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You've got to sim it to win it:
The journey to a true Common
Synthetic Environment for NATO

September 2025

NATO's adversaries are innovating at an unprecedented rate. From AI-enabled manoeuvres to autonomous drone swarms and precision disinformation campaigns, modern warfare now unfolds at machine tempo. NATO's ability to train, plan, and act must do the same.

Simulation and a Common Synthetic Environment (CSE) have a key role to play not just in preparing for this evolving battlespace, but also for fighting within it. The question is no longer whether a CSE is desirable — it is whether NATO can deliver one that supports operational decisions at speed, scale and fidelity. Done right, the CSE is not simply a training asset, but a potent digital deterrent: a persistent, integrated, and adaptive environment that allows commanders to plan, rehearse, and decide across a much wider range of scenarios with confidence - before the first round is fired.

This briefing series sets out the case for advancing the CSE, not as required infrastructure, but as a strategic deterrent. It outlines how a CSE, built to modern standards of interoperability, hyperscale simulation and multi-domain realism can enable faster preparation, readiness and operational advantage. It introduces key considerations, grounded in an industrial collaboration between Deloitte and Hadean, for how NATO can turn this vision into a strategic asset to safeguard the alliance.

Simulation is not new to NATO. It already underpins much of the Alliance's force generation and preparation — powering training, planning, wargaming, and test and evaluation across nations, commands and institutions. From mission rehearsal environments to strategic foresight studies, Modelling and Simulation (M&S) is an essential foundational capability.

However, its power remains under-realised and unable to react with the speed and flexibility required to combat the emerging threat. While effective, today's simulation solutions are typically tailored for narrow purposes, difficult to adapt to new use cases, incompatible across domains, hard to integrate with operational systems, and limited in scope, scale and fidelity.

As a result, current simulation approaches excel in narrow preparation of force segments across a small number of scenarios, but falter in driving creative problem solving for Joint and Combined operations across a broad range of scenarios, or in supporting live decision-making or dynamic planning.
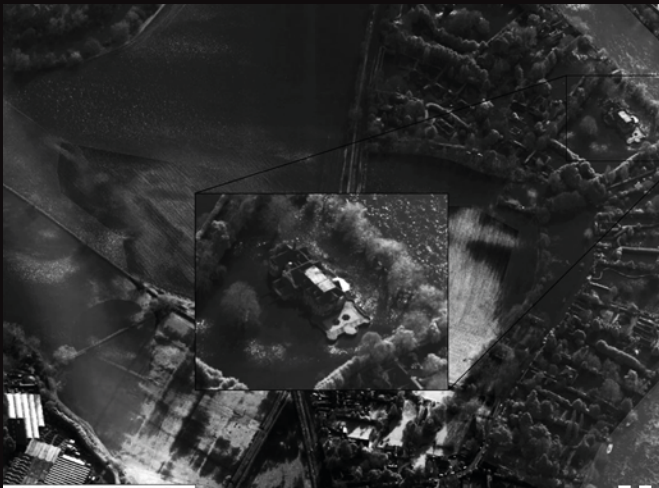
Reading between the 7-minute lines

> *Ukraine has demonstrated that across a 1000km front line, 400km deep, anything that emerges from cover that is above the economic threshold for targeting, is identified, targeted and hit within 7 minutes.*
>
> *A speaker at RUSI Land Warfare Conference, June 2025*

The Ukraine conflict has become a crucible for military innovation and demonstrates the challenge NATO face in modern conflict. The unprecedented acceleration in technological and tactical evolution demands previously unseen adaptation and a fundamental shift in how NATO prepares for future conflicts. This a world of continuous digital combat - where drones strike within minutes, disinformation moves faster than munitions, and autonomous agents operate beyond line-of-sight – **our synthetic capabilities must shift from merely preparation to full participation**.

Breaking down the earlier RUSI statement reveals implications on a modern Modelling and Simulation capability.

Scale - "1000km wide / 400km deep": Large-scale peer-on-peer conflict demands NATO prepare for complex, geographically vast, multi-domain operations involving diverse threats and civilian interactions. Simulations must accurately reflect this complexity across all operational levels.

