoperability of systems but the intersection of personalities. Especially in long-term and trust-based environments, national boundaries begin to blur among individuals working side by side. Relationships that begin with a common task often evolve into deeper, more genuine, and more meaningful bonds over time.

Many professional relationships deepen outside the scope of the assignment: conversations held beyond the briefing room, a special occasion celebrated together, an event involving families, or a moment of emotional openness. These experiences remind us that even within formal institutions such as NATO, true

#WeAreNATO

Above, from left
Community Services Section staff at the gym on the Joint Warfare Centre's Jåttå Compound; the co-author Major Marano speaking with a group of JWC colleagues.
Photos by JWC PAO

trust is not built solely through policies. Trust reveals itself in humour, empathetic listening, and sincere interest.

The Power of Presence in Times of Change

While restructuring and digital transformation shape the way ahead for NATO, this transformation affects not only processes, but primarily people.

Organizational change brings psychological weight: uncertainty, role shifts, generational differences. People seek not only updates but also transparency, trust, and the feeling that their voices are heard. They want to know that those leading the change understand not just the operational, but also the human foundation.

In this context, transparency and justice are not merely institutional values; they are lived experiences. When people sense fairness not just in decisions made but also in how they themselves are perceived and heard, change finds a moral foundation. It is at that point that true leadership emerges, not merely in terms of efficiency or rank, but through the strength that comes from being seen and included in a fair process.

Therefore, leadership, especially in international settings, must remain relational at its core. Systems evolve, structures transform, but the deepest sense of trust emerges when individuals believe they are part of a transparent and just process. It is then that the shared mission becomes sustainable through both mental and emotional engagement.

Shared Humanity Through Different Lenses

In international settings, no individual perceives the same event in the same way. A decision, a word, even a silence may carry different meanings across cultures. The iterative nature of our co-authoring of this article was no different. This is not a weakness, but rather the foundation of multidimensional thinking and mutual respect. The ability to see the familiar through another's eyes is one of a leader's most valuable competencies, and thus an area for growth.

At times, these approaches may clash. But more often, they enrich one another. When leaders not only provide information but also strive to understand, when they pause not to respond but to reflect, a new language emerges. This language is not found in manuals or presentations, but in glances, shared challenges, and the mutual appreciation of effort. Over time, assumptions give way to curiosity, and certainty yields to inquiry. Leadership draws strength not from offering answers, but from asking the right questions that allow others to share their perspectives in an atmosphere of trust.

Good leadership is not only about what we achieve but also about how we experience it. It considers emotional climate, past experiences, and relational context. And what arises from this awareness is a form of leadership woven with empathy, yet uncompromising on responsibility and accountability at every echelon.

Aligning Together: Generations, Justice, and Voice

Generational differences are often overlooked in international structures, yet they hold significant potential. Young professionals bring demands for innovation, digital competency,

Above, from left:
Traditional hand-painted items at the Norwegian stand at JWC International Day; Major General Ruprecht von Butler, Commander JWC, opens Sports Day; the co-author Colonel Mahnaoğlu. Photos by JWC PAO

and inclusivity, while seasoned colleagues offer strategic depth and crisis composure. When both contributions are acknowledged, institutions do not just progress, they deepen.

Here, justice is not only about the content of decisions but also about how those decisions are experienced. Who speaks, who is heard, how feedback is given, how mistakes are addressed: these seemingly small details create immense trust or mistrust in individuals.

Transparent leadership does not mean perfection; it is about consistency and the courage to change direction when necessary. This approach fosters participation and nurtures institutional loyalty.

Generational awareness is also a reason why we chose to avoid the commonly sought offering of a peer-reviewed article, strategic masterpiece, or theoretical mental model in the construct of this reflective article. Given our credentials and education (both military and non-military), we could have written something longer, more formal and more academically rigorous.

That approach falls short of truly honouring what we value most about our time serving together at the Joint Warfare Centre. It misses the mark of what we hope to leave for our spouses and children and for the up-and-coming young leaders of our future generations. That approach would not carry our thumbprint.

