National Defence | Défense nationale

DEFENCE RESEARCH AND DEVELOPMENT CANADA

CANADIAN ARMED FORCES | FORCES ARMÉES CANADIENNES

DRDC
RDDC

Defence Research and Development Canada (DRDC)

RESEARCH AND DEVELOPMENT (R&D) CAPABILITY PORTFOLIO

Canada

EXECUTIVE SUMMARY

DEFENCE RESEARCH AND DEVELOPMENT CANAD

has 47 research and development (R&D) capabilities, across its seven research centres, as well as the Directorate of Scientific and Technical Intelligence and the Directorate of Research and Development Operational Capabilities. These capabilities include the people, expertise, equipment and facilities to carry out world-class R&D in support of Canada's defence and security.

TORONTO RESEARCH CENTRE

Centre of excellence for human effectiveness R&D in the defence and national security environment.

SUFFIELD RESEARCH CENTRE

Offers expertise in unique and sensitive R&D domains to enhance defence capabilities. Sole provider of chemical/biological threat defensive based research to the Department of National Defence (DND) and the Canadian Armed Forces (CAF). Suffield offers a unique experimental proving ground facility allowing for a large array of experiments and trials to DND/CAF.

DIRECTORATE OF SCIENTIFIC AND TECHNICAL INTELLIGENCE (DSTI)

Provides all-source threat assessments of weapons and threat systems and their technologies.

CENTRE FOR SECURITY SCIENCE (CSS)

DRDC science advisor in the defence, public safety, and security domains.

ATLANTIC RESEARCH CENTRE

Centre of excellence for maritime defence R&D: R&D capabilities in underwater warfare, maritime information warfare and naval platforms. World-leading expertise in Arctic trials and experimentation.

VALCARTIER RESEARCH CENTRE

Renowned expertise in the areas of information, optronics and weapon systems with a unique capability for prototype development and experimentation to demonstrate/validate novel technologies under realistic conditions.

OTTAWA RESEARCH CENTRE

Conducts science research to support defence and security solutions in the radio frequency (RF) sensing and data integration, electronic warfare, space and cyber domains.

CENTRE FOR OPERATIONAL RESEARCH AND ANALYSIS (CORA)

Provides operational research and analysis (OR&A) R&D decision support across the DND/CAF.

Canada

Director general R&D science and engineering

CROSS CUTTING CAPABILITIES

Science visual documentation (VisDoc)

visually documents R&D in laboratories and trials on land, sea, in the air and in the Arctic. Specializes in videography, photography, 3D animation, graphic design and illustration.

Modelling and simulation

supports the people, processes and technologies tasked with identifying the personnel needs of the Canadian Armed Forces. Using a virtual battle space, the modelling and simulation collaboration effort can test future and current force capabilities of the CAF and offers advice on personnel development, generation and employment.

M&S capability relies on the scientific expertise residing in all R&D capabilities to perform M&S activities.

CAPABILITIES EXISTING IN EACH RESEARCH CENTRE

Project management

oversees the scope, activities, deliverables, financial resources and operating plan for projects included in the Defence and Security Science and Technology program.

SCIENCE VISUAL DOCUMENTATION (VISDOC)

ATLANTIC

Underwater warfare & surveillance

performs leading scientific and engineering research to enhance DND and CAF underwater situational awareness and to enhance the Royal Canadian Navy and Royal Canadian Air Force ability to detect and counter underwater threats.

Integrated warship survivability & performance

enables the delivery of R&D solutions to manage the signature and enhance the survivability, operational capability, maneuverability and sustainability of Royal Canadian Navy (RCN) ships and submarines.

Maritime systems experimentation & analytics

contributes scientific and technical expertise to enhance command team effectiveness through improved practices in information use.

Power & energy

provides R&D advice in the power and energy domain for defence applications such as soldier systems, fixed infrastructure and deployed camps, Arctic and naval platforms. Includes energy storage, modelling and simulation, as well as renewable energy.

Underwater signatures, survivability & materials

develops R&D advice and solutions for materials aspects of underwater signatures, platform survivability, through-life materiel management, and emerging materials technologies.

Development, engineering & experimentation (DEE)

coordinates the planning and execution of development, engineering and experimentation, on land, as well as in the air, at sea, and in the Arctic.

