NATO DIANA
Defence | Innovation | Adoption

Decision Superiority for NATO warfighters

Challenge Summary: To enhance NATO's operational effectiveness and to maintain its technological edge, DIANA is seeking digital capabilities, particularly AI/ML models and software solutions, that enhance operational planning and execution through improved modelling and simulation, targeting support, and operational wargaming. The focus is on augmenting and enhancing warfighting functions performed on AI-enabled digital platforms by NATO's Allied Command Operations ("ACO"), as well as by NATO's Allied Command Transformation and Allied nations.

i) Current Constraints

Military planning is often constrained by linear processes, manual workflows and data that do not update or respond dynamically according to changing operational conditions. This rigidity can reduce the relevance and utility of static plans as real-world events unfold differently from initial assumptions. Solutions to this challenge will augment or enhance operational planning and execution by integrating AI/ML models and innovative software solutions into existing digital platforms, increasing analytical depth, dynamism and accelerating decision-making in time-constrained operational environments.

ii) Technical Foundation

ACO, with its headquarters at Supreme Headquarters Allied Powers Europe ("SHAPE"), is responsible for planning and execution of NATO military operations and utilises an existing AI-enabled digital warfighting platform, Maven Smart System NATO ("MSS NATO"), amongst other tools, to conduct such activities. This platform enables diverse data sources to be ingested, transformed, and modelled in a digital twin to create a real-time and geospatially contextualised multi-domain operations platform. These data sources may include real-time intelligence, surveillance and reconnaissance (ISR) data, military operational reports, logistics information, catalogued specifications of military assets, and historical data on adversary behavioural traits and capabilities. Open-source data, including social media activity, commercial data and weather inputs may also be incorporated to enrich situational context. While the platform already fields several warfighting applications and supports the building of AI-enabled workflows, its open and extensible architecture allows for further integration of advanced analytical capabilities, AI/ML models, and other innovative software solutions.

iii) Desired Functional Outcomes

Integrated solutions could be deployed to identify patterns, correlations and change events in the input data to warfighting applications, revealing anomalies or deviations from established patterns of life that might signify emerging threats or opportunities. These additional capabilities, supported by open-source data, could also enable automated scene setting and contextual preparation for wargaming and planning activities. When coupled with advanced simulation and modelling capabilities, these integrations could be used to perform rapid course of action analyses across a high-dimensional parameter space, identifying potential risks, second- and third-order effects, and operational dependencies not readily apparent through manual processes. Accounting for force projection

calculations, targeting data and analytics, operational reporting, doctrine and further cross-domain contextual information, this enhanced analytical and modelling capability would strengthen operational decision-making and improve the ability to anticipate outcomes and alternatives. Further integrations of natural language and decision-support interfaces into AI-enabled applications would enable commanders to interact directly with the operational environment and execute command-and-control through intuitive workflows. Combined, these capabilities would reduce cognitive burden, improve situational understanding, and accelerate planning, targeting, and execution across time-constrained operational contexts.

NATO's strength lies in its integration of Allied capabilities; this must be reflected at the systems level through the integration of innovative solutions from across the Alliance and enabled by core digital warfighting platforms. To achieve this, DIANA is seeking solutions that augment existing AI-enabled digital warfighting platforms, including MSS NATO, to achieve decision superiority through the integration of commercially available AI/ML models, advanced analytical capabilities, modelling and simulation tools, and operationally relevant data sources. These additional capabilities would strengthen NATO's warfighting effectiveness by improving coordination and decision-making across tactical, operational, and strategic echelons, supporting commanders and staff in planning, targeting, and execution.

Illustrative Scenario: Due to an increase in grey-zone activities and rising political tensions, a decision is made to bolster Allied defences on NATO's Eastern Flank, with an increased naval force deployed in the Baltic Sea to protect commercial shipping and undersea infrastructure. This is accompanied by an increase in ground troops near the border. Simultaneously, Allied defence air systems are on high alert after a series of recent unidentified drone incursions into NATO territory. This activity is monitored and coordinated across ACO through 'Joint Force Commands' and 'Tactical Component Commands' supporting theatre-level posture decisions, reinforcement prioritisation, and escalation management.

