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Photo: Canadian Armed Forces



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EDITOR'S NOTE



When General Randy George, Chief of Staff of the U.S. Army, addressed the Association of the U.S. Army's annual meeting and exposition in October, many of his remarks on the changing character of war and the impact of disruptive technologies could have been issued to members of 5 Canadian Mechanized Brigade Group as they embarked on Exercise Maple Resolve in May.

George shared how the commander of the 2nd Cavalry Regiment, stationed in Germany,

now commands and controls his formations from five Stryker armoured fight vehicles "that are physically dispersed yet digitally connected. That commander understands the challenges of large-scale combat operations and is adapting in real time to be more mobile, low signature and lethal."

He described battlefield conditions where everything is a sensor, where "no one can hide, and no formation is safe; where what we can see, we can hit. And we can see everywhere." Where electro-magnetic signature management is essential, and where the traditional logistics tail is conspicuous and must also be distributed.

The challenges are complex, George said, but they "offer us the opportunity to assess and get better." And the U.S. Army's continuous transformation "means iteratively adapting and evolving how we fight, how we organize, how we train, and how we equip."

On Maple Resolve, the Canadian Army's culmination exercise for validating its brigades for deployment, dispersion of forces, disaggregation and movement of command posts, reduced electronic signatures, camouflage and concealment, and sustainment were driving themes as the brigade and exercise planners incorporated the observations and lessons of Russia's war with Ukraine.

They are also central to the efforts of the Canadian Army Commander as he leads the process of amassing capability, especially urgently needed equipment, for a multinational brigade in Latvia that, in his words, must be "ready to roll" by early 2026.

In fact, almost every article in this issue draws from one or more of those themes. From the trial of a cloud-based tactical network on Maple Resolve, to replenishment of donations to Ukraine, Reserve training on Arrowhead Guardian, 5th Canadian Division expansion, science supported experimentation, even landair integration on the Advanced Tactical Aviation Course, everything points to Eastern Europe.

In late October, the Canadian Press published excerpts from a Canadian Armed Forces (CAF) document on a pan-domain force employment concept. In his forward, former Army commander and now Chief of the Defence Staff, General Wayne Eyre, captured the urgency of those broad themes. "The CAF will continue to respond to crises of all kinds, foreign and domestic, but our clear priorities are deterrence, defence and countering the sub-threshold actions of our adversaries," he wrote. ■

Chris Thatcher, Editor

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STRATHCONA'S LEAD THE LEOPARD TANKS INTO LATVIA

by Canadian Army Today Staff
Well before then Defence Minister
Anita Anand announced in June that
Canada would be sending a squadron
of Leopard 2A4m CAN main battle
tanks to support the Canadian-led
multinational battle group in Latvia,
members of the Lord Strathcona's
Horse (Royal Canadians) were
preparing to move.

"There were some early indicators that this was on the horizon," said Major Matthew Shumka, the officer commanding B Squadron.

Even as the squadron began its high readiness training with 5 Canadian Mechanized Brigade Group last year, there was an inkling they could be deployed. The Army was well into discussions about how to scale the battle group to the strength of a brigade and which capabilities Canada would need to contribute.

Though tanks were already part of the formation, there were signs Canadian armour squadrons might need to augment the modest force of Polish PT-91, Italian Ariete, and Spanish Leopard 2E main battle tanks.

"We were already in our high readiness cycle" when the commitment was made, said Shumka. "We completed our build effectively with Exercise Maple Resolve, but we had started last September building with our own training initiatives, and then jumped in full steam as of January this year."

Initially, the task was assigned to A Squadron. But when the government in early 2023 pledged to provide eight Leopard 2A4 tanks to Ukraine, and a team to Poland to help train Ukrainian soldiers, A Squadron took the first rotation and B Squadron assumed the mission to Latvia.

Over the summer and early fall. teams of B Squadron members — sometimes as many as 24 shuttled between home base in Edmonton and the Army Equipment Fielding Centre in Montreal, overseeing the movement of 15 Leopard 2A4M CAN tanks, two armoured recovery vehicles, support vehicles, fuel, supplies and other equipment. The tanks and other vehicles, some of which came from Gagetown, were then put through an extensive maintenance, upgrade, and inspection regime, including paint work, to declare them operationally ready and configured for shipping.

"It has been a deliberate process," said Shumka of what he called "a complicated task" that required some support from the Corps of Royal Canadian Electrical and Mechanical Engineers at 202 Workshop Depot to

complete component repairs on some tanks before they could be loaded onto a ship.

The upgrades included adding armour plates last used in Afghanistan to some of the Leopards.

The eight Leopards provided to Ukraine were transported by a CC-177 Globemaster III, and met in Poland by a "Leopard 2 Catch Team" from C Squadron of the Royal Canadian Dragoons (RCD), which prepared the tanks for training and then guided the first crop of Ukrainian students through how to operate them.

In October, B squadron began departing for Latvia, some members to the Port of Riga to meet and escort the equipment and vehicles, the rest directly to Camp Adazi. In total, the squadron consists of about 130 personnel, 10 of whom will



serve with Task Force Latvia and other national support elements to augment logistics support.

"Logistics are fairly exhausting and extensive for a tank squadron naturally," noted Shumka, who previously served in Latvia as the officer commanding the Combat Support Company in 2020, when the battle group was led by the Strathcona's.

"As we roll in, we are trying not to draw off resources already in place that may be stressed to their own capacity. We have a very robust maintenance team coming in. We're going to add value, not pull from it."

The squadron's mandate as Roto 0 is to establish the Canadian tank footprint, performing initial maintenance and inspections as each Leopard arrives at Camp Adazi, and then get them operational with manoeuvre tasks on the roads and training ranges. Once complete,

the Strathcona's will hand over to C Squadron, RCD, early next year, who "will get them validated with the battle group" during a NATO Combat Readiness Evaluation (CREVAL), a capstone exercise to confirm the readiness of the multinational battle group, he said.

As the first on the ground, though, B Squadron will get to set up the purpose-built and refurbished maintenance, accommodation and headquarters facilities to their liking. "If we are going to have that persistent presence, it is great for our regiment to shape how this squadron is going to be laid out," Shumka admitted. "By going first, we can get that ball rolling and shape it."

Some members of B Squadron will be incorporated into C Squadron next year and will form the second full rotation, serving with the battle group for six months beginning

next summer.

The Spanish have reached out to offer any help if needed, he added. Having a variant of the Leopard A4M already in theatre "really helps us." The squadron is bringing extra tooling and other maintenance equipment, but if some shipping containers are not readily available, Spanish assistance to get the tanks operational will be invaluable.

Members of the squadron conducted a "tactical reconnaissance" of the facilities and available maintenance support over the summer, and "any [additional] lessons from the Spanish will definitely help us," he said.

While the leadership of B Squadron has a mix of operational experiences, including previous deployments to Latvia, most junior members are marking their first deployment. "There's a lot of youthful anticipation," said Shumka, who deployed in 2016

to Northern Iraq under Operation Impact and worked within the U.S. lead multinational Division Headquarters as the Combine Joint Forces Land Component Command – Operation Inherent Resolve J35 Operations Officer.

"People are eager to go in, but we've also got that experience to check our realities and make sure we have a deliberate approach to this."

Introduced in 1979, the 2A4 is the fourth of eight generations of the Leopard 2 platform developed by Germany's Kraus-Maffei Wegmann and manufactured until 1992.
Canada acquired 80 2A4s from the Netherlands in 2007 and 20 from Germany as those countries downsized their Cold War fleets.
The donations to Ukraine have left the Canadian Army with 34 of the 2A4s and 20 each of the upgraded 2A4Ms and 2A6Ms.



TRAINING THE C22 TRAINERS

By Ken Pole

Considering firearms controls and setting aside the law enforcement community, the first time most Canadians encounter pistols is likely when they join the military. The Army is the most common vector since its approximately 44,000 Regular and Reserve personnel account for two-thirds of the Canadian Armed Forces (CAF) overall.

Training personnel on pistols, especially new models that break with tradition, can be a challenge. That's currently the case as the Army introduces its new SIG Sauer P320, officially designated the C22 Modular Full Frame Pistol (MFFP).

Selected in September 2022 — five years after the U.S. Army — it replaces the vintage 9mm Browning Hi-Power that the Army began using in January 1944.

Conceived by an American, John Browning, and refined at Fabrique Nationale in Belgium, the Hi-Power — named for its large magazine capacity at the time — is no longer supportable. Until their retirement from service, the Army had to plunder unusable Brownings for parts to keep others operational.

But the advent of the C22 begs a question: who trains the trainers on the new pistol? Even experienced infantry do not simply pick one up and start shooting. That's where Warrant Officer Roy Ritch comes into the picture.

Posted to the 1st Battalion, The Royal Canadian Regiment, in Petawawa for most of his career, Ritch is a Master Sniper who deployed twice to Afghanistan and is now assigned to the Directorate of Land Requirements (DLR).

"My main role at DLR is to provide support to the small arms project team," he explained in an interview with *Canadian Army Today*. His involvement with the C22 began with the precision testing of the pistol in late July 2022, followed in February by assembling a team of CAF personnel, including instructors from the Combat Training Centre in Gagetown — many of them Afghanistan veterans — for an instructor training program.

They gathered at the SIG SAUER Academy in Epping, New Hampshire, a 25-minute drive from the company's headquarters in Newington.

The academy cycles through tens of thousands of shooters on courses every year on its picturesque 57-hectare site, replete with stateof-the art indoor and outdoor ranges, as well as tactical training areas, urban environments, a shoot house, a maritime training area, and a forceon-force village layout.

In addition to the Canadian Army and other military customers, the academy trains special forces operators, police and security personnel, as well as sports shooters and other rigorously vetted civilians.

"All of our initial training was in the indoor range facilities," Ritch said.
"However, we could build customized ranges with barricades and obstacles for more dynamic training." Their two week-long session was intense, beginning with quick lessons on how to dismantle and reassemble the new pistol and how it operates, immediately followed by live-fire range practices.

The course focus was split between tactical pistol training — the draw sequence utilizing the new modular Blackhawk T-Series L2D holster issued with each pistol; how to remedy stoppages; multiple target engagements; shooting on the move; use of cover; and no light/low light conditions — with how to become more proficient instructors. At its most basic, they learned different grip methods such as thumb placement and grip pressure to understand what would work best for individual soldiers.

Once the Canadian contingent

returned home, "the Advanced Small Arms Instructor Cell began developing a training package specific to Army requirements," said Ritch. "It combined everything we had before in the CAF with updated practices and techniques we learned at the academy. When these are applied correctly, pistol marksmanship will undoubtedly improve."

As the new syllabus was developed, the Canadian Army Doctrine and Training Centre (CADTC) weighed in on how to best allocate the number of student positions across the five divisions. It's a Goldilocks approach—not too many, not too few — to ensure that as personnel are introduced to the new pistol, an operational core is preserved within each unit.

Pistols are close-quarters weapons, but with the newer technologies and the C22 having more than twice the precision of the Browning, infantry can now be trained at distances up to 50 metres with the new supplemental range practices.

Feedback within the Army so far has been positive, particularly that the C22 is truly ambidextrous, unlike older Brownings. Like other elements of the new firearm, that potentially enhances troops' effectiveness in urban operations.





Members of the C22 Pistol Train the Trainer Course at the Combat Training Centre in Gagetown in June 2023. Photos: MCpl Samuel Martell

ARCTIC VEHICLE ON TRACK FOR RFP BY 2026

By Ian Coutts

When Canadian Army Today last checked in on the Domestic Arctic Mobility Enhancement (DAME) project in 2021, we likened it to a muskox. That implacable Arctic beast that, whatever the conditions, keeps plodding forward seemed a good stand-in for a project that kept advancing, however slowly. Two years on, the analogy remains apt, even if, by its own stately standards, it isn't advancing quite as quickly as everyone might have hoped.

The DAME project is seeking a replacement for the BV 206 tracked vehicle, the Army's current workhorse for use in the High Arctic. First purchased in the 1980s, the vehicle is now well past its best-before date. The Army was

initially looking at 100 vehicles, in four separate configurations — command post, standard troop carrier, cargo and equipment version and ambulance.

Whatever vehicle was chosen would be able to cope with the Arctic's distances, terrain and brutal weather, meaning it could take on a number of roles. These included obvious jobs, such as sovereignty and presence operations, essentially showing the flag, as well as more niche ones — search and rescue and, potentially, employment in a major air disaster in the Arctic.

The DAME contract was to be awarded by 2025. By 2019, the project team appeared to have bettered that initial milestone — delivery would begin by 2025, with

the contract awarded earlier. By 2021, however, the release of a request for proposals (RFP) and the delivery date had slipped, due in large part to COVID.

In June 2023, the Army issued a request for information (RFI), intended to elicit responses from industry by September 2023. The project team is now projecting an RFP by 2026, with the contract awarded in 2027. The first of the BV 206's replacements would be operational in 2029, about four years later than the initial estimate, and the Army anticipates full operational capacity by 2030.

There have been few changes to the high-level mandatory requirements since 2021. However, the number of vehicles the Army is now seeking has increased from between 111 and 153, to 130 to 170, a reflection of expanding operations across the High North.

Previously, the Army reported that there were several companies interested in putting forward bids for the project. Recent industry interest in the RFI suggests that is still the case.



The BV-206 in Resolute in 2018. Photo: PO2 Belinda Groves



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VEHICLE CREW SIMULATION NETWORK NEARS BID STAGE

By Canadian Army Today Staff

When the Land Vehicle Crew Training System (LVCTS) eventually opens doors on five new simulation centres across the country, it will launch the Army into a new world of networked and immersive individual and collective training.

An adaptable system, LVCTS is expected to offer greater diversity of training scenarios, threats, terrain, and environmental conditions than are possible in live exercises at the Army's main bases — all quickly repeatable and captured for playback, evaluation, and debrief.

Moreover, the new high-end simulators and task trainers will significantly reduce wear and tear on combat vehicle fleets, reducing the maintenance burden and fuel consumption. They could even help the Department of National Defence

lower its greenhouse gas emissions.

Exactly when those doors open, though, could be a ways out. The Army is projecting an initial operating capability by 2028 and fully operational training centres by 2031.

Earlier this year, five teams of suppliers were approved to compete for the LVCTS project following an invitation to qualify issued by **Public Services and Procurement** Canada in late 2022. The bid teams include CAE, with Elbit Systems as a major subcontractor; General Dynamics Mission Systems-Canada; Raytheon Canada with Krauss Maffei Wegmann as a major subcontractor; Rheinmetall Canada as a prime contractor, with Rheinmetall Electronics, Lockheed Martin Canada and Lockheed Martin Training and Logistics

Solutions as subcontractors; and Thales Canada with Thales AVS France, Thales Australia, Calian and Simfront Simulation Systems as subcontractors.

Over the past six months, the project team has shared portions of a draft request for proposals (RFP) with those companies, and is anticipating the release of a final RFP by the end of 2023 or early in the New Year.

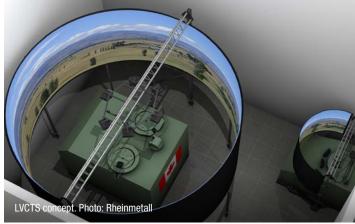
The Army's core mandatory requirements are a training system that allows for the conduct of multiple simultaneous individual and collective training events for the crews of its Light Armoured Vehicle 6.0, the Leopard 2 Main Battle Tank, and the Tactical Armoured Patrol Vehicle, with a high degree of realism, up to the combat team level.

It is seeking purpose-built facilities at the garrisons in Gagetown, Valcartier, Petawawa, Edmonton and Shilo, each with a family of high, medium and low fidelity simulators, all supported by an integrated operational and maintenance program that has a minimal impact on Army human resources.

The project budget is pegged at between \$250 million to \$499 million.

The back and forth with industry through the draft RFP process and an earlier request for information have not altered those requirements, but the engagement has "helped to inform and evolve the project's Statement of Work and many important project details," said Major Jeff Code of the Directorate of Land Requirements (DLR).









"I cannot emphasize how valuable the engagements with industry ... have been over the past three to four years," he said. "It has informed the team by allowing us to consider where innovations and technological trends in simulators and training technology are going. This has enabled the project team to consider solutions that are cost-effective and innovative, while reducing project risks."

The interaction has helped the project team to "devised a path forward to allow the resulting contractor of the LVCTS to evolve with new technologies and adapt to changes to the Canadian Army's capabilities once the infrastructure is built and the simulation systems are operational," he added. That will ensure the LVCTS remains current with the threat environment and training advances over its expected 25-year lifespan.

Once it is connected to the Army's Virtual Training and Experimentation Network (VTEN), the LVCTS is intended to be one of the key pillars of what is being called the Future Integrated Training Environment (FITE) initiative, which is intended to integrate several future Army simulation projects as well.

"This will allow a larger, more dispersed training audience to operate together in the same training event," Code noted. "The objective is to integrate the different types of simulation and simulators, allowing specific training audiences to take advantage of the various functionalities of those different systems, enabling potentially a real-time interaction in the virtual environment and more realistic virtual interactions."

The aim is a training experience

that will improve the competencies of the entire training audience.

The project team looked at the simulation systems of NATO and ABCANZ (America, Britain, Canada, Australia and New Zealand) army partners. One of the underlying principles of the FITE concept is better interoperability with allies to enable large scale, networked training.

There remains significant coordination, policy alignment, standardization of requirements, and other key considerations among the Army, Royal Canadian Navy, and Royal Canadian Air Force and allies, Cole noted, "which is being looked at through several different working groups."

The most influential lesson learned from allies, however, "is the importance of tailoring the level of accuracy of the simulation to the training being done," he said. "By tailoring the fidelity of the simulator used to the type of training being conducted, and the training requirements and objectives to the simulator fidelity, [that] enables for a more cost-effective use of resources and allows for the acquisition of more simulators of varying degrees of fidelity.