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Centre for Operational Research and Analysis (CORA)

Joint targeting

offers direct, timely research support to DND/CAF in the use of targeting data. Targeting is the ability to identify, track and engage assets and make recommendations on appropriate action or engagement. Joint targeting is the ability to share targeting data across platforms and commands which includes army, navy, air force and allies.

Joint & strategic analysis

provides advice based on an in-depth knowledge of the strategic environment and provides decision support to major strategic decisions. This includes considerations of timelines, resources, readiness, program investment and portfolios, and future joint capabilities.

Operational research and analysis for navy and air force employment

delivers operational research and strategic analysis to address complex issues within the Royal Canadian Air Force and Royal Canadian Navy using a combination of mathematical methods, practical problem solving skills and historical and political analysis. This improves decision-making and contributes to a more productive use of DND resources.

Operational research and analysis for enterprise resource management

conducts operational research and data-science to support evidence-based decision making across DND/CAF.

Operational research and analysis for army and force employment

conducts operational research and data-science analysis using quantitative, social and strategic research and analysis in support of the Canadian Army and DND/CAF.

Directorate of Scientific and Technical Intelligence (DSTI)

Scientific & technical intelligence

provides all-source threat assessments of weapons and threat systems and their technologies.

CORA

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Canada

OTTAWA

Cyber operations
works on developing techniques to sense, analyze, influence and exploit communications networks and strategies to secure and defend the wired and wireless networks used by the CAF.

Communications electronic warfare
focuses on R&D in detection, geolocation and countermeasures against malicious communications signals and ensures the CAF has unimpeded access to the electromagnetic spectrum.

Radar electronic warfare
delivers expert advice and technology solutions to improve the protection of military personnel and platforms against radar electronic threats.

Defensive space operations
enables space mission assurance and electronic warfare insights to defend and protect vital military space capabilities.

Space domain awareness
enables the development of technology and techniques to analyze and understand an evolving domain and effectively conduct space operations while enforcing responsible behaviour in space.

Radar systems for intelligence, surveillance and reconnaissance (ISR) and command and control (C2)
modernizes defence capabilities with advanced research in radar systems and provides the CAF with defence intelligence, surveillance and reconnaissance (ISR), and accelerates the command and control (C2) process.

Space radio frequency (RF) intelligence
develops exploitation technology and new practices for space-based, radio frequency intelligence gathering systems.

Continental defence modelling
enables the development of intelligence, surveillance and reconnaissance system-of-systems concepts, modelling and analysis for all-domain situational awareness to defend North America.

SUFFIELD

Explosive system performance & defeat
conducts research in advanced, new and improvised explosives and systems. This includes blast/fragment threat assessments as well as counter-improvised explosive devices (C-IED).

Chemical hazard assessment & protection
enables the provision of support and solutions to CAF operations and intelligence capabilities through the application of science, engineering and knowledge in chemical defence.

Combat casualty care
conducts research and provides technical advice to prevent, mitigate, and treat combat-related injuries.

Radiological & nuclear threat defence
contributes research and technical advice on hazard assessment, detection, identification, monitoring and protection strategies for defence against radiological and nuclear threats.

Autonomous unmanned ground & air systems for land operations
provides research and technical advice on the emerging capabilities and threats of autonomous systems in support of military operations.

Biological hazard assessment & medical countermeasures
researches and provides technical advice on hazard assessment, detection, identification, and monitoring, as well as medical countermeasures, in defence against biological threats.

Chemical threat medical countermeasures
conducts research and provides technical advice on medical countermeasures for defence against chemical threats.

Advanced chemical, biological, radiological, nuclear, explosives (CBRNE) & medical training
offers live agent, material and tissue training to enhance individual and collective operational readiness.

Development, engineering & experimentation (DEE)
coordinates the planning and execution of development, engineering and experimentation, on land, as well as in the air, at sea, and in the Arctic.

DRDC | RDDC


AUTONOMOUS UNMANNED GROUND & AIR SYSTEMS FOR LAND OPERATIONS


CHEMICAL THREAT MEDICAL COUNTERMEASURES

Canada

TORONTO

Warfighter & system effectiveness

develops human effectiveness R&D to support the development, evaluation, acquisition, and employment of technical systems and operational training of the CAF.

