

CELEBRATING TWO YEARS

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Good News Stories



Leading North Atlantic Treaty Organization effort to test artificial intelligence against camouflage in the field

DRDC Valcartier Research Centre, hosted a major international field trial this September. It brought together defence scientists and military personnel from 10 North Atlantic Treaty Organization (NATO) countries to explore how artificial intelligence (AI) interacts with modern camouflage and deception techniques. The trial, called Men Against Machines (MAMBA), was organized by DRDC's electro-optical warfare and electro-optical surveillance and reconnaissance teams. It was part of the NATO Science and Technology Organization research group SCI-359, which studies how AI can detect, or be fooled by, camouflage, concealment, and deception (CCD) techniques.

Held at the Canadian Forces Base Valcartier, from September 2 to 12, the trial tested how well commercially available AI systems could identify military assets hidden using CCD techniques. Personnel and vehicles from the 5th Canadian mechanized brigade group used a range of camouflage tools during simulated operations, while drones equipped with AI-driven sensors attempted to detect and classify them.

More than 120 participants contributed to the success of MAMBA, including military operators, scientists, and international collaborators. The campaign marked the first time NATO has directly tested CCD against AI in a realistic field setting.

As AI becomes more integrated into defence systems, and increasingly used by adversaries, understanding its strengths and limitations is critical. The data collected during MAMBA will help refine CCD strategies and ensure they remain effective against emerging threats. It also supports DRDC's broader mission to provide the Canadian Armed Forces (CAF) with science-based solutions for future operations.

Refurbishing a key underwater explosion test facility

After 3 decades of service and hundreds of controlled detonations, the underwater explosion test pond at DRDC, Suffield Research Centre has received a major upgrade. Originally built in 1994 for just \$30,000, the 50-metre-wide artificial pond has been a vital tool for studying underwater blast effects, supporting research into naval platform vulnerability, mine neutralization, and diver safety.

These modernization works included rebuilding the containment earth berm and installing modern ultraviolet-stabilized geotextile and geomembrane liners to improve durability and environmental protection. Once refilled to its full 6 million litre capacity, the pond will be ready to support another 30 years of cutting-edge defence science.

This upgrade ensures DRDC can continue delivering high-impact research for the CAF, helping to keep personnel and platforms safe in underwater environments.

Cutting through Arctic ice to support operation NANOOK-NUNALIVUT 2025

This past winter, DRDC technologists supported the CAF dive operations in the Arctic by cutting through nearly 3,400 kilograms of ice in Tuktoyaktuk, Northwest Territories. The work was part of operation (Op) NANOOK-NUNALIVUT 2025, a key annual Op focused on Arctic readiness and sovereignty.

To enable under-ice diving in the Arctic Ocean, DRDC used its custom-designed hot water drill system. Based on heat exchange principles, the system melts precise holes through thick ice, allowing large blocks to be safely removed. This innovative approach made it possible for the Dive Task Force to access the frigid waters below and carry out their mission.

DRDC's contribution highlights the organization's ongoing role in supporting Arctic operations through science and technology. We are ensuring CAF personnel have the tools they need to operate safely and effectively in Canada's North.



DRDC Spotlight

A new chapter for DRDC



As the year draws to a close, it's natural to reflect on what we've achieved and to look ahead at the opportunities before us. DRDC has received increased government attention and funding for defence and security research. This investment reflects Canada's commitment to strengthening the capabilities of the CAF in response to rising global conflict and geopolitical instability. DRDC is using this new funding to support the growing need for Canada to protect itself.

Science and technology are advancing at an extraordinary pace. Drones, satellites, AI, robotics, 3D printing, virtual reality, cybersecurity, and quantum technologies are just some of the new technologies that are increasingly used in defence. The Government of Canada, along with the rest of the world, has realized that technology is the key to maintaining a strategic advantage. It enables militaries to be more agile, prepared, and effective in this new era of evolving global security challenges.

DRDC's mandate is to lead defence science and technology and deliver solutions that matter to the CAF. With a budget that has grown nearly sevenfold compared to previous years, we are positioned to accelerate innovation and provide cutting-edge capabilities that help the CAF meet today's challenges and prepare for tomorrows.

