CALIAN ®

Confidence. Engineered.

Navigating complexity

Enhancing decision-making in modern warfare

The operating environment

The complexity of contemporary operations has accelerated in recent years. After decades of focus on counterinsurgency and counter-terrorism operations, high-intensity operations in Ukraine are now the focus of attention.

Renewed focus on high-intensity operations is not simply a return to the Cold War paradigm. The present challenge includes elements of Cold War concepts like massed fires, manoeuvre of tanks and mechanized infantry, tactical aviation for strike and transport, engineering for mobility and counter-mobility, and deep strike operations on medium- and high-value targets. However, the contemporary battlefield has layers of new challenges above and beyond the expectations of Cold War concepts.

Ukraine has shown that the will to fight and a rapid kill chain are much more important components than simply counting tanks and armoured fighting vehicles as the measure of combat power. Intangibles—such as morale, esprit de corps and unit cohesion, level of training and competence, the quality of leadership, and reliability of support—are showing themselves vital to measuring combat power.

The massive volume of ammunition and fuel required to sustain operations, and their importance as a high payoff target for an adversary, mean that logistics and sustainment needs to be exercised—especially in an environment with near-persistent air surveillance that can target resupply columns. Air superiority can no longer be assumed, with air defence assets placed across the battlefield narrowing the range of options available to commanders. Small, mostly commercially sourced uninhabited aerial vehicles (UAVs—or drones) are ubiquitous, providing aerial reconnaissance, air-drop strike and first-person view (FPV) strike against moving targets. The volume of data streaming from the battlefield back to command posts means that the targeting processes are moving faster than ever before.

The operating environment is no longer limited to combat action either. NATO's multi-domain operations (MDO) concept adds space and cyberspace to the existing domains of land, air and maritime—all trying to operate in a highly contested electromagnetic environment. External stakeholders are increasingly part of the operating environment—from the private sector and international business, academia, non-government organizations (NGOs) and civil society, and citizens from NATO countries, host nations and across the world. Information operations can target C4ISR systems or target the attitudes and perceptions of civilians, business leaders and elected officials.

The challenge

The character of warfare is rapidly evolving. However, the essence of decision-making and command has not changed. The challenge for contemporary operations is making informed decisions as quickly as possible in increasingly complex situations—that include high-intensity warfare challenges coupled with increased information volumes and speed—all occurring in a contested and confused battle space.

Commanders and leaders face a range of choices for addressing tactical dilemmas, each with benefits, limitations, opportunities and trade-offs. The complexity of factors in today's operating environment has not changed the fundamental nature of decision-making; it has added layers and domains.

For military training, this means accurately representing the operating environment to test decision-making in an accurate, realistic and relevant way.

The scope of the challenge

Exercising decision-making applies across the spectrum of warfare and applies across all levels of command—from national-strategic to tactical commanders in contact. All elements of the operating environment need to be represented in training to provide the most accurate, immersive and relevant training experiences, while ensuring the training audience achieves the training objectives of the exercise.

From a modelling perspective, the challenge is accurately representing the elements and entities in the operating environment and the relationships between them. Decision-making requires weighing costs, benefits and implications and making the optimal decision within constrained timelines while balancing all those factors. To create this context in a training environment requires an accurate representation of the factors where decision-makers see costs, benefits and implications clearly. Presenting this environment in ways that are relevant and realistic to today's operational challenges requires more than simply re-loading Cold War concepts. The world has changed, technology has advanced, and more elements now challenge leaders in an MDO environment.

Manoeuvre, logistics and sustainment, air operations, maritime operations and deep operations need to be accurately represented, with impacts from cyber, space, electromagnetic warfare effects and information operations. Joint and multi-national partners need to be included, with considerations for international organizations, NGOs and civil society. The outputs of the defence industrial base should be modelled to accurately represent the capacity for prolonged operations that require fourth-line logistical support.

Focus on design

The design of exercises is vital for MDO exercises. Conceptually, the same broad concepts apply to MDO as any other exercise. Objectives are defined, the training audience is identified, and scenarios are built with supporting events and injects to meet those objectives. The difference in MDO is the need to integrate many more stakeholders, planes of operation (logistics and sustainment, air superiority, commercially sourced UAVs, cyber and space), participation from joint and multinational partners, and simulating information operations. The overall procedural pathway for designing exercises is unchanged for MDO, though with more components and considerations along that pathway. This is why design is so important for MDO exercises.