The Silent Foundation That Carries the Entire Structure

Every nation brings its own assumptions about leadership, justice, and cooperation. These assumptions may sometimes cause friction, but at other times open the doors to dialogue. Leaders who approach these differences with humility show that strength and grace, courage and compassion, can and must coexist.

In such environments, people do not merely complete tasks; they also shape one another's perspectives. When the mission ends, it is not only completed objectives that remain, but also transformed individuals. Not because they have compromised their identities but because they have been able to view themselves through another cultural lens.

This is the essence of quiet diplomacy, which underpins lasting peace. It is neither ostentatious nor loud. But it takes root and endures. At every NATO meeting, every military exercise, and every coalition mission, there exists an unseen human bond. This bond is not built within systems, but between people. And when nurtured with humility, attentiveness, and sincerity, it gives rise to a shared language that needs no words: mutual understanding.

We were created equal. We arrived differently. But we can depart in connection, perhaps as better leaders, and maybe, we hope, as better spouses, parents, friends, and citizens. And if this shared journey leaves any mark, may it be one our children one day recognize as worthy of their footsteps. ✧

Colonel Mahnaoğlu holds a doctorate in international affairs and most recently served as Executive Officer, Exercise, Training and Innovation Directorate, Joint Warfare Centre.

Major Marano is a certified coach and PhD student in industrial/organizational psychology. He serves as Land and Amphibious Operations and Plans Advisor, Joint Warfare Centre.

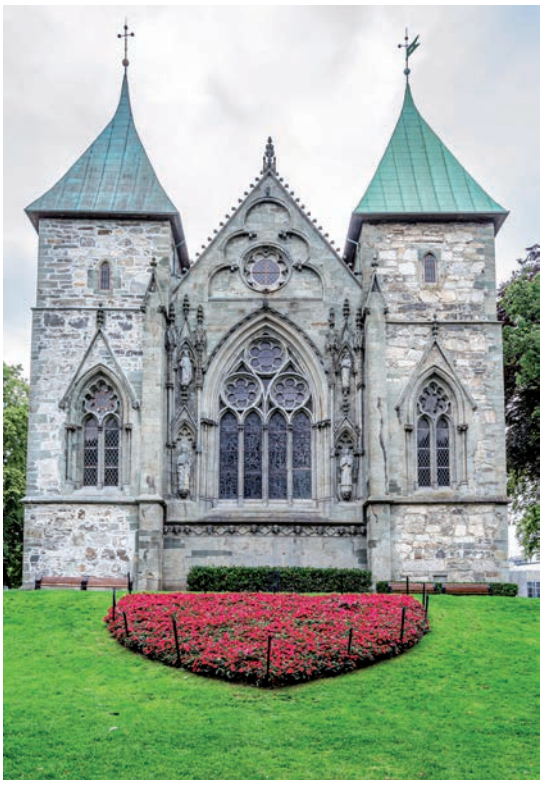
900 years – STAVANGER *through* the AGES

by **R. Morrigan**
Joint Warfare Centre Linguist
The Three Swords Editor

Above
The monument "Swords in Rock" in Stavanger, commemorating the ninth-century Battle of Hafrsfjord, whose victor Harald Haarfagre united Norway under his crown. Photo by Shutterstock

THE KINGDOM OF NORWAY graciously hosts NATO's Joint Warfare Centre in a breathtakingly beautiful part of the country, the city of Stavanger in Rogaland. The landscape here boasts the very features that attract visitors to Norway from all over the globe: mountains, fjords and a rugged coastline with countless islands.

Humans have populated the modern-day county of Rogaland in southwestern Norway since the end of the last ice age, some 10,000 years ago. The region became a significant power centre throughout the Bronze and Viking Ages (c. 3200 BCE to 1066 CE), evidenced by the burial mounds, cairns, ruins, rock carvings and other relics that litter Rogaland. However, the history of the county's capital, the city of Stavanger, begins at the end of the Viking Age: around 1100, construction began on a cathedral that stands to this day as Norway's oldest and best preserved. 1125, a sort of halfway point to the cathedral's completion in c. 1150, is considered the official birth year of Stavanger.