Modernizing existing defence

One clear example of this commitment is the North American Aerospace Defence Command (NORAD) modernization science and technology (S&T) (NORAD mod S&T) funding. Through this funding in S&T, DRDC will play an important role, future proofing capabilities to defend North America.

It is not about meeting today's challenges but rather anticipating

those of tomorrow. Backed by \$4.3 billion over 20 years, the NORAD mod S&T investment ensures Canada's defence capabilities remain agile and resilient in an era of rapid technological change. NORAD mod S&T positions Canada to lead in advanced technologies and maintain a strategic edge.

Guarding the North

Canada is facing the most complex security environment since the Second World War. Technological advances mean that distance and geography no longer provide the protection they once did. In this context, the CAF and DRDC are working closely together to ensure the right capabilities are developed at the right time. As the CAF identifies evolving threats and operational priorities, DRDC is aligning its expertise and resources to deliver the S&T needed to detect, deter and defend. Early deliverables under NORAD mod S&T, such as Arctic over-the-horizon radar and Polar over-the-horizon radar, exemplify this forward-thinking approach and lay the foundation for a stronger, smarter and more secure North America. These advancements directly support the CAF by providing:

- enhanced situational awareness
- improved threat detection
- resilient capabilities in the Arctic and beyond

This enables our forces to operate effectively in complex and evol-



ing environments. The research underway today will shape Canada's ability to lead tomorrow, protect lives and strengthen alliances.

Speaking at the University of Ottawa Forum, DRDC's Assistant Deputy Minister, Dr. Jaspinder Komal reinforced why this investment is more critical than ever:

"The world is changing, and together we can mobilize to harness our strengths and meet the moment. The government just passed a new budget with a focus on investing in Canada and there is a lot of exciting work ahead. Working together right now is critical as Canada needs the knowledge and expertise of industry and academics to meet the challenges we face. We live in a world where innovation is the battlefield. It is an era of breathtaking change, and yet we're never going to see a pace of change this slow again. Threats are not only moving faster, but they're becoming more complex and interconnected, and we must be ready. Gone are the days of geographic advantage provided by oceans that keep us safe from international threats. Our adversaries have capabilities that make

that no longer an obstacle.

Right now, the Government of Canada is focused on investing quickly and wisely to protect Canada. Our military is counting on us to deliver the capabilities they need. Research and development is a core part of our defence. Every insight strengthens our CAF edge."

From space to quantum

The NORAD mod S&T funding is an ambitious undertaking, and DRDC is working more closely than ever with industry and academia to deliver the capabilities the CAF need. Every investment is designed with CAF's operational needs in mind. It delivers the S&T solutions that strengthen readiness and resilience. Many of these investments focus on the Arctic, a region critical to Canada's sovereignty and security. Here are the key themes.

Space systems research and development (R&D)
DRDC will develop and test capabilities on prototypes in orbit to evaluate space-based surveillance, space domain awareness, and novel satellite communication capabilities in the Arctic.

DRDC Spotlight



We live in a world where innovation is the battlefield.

DRDC will be exploring the use of commercial and military low Earth orbit satellite networks for improved connectivity in the Arctic and resiliency against attack.

Integrated air and missile defence (IAMD) R&D
DRDC will conduct research to understand emerging missile threats as well as enabling integrated air and missile defence by developing detection, monitoring, targeting and counter-measure technologies. DRDC will continue research on a system-of-systems approach that integrates with NORAD and CAF capabilities to provide effective, layered and timely response to all-domain threats to Canada and North America.

Autonomy R&D
DRDC will advance research on autonomy development, concepts of employment, human-machine teaming, integration of semi-autonomous systems, and support of experimentation.

Counter uncrewed aerial systems (UAS) R&D
DRDC will develop a committed research stream to assess endlessly evolving threats and conceptualize and prototype counter-drone countermeasures and sensor technologies and develop methods to coordinate multi-agency responses.

Cyber R&D
DRDC will further increase its investment in autonomous systems and increase its capacity to develop and deliver specific cyber capabilities for the Canadian Cyber Force.

Quantum-enabled defence capabilities R&D
DRDC will advance research on understanding key quantum technologies and their applications for defence and security.

Arctic R&D
Research projects under this priority include research in the military implications of climate change, research on environmentally sustainable power and energy solutions for the Arctic and research on human performance and protection in the Arctic.