Warfighter performance & health

researches the psychological and physiological mechanisms underpinning conditions of high cognitive load, or high emotional stress, and develops tools and techniques to improve resilience.

Operations in the information environment

supports the development of tools, technologies and frameworks to enhance Canadian Armed Forces effectiveness in complex information environments and to understand, assess and influence the intent and will of adversaries beyond Canada's borders.

DRDC | RDDC

Canada

VALCARTIER

Weapons effects & protection
contributes advice and solutions in the sciences of the effects of weapons against military personnel and assets.

Weapons systems & ammunition
provides R&D advice and solutions on energetic materials, pyrotechnics, propulsion technologies, and precision weapons systems.

Electro-optical warfare
enables the development of R&D advice and solutions to improve the protection of military personnel and platforms against electro-optically guided threats.

Platform cyber warfare
delivers R&D advice and solutions to the military and its assets in the cyber-physical environment.

Electro-optical measurement & signature intelligence
contributes R&D advice and solutions for the study, characterization and remote sensing of optical signatures by terrestrial and aerospace sensors.

Command, control & intelligence
develops R&D advice and solutions in data, information and decision sciences to improve the intelligence and command & control of military operations.

Electro-optical surveillance & reconnaissance
provides R&D advice and solutions regarding electro-optical technologies and systems for surveillance, reconnaissance and intelligence.

Development, engineering & experimentation (DEE)
coordinates the planning and execution of development, engineering and experimentation, on land, as well as in the air, at sea, and in the Arctic.

Design & prototyping
creates world-class preliminary models to meet science, technology and engineering deliverables.


ELECTRO-OPTICAL WARFARE


WEAPONS EFFECTS & PROTECTION

DRDC | RDDC

Canada

Centre for Security Science (CSS)

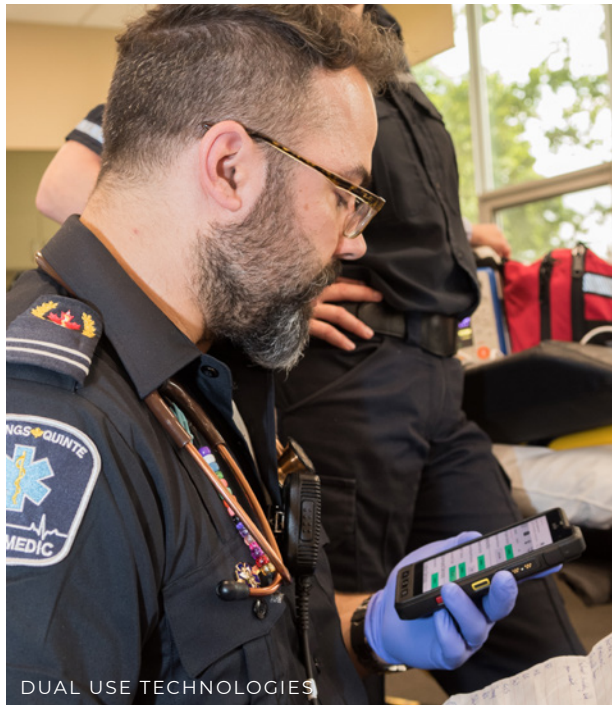
Critical infrastructure protection
provides R&D advice to public safety partners and critical infrastructure owners to ensure they are agile and secure against an ever-evolving risk landscape and threat actors of malicious intent.

