A Digital Battlespace

The Joint Warfare Centre's Computer Assisted Exercise (CAX) Support Branch is responsible for providing a compelling synthetic battlefield. Over the 19 years that the Centre has conducted its core business of exercise delivery, the simulation environment has evolved based on the changing needs of the NATO Alliance.

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Every exercise the Joint Warfare Centre (JWC) executes requires a compelling and realistic environment in which the training audience operates. Given the scale and complexity of the operational theatres that are necessary to challenge NATO's Command Structure, a unique approach is required: the provision of a virtual battlespace. The role of the CAX Support Branch is to provide that environment through the use of computer-based simulations.

NATO as a whole is a major user of modelling and simulation technology and is continually looking to exploit this key enabling capability driven by the Allied Command Transformation's transformational activities (TACT). What sets the JWC apart is the scale and complexity of the exercises it executes. As the JWC CAX team, the key challenges we face are the requirement to model activity across the complete spectrum of warfare and to present the outcomes of that endeavour directly into the training audiences' command and control (C2) systems in a seamless and transparent way.

If the CAX team executes as intended, the training audience is unaware that CAX support exists; they truly train as they fight. To that end, the JWC employs a range of simulation systems and support tools, but the Centre's vision is actually to keep the technology as simple, agile and flexible as possible.

Delivering a CAX is the mission of the whole of the JWC. The CAX Support Branch is charged with providing modelling and simulation support to the exercise enterprise. A good CAX should highlight organizational and procedural weaknesses, as that is the single best way to identify where we, as an organization need to improve in our core mission, ensuring the safety and security of the Alliance and its members.

The greatest risk for the technical element of a CAX is that the benefits of using simulation support are outweighed by the resources required to prepare and deliver that support during exercise execution. We endeavour to ensure our simulation systems are as current as they can possibly be in terms of

What is a Digital Battlespace?

The richly detailed operational planning environments devised by the JWC staff contain thousands of discrete entities, installations and systems located in a fictitious, yet convincing geopolitical region.

