



CAE's Solutions for Naval Forces



Proven, Experienced, Flexible

Naval personnel operate highly sophisticated systems in complex environments supporting naval-specific and joint, interagency and multinational operations. Navies play a variety of roles such as patrolling and defending national maritime shorelines, battling modern day pirates at sea, surveillance, deterrence, peace keeping, as well as supporting joint and coalition operations on a regional and global scale. Effective training and mission rehearsal across the full spectrum of naval operations is crucial to mission success

Operational effectiveness depends on proficient and coordinated use of all maritime systems across the naval enterprise. Advanced training techniques and technologies are used by leading navies around the world to develop highly competent and focused sailors, officers and commanders. All crew personnel must operate cohesively as members of an integrated force to ensure the common goal of mission success is achieved.

CAE is a training systems integrator that offers navies comprehensive, turnkey training solutions, including purpose-built naval training centres. Our portfolio of products and services combined with CAE's proven learning methodologies provide the foundation for delivering every element of basic and advanced naval operations training, mission planning and mission rehearsal. No other company has such breadth of experience applying modelling and simulation-based solutions to training and rehearsal to help prepare naval forces for their mission.

CAE's technology leadership, proven capabilities, experience and key partnerships place us in a unique position to be a partner of choice for navies around the world. We are able to deliver integrated naval training solutions that are flexible, modular and scalable. Our training solutions are capable of being deployed and networked across training facilities, and distributed to warships in harbour and at sea. CAE, as your training systems integrator, can deliver world-class naval training solutions designed to support mission success today and in the future.