Above, from left
A view of downtown Stavanger and the recently renovated Stavanger Cathedral, Norway's oldest and best-preserved cathedral, completed in c. 1150, photos by Shutterstock

And so, 2025 marks Stavanger's 900-year anniversary. A momentous occasion celebrated with museum exhibits, art installations, festivals and more. This article, too, aims to celebrate Stavanger by sharing some of its fascinating history with the readers of The Three Swords.

The name of this publication, along with the crest of the JWC, is a reference to the monument that is the symbol of Stavanger: three 10-metre-tall swords of bronze embedded in a rock at the Møllebukta bay in the inner part of the Hafrsfjord, in the Madla area of Stavanger. The swords recall the Battle of Hafrsfjord, an unprecedented naval battle that took place here at some point between 872 and 900 CE. King Harald Hårfagre, or "Fairhair," emerged victorious and incorporated several petty kingdoms into his realm. He is regarded as the first ruler of a united Norway, though the country had not taken its present-day shape at this time. The monument erected in 1983 reminds residents that they are walking in the footsteps of Vikings, and that the history of this region is far longer and shrouded in greater mystery than the city's documented origins.

IN THE 12th and 13th centuries, Stavanger thrived primarily as a significant religious centre. By the dawn of the 14th century, around 800 inhabitants enjoyed a wide array of trades, crafts and services. The town even had its own hospital. Calamity struck Stavanger along with the rest of Europe in 1349, when the bubonic plague decimated its population. According to some estimates, the Black Death may have left no more than 250 inhabitants alive. Agriculture and industry suffered; houses stood abandoned.

More waves of the plague kept the townsfolk struggling for decades before Stavanger began to recover from its brush with extinction. In 1425, it received the status of market town, bestowed by King Eric of Pomerania, who ruled the Kalmar Union (a 126-year union of Norway, Sweden and Denmark under one monarch). Nevertheless, Stavanger was rather a poor town. Most of all, it had been the Catholic clergy in whose coffers wealth had accumulated.

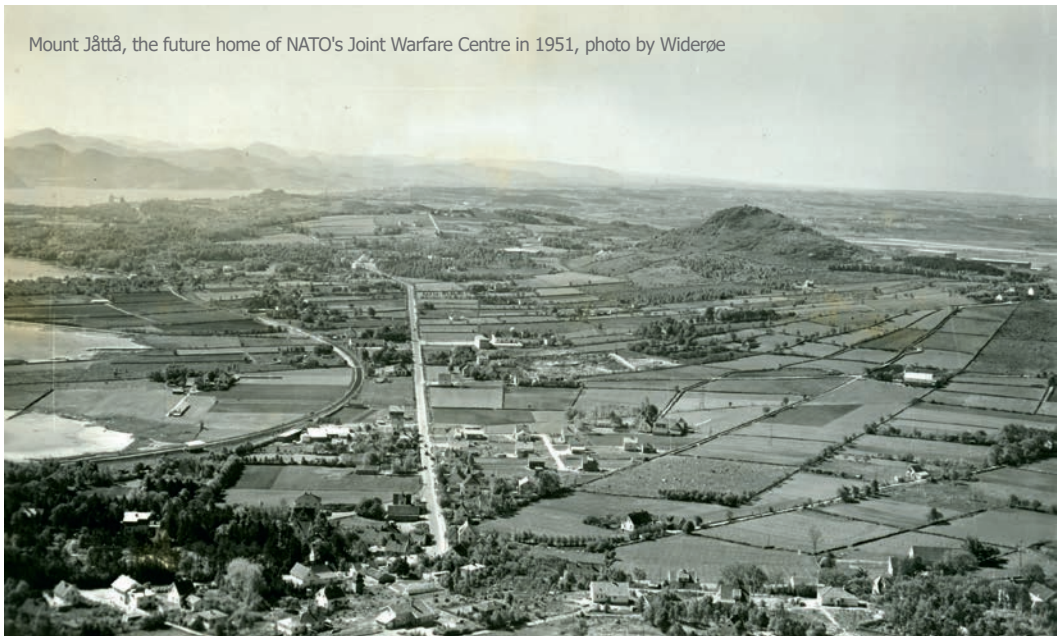
In 1536–1537, Lutheranism became the official faith in Denmark-Norway under its new king, Christian III. Catholic icons and relics were stripped from the churches and the Pope had to relinquish his property in the kingdom, ceding it to the Danish crown. As the Protestant Reformation reshaped Europe, Scandinavia saw an influx of skilled artisans from the continent, who were fleeing religious persecution and the bloodshed of the Thirty Years' War (1618–1638). Locally, this resulted in the Stavanger Renaissance, during which Baroque religious art flourished throughout the south and west of Norway. One of the leading artists was prolific German painter Peter Reimers, whose works grace many churches in Stavanger, including the Cathedral.