Over-the-horizon radar (OTHR) R&D
DRDC will investigate technology and concepts aiming to enhance the detection and tracking of air threats using OTHR, while also in-

vestigating non-radar applications of OTHR including embedded long-distance communications.

Into the future

Technology is fundamentally transforming the nature of warfare and national security. In response, DRDC is pairing significant strategic innovations with emerging challenges. Nations that effectively leverage these innovations can gain a decisive edge over adversaries. These technologies bring a new perspective to military strategy and can shift it from conventional land, sea and air conflicts to multi-domain oper-

space and cyberspace.

Modern capabilities such as advanced sensors, satellites and AI-powered analytics can provide real-time intelligence on enemy movements and actions, enhancing situational awareness and decision making. Uncrewed systems can perform dangerous tasks minimizing risk to human life, while technologies like global positioning system (GPS) and advanced targeting systems can enable pinpoint accuracy in strikes minimizing collateral damage and enhancing mission success rates.

These examples illustrate the future of defence, where collaboration between the CAF and DRDC is essential to ensure Canada stays ahead in developing and adopting frontier technologies. In today's rapidly evolving global security landscape, this partnership is critical to national security.



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DRDC Snapshot

Playing in the sandbox to advance innovation

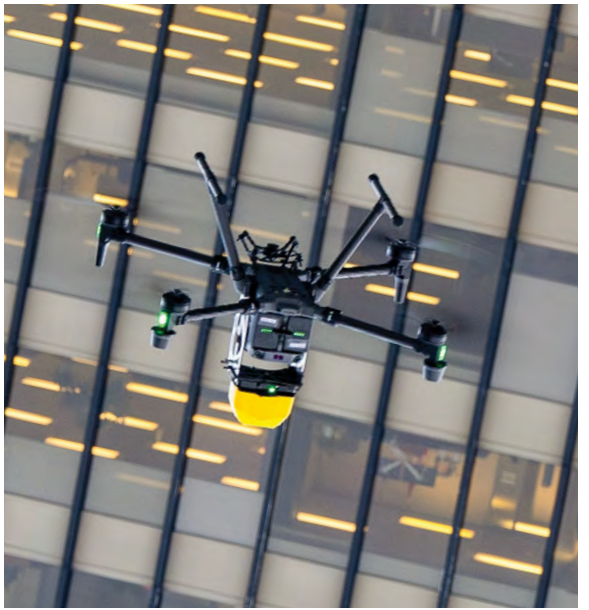
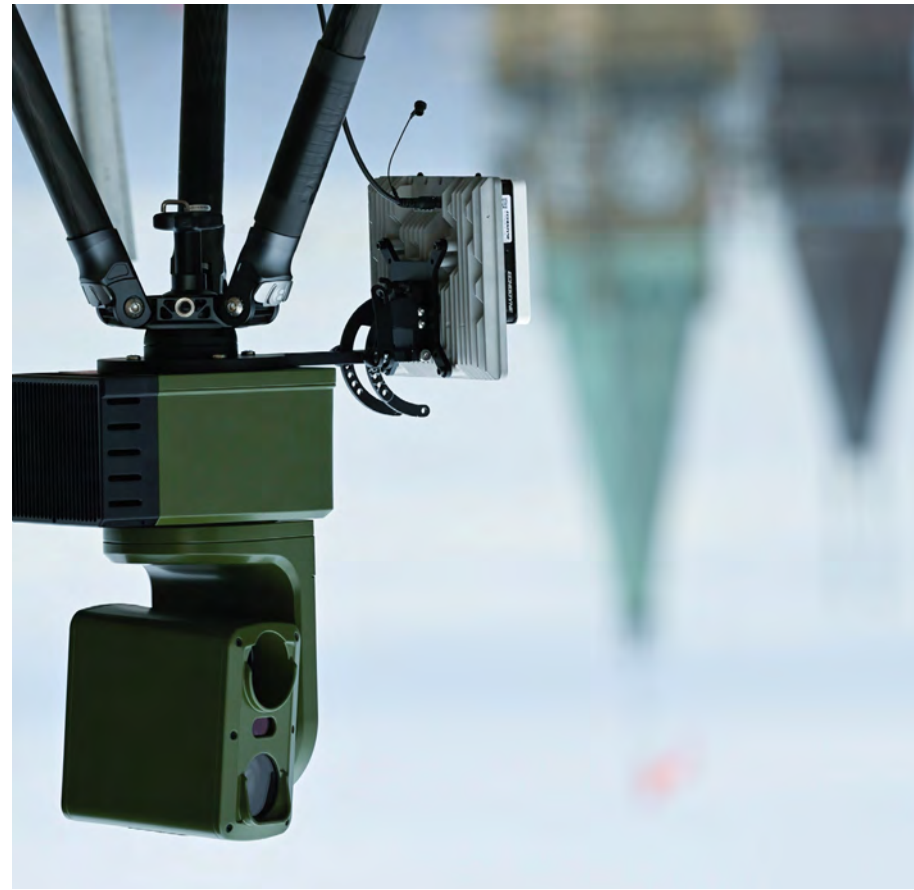
In late November, the Innovation for Defence Excellence and Security (IDEaS) program conducted the Counter Uncrewed Aerial Systems Sandbox 2025 (Urban) for drone detection trials in downtown Ottawa near, Parliament Hill. The objective was to assess counter-uncrewed aerial system (C-UAS) detection capabilities in a controlled scientific setting.