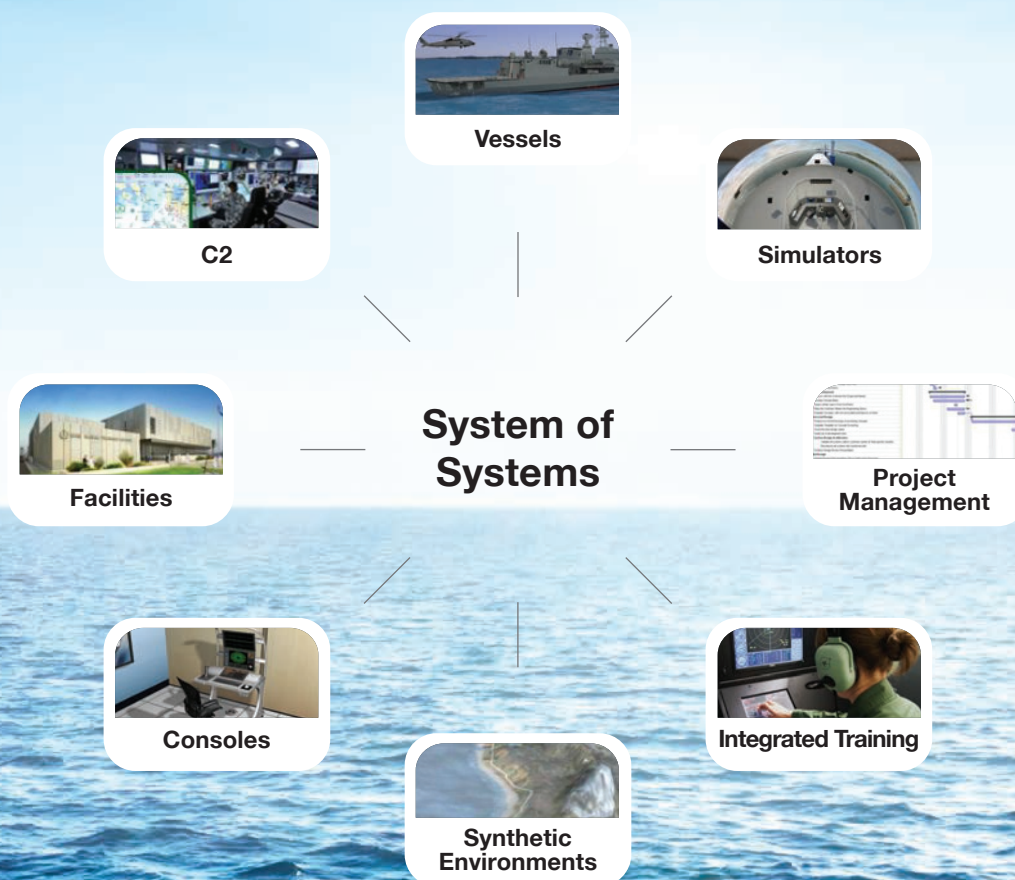


CAE is a world-class Training System Integrator

Training System Integration in a Virtual World

Increased operational tempos combined with limited personnel, environmental concerns and budget pressures have prompted defence and security forces around the world to seek reliable partners who can help develop, manage and deliver the training systems required to support sophisticated naval systems. Today, naval forces are faced with complex challenges and budget restrictions, thus the need to consider cost-effective, holistic training solutions that address specific requirements. At CAE, we call this training systems integration.

To help manage the complexities and challenges, many naval training programs are seeking an industry partner to help design and manage the total training system. For customers within the maritime domain, CAE delivers these total training solutions within its offering of a "Sea Virtual Task Force." The sea virtual task force encapsulates all facets of training systems integration to maximize commonality across the training enterprise, thus delivering increased efficiency, significant cost savings and most importantly, enhanced capability for mission preparedness.



The Sea Virtual Task Force

As a training systems integrator, CAE addresses the overall live-virtual-constructive (LVC) domain to deliver comprehensive training solutions throughout the entire program lifecycle. CAE's sea virtual task force provides naval customers with a more integrated and holistic approach to training by addressing the entire spectrum of the naval training enterprise. CAE partners with naval customers to plan, deliver and operate turnkey training solutions. Our experience and capabilities include:

- Training needs analysis;
- Media evaluation and optimization;
- Knowledge and skills transfer;
- Instructional systems design;
- Courseware;
- Training devices;
- Classroom, simulator, and live instruction;
- Learning management information systems;
- Facilities;
- Maintenance support services;
- Logistics support;
- Configuration management;
- Technology insertion; and
- Financing.





Training Centres for Naval Forces

Through CAE's global network of military, civil aviation and helicopter training centres, we train more than 120,000 crewmembers yearly with customers in over 190 countries at more than 100 sites. We are experts at applying simulation-based solutions to learning and knowledge transfer so that defence and security forces are trained and better prepared to accomplish their mission. As a global leader in simulation and training, we have the experience, expertise, knowledge, products, and service delivery capabilities to provide naval forces with turnkey training solutions.

CAE is uniquely qualified to design turnkey training centres for naval forces. CAE has an unparalleled global footprint, leading-edge technologies and innovation, and all the requisite skills of a platform agnostic training systems integrator. With CAE's sea virtual task force, we can offer a naval training centre featuring:

- > Training needs and media analysis
- > Technical Solution
 - Tactical Consoles
 - Environment / Effectors modelling
 - Bridge Simulators
 - Machinery Control Room Simulators (MCR)
- > Training Solution
 - Curriculum Development
 - Course Content Development
 - Course Delivery
- > Facility Design, Operation and Management
- > In-Service-Support

Flexible Financing and Delivery Models

We can provide training centres to naval forces through government-owned, contractor-operated (GOCO) or company-owned, company-operated (COCO) training facilities, or as part of independently financed joint venture training centres. CAE is also experienced in providing training centre operations through existing government-owned, government-operated (GOGO) training facilities where comprehensive support services are required.



CAE's Naval Products - Simulation and Operational Systems

CAE has thousands of engineers and technical personnel around the world focused on delivering innovative and leading-edge simulation-based solutions. Using synthetic training environments, naval forces will be able to enhance communications, situational awareness and decision-making. Our experience in modelling, simulation and training, combined with the skill and imagination of our people, has helped CAE achieve a leadership position related to simulation-based training. Some of CAE's leading-edge simulation products and solutions for naval forces include the following.

Synthetic Environments

CAE offers technologies that create a realistic, fully-immersive synthetic environment that can be used by naval forces to train, rehearse and support operational decision-making. With a realistic synthetic environment, naval forces can support training through "learning by doing" without the high costs and logistical challenges associated with live training. CAE offers modelling and simulation software tools for creating synthetic environments; visual and display systems for rendering the virtual world; and open, industry-standard architectures that support integration, re-use, and interoperability.