A number of merchant families accumulated significant wealth in the 18th century through their involvement in shipping, shipbuilding and trade. Luxury goods such as fine textiles became available and lavish houses and villas transformed the town's appearance. Not all residents were fortunate, though; many suffered hardship due to bad harvests and disease.

Four major fires destroyed well over 200 houses throughout the 1700s (after two fires had already devastated the town in the previous century). And then there was the Great

Northern War: between 1700 and 1721, Russia led a coalition with Denmark-Norway and Saxony-Poland-Lithuania (joined later by others) to reconquer territories from Sweden and challenge its supremacy.

While Rogaland was not the scene of any battles, the people of Stavanger felt the effects of increased taxation and the costly war along with the rest of Norway.



Mount Jåttå, the future home of NATO's Joint Warfare Centre in 1951, photo by Widerøe

DURING THE 19TH CENTURY Stavanger, now a Norwegian leader in shipping and herring fishing, grew at an unprecedented pace. The population rose from around 2,500 to 30,000 throughout the 1800s. Infrastructure to cope with Stavanger's population explosion was sorely missing. Epidemics spread and infant mortality rose. Outside of the herring fishing season, many were unemployed and struggled to make ends meet. In 1860, the Great Fire of Stavanger consumed 250 houses in one night. After its dense clusters of wooden buildings had been laid to ashes in so many conflagrations, the city now opted to build wider streets and constructed a waterworks and a gasworks. In 1878, a train line opened to Egersund in the south, connecting the Stavanger peninsula with towns and villages along the coast.

Despite such progress, times were hard in Stavanger, as in all of Norway during the 19th century. More than 800,000 people — approximately one in three Norwegians — chose to emigrate during this time, including many residents of Stavanger. Most of them left for the United States; only the Irish flocked to America in greater numbers during this period. As a result, millions of Americans have preserved Norwegian traditions in a large diaspora centred in Wisconsin and Minnesota.

The very first organized migration of Norwegians to the U.S. departed from Stavanger in 1825. To commemorate this event 200 years later as part of Stavanger's 900-year festivities, His Majesty the King Harald V and the Norwegian Royal Family visited the city on July 4, 2025. They saw off the Restauration, a reconstruction of the sloop that carried 52 emigrants in 1825, as it set sail to retrace that first voyage to New York.

The reconstructed sailing ship Restauration, nearly identical to the original and a symbol of the first organized Norwegian emigration to the United States. Photo by Jonas Haarr Friestad. Source: Restauration Friends Association (www.restauration.no)

The Restauration sailed from Stavanger to New York in 1825 with 52 people on board.

Inset: Stamp depicting the sailing ship Restauration by Shutterstock, World of Stamps

THE 20TH CENTURY brought further modernization to Stavanger. While a thriving canning industry and associated businesses had already emerged in the late 1800s, the work had largely been carried out manually. Now, local inventions enabled more automation, vastly increasing the number of goods produced and sold. Locals founded canning factories, cooperatives and labour unions; companies abroad clamoured for machines built in Stavanger. This led to ample job opportunities, particularly also for women. In 1909, electric power coursed through the city for the first time.