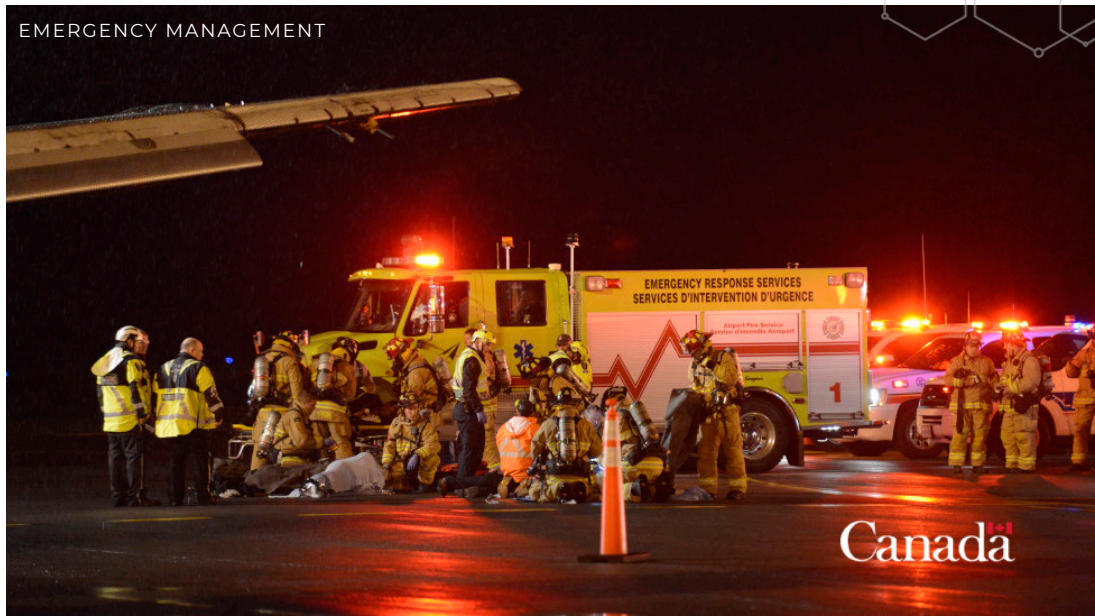
Emergency management
ensures the effective training of first responders and decision-makers and that they are suitably equipped and supported to safely and effectively anticipate, mitigate, prepare for, respond to, and recover from, routine and emergency operations.

Border security
improves the efficiency and security of the flow of people and goods at Canada's ports of entry and ensures the integrity of Canadian borders and border regions, including the Arctic.

Dual use technologies
assists and promotes dual use technologies to better identify and leverage investments across defence, security and safety capabilities for better efficiency, interoperability, and consistency in advice.

Community resilience
provides support to communities and ensures that they develop strategies and capabilities to strengthen their resilience against the most critical threats, hazards, and crises, while leveraging opportunities for community growth and well-being.


DUAL USE TECHNOLOGIES

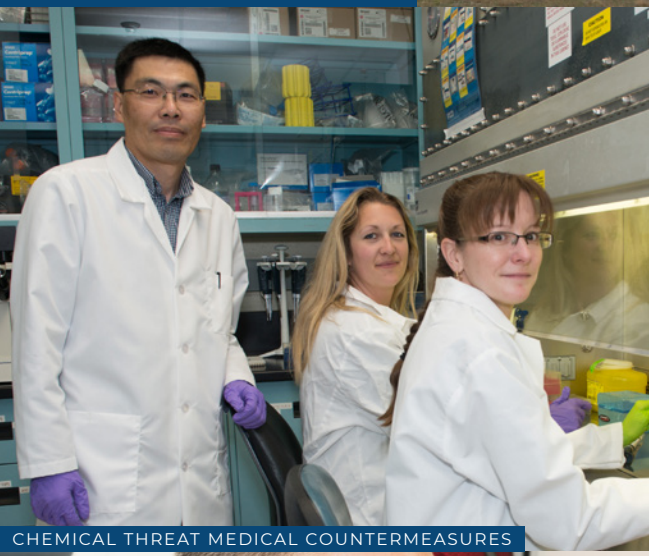


EMERGENCY MANAGEMENT

AUTONOMOUS UNMANNED GROUND & AIR SYSTEMS FOR LAND OPERATIONS

ELECTRO-OPTICAL (EO) MEASUREMENT AND SIGNATURE INTELLIGENCE

AUTONOMOUS UNMANNED GROUND & AIR SYSTEMS FOR LAND OPERATIONS



CHEMICAL THREAT MEDICAL COUNTERMEASURES

INTEGRATED WARSHIP SURVIVABILITY & PERFORMANCE

EXPLOSIVE SYSTEM PERFORMANCE & DEFEAT

DUAL USE TECHNOLOGIES

SCIENCE VISUAL DOCUMENTATION

UNDERWATER WARFARE & SURVEILLANCE