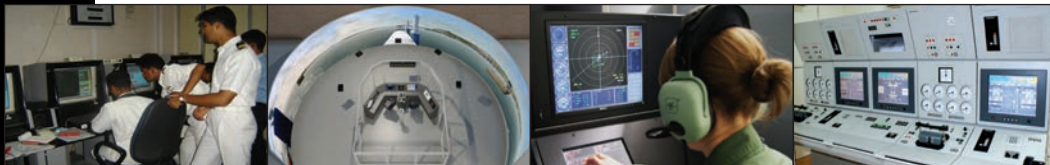
Common Database (CDB)

CAE's common database (CDB) is designed to significantly reduce the time it takes to get a fully correlated database in operation within a range of training and mission rehearsal systems. Correlation of multiple databases in varying formats has been one of the major obstacles facing defence forces wanting to practice and rehearse missions via simulation. The CDB architecture effectively removes this obstacle by allowing all users, or "clients," of the data required to access the information from a common database source and do so in real-time. These clients include not only the image generator that renders the synthetic environment, but also other systems in the synthetic environment requiring data, such as sensors, computer-generated forces, and communications systems. CAE's common database provides enhanced mission rehearsal capabilities, eliminates the need to manage multiple databases, reduces costs and increases efficiency.

CAE's Naval Simulation Technologies

- > Synthetic Environments
- > Common Database
- > Action Speed Tactical Trainer
- > Naval Warfare Training System
- > Combat Information Centre (CIC)
- > Integration of 3rd Party Trainers





Action Speed Tactical Trainer (ASTT)

The CAE Action Speed Tactical Trainer (ASTT) is a comprehensive simulation-based system to conduct realistic naval operations training. The primary purpose of the ASTT system is for the command teams of ships, submarines, and aircraft to communicate effectively in a realistic training scenario and rehearse the application of tactical doctrine in situations considered typical at sea. The ASTT is comprised of a network of computers used as player workstations and game control stations. The player workstations can be configured to simulate ships, submarines, aircraft, or shore-based sites. The game controller defines a scenario that includes the gaming area, atmospheric conditions, ocean conditions, composition of friendly and enemy forces, inventory of sensors and weapon systems, initial positions, mission objectives, and constraints. Further, the system caters to three levels of exercise control. The force controller can monitor their own forces while the instructor controller can direct the personnel. The highest level of control is the exercise manager who can see the entire scenario unfold and has complete control privileges over the training lesson.

Combat Information Centre (CIC) Simulation Solution

CAE provides a fully reconfigurable combat information centre (CIC) simulation solution that can be designed specifically for the unique needs of various naval platforms. The CIC simulation solution can be seamlessly networked to the bridge simulator to provide the linkage between the command and watchkeeping teams. The CIC simulation solution can include a fully configurable communications package (HF/VHF/UHF) and support internal communications between the CIC, bridge, machinery control room, and weapon crews, providing a highly representative configuration of any warship class.

Naval Warfare Training System (NWTs)

CAE's naval warfare training system (NWTs) can be used to train and educate sailors and officers in naval tactics, procedures and doctrine. It is a comprehensive, simulation-based system that can include simulation software, hardware, wargaming consoles, tactical mission trainers (TMT), and instructor operator stations. The NWTs can be used by all sea-operative units and their personnel for training in a range of disciplines, including sensor operations; command, control, communications and computers (C4), and weapon systems. The NWTs allows training and rehearsal for operations in anti-air warfare (AAW), anti-surface warfare (ASuW), anti-submarine warfare (ASW), mine warfare (MW) and search and rescue (SAR). The NWTs can be configured as a classroom training system and can include student workstations and instructor positions to create, manage and monitor training exercises. The student workstations include a range of core CAE simulation software such as simulation systems for sonar, radar (imaging, EO/IR), electronic warfare, navigation, communications, tactical display, weather and computer-generated forces. The synthetic maritime environment is built to the CAE-developed Common Database (CDB) standard to reduce cost and increase efficiency.