Value - "The economic threshold for targeting": Ukraine has reminded the world of the extreme rates of consumption in peer-on-peer conflict. NATO must remain on the right side of the 'cost curve'. Simulation provides a cost-effective route to force generation and preparation, but must also reflect the complex real-world considerations of sustainment and economic implications of different courses of action.

Flexibility - "Identified, targeted and hit within 7 mins": New technology has reshaped the theatre in Ukraine with the drone being the transformative technology of the war. Simulation systems must be flexible enough to quickly incorporate new ideas, platforms and data structures to test tactics and strategies for their use. Simulations must transcend the battlefield and into the strategic sphere, modelling up the support chain to reflect realistic force generation, preparation and sustainment while also representing a full suite of DIME (Diplomatic, Informational, Military and Economic) levers that NATO have at their disposal to Deter and Defend.
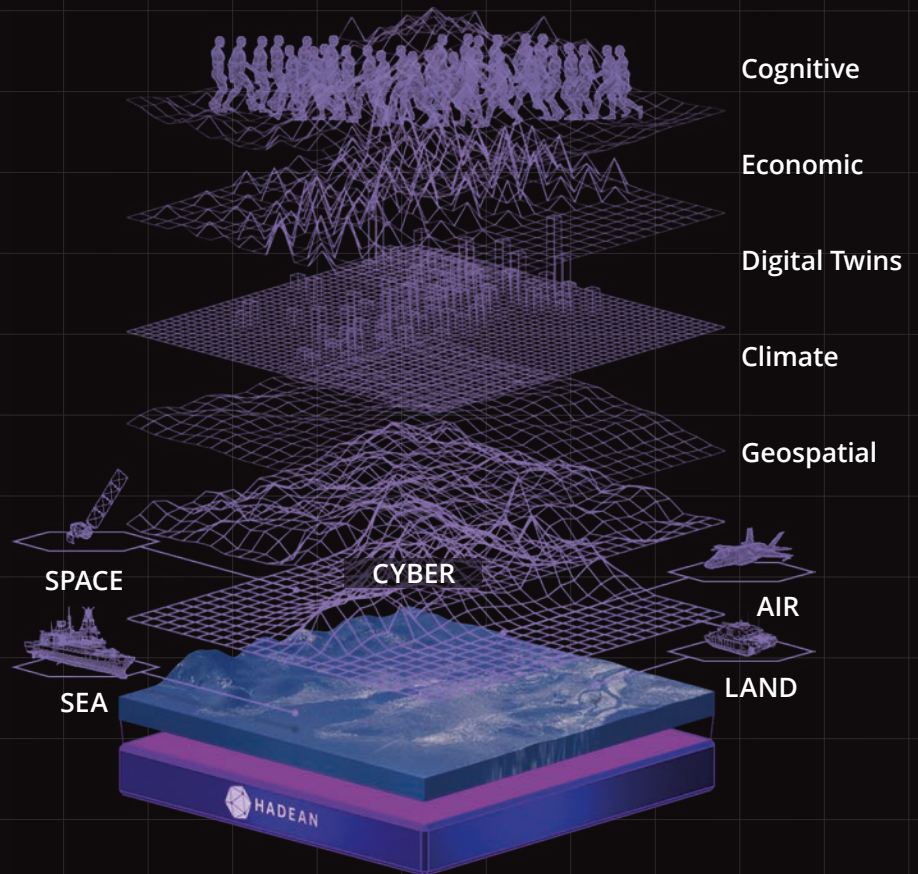
The Common Synthetic Environment

NATO is developing a Common Synthetic Environment (CSE) – a transformative technology that has the potential to deliver on the scale, value and flexibility requirement. **The CSE offers a unifying framework that connects existing simulation capabilities in a shared, persistent, and scalable environment** – one that reflects the complexity of real operations and is resilient enough to support real-world tempo.