"For example, purchasing a limited number of high-fidelity simulators in order to train very specific tasks that require a high degree of physical replication of the interior of the vehicle fleet, can also be balanced with acquiring a larger number of lower fidelity simulators which are more tailored to process driven and integration training."

The LVCTS is being designed to evolve with the Army's training needs, he added, and will bring a number of indirect benefits to the Army.



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With a skeleton structure now in place for the multinational brigade, the Army is focused on procuring equipment and building capability.

By Chris Thatcher

"The operational art is about being unpredictable," Lieutenant-General Joe Paul noted as he closed a lengthy discussion about Operation Reassurance and the Canadian-led multinational enhanced Forward Presence (eFP) Battle Group in Latvia. "It's about offering your opponent some dilemmas. The more agile and nimble you are, the less predictable you are."

Faced with an understrength force, gaps in critical capability, and allies with their own national priorities, the Army Commander has adopted an approach to brigade building that draws on the Army's history — in the Balkans and elsewhere — to develop a flexible force with advanced capability that can be projected into Eastern Europe. "If you want a new idea, read an old book," he joked.

"Agility" is the aim of a force structure he is contemplating for Forward Land Forces Multinational Brigade Latvia (MNB-L) that is gradually taking shape, but it could well be the keystone to the building process itself.

In June 2022, the government reaffirmed its intent to lead the battle group in Latvia that until recently involved 10 nations. At the same time, the government



committed to working with NATO allies to generate and stage the necessary forces to surge that formation to a combat capable brigade.

Since then, Paul and Army senior leaders, including those in Task Force Latvia, have been engaging with battle group partners and other nations in NATO to determine just how they meet that commitment.

When Canada first assumed the lead for the battle group in 2017, there were four such formations — in Poland, Latvia, Lithuania and Estonia — and contributors were readily available to step forward. In 2022, four more were established in Bulgaria, Hungary, Romania and Slovakia. Now, all eight battle groups are in various stages of scaling to the strength of brigades. Contributing partners to Latvia such as Slovakia and Spain are now either hosting their own brigade or assuming the leadership of one.

"The force generation pressure [across NATO] is real," said Paul.

The expanded number of brigades has resulted in a realignment of the Canadian-led formation, he added. Spain remains a contributor for the time being, Italy and Poland will continue to provide tanks and other capabilities, and Denmark has now come aboard.

Discussions among partners have solidified the overall structure for the brigade and its three manoeuvre battle groups. "The big muscle movements are taking shape, but we're not yet down to the sub-unit level in terms of who is going to be providing what," said Paul. "For instance, we are now drilling into who's going to be generating what for the indirect fires battalion. We have a little more clarity regarding combat engineers and reconnaissance squadrons. There are still a few moving parts, but we have that rudimentary skeleton, and there's going to be additional engagement."

Two of the three battle groups will be mostly generated by Canada. As is currently the case, one will be stationed in Latvia and augmented by allies, though with "a little more Canadians" than the current multi-nation composition, he said.

The other will be delivered by the three light infantry battalions of the Canadian Mechanized Brigade Groups, and surged into theatre for six- to eight-week periods for intensive training in Latvia or elsewhere in Europe.

"This is how we're going to be mitigating the force generation pressure. It is going to be just-in-time delivery, show the flag, and then back to your garrison," said Paul. "The people serving with the three light infantry battalions, reinforced by Reserves, are going to be on super short notice to go to Latvia.

"This is nothing new. We did that with Bosnia in the old days. This is what our allies, including the Americans, are doing now."

Brigade headquarters will be stationed in Latvia for a full year, and the battalions will cycle through every six months or surge as required.

"The light infantry battalion that we have on standby can be projected on the other side of the planet in a heartbeat," he said, noting the reach of the Royal Canadian Air Force (RCAF) CC-177 Globemaster.

That surge into Europe will be in conjunction with annual rotating deployments to the U.S. Army's Joint Pacific Multinational Readiness Center (JPMRC) in Fairbanks, Alaska or the Joint Readiness Training Center at Fort Johnson, Louisiana.

"I want to have a versatile instrument that will be capable of operating in multiple types of environments," said Paul. "Young soldiers serving in these light infantry battalions, over a window of five or six years, will have seen a





little bit of Europe, a little bit of Alaska, the Canadian Arctic, and the Bayou in Louisiana."

URGENT ACQUISITION

Since MNB-L was first announced, Paul has acknowledged that if there are gaps in its capabilities, Canada, as the lead nation, will have to fill them. In the weeks before he spoke with *Canadian Army Today*, funding for some of those was finalized, he said, "and we know how much national treasure is going to be allocated to us when it comes to enabling appropriations for the brigade."

He wouldn't reveal the number but said, "I'm super happy with the amount that we've been given."

The details of a procurement strategy for fast-tracking the equipment are still being developed by the Army and Assistant Deputy Minister, Materiel (ADM(Mat)).

Paul's top priority remains C4ISR, that critical blend of command, control, communications, computers, intelligence, surveillance, and reconnaissance capabilities. The Army's Land C4ISR program of six distinct projects is well underway, but the brigade will require the necessary sensors, communication systems and battlefield management suite far sooner than the program can deliver. "I need to deliver something quick, fast and furious," he said.

Paul is also requesting more anti-tank weaponry, ground-based air defence systems, and counter-uncrewed aerial systems (C-UAS). The Army is already pushing through three urgent operational requirements (UORs) to acquire portable anti-X missile systems (PAXM), air defence and CUAS for dismounted troops, fixed sites, and vehicles within the next 12 to 24 months.

But the brigade itself will need layered air defence systems capable of defeating threats and providing protection to the MNB-L, including loitering munitions, he said.

The funding includes more ammunition, some of which will be prepositioned in theatre, and a plan to refurbish the armoured Heavy Support Vehicle System logistic trucks that have been parked in Longue-Pointe, near Montreal, since the end of the Afghanistan mission. "Ukraine has clearly shown us that you need to protect your supply chain," he said.

Funding has also been secured for a tactical vehicle for the light infantry battalions. Exactly what that will be is still to be determined, Paul noted, but as part of the Light Forces Enhancement (LFE) project, the Army did some testing with a light tactical vehicle with the light battalions to inform its mobility requirements. Last year, the 3rd Battalion, The Royal Canadian Regiment, conducted weapons tests from the vehicle with a .50 calibre heavy machine gun, 40 mm grenade launcher, and BGM-71 TOW (Tube-launched, Optically-tracked, Wire-guided) anti-tank missile.

The plan is not to fast-track LFE so much as deliver a precursor to what the LFE vehicle might be. "LFE, as a major capital project, cannot deliver quickly enough," he said. "So, what the Army and ADM(Mat) are going to be proposing is that, as we keep working on the major capital project, [we] speed up a slice of it."

The consequence of concentrating limited Directorate of Land Requirements staff on the delivery of UORs will likely be a slowdown in some of the major capital projects, Paul acknowledged. While that might frustrate companies invested in those projects, he argued the UORs need to be seen as an investment. The Eastern European theatre will provide "an amazing laboratory where the Army can fine tune and test. Whatever kit we end up getting [for the brigade], we're going to have the opportunity to work with it ... and that will certainly inform the follow-on major capital projects and our doctrine."

As part of its digital transformation, the Army will also seek to push forward much of the experimentation that has been conducted by various units,



especially in Petawawa, as the brigades rotate through Latvia.

Other Canadian Armed Forces (CAF) capabilities likely to be deployed in the coming years include a tactical aviation capability from the Air Force, and a Role 2 medical facility.

The build up of personnel and equipment will be conducted in phases over the next three six-month rotations, to reach full capability in 2026. Camp Adazi in Latvia has limits in what it can absorb, so the CAF will need to look more broadly across the region, Paul noted. As much as possible, the goal will be to pre-position equipment and surge personnel as required.

"We need to have these logistical nodes spread out," he said, to minimize optimal targets. Latvia "is only the tip of the bayonet. When I'm looking at [the theatre], I'm looking at the whole continent."

That broad perspective applies to training as well, he stated. The Canadian Army Doctrine and Training Centre is exploring ways to deliver a validation training program in theatre that would replace some large exercises like Maple Resolve, and capitalize on the training venues of countries in the region.

"Since I see the Russian threat as being out there for probably a good decade, if not more, we need to ensure that when you go back for your third, fourth or fifth tour in Latvia, it is going to be interesting, challenging, and appealing," Paul said.

RESERVE STRENGTH

Like many of its allies, the CAF is struggling with personnel shortages. The Army is about 7,000 people short of its establishment, 4,000 in the Reserve Force and 3,000 in the Regular Force Surging the light battalions as required will mitigate some of the strain on the Army, and ensure capacity at home to support government responses to floods, forest fires and other domestic emergencies. But Paul also intends to draw heavily on Reserve members.

"There's no doubt in my mind that the Reserves are going to play a critical role," he said. "I've asked my division commanders to aim at having 20 percent Reservists on every rotation."

The Army is adjusting its Managed Readiness System to the reality in Latvia, and at the Combined Army Conference in September, division and brigade leaders "fine-tuned who's going to be providing what, when and where between now and 2026," said Paul. With the number of Reservists needed to meet the required troop presence, the Army is looking to increase the pre-deployment time each Reservist will have with their training unit. "Ideally, we can get to up to six months of pre-deployment integration, much like we did in the Afghanistan period."

6 Canadian Combat Support Brigade (6 CCSB), especially, will require significant augmentation. Units such as the 4th Artillery Regiment (General Support), which could be deploying a CU-172 Blackjack troop to Latvia in 2024, will be the destination for many of the urgent air defence and counter-UAS capabilities needed in theatre.

"The intent is certainly to invest into that regiment," said Paul. "The command team there knows it's coming."

The commander of the 5th Canadian Division is looking at the affiliation among Regular force and Reserve units in eastern Canada to directly bolster some of 6 CCSB's capacity.

"There will come a point where we need to ensure that it is crystal clear between the Regular Force and the Reserve Force who is supporting who," he said. "The key thing to me is to ensure that we have a level of predictability."

Nothing is cast in stone, and events in Europe could rapidly change the picture — and the planning — but for the next two years, domestic missions aside, most of the Army's focus will be in one direction.

"It's all about between now and the end of 2025," said Paul. "Because by early 2026, we need to be ready to roll."



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BLACKJACK CLEARED FOR TAKEOFF TO LATVIA

BY IAN COUTTS

atvia if necessary but not necessarily Latvia. That, to borrow from William Lyon Mackenzie King, Canada's famously waffling prime minister, is the situation that 129 Battery, home of the Army's CU -172 uncrewed aerial system (UAS), finds itself in these days.

"It's the main operation of the Canadian Armed Forces right now, so we are training for it. But there is no decision that has been made that we at 129 Battery are being deployed," said Major Lucas Jamois-Paradis, who has spent much of his career in the battery and in June became its commanding officer.



Members of the 4th Artillery Regiment (General Support) during the Small Unmanned Aircraft System (SUAS) Detachment Commander course during Ex Guardian Commander in Gagetown in late July 2023. Photos: WO James Roberge

In the meantime, they train and wait.

Getting the battery to this point has been a long time coming. The Army acquired the CU-172 Blackjack — the Canadian designation for the Boeing Insitu RQ-21A — back in 2017, as a replacement for the leased CU-165 ScanEagle, which was used in Afghanistan to good effect, flying more than 30,000 hours on operations.

The Blackjack was originally lodged with 4th Artillery Regiment (General Support) in Gagetown, and the Army had hoped that gunners using the new system would achieve their full operational capability (FOC) by 2021.

The COVID pandemic threw a wrench into the process. There were other delays as the structure of the regiment was rejigged in spring 2022, under the Royal Regiment of Canadian Artillery, to solidify a home for the small UAS suite of aircraft, launch and recovery systems, and ground control stations in 129 Battery. From there, the battery had to become experts with the technology and

clear a series of hurdles, key among them gaining an airworthiness certificate before they were ready to deploy.

In May 2023, just before Jamois-Paradis took command, the battery achieved FOC. The certificate issued by Transport Canada states that "the plane is ready to fly, that the program behind the plane — how we train people — is all in regulation with Transport Canada," he said. The certificate is only a provisional one at this point, but that's every bit as good from their point of view, he noted. The battery is now ready to deploy — when, where and if needed.

The CU-172 Blackjack gives the Army a critical reconnaissance capability. Twin-boomed and propeller driven, larger and faster than the ScanEagle, the Blackjack can reach a ceiling of 6,000 metres and has a cruising speed of 60 knots. The drone's maximum flying duration is 16 hours, although in practice, said Jamois-Paradis, "the maximum amount is 15 hours. We do this all the time."

It is equipped with a range of sensors including day and night full-motion video cameras, an infrared marker, and a laser range finder, as well as a communications relay package. Its effective communications range is a little over 100 kilometres.

Talking about a Blackjack in isolation is misleading in some ways. It's not so much an aircraft as it is a system. Each one consists of five drones, three ground control stations, and two launch and recovery systems. The battery currently possesses two such systems.

Standard operational practice is to have two UAS aloft, each controlled by a separate ground control station, with a third held in reserve in case either of the first two should fail, explained Jamois-Paradis.

With both systems in use, he can put aloft four drones. Generally, the computers in the ground control stations do the flying, based on what they are programmed for, with the operators overseeing the flight and the sensor feeds.

As a new technology, the UAS represents something of a jurisdictional quandary. Those that are large enough to need a runway, such as the General Atomics MQ-9 Reaper that Canada will likely acquire under the Remotely Piloted Aircraft System project, end up in the Royal Canadian Air Force. If they are small enough to operate in the field, they go to the Army, Special Operations Forces, and the Royal Canadian Navy.

The CU-172 can fill key aspects of the Army's intelligence, reconnaissance and intelligence requirements, but "the drone is a good enabler of fires," Jamois-Paradis noted.

Though the use of the system has evolved since the CU-172 was first acquired, and it now "has multiple jobs and options, it is still largely artillery-centric," he said. "I think that's why it resides with us for now since we have the pool of people who have trained with it for so long."

Any possible deployment would likely see one of 129 Battery's three troops deployed to Latvia, with one of the Blackjack systems. At home in Gagetown, a second troop would be training on the second system, preparing to deploy, while the third troop would be the next in line.

"Then we would rotate that triangle during the operation," Jamois-Paradis said.

The 129 Battery troop would be one of several capabilities 4th Artillery Regiment has proposed deploying to Latvia, said Lieutenant-Colonel Natasha Skidmore, the commanding officer.

Other sub-units could include an air defence battery, featuring a radar detachment, a short-range air defence troop and other elements, all drawn from the regiment.

Together with the CU-172 troop, these would be valuable assets for the Canadian-led multinational battle group in Latvia as it is expanded to the strength of a brigade by 2026, she said. The Army will be adding personnel to the regiment in the coming years, which would see 129 Battery grow from its current strength of 100 personnel to about 140, although "150 is my dream," admitted Jamois-Paradis.

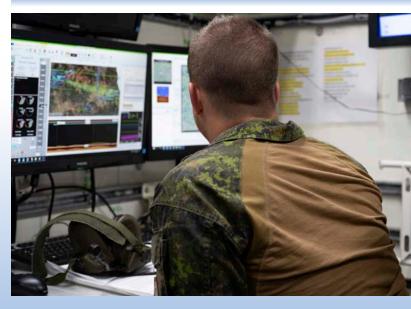
Deployment to Latvia remains up in the air, but there's little doubt of the role and importance of UAS in the conflicts in Ukraine and elsewhere.

"Drones are part of the way we fight now," said Jamois-Paradis. "When we go on large-scale training exercises, drones are a part of the planning exercise. They've been the flavour since the Afghanistan war, and now with Ukraine, they're using a thousand drones a month — they are a new way of doing war."

In Latvia, should it happen, 129 Battery will be one of the key intelligence collectors for the Canadian brigade. "We're adapting to that, and our training reflects that we'll be the intelligence collector if we deploy."







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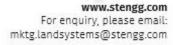
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An AWS engineer provides familiarization training to members of 12 RBC. Photo: Vaibhav Sharma

Tactical Networking

The trial of a mesh network for the enemy force on Ex Maple Resolve has demonstrated the value of cloud and other industry supported services.

By Chris Thatcher

It wasn't quite an unfair advantage, but it was certainly an edge. For the first time on Exercise Maple Resolve, the opposition force (OPFOR) came equipped with a tactical mesh network. And in a peer-on-peer scenario, where the speed of decision making can be a deciding factor, the enemy used their newfound digital capability to great effect.

Maple Resolve is the Army's culminating validation exercise. While a strong and creative opposition is a key to testing the capabilities of the primary training audience, any advantages in weapons or other systems are often simulated. But with the Army keen to seize every opportunity for digital experimentation, providing the 12 Regiment blinde du Canada (12 RBC) with a cloud-based tactical network to employ in its fight against the 1st and 2nd

Battalions of 5 Canadian Mechanized Brigade Group (5 CBMG) was quickly recognized as a worthwhile trial.

Armed with a Tactical Assault Kit (TAK)-enabled tablet and UHF radio, members of 12 RBC, augmented with a company from the 1st Battalion and troops from 5 Combat Engineer Regiment, were able to quietly share the positioning and movements of their own force, locations of enemy units identified through reconnaissance, and terrain features – manmade and natural – on a digital map and text chat function.

"It left a lot more time and space for commanders to discuss risks, decisions and opportunities," observed Lieutenant-Colonel Nicolas Lussier-Nivischiuk, commander of 12 RBC. "You could see even within two to three weeks the



A member of Operational Force Saguenay and a member of the Society for the Protection of Forests Against Fire (SOPFEU) coordinate the helicopter insertions of fire fighters into burned forest areas, during Operation Lentus in the surrounding area of Chapais, Quebec, in June 2023. Photo: Cpl Marc-André Leclerc

speed of adaptation on the battlefield."

