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NATO's M&S COE: Strengthening the Defense Enterprise

Perhaps never before in its 72-year history has NATO engaged the number and complexity of threats throughout the battlespace. Halldale Group Editor **Marty Kauchak** caught up with NATO leaders who described current M&S activities.

NATO is searching for solutions to respond to the significant military build-up of a resurgent peer-competitor – Russia – in and around the Ukraine. The organization is sharpening and expanding its skill sets to respond to increased hybrid activities, including disinformation, and the cascading frequency of hostile cyber-attacks against member nations.

Accordingly, NATO is strengthening its readiness across a variety of mission sets to remain relevant and dominant throughout the warfare domains. Of added importance, the M&S Centre of Excellence (COE) is enhancing the ability of NATO member nations and partners to use M&S beyond training – across alliance and national defense enterprises.

Inside the M&S COE

NATO COEs are international military organizations that train and educate leaders and specialists from NATO member and partner countries in doctrine development, lessons learned, improving interoperability and capabilities, and testing and validating concepts through experimentation. The overall responsibility for Centres of Excellence coordination and utilization within NATO lies with Allied Command Transformation, NATO's Warfare Development Command, in coordination with the Supreme Allied Commander Europe.

This Centre's heritage can be traced to 2008, when Italy proposed the establishment of the M&S COE for NATO. This COE came into existence with the signing of an MoU between the first two nations, Italy and the Czech Republic in 2011. Currently, the M&S COE is comprised of four nations: Italy, the Czech Republic, the United States, and Germany.

The M&S COE, located on the southern outskirts of Rome, Italy, inside the Cittá Militare Cecchignola (Cecchignola Military Compound), is bringing to bear capabilities well beyond the traditional M&S focus of training. Indeed, LTC Brad Koerner, US Army, Deputy Director, NATO M&S COE, emphasized this COE provides, "leadership, subject matter expertise, and technological capability for all aspects of M&S activities. Our vision of excellence is to be open minded and flexible. For this reason, the M&S COE constantly strives to maintain and further develop its level of ambition through the international cooperation with its communities of interest: academia, industry, military, interagency and science."

This centre is led by a Director (OF-5; officer paygrade 5, Italy) and a Deputy Director (OF-4, US). Its functional structure is designed to address NATO's Transformational Pillars, which are intended to work together to iden-

Above
NATO M&S COE supports activities to enhance NATO and national cyber capabilities.
Image credit: US Cyber Command Public Affairs.

tify, develop and document the alliance's transformational concepts and strategies, and provide support for NATO and the nations' predominant uses for M&S – which are expanding across defense department portfolios.

The M&S COE has four branches to accomplish these tasks:

- the Doctrine, Education and Training (DET) branch;
- the M&S Services (MSS) branch;
- the Concept Development & Experimentation (CDE) branch;
- and a Support branch.

The US Army M&S specialist pointed out these branches align with the NATO Transformational Pillars, which include Education and Training, Analysis and Lessons Learned, Concept Development and Experimentation and Doctrine Development and Standards.

"The M&S COE must provide unique capabilities not provided by other NATO entities in support of transformation," Koerner explained and continued, "Despite the Covid-19 pandemic, the M&S COE increased its institutional activities almost 23 percent in 2020 through the use of our technology and ability to distribute many of our capabilities."

Above
While NATO is expanding modeling & simulation competencies across defense enterprises, a core competency remains M&S education.
Image credit: US Cyber Command Public Affairs.

Cooperation Arrangements

The M&S COE's program of work is a product of analysis of the NATO community. Many of the tasks come from requests for support from NATO and its partners and allies, to support their activities or fill gaps. The Centre Deputy Director noted M&S is able to cover a wide range of activities, and the M&S COE is poised to support other COE activities, something that is unique to the centre.

Koerner explained the M&S COE harmonizes its efforts through attendance and membership in multiple NATO Modelling & Simulation Group (NMSG) meetings and events. "As Associate Members with voting privileges, we provide input to the activities organized by NATO concerning M&S. Our mandate requires the M&S COE to avoid duplication within NATO to conserve time and resources. The inclusion in the NMSG allows the M&S COE to synchronize efforts within NATO and to learn about other opportunities with different organizations. Many of these efforts lead to cooperation arrangements between the M&S COE and other military, academic, and industry partners."

Beyond M&S Training and Education

The M&S COE supports NATO through a number of tasks outlined in the Centre's approved program of work.

At the baseline level, activities include dedicated support to educating NATO and nations concerning M&S, by way of three NATO-approved M&S courses.

The NATO M&S Basic Course provides an overview of M&S assets, procedures, technologies and military usage of M&S and is conducted one to two times per calendar year both in residence and online. This change in instructional strategy has made a significant impact on the overall organization of the Basic Course. The Centre's Deputy Director added, "The online courses saw attendance increase threefold, allowing the M&S COE to reach an even greater audience in the M&S community."