Integration of Third-Party Trainers

CAE partners with naval customers to address specific requirements to fully integrate legacy or planned third-party training systems, simulators and courseware. As a training systems integrator, CAE has existing industrial partners around the world and we welcome the role of integrating third-party solutions required to deliver a holistic naval training system. For example, we can integrate CAE's simulation software to third party training systems to leverage a common synthetic environment and infrastructure, which translates to cost savings and increased efficiency for our customers. CAE's proven training system integration capabilities will help ensure your crews are well-trained and mission ready.

CAE's Naval Services

CAE's team of experts have the knowledge and skills required to deliver training and in-service support services to naval forces. As a training system integrator, CAE's offering includes professional and support services such as project management, training and courseware development, integrated learning management systems, systems engineering, human factors and in-service support.

Project Management

CAE offers project management services to help our customers focus on their mission while we successfully manage and execute a project throughout its lifecycle. Our project managers have extensive experience in naval operations, systems engineering and training to ensure all elements are incorporated within the solution and effectively delivered. CAE project managers provide a single point of contact for our customers, allowing for simple, yet effective, inter-organisation communications. Our project managers' main focus is ensuring projects meet mission requirements and are delivered on-time and on-budget.

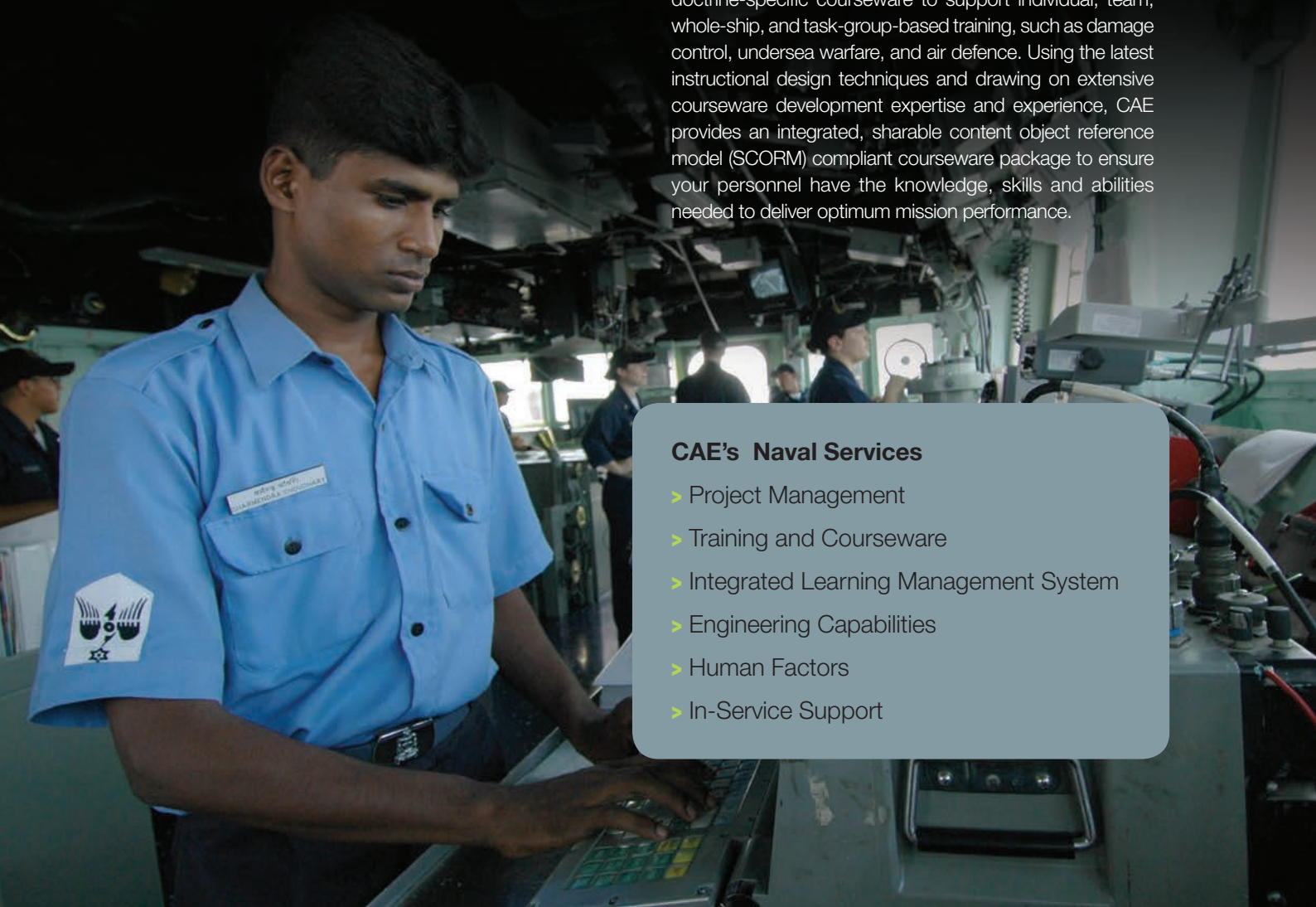
Training and Courseware

CAE conducts exhaustive training needs analysis (TNA) based on the mission and doctrine requirements. The data required helps us determine the optimum training content and methods for any required training situation. CAE's training solution is then developed to address the operational needs of our customers' most complex naval programs. Our solutions include training for machinery control room, combat information centre, and bridge personnel, operators in maritime patrol aircraft and helicopters, and maintenance personnel on a variety of platforms.

CAE designs, develops and maintains a full range of doctrine-specific courseware to support individual, team, whole-ship, and task-group-based training, such as damage control, undersea warfare, and air defence. Using the latest instructional design techniques and drawing on extensive courseware development expertise and experience, CAE provides an integrated, sharable content object reference model (SCORM) compliant courseware package to ensure your personnel have the knowledge, skills and abilities needed to deliver optimum mission performance.

CAE's Naval Services

- > Project Management
- > Training and Courseware
- > Integrated Learning Management System
- > Engineering Capabilities
- > Human Factors
- > In-Service Support





Integrated Learning Management System