With sound situational awareness of its force and knowledge of their proximity to many enemy units, 12 RBC was able to disperse and converge its operations far more effectively than previously, he said. "From a command-and-control (C2) perspective, that made us more resilient and less prone to targeting. We never assembled for orders or back briefs. We were able to send tactical graphic orders through the system — it would appear on your map."

And "because the net was not clogged with situational awareness issues, when we decided to converge, it was easier. We could act on decision points a lot faster," he said. "It accelerated our decision cycle and supported the manoeuvre warfare approach."

With accurate bearings on a digital map, crew commanders were able to focus on terrain rather than a map, improving navigation. And without a need to conduct logistics reporting via radio, unintentionally sharing grid positioning, 12 RBC was better able to track supplies, conduct vehicle recovery behind enemy lines, and "prevent the logistics train from falling too close to the enemy or into traps."

Perhaps most significantly, 12 RBC was able to adapt the lessons from Ukraine and Nagorno-Karabakh, employing the tactical network to call for fires more rapidly.

"It was not always 100 percent, we still had to confirm details, but it was a great improvement," said Lussier-Nivischiuk. "It increased the speed of decision making at every level."

MULTI-STAKEHOLDER CONTRIBUTIONS

That there was a network at all for Maple Resolve was due in large part to the effort of Major Martin Simard of the newly named Directorate of Digital and Army Combat Systems Integration (DDACSI), formerly the Director Land Command and Information.

When 2nd Canadian Division (2 Div) indicated an interest in digitizing the OPFOR for the culminating exercise on 5 CMBG's build to high readiness, Simard, a former member of 12 RBC, immediately saw a problem. With the brigade's Signals personnel at about 60 percent effective strength, any digital solution could not be reliant on their limited capacity.

That fall Amazon Web Services (AWS) had delivered a professional development session to about 80 people from Army headquarters and others with an interest in the burgeoning digital transformation effort. Among the points of discussion was a cloud-based tactical network. It might have been part marketing pitch, but Simard saw the possibility. "Why not try them out?" he asked.



LCol Daniel Vincent (right), commander of the eFP battle group in Latvia, shows C2 technology such as the Integrated Soldier System to Spanish Armed Forces members of "Hispania" Battery during a live fire exercise with M109A5 howitzers on Ex Titan Shield in September 2023. Photo: Cpl Lynette Ai Dang

He's still not sure if that was the wisest call. For the next five months, helping to deliver a tactical network became his all-consuming job.

Following a meeting with many of the primary operators in Valcartier in November 2022, AWS developed several technical courses of action to bring the network to fruition and permit data to move throughout the battlefield. But those came at a cost, from several hundred thousand dollars to over \$4 million. Without the mechanisms to procure the necessary equipment or lease it from AWS, "we were back to square one," Simard admitted.

He'd seen the problem coming. Pulling on existing agreements with companies such as Base Camp Connect, Inter-Op, Rheinmetall and L-3Harris, and equipment already in the Army inventory, by late January 2023 he had cobbled together the components to integrate with AWS's cloud computing services to deliver a rudimentary edge network.

"This required a little bit of investment on our part," he said, "But it was equipment we had in the system, or we had the procurement mechanism to do."

Once 12 RBC conducted some familiarization training with the equipment and network in late March, there was a mad dash to get everything from Valcartier to the Wainwright training area in eastern Alberta, for what is known as the engineering week prior to the start of Maple Resolve. Not everything arrived, prompting a call to the 3rd Canadian Division in Edmonton. But once most of the technical issues were resolved with all the supporting companies and 12 RBC, Simard stepped aside and left the project in the hands of 2 Div technicians.

"I believe it was a good lesson for all the stakeholders involved, working

together and knowing the limitations of others," he said. "It wasn't a tactical network as promised, as I would have liked it to be. But considering the timeframe, it was incredible work from everyone."

The trial marked a new step for AWS, which had not previously worked in the field with the Army. A small team of technicians tried to rapidly tailor AWS's services to the Army network requirements, and "bring cloud computing right to the tactical edge," said Ray Hession, National Security and Defence Leader.

AWS provided the computing and data storage for robust "edge devices" with situational awareness and C2 applications, he said. "That was extended over the course of the exercise to add some analytics capabilities ... [collecting data] for the purposes of playback for an after-action review or for future simulations."

Cloud-based computing brought "a whole lot of speed and agility" to building the network, Hession noted. And AWS adopted its customer-focused culture to a mission focused, iterative approach with "two-way door decisions" to allow for rapid testing that kept options open for alternative solutions.

That in turn allowed for what he called "undifferentiated heavy lifting," allowing the Army to focus on the exercise while AWS focused on the background cloud support structure to the network.

If the primary objectives were to trial the Everything as a Service (EaaS) concept, including the procurement mechanisms to make it happen on short notice, and then to deliver a tactical network for the exercise, "I can say this was a success, from the user point of view and from the strategic point of view," said Simard, a Signals officer who deployed to Afghanistan for 10 months in 2009-2010 as a non-commissioned member.

Given the no-fail requirements of Maple Resolve, there were legitimate questions about conducting an experiment so quickly, he acknowledged. A longer and slower approach might have delivered a better and more robust network. But the outcome proved an edge networked could be configured, installed, and integrated in a matter of weeks, with multiple industrial partners, despite inadequate procurement processes for acquiring small quantities of kit — albeit with the extensive effort of one exhausted Army integrator.

When he spoke to *Canadian Army Today*, Simard was in the process of gathering a lessons learned document from all the participants. "We can get best practices from the civilian side and integrate them into the Army," he noted.

For 12 RBC, the digitized systems noticeably helped reduce the sensorshooter link, "from recon to fires," said Lussier-Nivischiuk. "Once fires were sent, we operated from dispersed to convergence, a concentration of forces. That manoeuvre was enabled by digitization."

Other than massing fires, the unit did not change its tactics, techniques or procedures to play the enemy force, but it did leverage everything the network provided, he said.

INTO THE FIRE

Days after Maple Resolve wrapped and the network equipment was in transit back to Valcartier, Simard got a call. More than 120 forest fires had ignited on a single day, June 1, from lightning strikes across Quebec. One fire

alone would eventually consume 460,000 hectres.

Regular and Reserve members across 2 Div were on notice to deploy under Operation Lentus, the Canadian Armed Forces response to domestic requests for assistance. But with the Army's battle management software system retired, the division would need a way to network its soldiers, and to integrate them with provincial firefighters and police on a common operating picture.

Simard quickly saw an opportunity to create a similar edge network to Maple Resolve with a tactical server on a cloud. Using the civilian application of TAK, Team Awareness Kit, the military and provincial agencies could access a common map, share information, and conduct text chats, all from their personal cell phones.

Within three days, he had reconnected with AWS and other stakeholders, established the server, and transferred the "viable solution" to the division's digital transformation shop to run. To ensure everyone could connect and share even when 4G LTE coverage was not available in remote areas (or if cell towers burned down), he brought in Ottawa-based NORTAC Defence to help with connectivity.

NORTAC had been providing the Department of National Defence — and by extension the Army — with satellite-based short burst data asset tracking under a contract that was re-awarded several times since 2011. By incorporating WAVE, a small handheld device that provides two-way chat messaging, NORTAC was able to ensure TAK-enabled data such as position location information, overlays and other files, shared on the AWS cloud, could





Members of the 3rd Battalion, The Royal Canadian Regiment, conduct a live-fire company attack during Ex Royal Gunfighter V in Petawawa in October 2022. Photo: Cpl Sarah Morley

be pushed through the Iridium Short Burst satellite network when cell service was not available.

"Within a span of a couple of days, even though we had never done this together before, we were able to get everybody to communicate and ensure redundancy and consistency in having asset tracking and communication, regardless of where they were located," said Martin Bouchard, NORTAC's chief executive officer. "We were able to point that through their ATAK solution and bring everybody together on that same platform."

Redeploying the cloud structure from Maple Resolve in a commercial cloud-based operation so soon after the exercise, though regrettable given the circumstance, was a great opportunity to provide Army leadership with complete visibility of troops and helicopters supporting the firefight, all on their cellphones, Hession observed.

"We demonstrated a lot of the benefits that cloud computing can bring, that you can deploy anywhere in the world in a matter of minutes once you've built your capability because it is all the same platform."

Having an established cloud provider was a key to acceptance and success, Simard noted. On Op Lentus, the Army is a supporting player and cannot dictate solutions. Ideally, a system like this is planned and integrated with government and civilian agencies well before an incident, "so they are not trying to integrate live while fighting a fire," he said. "They don't have time or capacity. We have to make sure to have this as a permanent solution before next March, so it is ready for the next flood, the next forest fire."

Still, the firefighting response allowed DDACSI to observe a cloud server in an unclassified civilian-military environment and gather feedback on how data is accessed and shared. "That was the point with my boss: We don't know cloud. We need to start knowing cloud to be able to use it in the future," said

Simard. The cloud was attacked almost immediately, highlighting the need for added cyber defence in a military environment.

DDACSI is now focused on an Army-wide, scalable cloud-based tactical server that would be independent of the Army's Land Command Support System (LCSS), which operates as a secured/secret environment. "We are still designing the next LCSS architecture," he noted. "We don't know yet the part that cloud will play. But this type of use for domestic operations is a really good use case ... that could inform that."

The permanent solution, a project called Cloud TAK-PB, should be able to connect with different tactical servers that allow for the movement of both designated and undesignated information, visible to those with the appropriate clearance, he said.

For NORTAC, the success of information sharing in remote and austere conditions has opened the door to the Integrated Soldier System Project (ISSP), an ongoing effort to network dismounted soldiers at the platoon level and below. NORTAC's WAVE device, with encrypted messaging, is being considered for the integrated suite of systems on the ISSP tactical vest.

"As part of ISSP, they will have their cell and their radios, and [Simard's] goal is to include the Wave, our software and our platform," said Bouchard. "Everything is preconfigured. That way the soldier doesn't need to determine which device they need to use, depending on the environment or the situation they are in. They have the entire kit on them, and the technology will ensure they have communication at all times."

SOLDERDIGITZATION













NEXT GENERATION TACTICAL SYSTEMS



CONNECTING THE BATTLEFTELD









The Pursuit of Digitalization by the Canadian Army

By Colonel (Ret'd) Rick Fawcett

OMM CD VP Strategy and Business Development ADGA Group

From Analog to Digital

More than two decades ago, the Canadian Army successfully fielded a tactical digital system through the Tactical Command, Control and Communications System (TCCCS) project. Despite adopting a digital system, it can be argued that many analog processes have persisted. Also impacting the ongoing pursuit of digitalization are the realities that technology has changed rapidly through the years, as have the expectations of the soldiers who use the TCCCS system.

Senior Army leadership recognizes the need to put a greater effort into digitalization to meet the realities of today's battlespace. The fielding of an effective C4ISR system for Joint Pan Domain operations will be the major outcome of the Army's current Digital Transformation initiatives. Doing so will enable timely decisions based on reliable, trusted information.

The SSE Vision

The Strong, Secure, Engaged (SSE) vision is an agile, combat-ready Canadian Armed Forces that can defend Canadians at home, contribute to the security of North America, and be able to engage around the world to protect Canadian interests and values.

An effective C4ISR system that can be deployed rapidly throughout Canada and around the world is essential to the fulfilment of this vision. The system must be interoperable with domestic and international partners—emphasizing NORAD,

NATO and the UN while supporting the Army's data needs in both the force generation and force employment phases.

To achieve this, SSE has identified six major capital projects that will modernize the Army's C4ISR system at an estimated value of \$6 billion. These interrelated projects are moving into the definition phase of the procurement cycle. They will be managed by a modest staff who are charged with the responsibility of setting requirements and procurement strategies, leveraging the most advanced technology, all while trying to ensure individual projects meet the Army's requirements.

This journey is not just about technology. Beyond the selection and optimization of technology, there must be a balanced approach to integrate systems with policies, processes, organizational structures, and culture. At the core, digital transformation is about collecting, transmitting, manipulating, and storing data to improve the performance of Canada's Army.

Leveraging Allies and Industry Partners

This may seem like a daunting undertaking, but the Army can realize its digitalization objectives through cooperation and collaboration with its allies and industry partners. Learning from our allies, especially those the Army works most closely with, is a good starting place to move forward. For example, the Five Eyes partners have reportedly made significant progress with digital transformation. By studying their journeys or adopting their digital solutions, Canada's own implementation could gain better traction and momentum.



Canadian industry has been successful in delivering the equipment and services required by the Army and they have the capability and desire to continue doing this. However, the digitalized future may require more from industry. Once the technology is delivered, it must also be operated, maintained and evolved on a continuing basis.

Partnering is not about buying products from industry. It's about working with industry, and possibly academia, to identify needs, design/deploy solutions, and potentially include an operational role overseeing deployed/fielded systems.

To meet the staffing demands of the Army's C4ISR modernization plans, the Army could move from its current staff augmentation model to one of integrated project management services. In this scenario, the industry partner would be engaged to deliver on specific milestones or deliverables in the defence procurement process.

Value-added Program Management

Referred to as Value-added Program Management (VaPM), this outcome-oriented approach would put the onus on the industry partner to deliver the required outputs in an efficient, timely manner. This support would prioritize agility, accountability and scalability. In turn, this would free up Army personnel to focus on mission critical tasks that only they can do.

A final consideration for the Army in its digitalization journey is the importance of training. Digital training must be ingrained into the Army's operational culture, so it becomes second

nature, just like weapons training is today.

The challenge is that the need for digital training is continuous, including initial training, refresher training, skills updating, and collective training. This training must be refreshed every time there is a procedural or technical change to the digital systems, which would also be continuous. Finally, every member will require aspects of this training because every member will be using the digital systems.

The Ongoing Pursuit of Digitalization

To remain a relevant force, capable of mission success both at home and abroad, the Army must continue its digital transformation journey. The success of this journey will depend on a number of factors, including leveraging the experiences of Allies, relying on industry to play a greater role in the delivery and support of digital solutions, and providing effective training.



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SOLDIER SYSTEM CONNECTING

After an initial rollout that few units adopted, the Integrated Soldier System has found traction with ATAK and a smartphone.

By Chris Thatcher

Perhaps it was the communication plan, perhaps the sample size of the user evaluation, but when the Army rolled out the first cycle of a tactical smartphone-like computer system intended to network a platoon-sized formation, only some units embraced it.

"The biggest lesson learned we had with this project was user acceptance," admitted Frank Mouawad, until recently the project manager for the Integrated Soldier System Project (ISSP) within the Assistant Deputy Minister (Materiel) (ADM Mat) branch.

It wasn't for lack of effort. From the outset, the project team wanted soldier input on the utility of the Palm Pilot-like devices in operational scenarios. During the bid evaluation, they conducted a user trial in Petawawa, giving soldiers from the 3rd Battalion, The Royal Canadian Regiment (3 RCR) samples of each of the systems being considered to test. And that feedback was instrumental in selecting the eventual winner.

But once the preferred system was selected and fielded across the Army, the project team soon discovered acceptance was underwhelming — few units adopted it, and most of those did not fully employ it.

"What we quickly learned was that every brigade operates differently and has different needs. And we had picked only one brigade for the bid [evaluation] trial," said Mouawad, "so it met the needs of 3 RCR, which is why they used the kit the most."

Feedback from the other brigades in Edmonton and Valcartier was not positive, he said. "In principle, it did what it was requested to do, but there was a whole optics perspective."

The Integrated Soldier System Suite (ISS-S) was awarded to Rheinmetall Canada in 2015 and consisted of a tactical display computer, radio, push-to-talk headphone, hub, and battery pack, all connected on a modular fighting rig. Almost 3,000 were fielded in 2019, and the Army intended to keep improving the system in two more cycles, upgrading software as required and integrating more sensors.

Premised on the belief that a picture is worth more than words, the system, known by the company as Argus, gives platoon- or section-level commanders and individual soldiers better situational awareness and faster dissemination of information, by using a digital map with blue force tracking to share critical information.

The first cycle was always intended to be a baseline system, improved over time with user feedback. Though it was bulky, the Army was able to confirm



the value of the concept and demonstrate its potential.

It was tested on the Infantry Dismounted Company Commander's Course in the fall of 2018 to favourable reviews, albeit with reservations about battery weight, some of the connectors, and the ability of the network to absorb so much data effectively.

And a Defence Research and Development Canada (DRDC) trial on future soldier technologies, conducted at the same time, found that individual soldiers and small teams were able to complete tasks more quickly with the system than the baseline kit they had used in Afghanistan. The tasks included planning and executing a route while adapting to barriers such as a minefield; searching an operational area for an evading enemy or downed aircrew; mission planning and giving orders; and executing a mission from multiple insertion points.

"Anything the sections did (with the ISS-S took) a fraction of the time it took without ISS-S." Linda Bossi, the lead defence scientist, noted at the time.

The phased approach, however, may have been undersold to the receiving units. A more robust communication campaign explaining the intent of the initial fielding might have helped soldiers understand their role in the project, Director Soldier Systems Program Management admitted.



While the turnkey system met the Army's specific requirements, it did not offer much flexibility to make major adjustments. With the second and third cycles still being fully defined – and starting to overlap – and with the limited uptake by most Army units, the ISSP team went back to the drawing board and asked, "how can we get the best system for the Army, but in the most flexible and agile manner," said Mouawad.

"We started looking at how we could adopt agile project management and how we could get outside of the box and get creative," he said. "This was one of the rare projects where we [had] a chance to do a midlife upgrade [early] in the project because the technology [was] evolving so quickly."