The second M&S COE course is the NATO Computer Assisted eXercise (CAX) Specialist Certification Course. This

prepares personnel to support the NATO Response Forces qualification exercises. When complete, students will be able to function as part of a response cell in the respective exercise.

Additionally, the M&S COE conducts the NATO Exercise Support, M&S Integration Specialist Course, which provides knowledge of the federation/integration of constructive simulation systems for training below the Joint Operational level.

Like other defense organizations around the globe, the Centre demonstrated its agility in instructional delivery during the pandemic. Deputy Director LTC Koerner told *MS&T*, "The M&S Basic Course was moved to an online environment but continues to increase in enrollment. The other courses are delayed due to their hands-on technical nature but are expected to resume in presence in late 2021 and early 2022."

The M&S COE's portfolio is expanding beyond M&S education, with the Centre's deputy director noting in one case, this organization developed "one of the highest-fidelity mega-city models in the world in support of NATO's Urbanisation Project." He recalled, "The M&S COE led industry and university teams to create a model, named ARCHARIA, which provides over 250 informative layers of future mega-city detail and an easy-to-learn user interface. This virtual city model uses 2D/3D technology to support decision-making, planning, and wargaming and was recently used to support CESIVA, the Italian Army Simulation Centre."

A signature event run by the M&S COE for the M&S Community of Interest (CoI) is the annual Computer Aided Analysis, eXercise and eXperimentation (CA2X2) Forum. This meeting brings together M&S practitioners from across the community to work on NATO challenges and share their requirements, research and findings from across all domains of M&S. CoI. Koerner reported the 2020 CA2X2 Forum was a success in terms of participation with over 600 attendees from 41 nations, and added, "The Forum also included 124 companies, 109 speakers, 56 papers and presentations, 9 exhibitors, 22 working groups, and 11 sponsors. This event continues to expand in quality and content, remaining relevant for today with an outlook for future M&S challenges." In 2021, **the CA2X2 Forum** will occur from 4-8 October online, followed by a **CA2X2 Sprint Week** from 11-15 October. As of 12 May, registration was closed for the two events.

Above
LTC Brad Koerner, US Army, Deputy Director, NATO M&S COE.
Image credit: NATO M&S COE.

The M&S COE also organizes, in conjunction with the University of Defence of the Czech Republic, the annual Modelling & Simulation for Autonomous Systems (MESAS) conference. This activity brings the scientific community of experts together from military, academia and industry to share their research and experiences with presentations and scientific papers. These papers are then published for distribution to the greater community.

The M&S COE Deputy Director offered: "Both the CA2X2 Forum and MESAS conference are recognized as two of NATO's premiere M&S-focused events."

Expanding Portfolio

Looking to the future of M&S in NATO and capability gaps that currently exist, the M&S COE has focused on additional projects – the development of the Wargame Interactive Scenario Digital Overlay Model (WISDOM), and support of the rapidly evolving cyber domain.

Koerner explained WISDOM is an internet-enabled training portal, where it is possible to configure multiple virtual geographic environments and full wargaming scenarios. The command senior officer added, the model is a key leaders and SMEs Military Decision Making Process (MDMP) tool, able to enhance planning and execution phases of wargame activities. Further, "it has a fully customizable framework and is a flexible solution, able to include new virtual city models. WISDOM is also an open-source software environment and is an easy-to-use tool, multipurpose by design (dual use) controlled by an intuitive graphic interface."

In terms of other returns on investment, the Centre Deputy Director emphasized WISDOM eliminates the requirement for expensive software licenses and adds the ability to import map data from other areas of the world to create models of those areas for training or operational support. He added, "WISDOM continues to expand its capabilities and will be used to support NATO ACT's [Allied Command Transformation] activities with Multi-Domain Urban Operations."

Another area the NATO M&S COE has made considerable strides with is M&S support to cyber activities. At the overarching level, the M&S COE has developed the concept for a Cyber Synthetic Environment to improve NATO and national cyber capabilities. Koerner pointed out this concept implements M&S tools to provide cyber effects (the kinetic impact on simulated units) and Cyber Common Operational Picture tools (proof of concepts) to be used to support training and exercises for non-cyber operators (Commander and Staff) operating in HQs.

The Centre Deputy Director concluded, "The NATO M&S COE remains ready to support NATO and its nations with a multitude of M&S capabilities and educational opportunities to advance the subject. The M&S COE's work on cyber, autonomous systems, decision support, and wargaming are a few of the M&S capabilities being advanced in the Centre. The future will see an increase in these capabilities and a greater synergy created between the M&S COE and the M&S CoI." mst