Cognitive

Economic

Digital Twins

Climate

Geospatial

SPACE

CYBER

AIR

SEA

LAND

Hadean Common Synthetic Environment

Done right, a CSE transforms siloed wargaming, modelling and simulation toolsets into a single capability that can underpin core NATO operational activity and drive the flexibility and adaptability at all levels, from tactical to strategic, that modern warfare demands. A CSE can provide:

- **Decision Support/Analysis:** The ability to quickly explore and train for innovative strategic approaches beyond established doctrines (e.g. Operation Spider's Web and the Kursk Campaign). A CSE enables realistic modelling of localised adversary counter action, but can also explore wider dimensions like support chain requirements, impact on civilians or Diplomatic, Informational and Economic parallel actions.

- **Training:** A platform for cost-effective, interconnected Live, Virtual, and Constructive training for geographically dispersed NATO forces, fostering adaptability and interoperability in preparation for modern warfare's unpredictability.

- **Cost-Effective Evaluation:** A rigorous, affordable platform for pre-deployment evaluation of new technologies and doctrines, mitigating risks and reducing costs compared to trial-and-error approaches.

- **Operational Use:** A fully mature CSE can be extended and integrated to directly support real-time operational decision-making, providing crucial situational awareness and real time predictive modelling capabilities during active operations.

Making the CSE effective

The CSE must be fast, affordable, and adaptable, enabling a broader range of scenario testing and shortening the decision-making cycle. Such a system depends on modularity, integration with existing systems, and the ability to model economic and societal factors alongside military ones – the system must be set up to exist on the edge of innovation. **NATO should focus on four success factors:**

01. Technology: The CSE's architecture must be founded on robust and scalable technology like Hadean, adhering to Modular Open Systems Architecture (MOSA) principles to deliver flexibility, interoperability, and the ability to incorporate new technologies and capabilities as they emerge. Selection should rigorously evaluate platform abilities to scale, interoperate and support the diverse simulation needs of NATO in a secure manner. This includes the capacity to model large-scale, multi-domain operations, incorporating autonomous systems, AI-driven decision agents, and real-time data feeds, but also non-military factors as grey-zone activity poses strategic dilemmas.

02. Outcomes: The CSE's development and deployment must be **relentlessly outcome-oriented**, focusing on delivering measurable improvements to NATO's operational capabilities. NATO must define and measure progress against Key Performance Indicators (KPIs) aligned with specific operational needs, such as reduced training costs, improved decision-making speed, or enhanced effectiveness of new technologies. Value focus should extend beyond purely military applications, encompassing the broader Diplomatic, Informational, Military, and Economic (DIME) spectrum to ensure a holistic understanding of conflict dynamics.

03. Adoption: Technological advancement alone is insufficient. The focus should be on making the CSE an intuitive and indispensable tool for planning, training, and decision-making, rather than a standalone system. The CSE's success hinges on adoption through seamless integration with existing NATO operational systems and workflows, with a strong emphasis on business process re-engineering and user adoption from the outset. This transformation should extend to all levels, from tactical battlefield simulations to strategic-level wargaming and force generation planning.

04. Ecosystem: The CSE cannot be developed in isolation and will **require a vibrant delivery ecosystem of technology providers,** simulation experts, and NATO member states to foster innovation. A flexible commercial model, encouraging collaborative experimentation and knowledge sharing, and shared investment will be crucial. To develop a world leading capability, the procurement approach needs to reflect the innovation of the CSE itself.

Conclusion

The Common Synthetic Environment is no longer a concept on the horizon — NATO is already building it. The question has moved from "if" to "how", and the answers will define the Alliance's ability to out-think and out-pace its adversaries. This cannot just be a simulation layer for training; it should be a living extension of NATO's operational systems, feeding commanders real-time insight, connecting training to live missions, and making every exercise an investment in future advantage. However, what got NATO to where it is today will not get it to where it wants to be. NATO needs to take a whole capability approach, extending beyond just Technology to Outcomes, Adoption and Ecosystem, otherwise it risks building another generation of simulation tools that are excellent in siloes but collectively limited.

Deloitte and Hadean are collaborating to develop CSE capabilities, combining global Digital Transformation experience with industry leading technology to provide a CSE capability that is designed to serve at theatre scale, adapt as fast as the threat evolves, and drive measurable outcomes across all domains. **The journey is underway — the challenge is to build it with the speed, vision, and discipline that modern warfare demands.**

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