After exploring what the U.S. Army and NATO partners were doing, especially with commercial-off-the-shelf mobile devices, there was little doubt in the logic of adopting a cellphone with millions of dollars of commercial investment behind it.

"Why try and reinvent the wheel," he admitted. "The phones meet 90 percent of the Army's requirement ... and [we] will be in line with the rest of the world."

In addition to commercial phones, it also became apparent that the U.S. Army and others, including other projects in the Canadian Army such as Digitally-Aided Close Air Support (DACAS), were employing Android Tactical Assault Kit (ATAK) software — a capability that had not been readily available or as widespread when ISSP began.

Developed by the U.S. Air Force Research Laboratory in 2010 and adopted initially by U.S. Special Operations Forces, ATAK commercial (known as Android Team Awareness Kit-CIV) and military software has rapidly become the baseline for shared real-time situational awareness among para-public and military operators, with detailed mapping, blue force tracking, and encrypted data communication by text, voice and video.

Significantly, it readily integrates approved plug-ins. Most companies with military devices such as night vision systems, laser range finders, drones or even call-for-fires applications, are building plug-ins for ATAK.

After acquiring Samsung S-20 phones and ATAK, through a foreign military sales agreement with the U.S., the ISSP team then competed for a hub and cables to connect with the current battery on the existing tactical yest.

"It is almost a carbon copy of what the U.S. has and what NATO has been following through with," said Mouawad, but it is "tuned and designed for Canada.

"Rheinmetall still does software development, but other than the plug-ins that are designed for ATAK, there is no more intellectual property. We don't have to go back to one vendor to replace portions of it. We are now fully agile and fully interoperable."

More importantly given user feedback to the first iteration, the S-20 and apps are familiar territory to soldiers who rely on their cellphones in their personal lives.

"ATAK looks like Google Maps, except it's on steroids," he said. "The system that we're fielding is a SOFCOM system. We're the first country that is deploying a system like this, to dismounted soldiers that are not special forces. The soldiers know they are getting something relevant, something that is cutting edge. So, you've broken down a lot of barriers."

The updated ISSP has been distributed in small quantities to all three of the Canadian Mechanized Brigade Groups and the project team anticipates launching a training program over the coming winter, in early 2024.

"They're finishing up the training package at the moment," said Mouawad, who transferred this summer to the Joint Fires Modernization project as its associate program manager. "All the units have small quantities, and they're going on exercises with them."



The system was tested on Exercise Maple Resolve in May with some success — the project team was congratulated by Army Commander LGen Joe Paul — and over 200 sets were sent over the summer to the battle group in Latvia for evaluation in exercises.

"We were still in a trial basis, so we used Maple Resolve to learn," said Mouawad. "We have different variants of the kit. In the past, we had one system. Now we have a commander variant and an assaulter variant, though that name might change. We developed the kit in a flexible manner that is more ergonomic. The commander, which will carry more sensors and gear, will have a different hub that is much larger. The assaulter will get a much more streamlined, lighter hub."

The encouraging feedback has already resulted in a 2.0 version of the system this summer, and the team is now working on 3.0, which could include an upgrade on the Samsung S-20 phones and a more malleable battery. "It would still be a lithium-ion battery," he said, "but a conformal, wearable one — we're migrating towards safer and more ergonomic batteries."

There remain some networking challenges to overcome. As part of their trials, the brigades are focused primarily on integration with the current Land Command Support System architecture as the Army develops a new digital backbone.

"When you're integrating it into the rest of the architecture, and the rest of the architecture is still getting figured out, that's where the challenges are," observed Mouawad. The brigade units have "proven that they can plug in any component they want. They have bought tethered drones ... and a bunch of other components to play around with, but their focus right now is really the network."

The system also must bridge the unclassified-classified divide. DACAS, for example, operates on a classified network to communicate with aircraft; ISSP is on an encrypted unclassified network due to the volume of users and the nature of the information being shared. Ideally, though, Joint Terminal Attack Controllers and dismounted soldiers could easily share data on the same display system.

ISSP could also be an early example of how ADM (Mat)'s Continuous Capability Sustainment (CCS) initiative functions. The project team has advanced a rolling wave approach that would see systems acquired and delivered to Army units just before they begin their high readiness training cycle. "We got consulted on (CCS) quite heavily," said Mouawad.

Using current supply arrangements and a just-in-time distribution model, soldiers would have "a roadmap for replacing devices that rapidly go obsolete." And with the ATAK community continuing to grow, there would be no shortage of downloadable applications for Army employment. "That's the ideal, that you time everything to provide the soldier with the latest whenever they're starting up their training."

Mouawad spent 10 years working in the Royal Canadian Air Force simulation group, much of it on implementing the Canadian Advanced Synthetic Environment (CASE), a joint distributed mission training network. Like CASE, ISSP has found traction with some creative thinking.

"I think the biggest thing for ISSP was getting outside of the box, being more agile, looking at different methodologies that would be more current, more modern than the typical template projects are told to follow," he said. "And you can see that the Army's benefiting."

Since February 2022, the Canadian government has provided over \$2.4 billion in military assistance to Ukraine. Some equipment was specifically acquired for the Ukrainian military, but much has come from the stocks of the Canadian Army, including Leopard 2A4 main battle tanks, an armoured recovery vehicle, armoured combat support vehicles, M777 howitzers, anti-tank weapons, small arms, associated ammunition, personal protection, winter clothing, and more.

Replenishing Locks, Stocks and Smoking Barrels

What gets replenished, what gets replaced with newer capability, and when, falls in part on the Director General, Land Equipment Program Management (DGLEPM). Shortly before he was promoted to Chief of Staff for the Materiel Group this summer, **Major-General Rob Dundon**, former DGLEPM, spoke about the task of replenishing stocks while adjusting to a new capability sustainment model.



What's the process for replenishing or replacing all this equipment, and how much of that lands on DGLEPM?

The first thing I'd say is that the Department of National Defence (DND) does not have a good system for exercising donations. It was never fundamentally designed that way, for a comprehensive program like this to aid another nation that's in peril. And it has challenged our system, to say the least. The government seems to have a firm idea of where it wants to go. It's more internally; we don't necessarily have the policy mechanisms inside our own organization to do it. Where I get involved is where the rubber hits the road, with replacement primarily of a lot of the clothing, equipment, and lethal aid.

The scope of what we're replacing is fairly large, to the tune of about \$220 million. And some of it gets very challenging to replace. Some we don't worry about, such as fragmentation vests that we were phasing out anyway. The more challenging ones are things like M777 howitzers. BAE Systems, the original manufacturer, is not planning on running a production line until 2028, until they have orders for 120 guns.

Tanks are a challenge, too. We've already got multiple variants. The Army used to have around 120 tanks in two fleets. There was a version of the Leopard 2A4 and the Leopard 2A4M, which had a mobility enhancement on it that required some different parts. Later we introduced a Leopard 2A6 and a Leopard 2A6M. And then there was an armored engineering vehicle and an armored recovery vehicle. So, in many ways we have six different variants inside the Army.

As we look internationally at replacing the tanks, you realize that KraussMaffei Wegman and Rheinmetall are not fabricating 2A4s anymore, nor are they fabricating 2A6s. You've got to now go to the Leopard 2A7. And there's a movement afoot, primarily led by Germany, to get a group of NATO nations together to open up a production line for Leopard 2A8. That would introduce a seventh variant and possibly even an eighth if we put mobility enhancements on it. That becomes a challenge for us. We know the procurement mechanism by which we would do this, but we're waiting for a call at the Canadian Armed Forces (CAF) level to see which way we want to go with tanks. Do we buy A7s? Do we get on the bandwagon with the A8 change? Do we go to another original equipment manufacturer? We've looked at all the options. We're now waiting for a CAF strategy decision on which way they want us to execute.



At what point does replenishment become replacement? Not everything necessarily needs to be one-for-one and like-for-like. If the Army's Indirect Fires Modernization program, for example, is looking at the next bound for long-range fires, do you still replenish the M777 stock?

Those are the types of decisions that we're waiting for, and a lot of them haven't been decided. You're right, Indirect Fires Modernization is a massive program to lift us up to the next tier for indirect fires. Fundamentally the world has changed. The M777 is a great platform when you're conducting counterinsurgency missions. But when it's state-on-state, my preference is to be under armour. The targeting cycle is down to three to four minutes right now. The Russian capability to find a target and engage it is like nothing we have ever seen. So, we're looking at options for the full gamut: Loitering munitions, self-propelled howitzers, and even replenishment of the M777s. Of the equipment that falls within your immediate remit, what are the priorities?

All ammunition that has been donated is programmed for replenishment out to 2028. We have a program with a five-year funding profile; we even know when they're coming in. There is some demining equipment that we donated in the first tranche. We're not necessarily looking at replacing it, as the technology has moved on, but we are ready to move forward with new technology. The same for fragmentation vests, where we are looking at Kevlar vests that are sized appropriately

for women. Those are being incorporated into other projects that we're doing in the future.

Carl Gustaf rocket launchers are another piece of equipment that isn't fabricated anymore, so we are looking at more modern systems from multiple firms. The challenge we get into with ammunition is that we acquire all these through the munition supply program. There is a strategic Memorandum of Understanding agreement with five firms in Canada that we use to produce these munitions. And the regime to order is specific, so some of these will take three years to replace. There is a movement afoot to invest significantly in the munition supply program, to ramp up our production of 155 ammunition in particular, to the point that we are working with the United States to establish a North American industrial base, to augment what the Americans are doing. I can't say much more than that, but we have already made one investment. We were producing 3,000 rounds a month, we're now up to 5,000 rounds a month, and we're looking at going well beyond that.

That said, we have never dipped into our strategic reserves or anything that we consider operationally necessary. As a consequence, we think we're okay on all those.

How does the shift to Continuous Capability Sustainment impact DGLEPM? If you are continuously sustaining capability, are you by extension continuously procuring it? If you're acquiring capability in regular spirals, are sustainment and procurement more integrated?



Interoperability, supply chain resilience, and Continuous Capability Sustainment all must integrate to be able to do what we're trying to achieve. Continuous Capability Sustainment is about moving away from the standard approach of starting a project every time you buy something. The rationale being, when you start a project, you do so because you've been asked to do something new. At no point has the government ever asked us to stop moving, shooting or communicating. Really, all we want to do is be able to keep up with technology in those three regards. It's a bit of tweaking. That entails transferring money from a Capital account over to an In-Service Support account. You improve your equipment through cycles of faster iteration. As opposed to doing a big buy, a midlife upgrade, and then disposing of it in 30 years, you are doing incremental change every three to four years.

We know fundamentally that single-use military equipment becomes obsolete in about eight years because adversaries figure out how to defeat it. We want to move to a faster cycle, because that's really the essence of the Western way of war – technological overmatch. We're going to do that through technology injections that are a bit cheaper and don't require the authority levels that we go through with full project management. This is a concept that was developed in close collaboration with Public Service and Procurement Canada and Innovation, Science and Economic Development Canada.

Industry plays a really important role in all this. DND is not a cutting-edge leader in technology development, but our Canadian industrial base is, and they have the network and the know-how to do this. So, we need to develop more strategic partnerships. Fundamentally, what we need is a technology roadmap. I could figure out what a technology injection might look like in three or five years, but when I get past that, I don't necessarily

know. But each of our Canadian firms has good research and development programs and they know where that technology can go. If we couple that with what Defence Research and Development Canada does, it will be a winning combination.

Do you need to move to a modular approach to do this? Industry might not always know what a fifth or sixth iteration of a technology is going to be, but if capability is delivered in modules, you might be able to swap out without too much disruption.

Precisely. You want to focus on modularity and inter-compatibility with the parts. They've got to be interchangeable to an unprecedented degree.

That ties into this emerging emphasis on interchangeability in addition to interoperability.

What is driving that? And what does it mean for how you approach acquiring equipment?

I can speak specifically about one instance that resonated with me and changed my mind about interoperability. Nine different nations contributed M777s to Ukraine, which were all supposed to be common systems. But then 14 different natures of 155-millimeter ammunition came with those. All the western nations had qualified their guns with very specific ammunition that we thought was interoperable. And Ukrainian logisticians are struggling as a result — they have got to match up the gun that's on the frontline with the ammunition from the nation that donated it. We learned a hard lesson at their expense that we are probably not as interoperable as we thought inside NATO.



Incidents like this sparked the Committee of National Armaments Directors — they have been meeting on a frequent basis since the invasion of Ukraine — to look at ways to move beyond interoperability, to define what the next level is going to be. The term that they've settled on is one that you're just starting to hear, interchangeability. What it really means is, this type of incident with the M777 will never happen in the future. Armed forces from one nation will be able to use the equipment of another nation without any type of challenge. We want to get to the point where a Spanish soldier can pick up a Canadian anti-tank system, she may not be able to read the language, but she has a good feeling for how the buttons work, how to aim it and make it function. Or an American who has no experience on one of our radios can see it's comparable to something that he's used, and make it function.

Does that mean a rethink around NATO standards? We've assumed that STANAGS provide for a degree of interoperability. Do you now need a much more general standard?

We have teams looking at that. We don't know what the new standard is ultimately going to look like, but what we are finding is that we're going to have to look seriously at strategic partnerships with other nations, that everybody understands these broader standards of interchangeability and what that will fundamentally mean. What that could entail for communication systems, for example, is open architecture software, common waveforms for



the ability to communicate with all these systems, and more common standards on user interfaces. From a Canadian standpoint, does that mean more commercial or military off-the-shelf capabilities? Perhaps a greater inclination to follow the lead of others if they've already acquired and certified a piece of equipment?

Your instinct is right. If another nation qualifies a weapons system and then we buy it military-

off-the-shelf, it accelerates our acquisition cycle and ensures we are getting the same type of equipment. But there's always a risk doing that. There is a desire to meet interchangeability, but we've got to balance that against the risk of things like vendor lock, where you're so embedded with a contractor that they're not innovating. That's why Canadian policy around competition has always been so important to what we do. That focus on competition forces a degree of innovation amongst Canadian firms that makes us world leaders for some of the capabilities we produce.

Do you become a little more reliant on industry centers of excellence as repositories of certain key capabilities that can be delivered more quickly?

You do become more dependent on them. But again, you've got to balance that with that need for innovation and ensuring small and medium enterprises with cutting edge technology can play in the game, because you don't want to see a monopoly develop. And that's where my role comes in. What my team and I do is try to be sophisticated customers, making sure that we're achieving that balance.

We can't necessarily dictate that large firms go to the small and medium enterprises for subcontractors. But we want to encourage that type of thing, to help bring them inside the tent. We've had great success with Logistik Unicorp. This is a prime example of one we have been working on for years. We've asked them to find





some great technology and show us how to advance what we're trying to do. For example, to go out and source natural products. They're now experimenting with milkweed as insulation in our jackets. They have teamed up with indigenous firms to harvest it. Clothing and equipment are a little bit easier than trying to do the same thing with a light armored vehicle, but we're seeing other firms be very responsive.

If you're building strategic partnerships with specific firms or clusters, does that in turn ensure greater supply chain resilience? Does continuous engagement like that lead to resilience in and of itself?

It does. Don't get me wrong, we've been continuously engaged with all these firms. But we're talking about more than that. When we looked at our ammunition manufacturing capability, for instance, we have great resources in Canada. But when you start looking for the explosive component that gets poured into each of these shells, we realized that we don't control the whole supply chain to be able to fabricate that. We don't even control the supply chain to be able to fabricate a 5.56mm round completely without having to reach outside Canada.

So, we're looking deeply at many of our supply chains, and the pedigrees of components that go into all our manufactured goods, and making sure we definitively know where they are coming from. We can't necessarily have everything in Canada, it just doesn't make sense. You can get better

prices on a competitive market. But what we are looking at is friend-shoring, making sure that we have partners across the globe that are reliable and trustworthy. That's really what supply chain resilience is about — those strategic friendshoring partnerships.

The Army has trialed a third-party cloud-based network service on Exercise Maple Resolve, and the modernization strategy encourages exploring the Everything as a Service model. How widely

and how far forward can you project that approach?

There's a challenge with Functions-as-a-Service in that they can only go so far forward. Life insurance firms just aren't going to cover anybody going into the Ukraine — it is considered a war zone — so we must carefully select how far forward we go with them.

We're experimenting right now with project management as a service for some of our communications components. The Royal Canadian Corps of Signals is really struggling with human resources, so I can't draw on many of their communications-electronics engineers. We're looking at a model that the American Army has used, where they have entered into an agreement with an organization to do project management as a service. We're about to attempt the same thing. For Army equipment, this is our first foray with project management as a service, and it's a sensitive issue. You want to make sure that any firm that has the potential to win this contract is not also producing the radios, building the antennas, or making the batteries, because it quickly becomes a conflict of interest.

The world has changed. State-on-state warfare has made a comeback. We are moving to deterrence, and that is fundamentally changing the way that we look at everything, including our equipment and our systems and processes to deliver that. That's what you're seeing here. You're seeing all this in the background, and we're trying to weave it together into one big strategy.





TRAINING FOR THE

The Army is rapidly incorporating the critical lessons of modern conflicts into its collective training.

By Chris Thatcher

Wainwright still looked like Wainwright, albeit with the conspicuous haze and smell of smoke from distant wildfires burning elsewhere in the province. But for the participants of Exercise Maple Resolve, the sprawling training area in eastern Alberta had the distinct feel of a proxy for Ukraine.

From the overarching scenario against a peer enemy in Eastern Europe, to the added strength and capability of the enemy force, and the critical points emphasized throughout the exercise, Russia's war in Ukraine was a persistent presence for the units being validated for global deployment.