A radar system detects a small but fast-moving unmanned aerial vehicle ("UAV") travelling close to a civilian airport within NATO territory. With radar alone, it is not possible to identify the model, or if the drone is friendly or foe. Minutes later, a telecoms company reports a severance of an undersea internet cable in the Baltic Sea. Satellite imagery detects two unidentified vessels which have recently changed course twice in the vicinity of the cable severance. Further, social media monitoring websites report numerous videos of small convoys of unmarked vehicles crossing the border at several locations. These events suggest that an attack on Allied territory may be imminent or already underway, and NATO commanders must prepare to respond. Using the AI-enabled digital warfighting platform, all relevant data from military and civilian sources is integrated, transformed, and unified into a single common operating picture (COP), giving commanders across all domains and echelons a shared view of the rapidly evolving situation. Automated analytics highlight correlations and anomalies, while analysts validate data provenance, assess reliability, and contextualise the information prior to decision-making.

The platform, using integrated AI and analytical capabilities to assess the fusion of radar data and coarse video imagery, calculates with high probability that the unidentified UAV is an enemy attack drone. This triggers a command-and-control workflow prompt seeking authorisation to neutralise the threat, in line with rules of engagement. Simultaneously, by correlating satellite imagery with the public domain reporting and maritime tracking data, the platform flags a high probability that the internet cable was severed by the two suspicious vessels in the Baltic Sea. Furthermore, due to the ongoing ingestion and real-time analysis of ISR and commercial feeds, the COP now updates to reflect that these vessels have again changed course and are heading for a second subsea cable. Based on the current COP and using modelling and simulation tools that account for the weather, sea conditions, logistics constraints, and capabilities of available assets, Allied naval commanders can within minutes

run a detailed course of action analysis to identify which assets are best positioned to intercept the suspicious vessels before they reach the second subsea cable.

On approach, the Allied assets observe possible hostile intent from the suspicious vessels. This is reflected in the COP through operational reporting and is immediately visible to the commanders of land forces in the vicinity of the unidentified convoy. This is accompanied by further data ingestion relating to an increase in observed radio interference and jamming in the vicinity of the convoy. Combined with ongoing analysis of ISR feeds, signals intelligence inputs, and open-source reporting, these factors increase the assessed probability that the unidentified vehicles are hostile. Targeting considerations, force protection requirements, and escalation management are incorporated into the ongoing analysis being conducted by the commander of land forces in the region, enabling the most robust course of action to be identified.

Using the COP, commanders in air, land and sea domains track the evolving situation as their chosen courses of action are implemented, whilst simultaneously performing further modelling, simulation, and wargaming to optimise the Allied response to the evolving threat. Decisions at the tactical level inform operational and strategic assessments, supporting coordination across ACO, including SHAPE, Joint Force Commands, and Tactical Component Commands, as the situation develops.

Exemplar Effects: To augment and enhance existing AI-enabled digital warfighting platforms, DIANA seeks digital capabilities that:

- Simulate the behaviour of red team and blue force entities in wargaming and operational planning environments to support planning, targeting, and execution across evolving operational scenarios. These entities include units, platforms, ISR assets and neutral actors such as civilian populations and infrastructure providers;
- Enable agent-based or AI-driven representations of adversary and friendly forces to interact within simulated digital environments, supporting experimentation, rehearsal, and operational decision support;
- Enable reinforcement learning, probabilistic modelling, and optimisation techniques to explore complex operational dynamics and improve decision support through repeated simulation and analysis;
- Support course of action analyses based on systemic exploration of complex and multi-faceted parameters relating to force posture, logistics, adversary behaviour, targeting and environmental conditions;
- Automate elements of scenario preparation and operational context development, such as initial conditions (unit locations, readiness levels, equipment, etc.), dynamic stimulus material such as trigger events and media reporting on external events;
- Support elements of the operational planning and assessment cycle, including decision support, order development, operations assessment, forecasting, and lessons learned, in ways that integrate with existing command workflows and planning processes;
- Support targeting workflows, including target identification, prioritisation, asset-tasking, and engagement decision support within operational planning and execution cycles;
- Extract insight from raw ISR feeds such as satellite imagery, radar data, full-motion video, signals data, etc., including through computer vision, sensor analytics, anomaly detection, and multi-source fusion;
- Enable intuitive interaction with the digital environment, including natural language interfaces alongside other analytical modalities such as forecasting, optimisation, and perception capabilities;

- Leverage commercial and open-source data sources, including structured defence datasets, targeting-relevant information, maritime and infrastructure data, and publicly available information, to strengthen situational understanding and analytical outputs.