During the German occupation of Norway (1940–1945), the Stavanger peninsula was of strategic importance due to its airport, harbour and location. The area was to become *Festung Stavanger* (Stavanger Fortress), a German stronghold full of fortifications such as bunkers, coastal artillery and anti-aircraft batteries. Throughout the war, Stavanger residents such as Otto Olsen and Solveig Bergslien risked their lives (and perished in Gestapo custody, in Bergslien's case) to resist the occupation. Volumes could be — and have been — written on the Second World War in Stavanger, even though it was merely a five-year period in a history spanning a millennium.


The "colour street" in Stavanger, photo by Travel Faery, Shutterstock


Old Stavanger with its 173 wooden buildings, photo by Charles HHuang, Shutterstock

Prosperity returned to Stavanger in the post-war period. Modern amenities such as washing machines and television sets became commonplace. The general wealth of the city was still modest, however, before one event changed Stavanger and all of Norway forever: the discovery of the vast Ekofisk oil field on the Norwegian continental shelf in 1969.

From the 1970s onwards, the development of hydrocarbon resources rendered Norway one of the world's foremost oil and gas exporters. The country opted for a mixed model of commercial and state-controlled activity; to this day, the Norwegian state remains the majority shareholder in the now privatized company Equinor, formerly Statoil, the biggest player in the Norwegian petroleum industry.

In 1990, Norway founded the Petroleum Fund, later known as the Government Pension Fund Global, to invest the surplus generated by the industry. It is the largest sovereign wealth fund in the world, currently valued at approximately 2 trillion U.S. dollars. Norway would not be the country it is today without prudent investments derived from its natural resources — and Stavanger, the "Oil Capital of Norway," is the city at the centre of the staggering wealth that supports the welfare of the country's residents, native and immigrant alike.


Oil Museum in Stavanger, photo by Shutterstock

Inset: Balloons at the Port of Stavanger, near the Oil Museum, photo by JWC PAO

FROM THE HOME of Bronze Age chieftains to Viking-Age birthplace of national identity, from a struggling fishing town to the cosmopolitan heart of Norway's prosperity, and from occupied theatre of the Second World War to host of a strong, close-knit alliance. The past has been an awe-inspiring journey for Stavanger, and the staff members of the Joint Warfare Centre are proud to be a part of that history — as well as the chapters that are yet to come. ✧

When I followed my NATO spouse to Norway, I had to learn to thrive through resilience – and gained a new outlook on life itself.

Growing Into a New Home

by **Amanda Eden**
Director of Brands MKT – IK Group Worldwide
and NATO Spouse

ELEVEN YEARS AGO, I fastened my six-month-old daughter, Emily, into a car seat, squeezed my two-and-a-half-year-old son, Tommy, into a puffy coat he hated, and let the Lisbon sun slip behind the clouds of memory. My husband's new post with NATO was waiting in Stavanger, Norway; however, my own award-stamped career in a global advertising agency was not. I still remember my last visit to my favourite neighbourhood café, thinking, "This might be the last time I hear my mother tongue every day."

Resilience, that word people toss around like a paper aeroplane, suddenly felt heavy as a lump of metal in my pocket.

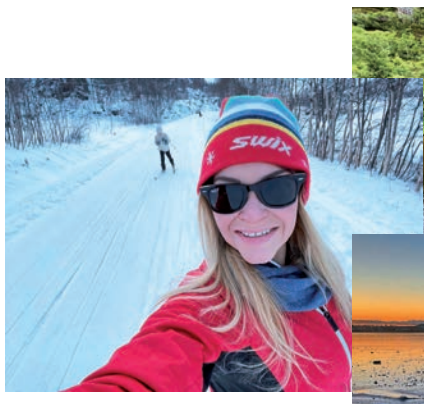
I won't lie. Norway wasted no time to strip away illusions. November rain arrived sideways. The sky came in only two colours: black and graphite. The sun became a collection of photos from my last summer in the Algarve, and my confident professional veneer dissolved in supermarket aisles where I couldn't pronounce *rømmegrøt*.