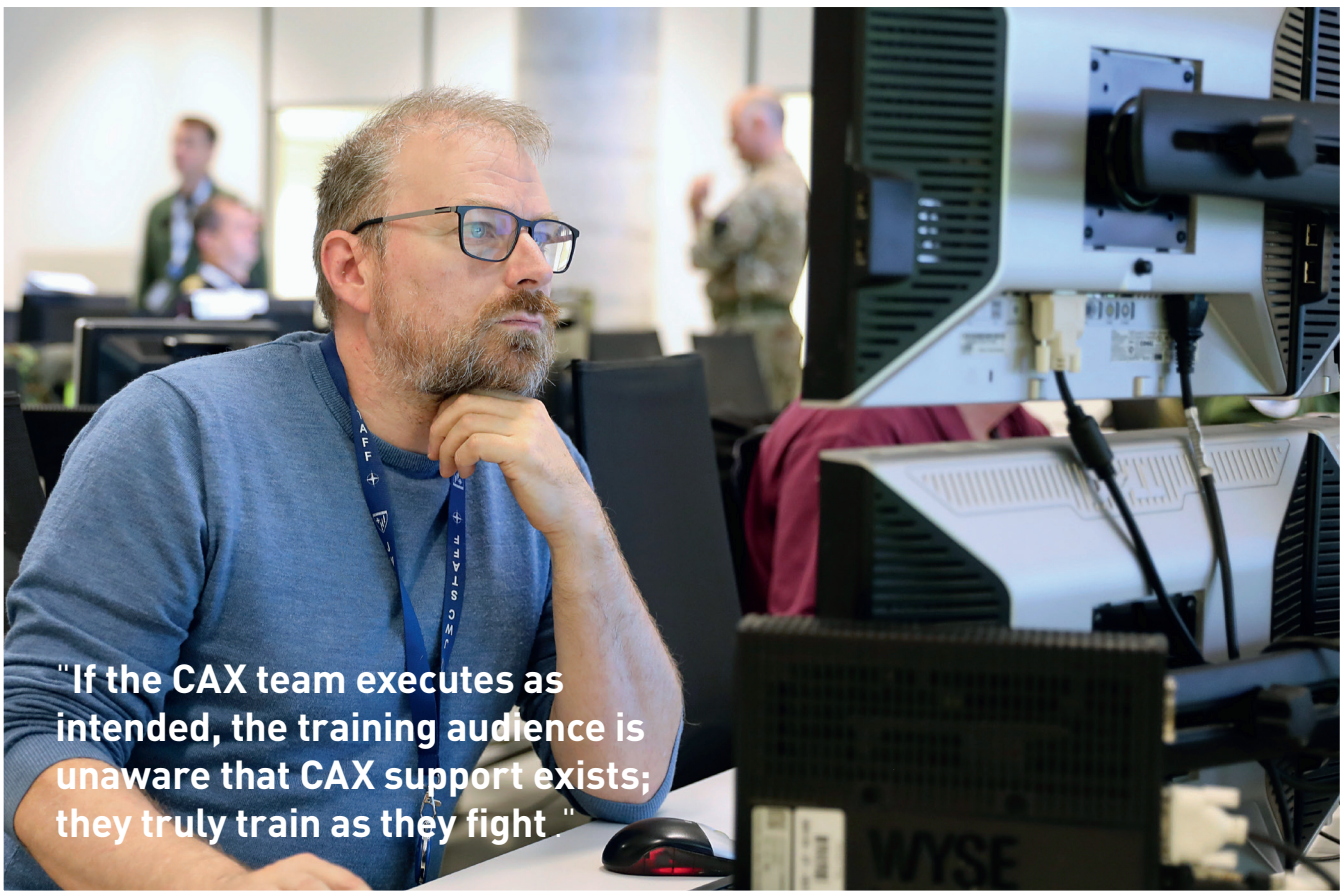
The simulations continually calculate the position and status of all of the thousands of entities that represent (virtually) the aircraft, ships and land forces under the control of the NATO headquarters involved in the exercise event as well as the opposing forces that are employed to test and challenge their plans.

fidelity and data accuracy to ensure we deliver value across all of the domains represented in exercises of the scale and complexity that the JWC provides.

Over the 19 years during which the JWC has conducted its core business of exercise delivery, the simulation environment has evolved based on the changing needs of the NATO Alliance. Recently, the focus has shifted to large-scale, high-intensity warfighting exercises. The major impact of this change is on the effort required to build the simulation databases that represent operations at the scale and complexity demanded, and on the number of personnel required to execute them. This places even more emphasis on the requirement for the CAX Support Branch to ensure that the parametric performance data for weapon systems is correct, and also to understand how changes in doctrine and the operational art can be accurately represented in a synthetic environment. The JWC CAX Support Branch has many challenges to face, but this also makes it a rewarding time to work in this field for NATO. As an example, for the virtual battlespace of one of the JWC-led exercises it was necessary to build a database that represented five corps down to battalion level, and the baseline scenario called for hundreds of ships and aircraft to operate in the battlespace simultaneously.

> “What sets the JWC apart is the **scale and complexity of the exercises** it executes.”

BELOW
The author, Phil Draper, during Exercise STEADFAST JUPITER 2021



The Way Ahead

NATO's level of ambition associated with its exercise programme is extremely challenging. The increase in the number of events scheduled for the JWC programme of work since 2020 and onwards is an indication of the faith placed in the organization and its ability to assist in the preparation of the Alliance. To effectively support that continually increasing NATO level of ambition and to sustain professional capability in the future requires a particular focus on simulation technologies and advances in new technologies. If that can be achieved, then the next 19 years should be as successful as the previous. ✦

ABOVE
CAX operators during various exercises

Philip Draper is a NATO Civilian employed at the JWC since 2011 as a simulation specialist focusing on joint operational-level conflict modelling.