Figuring out how to represent complexity is the main challenge in design. Connecting the right components and capabilities into a common concept and synthetic environment is difficult.

Executing on design becomes a question of adhering to a rigorous process of defining objectives, the actors in the exercise and the effects they can generate on others, and creating events and injects that connect actors to activities that support objectives. To ensure that the complexity of MDO is reflected in training, a rigorous design process is essential.

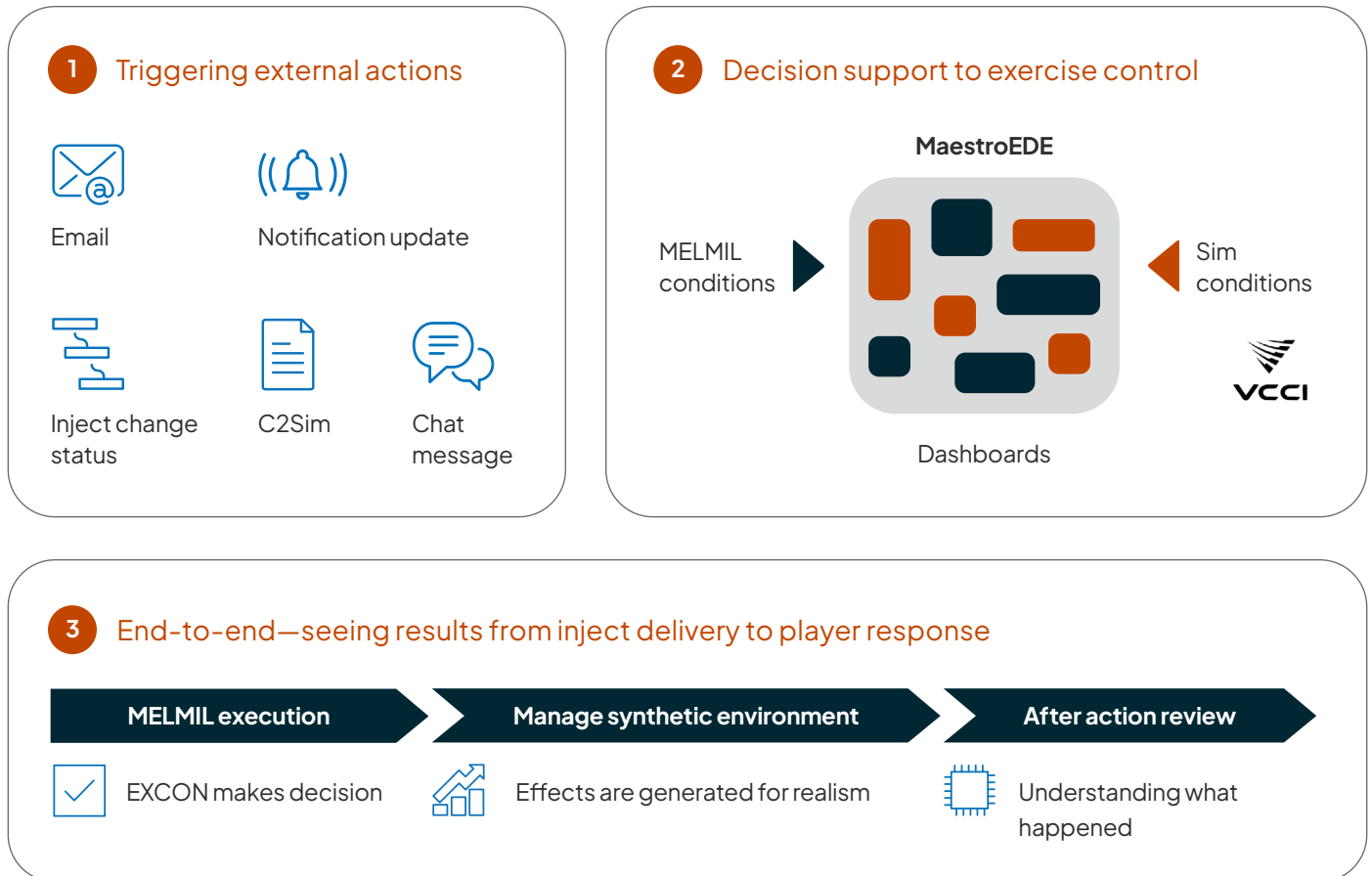## Synthetic environments for decision-support activities