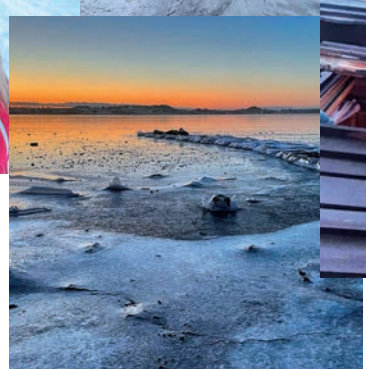
I missed the lazy clatter of espresso cups in Lisbon cafés, the laughter of colleagues sharing a glass of wine during work lunches, and the city noise. I missed feeling competent.

But contrast, I discovered, is a masterful teacher. Stavanger's gloom made every shaft of light sacred: that first pastel sunrise at 10 a.m. in January, the gold coin of August dusk skimming a fjord, the fierce glitter of fresh snow under streetlamps.

Norwegians have a word, *kos*, for the cosy satisfaction of candles against a storm. I adopted it like a stray cat. *Kos* in our home became nightly board game marathons, multicultural parent potlucks that transcended language (thanks to the wonderful opportunity to join an international school), and wool jumpers that felt like quiet hugs.

Below, from left to right
Cross-country skiing in Suleskard, Sirdal; Paddleboarding on Fidjelandsvatnet, Sirdal; a frozen Hafrsfjord; enjoying the winter holiday, Sirdal; fishing at Ims. Photos by the author





Little by little, I rewrote belonging. Nature became our playground. Hiking was our favourite weekend pastime, and we found picnic spots that looked computer-generated in their flawless splendour. I learnt that silence is an important part of the conversation. Norwegians speak sparingly; their pauses aren't awkward — they're generous. So, I learned to let silence finish my sentences. And best of all, I understood the weather as an equalizer. Everyone, from CEOs to bus drivers, checks the same forecast and owns the same rain gear. In other words, I'd never felt social equality so viscerally.

As the kids grew older, I began to feel the itch of unfinished ambition. I had spent some years pouring my energy into building a life from scratch in a new country, learning the ropes of motherhood, and embracing a culture so different from my own. But now, it was time to reclaim a part of me I had carefully tucked away. Re-entering the workforce after a long break is daunting enough. Doing it in a second language is on another level. But instead of fear, I felt something else: readiness.

When I first moved to Norway, people warned me: "You'll never get a good job if you're not Norwegian." Even for an ordinary role, they said, you had to speak the language fluently.

Well, I'm not Norwegian. My closest tie to local tradition is an unwavering love of cod. And while I can order coffee and navigate a dugnad (a community volunteering effort), I'm far from fluent. But I couldn't let that stop me.

Because here's what I've learned: the world doesn't need you to be perfect; it needs you to be authentic. To show up with your own voice, your experience, your point of view. I had a solid career behind me, a creative mind that hadn't gone quiet, a deep desire to contribute, and a belief, however fragile, that I still had something original to offer. That was enough.

So, I stopped waiting for permission. I chose not to settle, not to shrink my experience to fit other people's expectations. And that choice changed everything.

Today, I'm Director of Marketing for a global Norwegian engineering company. Proof that careers aren't lost — they're rerouted. They may take detours, yes, but those detours often lead to the most beautiful destinations.

And if there's one thing I hope you take from this part of my story, it's this: don't let anyone define what's possible for you. Keep believing, keep showing up, and trust that the right doors will open. Even if you have to knock a little louder to be heard.

After 11 Norwegian winters, I've learned a lot. I've learned that home is plural.