"We are incorporating significant amounts of lessons that we're getting from

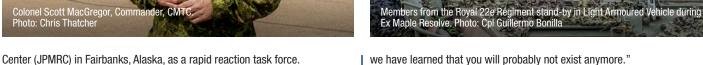
the Donbass and the Ukraine-Russia conflict," said Colonel Scott MacGregor, commander of the Canadian Manoeuvre Training Centre (CMTC) and the Army collective training authority.

To an observer of the ongoing war, the synchronization of effects, specifically indirect fires, the dispersion of forces after a fire mission, the disaggregation and movement of command posts, the reduction of electronic signatures, the significance of camouflage and concealment, and the importance of sustainment might seem self-evident. But for an Army that has over the past decade been gradually tailoring its tactics and capabilities to confront a peer



enemy, the experience of the Ukrainian Armed Forces has underscored the consequences of failing to do these actions well. "That's one huge evolution in our collective training," MacGregor observed. Maple Resolve is one of several exercises CMTC conducts every year to validate Canadian Mechanized Brigade Groups, their battalions and other units ready to deploy. As with the rest of the Army, much of CMTC's focus is on the Canadian-led multinational battle group in Latvia, and the lessons from Ukraine that must be incorporated into collective training. This year, Maple Resolve, a live Level 6 training event, was the culminating exercise for the 1st and 2nd Battalions of 5 Canadian Mechanized Brigade Group (5 CBMG), and the headquarters of 12 Regiment blinde du Canada (12 RBC) on their build to high readiness. 12 RBC and its three armoured reconnaissance squadrons, augmented by a company from the 1st Battalion, troops from 5 Combat Engineer Regiment, and some Special Operations Forces, played the role of the opposition force (OPFOR). The brigade headquarters was validated in February at Unified Resolve, a three-phased Level 7 computer-assisted exercise. The 3rd Battalion of 5 CBMG was validated through Global Resolve, an exercise for the light infantry battalions conducted each year at either the Joint Readiness Training Center (JRTC) at Fort Johnson Louisiana, or the Joint Pacific Multinational Readiness





CMTC also provides NATO-qualified observer-controller-trainers (OCTs) to validate the battle group in Latvia through a Level 6 event known as the Combat Readiness Evaluation (CREVAL).

To provide the most realistic scenario possible for the primary training audiences in each of those exercises, CMTC draws from a wide array of sources to inform its exercise design writing boards and the planning conferences with the divisions supporting each one. Those include the Army Lessons Learned Centre, Task Force Latvia, the lessons gathering cells of allies such as the British and Americans, and from CMTC's own involvement in CREVAL validations that are conducted in Latvia twice each year.

"We're thirsty," MacGregor acknowledged.

The most direct source of major combat operations lessons, though, is the Ukrainians themselves. Through the training missions in the U.K and Poland under Operation Unifier, as well as the former training mission in Ukraine that began in 2014, Ukrainian soldiers and instructors have shared the latest from the frontlines of the fight.

"Ever since the Ukraine war started, we've had incredible opportunities to see the Russian army as they actually function compared to what their doctrinal function is," said Trevor, a sergeant and senior intelligence operator supporting the intelligence picture for both the blue and red forces in Maple Resolve.

Much of that intelligence is synthesized by CMTC's Operations Group and incorporated by its planning team into the exercise design, and then applied against the Army's battle task standards.

"The lessons observed there are turned into lessons learned here in collective training," MacGregor noted.

LESSONS FROM UKRAINE

Among the prominent themes of Maple Resolve was the importance of synchronizing effects, especially indirect fires, to reduce the sensor to shooter link. The wars in Ukraine and Nagorno-Karabakh have highlighted the need to quickly and coherently gather information from any sensor — human and/or machine — on targets of interest, and then process, analyze, and distribute to the right shooter for prosecution, MacGregor said.

They have also underlined the criticality of dispersion. "A huge lesson we're observing from the conflict in the Donbass is the requirement to be agile," he said. "If you can't move within three minutes of firing an indirect fire mission,

That also goes for the command-and-control nodes coordinating those missions. Headquarters and command posts were frequently dispersed in multiple smaller formations to minimize concentration of force. Units were often well camouflaged, and the brigade headquarters was at least 10 feet underground, moving among a series of sea containers able to withstand some fires.

"One of the comments we got from some of the [reconnaissance] overflights was that this was the most dug in Maple Resolve that anyone had ever seen," noted Major Andy Torrance, CMTC's lead exercise planner.

"The [Army operating concept] of Adaptive Dispersed Operations — it's doing it rather than just talking about it," MacGregor said. Concealment has always been a vital component of warfare, but the proliferation of uncrewed aerial systems has added a "top-down piece [that] is a lot more difficult. With our instrumentation, we were able to see that and give [the training audience] an assessment on how they were doing, and ... coach them on some better ways."

Radio discipline, too, might be a staple of conflict, but CMTC now has the means to count and time transmission bursts, he said. "Because of the electronic signature that we push out, we know we're going to be noticed in the electronic spectrum. Now, we count how many transmission bursts they do by attack, and the length, to get that down to an acceptable level where they can send the information that they need in a very limited amount of time, and then move, so that by the time it's homed in on, they're gone."

For the first time, Maple Resolve also featured the use of a mesh tactical network used by the enemy force, further reducing the need for voice communication. Members of the Royal Canadian Air Force 7 Space Operations Squadron brought some jamming capabilities to further test the blue force's ability to minimize its use of the electronic spectrum.

"This [was] a bit of a first step in incorporating space-based effects into an Army training exercise," said Torrance. "It's helping to inform the primary training audience that that threat is out there."

The rate at which ammunition and other equipment has been consumed in Ukraine has put a spotlight on sustainment. "To feed that capability, specifically for indirect fires and even direct fires, to be able to sustain major combat operations for let's just four days, takes an inordinate amount of logistics" that reaches all the way back to national support elements, MacGregor noted.

During Maple Resolve, the blue force was presented with the problem



of potentially running out of ammo as it conducted defensive operations. To go on the offensive, in an urban environment, for the final phase of the exercise, "they are going to have to think that problem through to regain the momentum," he said. "We want to teach that hard lesson or maybe even avoid it beforehand."

The rapid depletion of ammunition, fuel and other supplies also carried a human toll. "One thing that we're relearning, unfortunately, on the backs of Ukrainians is the industrial rate of death that occurs in major combat operations," he said. "The average death toll was trending on both sides [of the Russian-Ukraine war] between 150 and 200 a day."

Reconstituting units that have been hit hard by direct or indirect fires was a talking point in the exercise. So, too, was the challenge for a Role 2 medical facility that could quickly be overwhelmed in a mass casualty event, MacGregor noted. A medical system shaped by the conflict of Afghanistan and the "golden hour" of responding to and treating the severely injured, "would be tested beyond its capacity, but we would have to triage that."

METRICS PAINT A PICTURE

While the broad themes of synchronized effects, rapid dispersing of forces, and sustainment are understood, this year CMTC was able to provide the training audience with a much clearer picture of exactly how each was affecting performance.

Rather than after-action reviews midway or at the end of the exercise — where few recall the exact sequence of events from seven or 13 days prior — CMTC is now employing CATS Metrix, a data collecting and replay feature of Cubic Defense's exercise control software that is part of the Weapons Effects Simulation (WES) system administered by Cubic Field Services Canada in Wainwright.

CATS Matrix provides units with what MacGregor called a "mirror" with which to look at themselves in hot washes. More than a review of battlefield statistics such as ammo expended and personnel wounded or killed, it offers a visual playback of battle procedures and manoeuvre analysis, answering some of the questions of why something happened.

During the first day of Maple Resolve, the blue force came into contact with the enemy and then conducted a delaying action, buying time to build defensive positions and the space to plan a counteroffensive. Rather than hit and retreat, they "were seduced by the contact, and they stuck around and kept engaging," said MacGregor. "They were buying time, but losing a lot of people."



After the delay had culminated, the exercise controllers called a pause, brought in the commanders, and asked them to evaluate their combat effectiveness and that of their enemy. They then pushed play.

"We saw the enemy completely envelop [the two battalions] — they had no idea," he said. Of note, the blue force had made limited use of indirect fires. "The CATS Metrix system provides that [detailed data]. The hot washes provide an opportunity to use these products, but at the leadership level so they can see what they're doing right, what they're doing wrong, and arm them with themes [they can take back] to their units to do their own afteraction reviews (AARs).

"The next day was amazing," he said. "On Day 2 of the delay, [the blue force] quadrupled their fire missions, they were tighter in terms of the sensor-shooter link, more accurate."

"The OPFOR did a great job in exploiting some of the seams and using some terrain to approach from unexpected axes that offered some really challenging situations for those battle groups to react to," said Torrance. "The feedback we've been getting through the AARs has been really positive. They've been able to challenge each other."

MacGregor credited the combination of the WES system and its metrics, the Cubic manoeuvre analyst, and the OCTs on the ground with helping the training audience see the complete picture and adapt. It's a capability the Army has had but did not fully appreciate until members of CMTC saw it being utilized by allies, especially the U.S. Army at JRTC and JPMRC. "We have this Lamborghini, and we were driving it like a Chevette, we just weren't using it," he said. "What we have is good, let's use it to its fullest capacity."

Over the next year, Maple Resolve and Unified Resolve will undergo substantial change as the Army shifts even more of its focus to the battle group in Latvia as that force becomes Forward Land Forces Multinational Brigade Latvia. The Army has revised its Manage Readiness System (MRS) to align the build to high readiness training with that mission, and will transfer more of the collective training validation to Latvia.

As a result, MacGregor is adopting a model that would make the training support system far more mobile. Wainwright and its massive training area and highly instrumented urban operations facility will continue to see plenty of action, but he envisions a model along the lines of Australia's that would allow the Army to "deliver collective training at a point of need, [and] not just in Latvia, but in Gagetown, Valcartier, Petawawa and elsewhere."





TRAINING SKILLS FOR REGULAR FORCE INTEGRATION

In late August, soldiers from across Ontario participated in the largest simulated war-fighting Reserve exercise since 2018. Designed to enhance combat readiness, Exercise Arrowhead Guardian involved over 750 members of the Reserve and more than 200 vehicles.

Units from 31 Canadian Brigade Group (CBG), 32 CBG and 33 CBG were formed into 31 Territorial Battalion Group, under the command of Lieutenant-Colonel Shawn Dumbreck of the Royal Highland Fusiliers of Canada (RHFC).

The exercise began with live-fire training and other related field preparations in southwestern Ontario before concentrating at 4th Canadian Division Training Centre Meaford after a major road move across the region.

A test of individual and team level combat expertise, Arrowhead Guardian included live-fire tactical movements, dismounted infantry attacks against opposing forces, and targeted demolitions of fortifications. Forces were also tasked with the defense of key objectives (bridges and strong points) utilizing section, platoon, and company tactical formations. Simulated logistical complexities increased in intensity as the training progressed. The exercise culminated with a high stress and demanding simulated combat mission.

Designed to provide an immersive and realistic simulation of the challenges faced in modern combat environments — due in part to the complexity of logistical support required for the needs of a large body of soldiers — Arrowhead Guardian emphasized the development of core

competencies across all military trades and levels of leadership.

"When Army reservists deploy on operations at home and abroad, it is training like [Arrowhead Guardian] that will establish their skills to join our Regular force counterparts," said Colonel Chris Brown, commander of 31 CBG. "This exercise demonstrates that within only a week, we can rapidly scale up our capacity to conduct sustained operations to meet the needs of Canada."

"This exercise will see soldiers from multiple units work together to hone their skills as an effective fighting force through a progressive and dynamic training environment," said Dumbreck. "For many soldiers, it will be their first time working collectively under such a large organization, adding realism and challenges that will prepare them for operating alongside their Regular force counterparts on future operations."

About 300 members of the battle group were part of the Reserve full-time summer employment program.

Participating units included the RHFC, 11th Field Artillery Regiment, 31 Combat Engineer Regiment, 31 Signal Regiment, the Royal Hamilton Light Infantry, 4th Battalion, The Royal Canadian Regiment, Grey and Simcoe Foresters, the Essex and Kent Scottish, the Argyll and Sutherland Highlanders of Canada, 31 Service Battalion, 23 Field Ambulance, 31 Military Police Platoon, as well as units from 32 and 33 Canadian Brigade Groups. ■







ENHANCING WEAPONS

What was once labeled a midlife upgrade is now a full modernization program. Over the past three years, Weapons Effects Simulation (WES) has transformed from an enhancement of the equipment the Army currently uses to capture weapons and other effects in training, to a more substantial effort to improve and expand the capability.

"The change in name was to make sure that it communicates the complete scope of the project, which is not only to update the equipment but, in many instances, will involve the full replacement of system and the procurement of increased capacity," explained Major Jean-François Desmeules of the Directorate of Land Requirements (DLR).

WES Modernization (WSEM) might be the new moniker, but the three broad high-level mandatory requirements (HLMRs) remain the same. The first is to improve the interoperability and mobility of the simulation system by being able to connect it with ABCANZ (America, Britain, Canada, Australia, and New Zealand) armies and with NATO partners in training events both in Canada and abroad, including in operational theatres such as Latvia.

The second, focused on the training and

exercise participants can interact with their personal equipment, weapons and mobile platforms without being hampered by the WES kit, and that it produces realistic battle effects and allows for "enhanced after-action review and validation capability" to improve the overall quality and realism of the training.

The third requirement aims to increase the capacity of the current system by ensuring WES can support brigade level exercises in Wainwright, as well as training on Army force generation bases. "The Canadian Army Collective Training evolution will require more flexibility with Level 6 (Battle Group) training in other locations such as Gagetown or on operations where conditions permit," Desmeules noted.

The HMLRs "are currently being reviewed to ensure they are in line with the Army's evolving approach to training," he added.

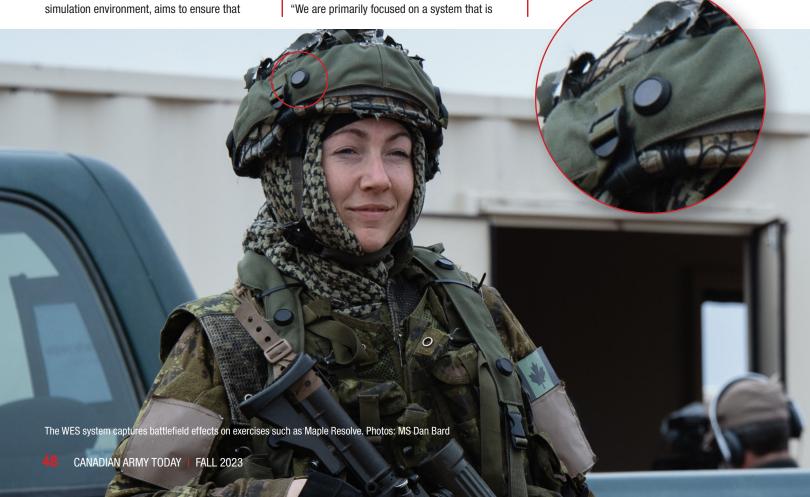
As part of its Future Integrated Training Environment concept, the Army has sought to begin interoperability discussions for training systems early in the procurement process. Interoperability is a high priority for WESM, Desmeules said.

compliant with the international Urban Combat Advanced Training Technologies standards. However, recognizing that the U.S. is a significant training partner of Canada, we will likely also require compatibility with [the U.S. Army's multiple integrated laser engagement system (MILES)].

The project is still refining its data requirements for a modernized WES, but the focus is on four primary categories: tactical, operational, strategic and lifecycle management. The Army "needs the WES system to validate the battle task standards and to support the decision-making process for its senior leadership on operational readiness and improvements to the training program," he said.

The system will also be required to integrate with the virtual and constructive elements, but the project is not striving for the ability to deliver a LVC (live, virtual, constructive) training environment. However, the possibility of capitalizing on LVC development is part of the debate.

"As an example, ideally within an LVC environment, the troops would be able to train



EFFECTS SIMULATION

in a live simulation environment at the same time as a vehicle crew trains within a virtual simulator and other [Army] personnel are training within the constructive environment, while all are operating under the same common operational picture," Desmeules said. "Technology, such as augmented reality, continues to advance and provides opportunities to make this concurrent activity possible."

The current system is being used for training exercises by the battle group in Latvia, but WESM will aim to improve the scope of that portability.

"There are two WES mobile towers and a mobile exercise control that can support exercises anywhere as long as the required frequencies are deconflicted," he said. "The soldier equipment and newer vehicle kits (MSVS and TAPV) are interoperable with our allies, but the legacy vehicle kits (LAV 6 and Leopard 2) are not."

Like many of the Army's major capital projects, WESM has slowed due to limited personnel in DLR and an increase in the quantity of systems now required, as well as the complexity of tasks to be completed during the options analysis (0A) phase of the procurement process. The project team is hoping to begin the definition phase by 2026 and is anticipating an initial operating capability (IOC) by 2032 or 2033.

"The WESM has built a robust schedule for the OA phase that serves as an example for other projects," Desmeules said. "It now contains all the key activities and governance required to complete it. This process allows for a more precise schedule estimation, which pushed the IOC [date]."

When WESM was briefed to industry in April, the project team raised the possibility of multiple contracts spread over time to better incorporate technology. The team said feedback from potential vendors had identified the "advantages and limitations of different procurement strategies."