A sandbox is a collaborative testing environment where innovators can demonstrate and test their solutions under realistic conditions. They work alongside defence and security partners to support and accelerate technology development.

The week-long sandbox brought together defence scientists, innovators, CAF personnel, law enforcement, and other security partners. Together, they evaluated how detection technologies perform in a complex urban environment.

The testing took place around Kent, Queen, Sparks, and Wellington streets, steps away from Parliament Hill. Sensors were positioned at ground level, on mid- and high-rise balconies, and rooftops to measure performance across multiple elevations. The trials focused on detecting small drones, including both micro and mini uncrewed aerial systems, using detection-only approaches. All systems were registered and compliant and were operated in accordance with Transport Canada and other safety regulations. Testing was conducted under strictly controlled conditions to ensure public safety while providing a realistic urban testing environment.

These trials highlight how collaboration between defence experts, industry innovators, and security partners support the development of advanced technologies to counter emerging drone threats and shape future solutions for Canada's security.



Un environnement protégé pour stimuler l'innovation

À la fin du mois de novembre, le programme Innovation pour l'excellence et la sécurité en matière de défense (IDEaS) a mené l'Environnement protégé des systèmes de défense contre les systèmes aériens sans pilote 2025 (urbain), au centre-ville d'Ottawa, près de la Colline du Parlement. L'objectif était d'évaluer les capacités de détection des systèmes antidrones dans un cadre scientifique contrôlé. Un environnement protégé est un cadre collaboratif où les innovateurs et innovateurs peuvent présenter et tester leurs solutions dans des conditions réalistes, en travaillant aux côtés de partenaires de la défense et de la sécurité afin de soutenir et d'accélérer le développement technologique. Cet environnement protégé d'une durée d'une semaine a réuni des scientifiques de la défense, des innovateurs et innovatrices, du personnel de l'AC, des organismes et innovatrices, de la loi ainsi que d'autres partenaires en sécurité. Ensemble, tous ces partenaires ont évalué le rendement des technologies de détection dans un environnement urbain complexe. Les essais ont eu lieu autour des rues Kent, Queen, Sparks et Wellington, à quelques pas de la Colline du Parlement. Des capteurs ont été installés au niveau du sol, sur des balcons d'immeubles de moyenne et de grande hauteur, ainsi que sur des toits, afin de mesurer le rendement à différentes altitudes. Les essais portaient sur la détection de petits drones, y compris des systèmes d'aéronef sans équipage de type micro et mini, au moyen d'approches axées uniquement sur la détection. Tous les systèmes étaient enregistrés conformément et exploités dans le respect des exigences de Transports Canada et de d'autres règlements de sécurité. Les essais se sont déroulés dans des conditions strictement contrôlées afin d'assurer la sécurité du public tout en offrant un environnement d'essai réaliste en milieu urbain. Ces essais démontrent comment la collaboration entre les experts de la défense, les innovatrices et innovateurs de l'industrie et partenaires de la sécurité favorise le développement de technologies de pointe, aide à contraindre les menaces émergentes liées aux drones et orienter les solutions futures pour la sécurité du Canada.