CAE is an experienced provider of learning management solutions to help our defence customers manage training content, track training records, and management training resources. CAE calls this an integrated learning environment (ILE). Our learning management solution is a fully integrated suite of cutting-edge software applications used to support high-performance, high-volume learning. With a proven learning management system (LMS) at the core, CAE's ILE also consists of a learning content management System (LCMS) to enable the development and management of e-Learning and other training materials. It is also a resource management system (RMS) to enable the development and optimization of resource assignments and training schedules for students, instructors and resource managers. The ILE also provides a conferencing and collaboration system to support distance learning, which improves consistency of training and reduces cost by enabling the delivery of training across multiple sites simultaneously. Our learning management solution supports individual, command team and task force personnel training. The LMS can be used to assess and track all training requirements from the individual to the task force exercise level, including concept of operations (CONOPS) and rules of engagement for coalition or task force exercises. This approach ensures the naval personnel have the right skill sets and knowledge to perform their duty, ultimately leading to a high standard of individual, ship and fleet readiness at all times.

Systems Engineering

CAE has been providing systems engineering to its navy customers for over 30 years to support operational systems on-shore and on-board ships. CAE provides expertise to optimise the use of critical systems and software, and inserts state-of-the-art technologies to increase operational capabilities. CAE designs, implements and supports mission systems software including weapons, data links and sensors. CAE leverages its state-of-the-art modelling and simulation technologies and applies it to software development, integration, testing and support. We also customize system management solutions and support proven fleet operations and maintenance management systems, complemented with a comprehensive in-service integrated logistics support capability.

Human Factors Capabilities

Today's vessels are equipped with complex, leading-edge technologies and systems that naval personnel must learn to use and operate to their optimal capacity. As a world leader in the field of human factors engineering (HFE) and human systems integration (HSI), CAE is supporting research and development (R&D), acquisition, capability management, and technology programs to analyse and design innovative, ergonomic systems that optimize and enhance human-system performance for naval forces.

In-Service Support

CAE has over 25 years' experience providing in-service support (ISS) to defence customers through a broad network of facilities, tools and systems, personnel, suppliers, and key industrial partnerships. CAE has been providing in-service support to Canada's fleets of Halifax-class naval frigates and maritime helicopters, and plays a key role in helping maximize mission readiness and optimize cost efficiency through performance-based logistics.