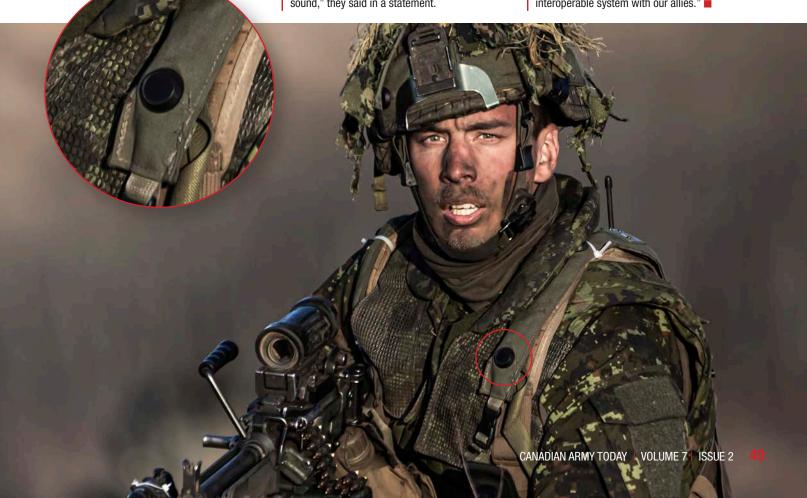
"WESM will continue to consider the possibilities of one or multiple contracts for both acquisition and sustainment of the live simulation capability, but the driving factors are now more focused on achieving the best solution for the Army while the procurement remains competitive and fiscally sound," they said in a statement.

The project has issued two requests for information that drew seven responding companies. A market analysis of live simulation by the Industrial and Technological Benefits Branch of Innovation, Science and Economic Development (ISED) also identified a strong vendor base, several of which would be able to provide a complete solution.

The current WES system is provided by Cubic Field Services Canada, but that contract expires this year. The project team said the system would be dormant until at least the fall of 2024.

"Considering the challenges to ramp up such a capability once the contract is awarded, it is expected that the Army will not be able to use this capability until spring 2025," they said. "Although many plans were considered to bridge this gap, none were feasible due to resource constraints.

"Once the new contract is awarded, the [current] WES will continue to support training in Canada until WESM comes online. As well, to support exercises outside of Canada, the Canadian Manoeuvre Training Centre is working on a separate services contract which will deliver an interoperable system with our allies."





Two variants in development for next modular assault rifle

By Ken Pole

When the federal government rolled out its June 2017 defence policy paper, it was packaged as "a long-term vision" for how Canada's military could respond to a rapidly changing world. It was an ambitious vision built around a promise to spend billions more on defence over the ensuing two decades.

Among other things, it stated that "the Department of National Defence remains committed to the significant and strategic long-term investments that will ensure the Canadian Armed Forces (CAF) continues to function as an agile, and combat-ready force, capable of making tangible contributions and delivering on its commitments at home and around the world."

A critical element of that 2017 vision, which is expected to be updated in a new policy paper promised in the April 2022 budget — six weeks after Russia spiked global tensions by invading Ukraine — is the need to provide the Army with new small arms and other light weapons for its dismounted troops.

Since 2017, the Army has moved ahead with the new C20 and C21 sniper rifles and is now introducing the Sig Sauer P320 as its new pistol of choice, designated the C22. But replacing its Colt Canada C7 family of standard-length assault rifles and shorter and lighter C8 carbines remains a work in progress.

Both have proven effective in various theatres of operation, but they have been in service for more than three decades. Major Carl Gendron, who directs the Army's small arms and light weapons program, says their effectiveness has been eroded



over the years by simple wear and tear.

He told *Canadian Army Today* that Canada has reached a point within NATO, where it ranks near the bottom in terms of assault rifle modernity. "We're not competitive with what's been available for the last 20 years and they do start to degrade with time."

Most NATO countries have "moved on" and Canada is "overdue to bring its capabilities up to speed," he said. Gendron warned that "our operators who use their assault rifles for

dismounted offensive operations or personal protection now risk being overmatched by adversaries using readily available technologies."

The Army's solution is the Canadian Modular Assault Rifle (CMAR), which could be adopted to various tactical scenarios by changing components procured through Colt's subcontractors or other certified manufacturers. The expectation is a weapon it says will "enhance the awareness, lethality and protection of deployed CAF members."

The CMAR project was presented to an

Independent Review Panel for Defence Acquisitions in July 2020. While it acknowledged the Army's specific needs for its dismounted operators, the panel also suggested that the entire CAF assault rifle fleet requirements be addressed. This led the Army to rethink how it could achieve this within a reasonable funding envelope and without jeopardizing the operational effectiveness of the Army.

To support CMAR project viability and avoid delays, the Army and Assistant Deputy Minister (Materiel) (ADM (Mat)) simultaneously conducted market surveys, testing and prototyping to validate the way ahead. In the same vein, the Army is also championing a C8A4 upgrade initiative and using it as a testbed to confirm CMAR requirements.

The current thinking favours a two-tier fleet of modular weapons that retains the familiar C7/C8 configuration, but with a floating barrel and full rails that can accommodate options for advanced day optics, night vision systems, thermal sights,

voice command and control, saving shooters' hearing, and making quick follow-on shots much more accurate," Gendron said.

It is understood that even the Tier 2 General Service rifle would have superior target acquisition, accuracy and ergonomics, and would surpass most other assault rifles on the market.

Gendron would not go into details about the Tier

For decades, the Canadian Army has used the 5.56 mm NATO calibre, one of five NATO time-tested standards, which range up to 12.7mm. The U.S. Army has been pushing for more combat punch

1 Full Spectrum, but he said "the General Service and Full Spectrum rifles are very similar. The Full Spectrum will have a different barrel for better accuracy and will also have more sophisticated optics. It's all the peripherals that change." He said a basic FS variant has already been tested with new ammunition and delivered better results than expected. There is ongoing debate about the ammunition.

A member of the 3rd Battalion, Princess Patricia Canadian Light Infantry, during Ex Apollo Foundation in October 2023. Photo: Cpl Trevor Pomarenski

grenade launchers and individualized ergonomics.

This two-tiered approach would result in a Tier 1 Full Spectrum (CMAR-FS) rifle optimized for offensive operations in urban and open terrain, and a Tier 2 General Service (CMAR-GS) rifle designed for support and personal protection. This is similar to how the U.S. Marine Corps uses its Heckler & Koch M27 rifles and Colt M4 carbines.

Both variants would also be fitted with a sound suppressor that doubles as a muzzle brake. "It's good for reducing sound signature, facilitating

with their Next Generation Squad Weapons (NGSW) using a new 6.8 mm cartridge. Without going into details, Gendron has acknowledged that he and his team of elite shooters, weapons technicians and engineers have shot both the NGSW's XM7 and XM250, and are tracking the NGSW program. While not opposed to new technologies, Gendron's response was that there are serious considerations to using magnum-level cartridges and that, until a new assault rifle cartridge is agreed upon by NATO, the 5.56 is "sufficiently potent" for how it's used by Canadian troops.

That said, he also revealed that prototyping work, in conjunction with General Dynamics Ordnance and Tactical Systems-Canada, is looking at refining the current C77 5.56 mm into a toxic-free option for the CMAR, and that "we have extremely encouraging results in terms of terminal effect and extending current effective ranges from live-fire prototype tests."

Currently, the Army and ADM (Mat) are working towards a validation of the C8A4 as a tangible lead-in to the CMAR project while also grinding through the procurement process.

"The current aim is to finalize the configuration of the C8A4 so that it can become a valid option for the CMAR project," Gendron explained. Having standardized that way should make future procurements relatively straightforward. "If all goes well, the final C8A4 setup should meet the requirements of the CMAR GS and could start replacing the bulk of the C7/C8 fleet."

However, technical challenges with suppressors and optics, supply chain issues, coupled with "chronic shortages of specialized staff," have resulted in delays to the C8A4 and, by extension, the CMAR.

Even so, Gendron said, Colt Canada has produced 500 basic C8A4s which will be distributed to select Army and CAF units "within a month or two," along with different scopes, for "final user input" before the configurations of some key elements are locked down.

"In the first few months of 2024, we're going to have an idea of what we want to change in the configuration," he said. That would include feedback from the units getting those 500 basic weapons. Gendron was reluctant to say which units would be involved because final allocation would depend on which ones are available when the depot is ready to ship. Initial depotlevel distribution is expected in November, and he expects feedback "roughly" by January, at which time a human factors specialist would distill preferences or recommendations into a practicable package.

The Directorate of Land Requirements staff hopes to obtain initial funding in the 2024-2025 fiscal year and start production within two or three years after that. But CMAR timelines and scope remain contingent on the prioritization of staff efforts and funding.

As for that NATO ranking, Gendron said that if the CMAR project works as he hopes, he's optimistic Canada will comfortably return to the top tier when it comes to the Army's small arms effectiveness.



The odds are that, regardless of your rank in the Army, you have literally had your fingertips on something that made you a more effective warrior. That's the C79 optical sight, a key piece of kit designed, developed and manufactured by Raytheon ELCAN for the standard infantry rifle, the Colt Canada C7, which was adopted in 1984 after more than 150 refinements by Colt's predecessor, Canadian Diemaco.

The original C79, which became a valued accessory on many of our allies' rifles after its debut in 1989, really came into its own with the advent of the upgraded C7A1 rifle and its C7A2 successor.

A 3.4-power magnification (3.4x) scope affords more mid-range accuracy out to longer ranges while still providing a reasonable field of view for most distances. Also used on the Colt C8A3 carbine, it has a distinctive green rubber armoured cover which helps it blend with the standard Canadian Disruptive Pattern (CADPAT) uniform.

This Canadian innovation has launched a full spectrum of optical and digital sights, used by allied militaries around the globe. A modified version, the M145, is on the U.S. Army's M240B/L medium machine gun.

The next generation was the introduction of the world's only dual-field-ofview optical sight to the U.S. SOPMOD Kit II in the early 2000s designed and

manufactured for Afghanistan's asymmetric combat environment. Changes implemented after customer feedback included ambidexterity, decreased weight, increased battery life, and an accessory rail integrated into the housing.

Mike Lewis, a Newfoundlander with physics degrees from St. Francis Xavier and McMaster universities, is general manager at Raytheon ELCAN. Headquartered in Midland, Ontario, it's a division of Virginia-based RTX Corp., the aerospace and defence conglomerate rebranded from Raytheon Technologies in July 2023.

Lewis joined the company

as an engineer 17 years ago and eventually was rotated through various management positions before being promoted to his current role in early 2022. It's a career track that has given him valuable insight into the history and potential future of weapons sights.

Looking back at the company's evolution, he noted that in the 1970s, "Canada was at the forefront of Army services and really was renowned across the globe." Among other things, "we were one of the first countries to have an optical sight on its rifles." And it helped that "Canadian shooters have been known across the world as some of the best."

As a result, "we've sold more than 450,000 rifle sights to 60 countries, and all of Canada's allies in some shape or form have rifle sights that have been manufactured here," he stated. Some 70,000 have been delivered to the Canadian Armed Forces (CAF).

The evolution of the C79 not only created a new technology but also jobs at Raytheon ELCAN: some 400 at present and projected to rise to nearly 500 in 2024. Many of its employees are former CAF personnel or are from families with CAF connections. "The pride we take from supporting Canadian

troops and our allies is amazing," Lewis said. "The flip side of that is the Army's perspective; they're getting a world-class Canadian product.

"From the government's perspective, we're creating capabilities in technology and jobs and promoting economic growth. ... That's the kind of thing we want to repeat as we think about how we can better serve Canada and move things forward in terms of what's the next technology they want and how we can partner with Canada to give them the capability that supports the soldier."

He acknowledged that while "it's great" that a C79 sight can be "run over by a tank and still function," it "might not be a great business model" in that it doesn't have to be replaced every five or 10 years. "We know the importance of them and the reliability that's required. [The sight] has got to survive in harsh operating environments. People's lives depend on that."

Still, there's always room for improvement as sight technologies improve. As it focuses on its newer products, Raytheon ELCAN is providing greater magnification and multiple field-of-view functionality. "Most of our customer base has shifted to some of our products that have more capability ... and my expectation and understanding is that Canada is moving toward that, too," Lewis said.



Asked whether product evolution is driven by Army or corporate requirements, he said it "works best when it's a partnership." The company obviously is aware of developments in the market "but the best products happen when the customer is working with us."

With the Canadian Army, feedback can come from individual troopers or through the traditional chain of command and procurement processes. Defence Research and Development Canada (DRDC) is open to testing Raytheon ELCON products, but Lewis believes "there's always an opportunity for us to further that engagement."

Just the day before his time

with *Canadian Army Today*, Lewis had been chatting with a Royal Military College student about a "special project of choice," one of several Raytheon ELCAN regularly proposes to RMC, covering the gamut of factors that go into sight production. "We fund some of those projects and support them with engineering capabilities," he said.

Every year, 30 to 50 RMC students visit Midland as part of a series of visits to the private sector. There also are occasional sessions at Connaught Range in Ottawa, where shooting at distances out to 900 metres is possible.

"In all those instances, we're looking for feedback and to answer questions," Lewis said. "Individual soldiers can provide feedback in addition to the more formal procedures. We try to make it as open and as often as possible."

That also applies in-house at Raytheon ELCAN. Design and engineering are upstairs while manufacturing is on the ground floor, and "there's a constant interchange," Lewis said. "If I go down to the assembly area, I'm just as likely to see an engineer trying to get a handle on the manufacturing process and whether there are maybe potential changes to incorporate on a future evolution."

This Trial's For You

In testing new kit for the dismounted infantry, the Army is experimenting with procurement approaches for the full force.

By Canadian Army Today Staff

f you have noticed more requests for participation by your unit in equipment trials over the past few years, you are probably not alone.

From an integrated soldier information sharing system, to light off-road vehicles, camouflage patterns, clothing, helmets and other personal equipment, the Army is increasingly turning to soldier input before it finalizes statements of requirements or selects a winning bid.

"We want buy-in," said Warrant Officer Duane Gyuricska, the deputy project director of an initiative called Dismounted Infantry Capability Enhancement (DICE) that has delivered a new helmet for the light infantry and is in the process of acquiring a load carriage modular fighting rig for those same units.

The equipment was originally part of an initiative called Soldier Operational Clothing and Equipment Modernization (SOCEM), which includes modernizing everything from footwear, all-weather gear, and gloves to ballistic helmets, rucksacks, and patrol packs.

Because of the nature of the equipment being acquired and the range of soldiers requiring it, DICE was hived off from SOCEM in 2020 to give the team at the Directorate of Land Requirements (DLR) and Assistant Deputy Minister, Materiel (ADM (Mat)) the ability to purchase smaller quantities for specific communities while trialing procurement methods that could inform the larger SOCEM initiative.

"DICE is an initiative, not a project," noted Captain Jun Bae, the project director at DLR. "It looks to enhance and modernize any equipment for the dismounted infantry, primarily the light infantry battalions. But we are also trying to include any enablers and support units that are tasked to do specialized mission profiles."

While DICE targets the light infantry, SOCEM will deliver the same type of equipment for the wider Army, but with some lessons learned from DICE, explained Andre-Marc Dallaire, the section head for personal and night vision equipment at ADM (Mat). "[DICE] gives us a jumping board toward SOCEM. We are testing some of the ways we're doing things with DICE to incorporate those with SOCEM."



The Galvion Caiman. Photo: Canadian Armed Forces

By adopting a more focused approach for equipment like helmets and load carriage systems, the team has been able to conduct controlled trials and gather detailed data and individual soldier feedback on form, fit and performance.

"We expect light infantry to operate in any terrain, ranging from reconnaissance to pioneer and mortar tasks, and we need them to have modernized gear that allows them to do that," said Bae.

Last November, the DICE team travelled to Edmonton to work with members of the 3rd Battalion, Princess Patricia's Canadian Light Infantry (3 PPCLI) on a series of trials to test three helmet options under operational-like conditions, such as moving, shooting, and communicating. The experiments included small arms weapons firing from various positions, and how well the helmets worked with current night vision goggles, gas masks, hearing protection, communication systems, winter gear and the balaclava.

All three options performed well, but members of 3 PPCLI gave the Galvion Caiman the highest rating by a significant margin. "We want the troops to want to wear it," said Gyuricska.

The Army has since signed an implementation order and ADM (Mat) expects to provide the new helmets to the light infantry battalions this fall.

Other units will be asked to provide feedback on how well the Caiman works in their roles in the coming year.

Although the fit of a helmet might seem a subjective matter, the user trials were conducted in a controlled manner. "There was a very structured and scientific method to this evaluation, with a good sample size, to give us reliable information," said Dallaire.

"It was very much a hands-on evaluation," added Alex Legault, a personal protective equipment technologist with ADM (Mat). "People will tell us if the gear doesn't fit them, but in a bid evaluation we have to take that personal element and make it as objective as possible."

There is back-and-forth with industry to ensure equipment meets the Army's requirements, but also that industry input can inform the specifications, Legault noted. The three helmet options were acquired through a phased bid compliance process, with an initial contract for a small quantity.

Soldiers can be brutally honest in their assessment of new kit, Gyuricska acknowledged, and their professional judgment is an important part of the process.

"We really want to push the idea that as professional soldiers, their opinion should matter for the procurement system we are trying to build," said Bae.

Ultimately, the Army needs soldiers to want to wear their gear, said Gyuricska. As a warrant officer, he has never had to tell troops to wear their Oakley glasses. Quite the opposite. Soldiers like the professional look and, in certain circumstances, he must ask them to take off the glasses. Likewise with a new helmet, the aim is to provide gear that soldiers will see as professional and want to wear because it is comfortable and functional.

"This was one of the first trials done in this manner," he said, "and we are trying to shift the process to do this more often. It's become the gold standard. We really want to hear what the end user thinks. We can give them a helmet, but if they don't want to wear it, it's just another fight [to make that happen.]"

CARRYING THE LOAD

The DICE team focus is now on a load carriage system for the dismounted light infantry that would include ballistic plates, fragmentation armour, vests, pouches and packs. A broad user trial with several options could begin between summer and fall 2024, and the team hopes to have a decision and new kit within the next 18 months.