Technology is at the centre of our approach for designing, developing and delivering training. We are constantly expanding the functionality of our toolsets to meet the evolving needs of defence customers in Canada, NATO and NATO member nations. Our solutions are used to rehearse decision-making across the spectrum of conflict, from non-combatant evacuation operations (NEO) and peace support operations, to counterinsurgency, high-intensity conventional operations, nuclear deterrence exercises and wargames to support senior-level decision-making about capability planning and force posture. Though the specifics are different across the spectrum of operations, each scenario still requires command decisions based on the context. In each scenario there are still considerations commanders weigh on manoeuvre, air defence, aviation, ISR, logistics, civilian policing and more. Calian uses a collection of tools to create synthetic environments that meet any training requirement.
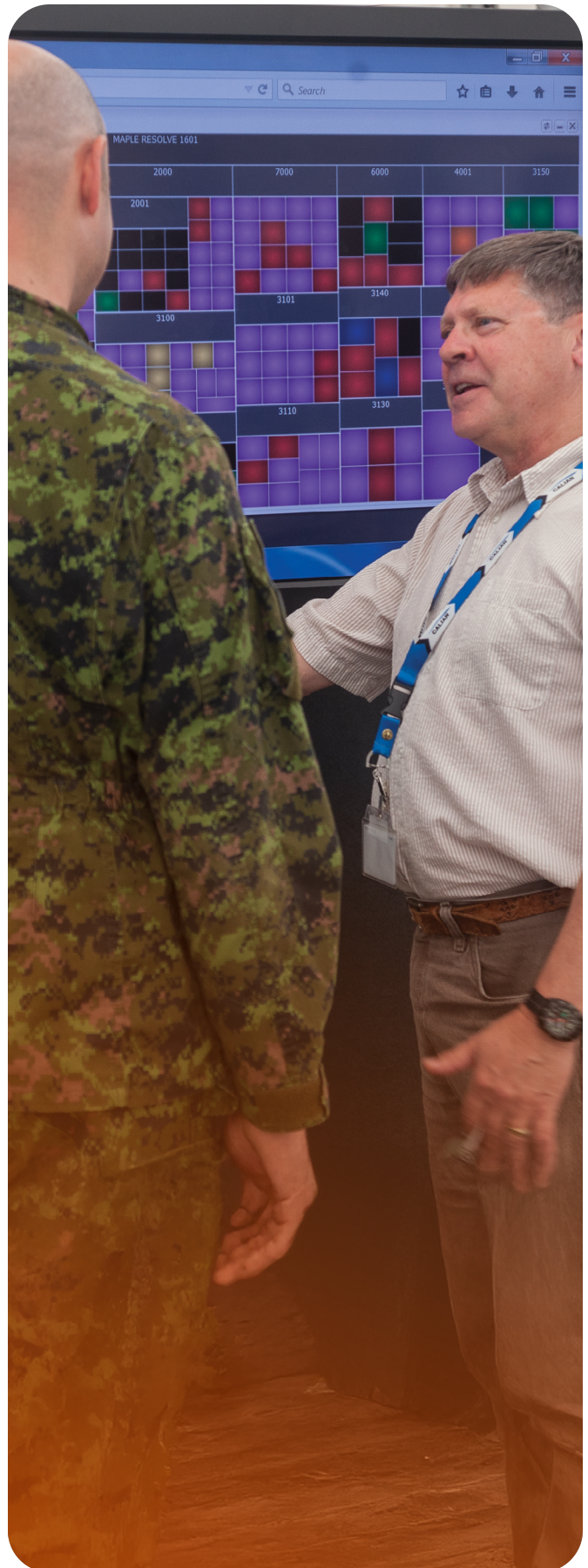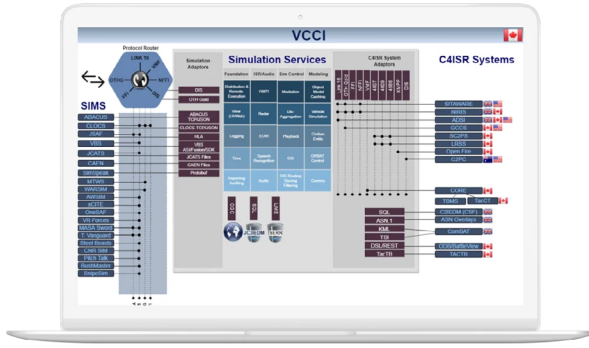
MaestroEDE