CAE's in-service support solutions include program management, systems/software engineering, integrated logistic support (ILS) and an integrated information environment (IIE). In Canada, CAE has achieved Level 5 of the capability maturity model integration (CMMI) for its in-service support processes. CAE has extensive experience providing the tools and technical expertise necessary to ensure naval fleets are operationally ready.

Breadth of Naval Experience

CAE's team of experts has the knowledge and skills required to deliver training and in-service support services to naval forces. As a training system integrator, CAE's offering includes professional and support services such as project management, training and courseware development, integrated learning management systems, systems engineering, human factors and in-service support.

For the past three decades, CAE has been trusted to design and develop some of the world's most sophisticated and capable naval training systems. The company is now focused on further extending its expertise as a training system integrator to the naval domain. Following is a brief description highlighting several recent naval programs where CAE is providing training and operational support to naval forces.

Naval Warfare Training System for Swedish Navy

The Naval Warfare Training System (NWTs) is a comprehensive, simulation-based system that includes simulation software, hardware, wargaming consoles, and instructor operator stations that will be used to train and educate Swedish Navy sailors and officers in naval tactics, procedures and doctrine. The system will be delivered in 2015 to the Swedish Naval Warfare Centre in Karlskrona, Blekinge, Sweden.

The NWTs will be used by all sea-operative units and their personnel for training in a range of disciplines, including sensor operations, command, control, communications and computers (C4), and weapon systems. The comprehensive training solution will allow the Swedish Navy to train and rehearse for operations in anti-air warfare (AAW), anti-surface warfare (ASuW), anti-submarine warfare (ASW), mine warfare (MW) and search and rescue (SAR). The NWTs for the Swedish Navy will include three classroom training systems, each of which includes student workstations and instructor positions for creating, managing and monitoring training exercises. The student workstations include a range of core CAE simulation software such as simulation systems for sonar, radar and computer-generated forces. The synthetic maritime environment will be built to the CAE-developed Common Database (CDB) standard.

Halifax Class Modernization Program in Canada

Under subcontract to Lockheed Martin Canada, CAE is providing electronic warfare, human factors, human systems integration and systems engineering support for the Halifax Class Modernization program in Canada. As the technical lead for human factors, CAE is responsible for providing human factors direction pertaining to the re-design of the operator workstations, operations room layout, and the command and control system graphical user interface (GUI). CAE is also providing systems engineering, software development, hardware engineering, networking, testing and in-service support.

Canadian Naval Electronic Warfare System (CANews)

The Canadian Naval Electronic Warfare System (CANews) program was a shipboard electronic support measures (ESM) system for Canadian naval destroyers. CAE provided all the operational software for the system including all the signal analysis processing software, as well as the supervisory processing and user interface software, as well as interfaces to the ship's command and control system. The program was extended as CANews 2 and CAE was tasked to develop an advanced development model (ADM) for Defence Research and Development Canada (DRDC) in Ottawa and for the Royal Canadian Navy to serve as Canada's next generation electronic support measures (ESM) system.





Other Program Examples

- > Engineering support for the Iroquois-Class Destroyers and Canadian Frigate program, under subcontract to Lockheed Martin Canada, for the Royal Canadian Navy.
- > Action Speed Tactical Trainer (ASTT) – Anti Submarine Warfare for the Indian Navy.
- > Maritime Wargaming System (Poseidon) for the Indian Navy.
- > Maritime Command Operational Information Network, under subcontract to MDA, for the Royal Canadian Navy.
- > NetCentric Research for Defence Research and Development Canada.
- > Motion Control Simulator for the Indian Navy.
- > 'Burya' Engine Room Control Simulator for the Indian Navy.

Conclusion

CAE offers integrated training and operational solutions that are tailored, flexible, scalable and highly cost-effective to our naval customers. We provide a safe and cost-effective synthetic training environment that helps deliver consistent and repeatable training for situations that would be highly dangerous or costly to perform in actual ships or operational systems. As a world-class systems integrator, CAE can be your partner of choice for designing and developing turnkey training and operational solutions that addresses every aspect of the naval training enterprise. Our shared objective is helping to ensure increased efficiency, reduced costs and most importantly, enhanced mission preparedness for your naval forces.





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