"We are purchasing them as a set so that we don't run into compatibility problems buying one piece at a time with this type of gear," said Legault. Industry will be invited to provide their best solutions for a down-select for the user trials, rather than conform to a detailed list of prescriptive specifications, he added.

From the initial testing with the light infantry and support units, the SOCEM program will then assess how well the load carriage system works for other units across the Army. The Army wants a set of equipment that is lightweight and functional, Gyuricska said, but also modular and easily customizable.

"We are looking at reducing burden. Not just physical burden but mental burden as well," he said. "We want to make sure that the kit we give soldiers is going to be easy to use. Maybe I don't want a certain pouch on my left side. Maybe I like my vest a little higher on my waist. [Troops] want that sort of adaptability."

Some accessories such as a medical kit will need to be in the same easily identifiable pouch and on the same side of every soldier, but some jobs may require different kit or more ammunition, and soldiers may perform multiple tasks in a unit.

"You may have several jobs and you may need to modify your kit to do that," Gyuricska said. "Uniformity is not the answer to that solution. We need specific pouches to hold specific things, but sometimes where that goes might not be as important as it once was. We want to give soldiers the ability to expand the number of pouches if needed, especially on operations."

As part of the DICE initiative, the team is paying particular attention to sizing and armour plating that can be adapted to fit all sizes and shapes. But the solution it selects for the light infantry won't necessarily be the final word, said Bae.

"For SOCEM, we have the ability to change and write different requirements if we realize that the DICE [solution] is not working for some set of people."



HARD DRIVING

Under RAMD, the Army has subjected its new Armoured Combat Support Vehicles to a tough test.

By Ian Coutts

We've all heard that old line about someone who, perhaps after a night of convivial socializing, resembles "forty miles of bad road." Try 20.000 kilometres.

That's what the Army is subjecting four new Armoured Combat Support Vehicles (ACSV) to. Bad roads, tough terrain and pretty much anything else that they can throw at them. All to make sure that by the end of the evaluation — however many miles or kilometres each ACSV may traverse — the vehicles do not resemble or operate like all that bad road.

That's Reliability, Availability, Maintainability and Durability (RAMD) testing.

Canadian Army Today recently spoke with Major Alex Bazinet, RAMD Test Director for the ACSV project, and Major Phillip Gartner, project director for the Directorate of Land Requirements' Armoured Vehicle Systems, about the testing the ACSV underwent from August 8 to October 6, 2023.

The Army has ordered 360 ACSVs from General Dynamics Land Systems-Canada (GDLS-Canada), in eight separate configurations, ranging "from the ambulance and troop carrier to the fitter/

cargo variants, to the CP [command post] and EW [electronic warfare] versions, to the engineering variant and a repair and recovery vehicle," Gartner explained.

They will replace the LAV II Bison, which first entered service in 1990, and the M113 tracked armoured personnel carrier, a Beatles-era piece of equipment that was adopted in 1964. The design and production stages for the CP, troop carrier, and ambulance variant are by this point largely done. The Army accepted the first four ambulance variants at a ceremony in Petawawa on October





19, and will deliver a total of 49 of the medical platforms to bases in the coming months.

That being the case, it might seem strange that what appears to be key testing started in just the past two months. Would it not make more sense to do the RAMD evaluation much earlier, perhaps even as computer simulations?

"Simulations could work as an initial first step to predict where we might see issues in a platform," said Gartner, "but a simulation is only as good as the person programming it. It doesn't actually predict how a vehicle will be used in real life."

With RAMD, they take the ACSV and push it as hard as possible to see how it fares.

"How long can something be relied on before it breaks?" said Bazinet. Then, "if something were to break, is it really hard to fix and [does it] maybe take special tools? If an operator can do it and it's easy to fix, then it's easily maintainable."

If that answers the challenges of reliability and maintainability, there is then the question durability — how hard something is to break. Add them all up and, to mangle the old song, and they spell availability.

To evaluate the vehicles for these qualities, the Army subjected them to a range of tests. These included driving them hard, far harder than an armoured vehicle like the ACSV might normally be subjected to, and testing seemingly innocuous gear. The four test vehicles — two ambulances, a CP, and a troop carrier — each have their little differences. The CP version of the ACSV, for example, has special fold-down seats in the back and a platform for an observer built in.

During testing, "we had a soldier hit that platform again and again," said Bazinet, comparing it to that machine at Ikea that simulates a sofa being sat on repeatedly.

What they look for are what the Army refers to as "incidents."

An incident could be anything from a plastic part that snaps off in someone's hand, to a major system failure. They then want to figure out why the incident occurred. In a case where something broke, "did it break because the hardware broke, or did it break because [the vehicle] got into an accident or maintenance did not follow the proper procedure? Or was there a training accident?"

It's important, Bazinet said, to distinguish between those instances that are external to the goals of RAMD testing and ones that represent problems that suggest there are shortcomings in the vehicle that do not meet the contract requirements.

The officers conducting the RAMD tests collect

information about possible instances in several different ways. "We can use some of the onboard maintenance devices that are on the vehicle," he said, including health usage monitoring systems in vehicles.

They also depend on the Quality Engineering and Testing Establishment, which can place instrumentation on the vehicle that "can report a lot on drive throttle positions, left-right steering, selection. They can also measure inputs from the engine and transmission," he explained.

"But we also need real feedback from people on what they see and hear while driving the vehicle. Combine all that together and you get a pretty good idea of what's happening when an operator says, 'I was doing this when this happened.'"

"We're discovering a lot of not just bugs, but interesting observations from drivers, maintainers and operators on how the vehicle interacts with the environment," added Gartner.

After the RAMD data is collected, "what we're going to do is finalize all the scores of all the different instances that occurred, and discount the ones that don't apply, and that'll give us the result," said Bazinet. "GDLS-Canada will do their own analysis and then we're going to review answers to see if they meet our requirements."

Land-Air Integration

On the Advanced Tactical Aviation Course, Army captains learn the art of combined arms planning and execution with Griffons, Chinooks and other air assets.

By Chris Thatcher

On a clear, cool morning in mid April, a platoon from Charlie Company of the 3rd Battalion, Princess Patricia's Canadian Light Infantry (3 PPCLI) loaded into three CH-146 Griffons and a CH-147F Chinook and lifted off into the training range of 4 Wing Cold Lake to retrieve a downed fighter pilot evading capture behind enemy lines.

Over the previous 24 hours, Jack, as they were calling him, had been on the move, meeting communications check-in windows while an uncrewed aerial system (UAS) monitored his progress from above.

A tactical aviation air mission commander (AMC) and a ground force liaison officer had planned, briefed, and rehearsed the extraction mission, playing out possible courses of action (COAs) and building in contingencies. Intelligence briefers had apprised them of suspected enemy strength and surface-to-air threats, including radar-guided missiles and man-portable air-defence systems (MANPADS).

Throughout, the aviation battalion commander and senior officers had challenged their possible COAs, offering up alternatives or pressing for what would constitute a go/no go decision point. If they lost contact with Jack and could no longer confirm proof of life, would they still risk the mission? What if they lost that overhead intelligence picture? Did they have secondary landing zones (LZ) if the enemy was too close to their primary extraction point? Was close air support and suppression of enemy defence available throughout? Casualty evacuation? What was the plan for a downed Griffon or Chinook as they approached the LZ? And if so, where would the recovery aircraft be located? How far forward could they safely locate the forward arming and refuelling point?

Their detailed plan attempted to address all of that as well as the use of other enablers such as a joint terminal attack controller and supporting fires from artillery and the air to take out the surface-to-air systems and to create a diversion before they approached their objective. They even mapped out the covering arcs of fire for the Griffon door gunners holding overwatch positions, and which side of the Griffon the infantry would disembark from once they landed.

In the hours before they launched, the plan changed. A strike on the nearby airfield had reduced the number of surface-to-air threats, but enemy forces were congregating in the vicinity of the LZ, and the UAS was vectoring Jack to an alternate location. Reconnaissance, however, showed that the new site



might be too narrow to land two helicopters at the same time, so the AMC and Army liaison officer were proposing one land and unload soldiers while the other provided a screen; they would then switch roles. In the end, they and the battalion commander agreed to make that call when they reached the LZ.

The aircrews and infantry were participating in the final phase of the Advanced Tactical Aviation Course (ATAC), a test of complex combined arms mission planning and execution that was last held in 2017, due primarily to the global COVID-19 pandemic, and to the operational tempo of tactical aviation. It's a course helicopter pilots like to call their equivalent of the U.S. Navy Fighter Weapons School program, Top Gun.

A step up from the annual Basic Tactical Aviation Course (BTAC) – where pilots build their knowledge of tactical aviation operations and the skills to lead small sections of aircraft – ATAC represents the apex of training.

In addition to commanding larger formations, pilots are thrust into the challenging environment of combined arms. They are evaluated on their ability to collaboratively plan and execute dynamic missions such as air assault, strike coordination and reconnaissance, non-combatant evacuation, personnel



recovery, fire support, and others, with a mix of fixed- and rotary-wing assets, integrating land forces, tactical command and control systems, enabled by ISTAR (intelligence, surveillance, target acquisition and reconnaissance) assets, fires and other integrated effects.

"What we want people to walk away with is the ability to execute in complicated joint situations, to be able to execute in the chaos," said Major Geoff Martin, the officer commanding the Aviation Tactics Flight (ATF) at 438 Tactical Helicopter Squadron, and the chief instructor for ATAC.

"A lot of what we're evaluating here is their ability to provide their own intent, provide their own tasks to their subordinate commanders, and then manage and supervise that team, both in planning and during execution," he said.

ATAC was delivered in several phases, beginning in mid-February with two weeks of distance learning, followed by two weeks of ground school in Valcartier, a week of mission rehearsal and tactical training, and then the final four weeks of mission planning and execution in Cold Lake.

While the core skills of an AMC have not changed since 2017, the context in

which they apply has. The Russian invasion of Ukraine and the shift in training to a peer enemy was a constant backdrop to the ATAC scenario.

A ground liaison officer explains his plan to the aviation battalion commande Photo: Chris Thatcher

As part of the effort to rebuild the course after five years and fill any knowledge gaps, the 438 Squadron ATF team sought guest lectures from a wide range of global specialists, including the U.S. Army Aviation 10th Combat Aviation Brigade Commander, a Royal Netherlands Army officer expert in air defence, U.S. Army MH-60M Black Hawk and A-10 Thunderbolt II experts on joint recovery of downed aircrew, a U.S. Army Aviation 3-10 GSAB UH-60M pilot, a U.S. Marine Corps weapons and tactics instructor, a U.S. Marine

Special Operations Command Marine Raider Support Group AH-1Z pilot and fires officer, and a U.K. exchange Chinook pilot with combat experience in Afghanistan and Mali.

The 11 AMC candidates were drawn from across 1 Wing and included two captains from the Army, one from the 2nd Battalion, Royal Canadian Regiment (2 RCR), in Gagetown, and one from the 3^{ell} Battalion, Royal 22^{el} Régiment. The members of 3 PPCLI brought the realism of inserting infantry troops and served as some of the ground force liaison officers.

"Integration between the Army and aviation is a difficult thing to achieve," acknowledged Major Yvon Voyer, an armoured officer who serves as the land tactics advisor for the ATF at 438 Squadron.

"If [Army members] can't understand the requirements to make aviation function properly in force projection, that leads to a lot of difficulties integrating. The Army will ask something of aviation that they're not necessarily able to do. And if the aviation doesn't understand exactly what the Army wants, then the default answer can often be 'no' because of risk to personnel, risk to mission, risk to equipment, etc."

Because helicopter time is limited, the two communities often training in silos, he noted. Tactical aviation operations "is not a knowledge base that is spread across the Army – it's very focused in certain spots."

For the Army, ATAC represents a rare opportunity to collaborate on those skills and build a network of relationships with aviators.

The ideal ATAC candidate is a graduate of the Army Operations Course (AOC), a captain with combat arms planning experience. "This year, because of the short timeframe and the number of personnel being deployed, we have some junior guys," said Voyer, a convoy escort commander in Kandahar, Afghanistan between 2007 and 2008, and then a staff officer at Regional Command South between 2009 and 2010.

"We have adapted what we're evaluating those junior guys on to fit their level of background. But they'll come out of here much stronger experts in aviation," he said. "What I want these Army candidates to do is be able to explain aviation in the Army and be able to explain the Army to aviation, and really bridge the gap of knowledge between the two groups."

Captain William Hand of 2 RCR was admittedly not the AOC-qualified candidate they were seeking. But he arrived with experience as a LAV captain on Exercise Maple Resolve in 2022, "working with the combat team and maneuvering the company's LAV as per the [commanding officer's] intent."

The introduction to helicopter operations was a "massive learning curve for me," he said, adapting to new acronyms and terminology, and developing an understanding of threats to tactical aviation.

"From the ground perspective, it's interesting to see how they perceive threats versus how we perceive threats," said Hand. "We perceive threats more from indirect fires, whereas they're more [concerned with] direct surface-to-air missile and MANPAD threats. It was a challenge to integrate those in my mind and function them together."

Mission planning had to account for the availability of helicopters – the larger Chinook is key for any significant insertion of troops – the duration of an operation, and the location of fuel. There were also terrain considerations such as firmness of the ground and clearance from trees. "A ground guy might not be so happy to be dropped off a kilometer or two away from the objective," he noted, "but in reality, it's probably a good thing because then the air assets are safer from ground threats."

"I've learned exactly what information I need to extract from the ground force to help tailor the aviation plan," he added. "I'm fortunate to be on this course, and have all the knowledge of tactical aviation. Most infantry officers



don't get this experience."

Throughout the weeks of mission planning and execution, there was a constant push and pull between Army liaisons and the AMC candidates. In some cases, the Army member was the more experienced operator, in others the AMC had years of real-world mission planning with allies in Iraq, Afghanistan, Mali and elsewhere.

"What I really liked was the strong understanding of commander's intent and unifying purpose," said Major Lex Luciak, the officer commanding Charlie Company, whose members provided the ground tactical plan. "That makes things a lot easier from a ground force perspective — we're all working toward the same goal. There [wasn't] an occasion where the [Air planners were] not able to allocate resources to a specific problem to set the conditions for Charlie Company's success on the ground."

Successful collaboration is about "finding common areas within the planning process," he suggested, and knowing the questions to ask to bridge any gaps. "What I see with the candidates, especially with the ground candidates who may not have the experience that the air mission



to build it to that next level."

With an array of expertise at their disposal, air mission commanders "need to be able to bring those people to the level appropriate to have the best effects on the battlefield," said Voyer. "What we're trying to teach, as well, is for people to not be as nervous about asking questions or letting people know what they don't know, so that the experts around the table can help."

Ultimately, he said, the goal is to learn how to build plans for complex problems that can be adapted to the reality on the ground.

"What we're trying to get these candidates to do is go through the planning process, make sure you know where your holes are, and make sure you know what kind of contingencies you can employ on the ground, and when you encounter a situation that's not exactly what you expected, but something you considered, then you have a rapid avenue to be able to deal with that problem and continue on and have success with your mission," Voyer said. "The better the plan that they have going in to meet the enemy, the more likely that they'll come out successful at the end."

With the Air Force into the early stages of the next Tactical Aviation Capability Set (nTACS), a program that will eventually replace the CH-146 Griffon, the more Army members who understand aviation, the more information the Army will be able to provide about the capabilities it requires, he added.

"We want people to be experts in at least thinking about how you employ aviation, about the possibilities of what aviation can offer, and then be able to transmit that up the chain of command and transfer it over the Air Force. The more you know about aviation, the easier it is to articulate the Army's needs." ■

Our troops are ready

Home to some of the Army's unique capabilities, 5th Canadian Division is preparing for global deployment while still focused on domestic operations.

By Tim Dunne

Once seen as the Canadian Army's "Cinderella," 5^{th} Canadian Division (5 Div) has undergone growth, transformation, and reorientation under a series of transformational leaders.

From the 1967 Canadian Forces Reorganization Act until Sept. 1, 1991, it bore the title Atlantic Militia Area, largely Reserve with a modest Regular force support complement. With the nationwide reorganization of the Army's regional command structure, the militia areas disappeared, and the region's Regular and Reserve units were integrated under the senior Army officer within Canada's four areas – Atlantic, Quebec, Central (Ontario) and Western (Manitoba, Saskatchewan, Alberta and British Columbia).

A new name, Land Force Atlantic Area, reflected new responsibilities. It integrated the Reserve force component with the Canadian Ranger Patrols in Newfoundland and Labrador, and Regular force infrastructure within the Atlantic Provinces. In 2013, it was rebranded 5th Canadian Division.

On July 16, 2022, Brigadier-General Stéphane Masson assumed command of the division and the stewardship of the continuous process of modernizing the Army within his jurisdiction.

"Fifth Canadian Division has evolved over the last few years," Masson said. "We have two reserve Canadian Brigade Groups, 36 and 37. But we also have the newest Regular force brigade, 6 Canadian Combat Support Brigade. Six Brigade is an integral part of 5 Div and the Canadian Army, even though it is spread over seven provinces, with its headquarters in Kingston, ON.

"Through 6 Brigade, we provide unique capabilities not found elsewhere in the Army, and we provide it to First, Second and Cinquieme (Fifth) Brigades. Everything that 6 Brigade provides is unique to the Army and unique throughout the Canadian Armed Forces (CAF)."

Fifth Division's Regular force component is 2,300, Canadian Rangers number 1,150, and the Primary Reserves are 3,200, all supported by 650 civilian members.

"A Canadian Army division's fundamental role is to support both the Army and the CAF, from both an expeditionary perspective and domestically. So, if I were to put it in an overall framework, we are to become more agile, scalable, and responsive. We need to learn, or perhaps more accurately, relearn how to be small and agile," Masson said. "The principal challenge with deploying



larger units is that it takes so much time — too much time — to mobilize.