To design, develop and deliver military training exercises, Calian relies on MaestroEDE. Developed by Calian, MaestroEDE provides a single synthetic environment for exercise designers, planners and developers to turn exercise concepts and objectives into turn-key training exercises. Designed from the start to facilitate distributed development and delivery, MaestroEDE allows developers to work from their home units or remotely to build complex scenarios and provides a proven way to deliver complex exercises from the participating unit's garrisons—saving travel costs, which concentrates every training dollar on achieving results. MaestroEDE streamlines planning, connects objectives to actions and outcomes, and centralizes all exercise traffic in a single platform with a user-friendly interface. MaestroEDE drives exercise development and delivery, providing traceability throughout the process to allow exercise controllers to deliver a meaningful and valuable training experience.

Recently, Calian developed AI assistant functionality within MaestroEDE to automate the development of exercise content for any exercise. The AI assistant develops expert guided draft content to meet the objectives of the exercise, which human operators then verify to ensure it meets the training needs and can be used in an exercise. More content can be developed in less time which can either shorten writing boards or allow for richer exercise complexity within events. This AI-enabled process allows for massive reduction in the time required to develop content for large, complex military exercises. Accelerating content generation is a game-changer for developing large, complex military training exercises and brings a level of agility and flexibility for development that human operators alone cannot match.

1 Triggering external actions

Email

Notification update

Inject change status

C2Sim

Chat message

2 Decision support to exercise control

MaestroEDE

MELMIL conditions

Sim conditions

VCCI

Dashboards

3 End-to-end—seeing results from inject delivery to player response

MELMIL execution	Manage synthetic environment	After action review
EXCON makes decision	Effects are generated for realism	Understanding what happened

Virtual Command and Control Interface

For joint and multi-national exercises, Calian technology delivers an interoperability solution that allows any exercise participant to be integrated into a common synthetic environment. Many NATO members have proprietary and stovepiped simulation and operational systems that cannot exchange information with other systems, making interoperability a challenge—which becomes even more challenging as the number of participants increases. The proven Calian Virtual Command and Control Interface (VCCI) enables data exchange between dozens of systems, powering interoperability and the delivery of a single synthetic environment for training. VCCI was purpose built and is continuously updated to meet the changing needs of NATO and NATO members. VCCI is already fully interoperable with many simulation systems used in NATO and is used to connect operational communications and ISR systems into large headquarters.

Audio Distribution Service

Communications interoperability presents challenges for joint and multi-national operations. With different field radios that may not be able to talk to each other, interoperability across NATO can be an obstacle to effectively training and working together on operations. The Audio Distribution Service (ADS) provides system-agnostic connectivity of field radios, allowing for the integration of disparate radio systems into a common communication network. This means that command posts and leaders can see the entire radio network and contact any callsign in the network, no matter what frequency they are operating on or radio system they are using.

With voice-to-text capability, ADS turns voice radio calls into text on a chat screen. With translation capability, language barriers can be minimized by turning any radio call into text. This functionality creates a combat log with more accuracy in reporting, which is critical within the kill chain when coordinates are being verbally passed.

Bottom line: ADS eases clear communication and information passage, enabling faster overall decision-making.

CALIAN
Confidence. Engineered.

Calian® helps people communicate, innovate, learn and lead safe and healthy lives. Every day, our team embodies our core principles of unwavering customer commitment, integrity, innovation, respect and teamwork, to engineer reliable solutions that solve complex challenges. That's Confidence. Engineered.

We are a growing company headquartered in Ottawa with offices and projects spanning North American, European and international markets with a focus on innovative healthcare, communications, learning and cybersecurity solutions.

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