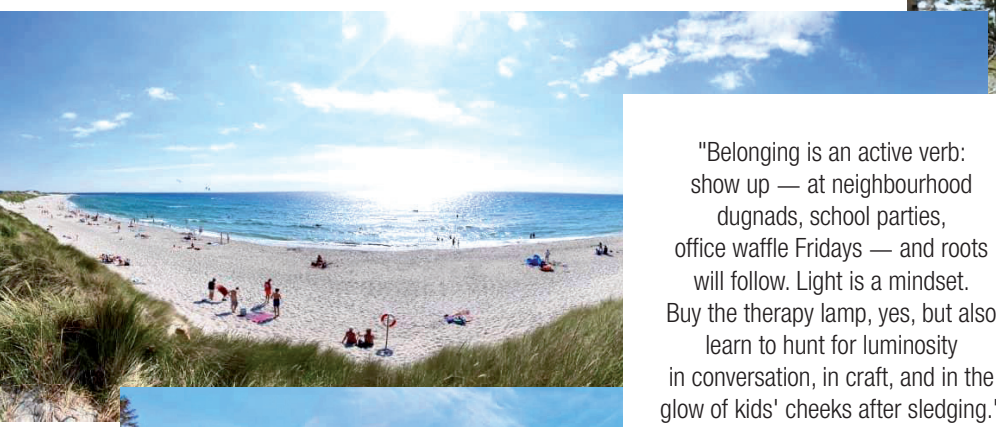
Lisbon didn't shrink when I left; my heart simply made another room. Belonging is an active verb: show up — at neighbourhood dugnads, school parties, office waffle Fridays — and roots will follow. Light is a mindset. Buy the therapy lamp, yes, but also learn to hunt for luminosity in conversation, in craft, and in the glow of kids' cheeks after sledging. Difference is a two-way mirror. The more I explained Portuguese hospitality, the more I understood Norwegian directness. Careers can hibernate. Dormant does not mean dead; it means gathering strength beneath the snow.

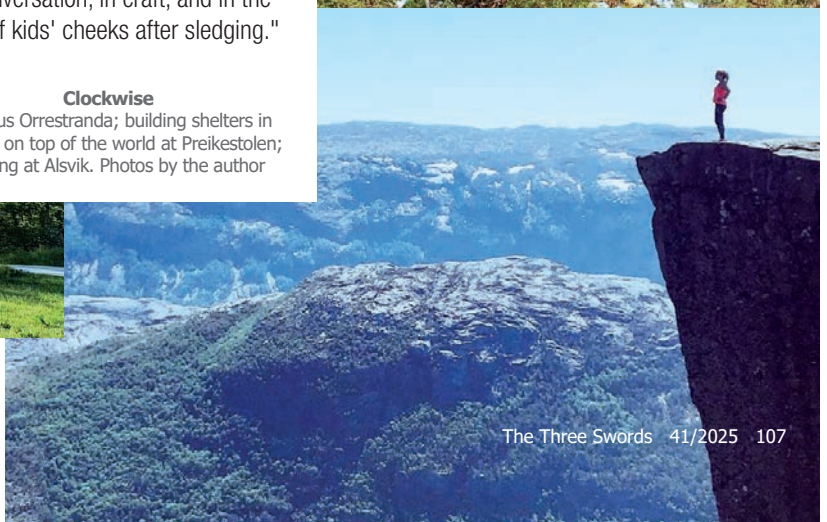
There are still mornings when the sky forgets to brighten. But resilience is now less a weight in my pocket and more a rhythm between what was and what is becoming.

Lisbon taught me to savour life; Norway taught me to endure it.

Together, they teach me to celebrate it, whatever the forecast. If you ever find yourself trading sunshine for drizzle, remember: the very differences that unsettle you may be the ones that remake you. So put on your waterproofs, and step outside. The rain won't wait — and neither should you. ✦

"Belonging is an active verb: show up — at neighbourhood dugnads, school parties, office waffle Fridays — and roots will follow. Light is a mindset. Buy the therapy lamp, yes, but also learn to hunt for luminosity in conversation, in craft, and in the glow of kids' cheeks after sledging."





Clockwise
Fabulous Orrestranda; building shelters in Melshei; on top of the world at Preikestolen; camping at Alsvik. Photos by the author

The Joint Warfare Centre is NATO's training focal point for joint operational- and strategic-level warfare.

"The exercise process can seem like a complex and, at times, overwhelming project. However, it is purely the scale and scope of an exercise that drives this complexity, and not the process itself. The officers of primary responsibility (OPRs) ensure the success of each exercise by being effective leaders, managers, and problem solvers." pp. 87-90

The Joint Warfare Centre's three OPRs for NATO Exercise STEADFAST DUEL 2025. Photo by Tore Ellingsen

ONE TEAM
TOGETHER
WE MAKE NATO
BETTER!

Scan the QR code with your mobile device to visit **www.jwc.nato.int** and learn more.