"This is the philosophy that I have implemented in the division. So small teams tomorrow, rather than the 100 percent solution too late."

The CAF as a whole is facing stark problems with which the entire Army must contend, Masson acknowledged.

"Our number one priority is people. The Chief of the Defence Staff was quite clear about this. We are in a staffing deficit. We don't have enough folks. And when we look at what's in the personnel pipeline, there are not enough people coming in.

"We need to take care of those who are in service now — those who have committed to serve. We need to make sure that they understand the needs of the service. Our job as leaders is to find the sweet spot between the needs of the service, the needs of the family members, and the needs of our members. We need to invest in the folks that we have. This is the number one priority.

"And, in meeting the demands of the contemporary Army, we have to

recognize that the Canadian population mosaic is different than at any time in our history. Our composition must reflect that mosaic to broaden and deepen our strength and help us build the Army we need for the future."

The next priority is readiness, said Masson. "Our team of Regular force, Reserve, Rangers, and civilians must continue to be prepared to support operations at home and abroad. Whether that is domestic humanitarian assistance and disaster response, counterterrorism and peace support operations, or high intensity combat operations, our goal is to be ready when and to where we are called to deploy."

That means keeping a cautious eye on the geopolitical horizon, he noted.

"We have a well-defined mandate, and we can expect the [government] to assign additional resources and personnel to our partners in Eastern Europe. So, we are conducting detailed contingency planning to figure out what we can provide. I can assure you that once that call comes, this division will step up and deploy our unique capabilities overseas."



Members of the 1st (Halifax-Dartmouth) Field Regiment, 84th Independent Field Battery, and 38 Canadian Brigade Group learn to fire the 105mm LG-1 Howitzer and the 84mm Carl Gustaf during Ex Tempest Gunner in April 2023. Photo: WO James Roberge



Members of 36 Combat Brigade Group conduct weapons training on the C16 automatic grenade launching system in April 2023. Photo: MCpl Trevor Matheson

Canada's size, diversity and pluralism has always been its most visible attributes as well as its challenges, and 5 Div is not immune to the strictures of these factors.

"The fact that this division is spread over seven provinces challenges us to deal with different physical locations, so the span of control of my commanders is quite challenging. It is their responsibility to ensure that our folks are trained and well taken care of despite not seeing them face-to-face every week.

"It is challenging. But also from a Reserve force perspective, we are competing with civilian employers for people. We have challenges to attract younger Regular force retirees back into the service as Reserve force members. So much is related to the challenge of staffing. But the reality remains that we need talent, we need people who are dedicated to this business."

As part-time soldiers, and contingent on circumstances, training reservists to the Army-wide standards of operational and tactical manoeuvre, field craft and effective use of a growing array of weapons and equipment can be an

additional requirement.

"We train to the same standard right across the Army, whether it is a rifle, a howitzer or driving a truck," said Masson. "However, the way that we differentiate full-time and part-time soldiers is their proficiency level. If there's a requirement to mobilize that part-time soldier into a full-time cadre, we will give them up to six months of full-time employment to attain that proficiency level necessary for either domestic or expeditionary employment. We have done that with great success in Afghanistan and other theatres.

"We have 5 Div soldiers in Latvia [under Operation Reassurance] and in the Middle East as part of Op Impact. Soon we will deploy troops to Poland to support Ukrainian Armed Forces training and capacity building for Op Unifier."

The division's soldiers, commanders and commanding officers are keeping an eye on the worrisome events in Europe. Russian aggression in Ukraine violates international conventions that have been in place since the October 1648 Treaty of Westphalia, which ended the Thirty Years' War and solidified international frontiers in much of Europe.

"We are affected," Masson said solemnly. "We are going through contingency planning to be able to reinforce our current commitment in Eastern Europe whenever we are called upon. We are learning from our partners' successes and their lack of success. We are adapting our training to ensure our soldiers are ready to face this threat in the European theatre.

"For now, we just wait. But when the call comes, we will be ready. We did this for Op Lentus when this division stood up and answered a call to support three of the four Atlantic provinces after Hurricane Fiona. Fiona recovery was the largest, most complex domestic operation that the division had to support, and I am personally proud to say that my soldiers did that with great success. We had Regular force teams and Reserve members that mobilized to a full-time cadre, as well as the Canadian Rangers who made an impressive contribution in southwestern Newfoundland."

While preparation for international conflict has become a major preoccupation for 5 Div's senior leaders, domestic responsibilities remain front and centre.

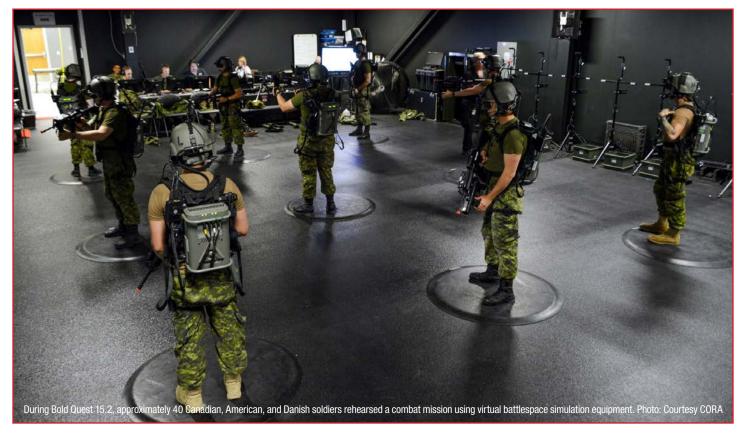
"We take training for domestic response very seriously. We have a dedicated training plan and prepositioned equipment in strategic locations across the region," he said. "When the call comes for the most common tasks such as flooding, hurricanes or blizzards, our troops are ready.

"It is a story we need to get out to inspire diverse and talented people to join our ranks. By connecting with people in the communities where we live and work, we can share what we do on behalf of Canadians and hopefully get them to want to be a part of what we do. We need people who want challenges, people who can work in a team, and [people who] are capable of taking a leadership role. We need talented people from all walks of life and backgrounds, and we need them now."

Major Tim Dunne, CD, is a retired public affairs officer. His service includes peacekeeping and peace support operations in the Middle East and the Balkans. He is the recipient of numerous awards, including a citation from the Privy Council of Canada.



A candidate from 4th Engineer Support Regiment's Expedient Route Opening Capability (EROC) section commander course in June 2023. Photo: MCpl Samuel Martell



Science in support of trials, exercises, live experiments, and tech demonstrations

by Maude Amyot-Bourgeois, Dr. George Nikolakakos, Dr. Katherine M. Banko

The Canadian Army, both alone and with allies, regularly conducts live and computer assisted exercises (CAX). Often incorporating military simulation and virtual components, these activities can be used to achieve a variety of goals including the identification of capability gaps; exposure to near-ready technologies to improve procurement; the trialing or experimenting of new equipment and associated tactics, techniques, and procedures (TTPs) (e.g., Bold Quest); exploring new organizational structures and/or concepts (e.g., Exercise Virtual Bear); and conducting large-scale training to meet force generation requirements (e.g., Maple Resolve and Unified Resolve).

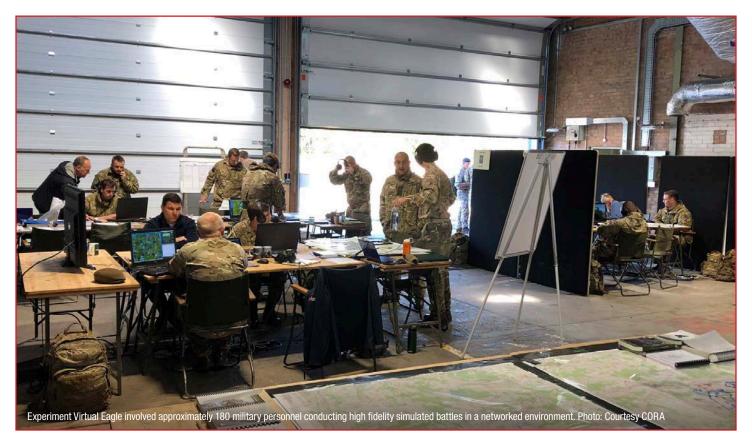
Operations Research Scientists from the Centre for Operational Research and Analysis (CORA) have a long and successful history of providing rigorous analytical support to such events. Past efforts have included developing experimentation and data collection plans, providing assessments and recommendations to improve aspects such as TTPs or the simulation environment employed, and collecting and analyzing post-exercise data to help evaluate the effectiveness of the exercise and make recommendations for the next cycle.

This article highlights several activities that have been supported by the CORA Canadian Army Operational Research and Analysis Team (CA ORAT) in recent years.

DOMESTIC EVENTS

The on-going conflict between Ukraine and Russia has highlighted the vulnerability of traditional large, static, centralized command posts (CP) on the modern battlefield. To counter this vulnerability and enhance the survivability of future CPs against near-peer opponents, the Army recently developed and explored a new decentralized CP concept. Termed the expeditionary dispersed brigade CP, the concept involves operating with distributed and highly mobile CPs which function as communication nodes.

In November 2022, the 2 Canadian Mechanized Brigade Group (2CMBG)
Headquarters and Signals Squadron explored the distributed CP concept during
Exercise Virtual Bear. A secondary objective of the exercise involved partnering
with industry to trial a new command and control (C2) software tool as part of the
Army's digital transformation efforts. The exercise participants were separated
into different nodes, each with a specific operational function, and the nodes



were geographically distributed across Canadian Forces Base Petawawa and Gagetown. Information from a simulated combat scenario was relayed to the nodes who each carried out their relevant tasks within the context of the new CP concept.

Over the course of the exercise, data was collected through observations, interviews with exercise leads, and discussions with exercise participants. Recommendations toward establishing future CP-related experimental approaches and data collection plans were provided.

The Army Intelligence Regiment is currently developing and executing a series of computer-assisted training exercises in collaboration with the Canadian Army Simulation Centre (CASC). The primary objective of this project is to develop and trial a customized synthetic training environment (STE) that will enable demanding and realistic intelligence training. To that end, the exercise leads requested analytical support from the CA ORAT to aid in investigating the simulation requirements for developing an optimally tailored STE. **Exercise Rising Star**, a section-sized intelligence training exercise conducted May 2023, served as a major first step in this initiative.

The STE applied during the exercise consisted of four separated Intelligence Support Teams (IST) that reported to a simulated command post headquarters. Each IST conducted intelligence tasks based on real-time feedback from a simulated battle played by interactors. The event was used as an opportunity to gain insight into the requirements for achieving an effective intelligence-focused STE and to assess the execution of the exercise. The assessment was based on pre- and post-exercise survey data from exercise participants, supplemented by interviews with participants during the event.

The study identified priority intelligence-focused simulation requirements (e.g., sensor, terrain, environmental effects) and examined potential limitations of the STE architecture and overall exercise execution.

MULTINATIONAL EVENTS

Bold Quest (BQ) is a large-scale technical demonstration and experimentation event with participation from almost two dozen allied countries; the overall emphasis of BQ is interoperability. A series of three BQ events that benefited from operational research support are highlighted below.

For **BQ15.2**, the Canadian Army Land Warfare Centre (CALWC) undertook an assessment of military ethos and social (unit) and task (mission objective) cohesion within a dismounted infantry platoon. Using a combined training approach, approximately 40 Canadian, American, and Danish soldiers rehearsed a combat mission using virtual battlespace simulation equipment (VBS3). They then executed the same mission in a tactical environment using simulated munitions with actors playing the role of insurgents. Prior to the exercise, cultural differences between nations were evident regarding levels of trust, however, these effects disappeared over the progression of BQ15. Even when sections/squads were mixed with soldiers from different nations, it did not negatively impact ethos or cohesion measures.

In **BQ 16.2**, CALWC undertook an assessment of how the addition of a technological system (Net Warrior) into dismounted infantry teams impacted team performance, situational awareness, and operational effectiveness. Approximately 90 Canadian, New Zealand and American Army personnel from dismounted infantry sections participated as part of a regular tasking. The addition of the technology improved perceptions of performance and situational awareness. There was no evidence to suggest that it increased cognitive load to the point that it was not manageable.

Furthering the previous work on interoperability and the effects of technology on load and small team effectiveness, in **BQ17.2** Canadian, New Zealand, American soldiers and Marines wore different battle management systems (BMS) while conducting a variety of day and night tactical missions.



The ability of the Integrated Soldier System Suite (ISS-S) to integrate with other dismounted BMS to improve situational awareness and, as a result, increase operational effectiveness, was tested. For technical interoperability, data sharing required third-party service.

From a human dimension perspective, the company, platoon, and section performed as a cohesive, mission-focused unit. The BMS improved situational awareness and enhanced tactical performance.

Long term experimentation plans such as those applied to BQ can provide the greatest benefits as was demonstrated in the BQ series. Repetition and extension are the hallmarks of robust scientific work and with proper planning can be applied effectively to military settings.

Experiment Virtual Eagle, organized and run by the British Army and analysts from the U.K. Defence Science and Technology Laboratory (DSTL) with support from allied analysts, incorporated approximately 180 military personnel conducting high fidelity simulated battles in a networked environment. The experiment assessed the effectiveness of the future U.K. Funded Force (FF25) Armoured Infantry Battle Group against a representative peer threat. A secondary experimental goal was to evaluate the potential for employing a battle group level virtual laboratory based on VBS3.

The experiment enabled the British Army to explore new operating concepts and doctrine related to their future force. Insights from the event were further leveraged by the CA ORAT to develop a method that could be applied by the Canadian Army to conduct similar studies that combine existing virtual simulation training exercises with experimentation objectives.

LOOKING AHEAD

In the present complex and resource-competitive environment, it is increasingly important that militaries leverage training exercises and warfighter experiments to extract valuable data and insights. Scientific support from CORA researchers can provide valuable analytics and experimentation tools and approaches during the planning, execution, and post-exercise analysis phases of these events. The authors encourage Army organizations to reach out to the team to explore potential opportunities for future collaboration (please email Maude Amyot-Bourgeois at <a href="mailto:mailto

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The Power of Words

"Continual professional development underpins the profession of arms, and reading offers us access to the experience, perspective, and expertise of others," Lieutenant-General Joe Paul writes in his introduction to the Commander Canadian Army Reading List.

If you're often asking colleagues, "What book do you recommend," consider the Commander's reading list a good place to start.

If a book is not interesting enough to pick up on a Saturday night, "it probably doesn't belong on the list," said Colonel Kyle Solomon, Commandant of the Canadian Army Command and Staff College, which has curated a selection of books by rank and five broad themes.

The reading list was last published in 2015, and ran some 140 pages of suggested titles. Seeking a format more befitting the Army's digital transformation, the College has moved the list online, to its Line-of-Sight portal, and has limited it to a concise 60 books.

"We did not want a big, imposing list," said Solomon. "We wanted to generate a professional development resource that was designed for all Canadian Army members."

The list is based on three principles: Being accessible, relevant, and purposeful. The digital organization and the availability of many of the books in e-book or audio format through the CAF Virtual Library help with the first.

The list is organized by rank level, and then by the five categories of foundation, history, useful fiction, emerging ideas, and the human dimension. Applying certain books to each rank provides a way to suggest topics the Army believes are relevant for each level of leadership, Solomon noted, but it's not

restrictive. "We're saying, here's a place to start ... but there's a wider selection of books we think are interesting and relevant."

About 60 percent of the titles are Canadian, ensuring the content is purposeful to the Army – many will not be on the reading list of any other army. But the rest include ideas from around the world, he said.

"If you are brand new and want to understand what it's like to be on a fighting patrol, you can crack open [Ryan Flavelle's] *The Patrol*, a Canadian's first-person experience of what it's like to do that in Afghanistan."

A senior non-commissioned officer, attempting to counter disinformation in a unit, might find *Critical Thinking* or *War in 140 Characters* relevant. A senior officer working on, maybe, deploying a brigade to Europe, might gain insight from Peter Kasurak's *A National Force*, a history of the Canadian Army since 1950 when the Army last supported a brigade in Europe.

New to the list is the inclusion of useful fiction, "a great tool for imagining possibilities," said Solomon.

The list includes science fiction battles with aliens — Robert Heinlein's popular *Starship Troopers* — and more practical assessments of the future, such as Andy Weir's novel, *The Martian*, a book about innovation and adaptation. "What do Canadian soldiers do on every mission? They innovate, they adapt because the environment is uncertain, complex, full of ambiguity, fog and friction," he said.

"I'm a big fan of using useful fiction for understanding what warfare in the land domain could look like in the future. It frees you from the shackles of policy constraints, political constraints, capability constraints, [to] explore the edges of what you might come in contact with. And there are some terrific books on here."

Strategist P.W. Singer is one of two authors to make the cut twice, with his novel *Ghost Fleet*, about the next World War, and *Likewar*, about the weaponization of social media.

The digital format, supported by analytics about reader preferences, allows for frequent change. Solomon is planning an evergreen approach, turning over about 10 percent of the list each year. "That will help keep it fresh and adopt new books that have just been published." Army members are also invited to offer their own recommendations.

The hardest part of compiling the reading list was deciding which books were not going to make it. "There is so much good literature that could have been on the list," he acknowledged. "It was tough narrowing down that list."

Solomon was reluctant to name a favourite, but he said he had read about half the list and was in the process of finishing *Backpack to Rucksack*, a book on leadership and resilience by Daniel Zia Joseph.

"My challenge to Army members would be: If you haven't read a book on this list, read one. If you have read a book on the list, read all the books that are indicated for your rank level. And [if you have already done that], join me in the challenge of reading the entire list."

Scan For Reading List



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