



Design

CAE Professional Services provides a wide range of design support services to our client community in the defence, homeland security, process control, transportation, and manufacturing sectors. Design projects typically consist of our team providing support to system or capability design and development teams.

At the system level, the CAE Professional Services team supports system engineering and design teams develop design concepts for systems, subsystems, and human-system interfaces. Past projects have included providing design support to a variety of systems and platforms, including armoured fighting vehicles, helicopters, fixed-wing aircraft, ships, submarines, mission systems, dismounted soldier systems, communication systems, digital mapping systems, command centres, process control centres, navigation systems, and much more.

At the capability level, capability design involves the design of a system-of-systems capability “package”, whereby a collection of organizations – each with their own systems, personnel, and processes – combine to create a capability. The “design” process at the capability level is focused on defining the structure of the system-of-systems, the roles of these systems, the allocation of functions across systems in the capability package, the information flow between the systems, and the design of procedures that shape the performance of the capability. Our team’s past experience in this area includes military C4ISR capabilities at the environment level (army, navy, air force) and at the Joint operations level, as well as collective multi-agency emergency response capabilities involving combined municipal, provincial, federal, and international agency response to all hazard emergencies and terrorism.

Capability Engineering and Design Approach (CEDA™)

To physically build and test a capability is nearly impossible. The players are too diverse and the budget would be too immense for any military force, multi-agency emergency response team, or critical infrastructure team. In simulation, a capability can be rapidly prototyped and operationally ‘experienced’.

CAE Professional Services has developed a Capability Engineering and Design Approach (CEDA™) that applies our team’s unique skill sets in the fields of Capability Engineering, Human System Integration, and Modelling & Simulation to conduct user-centred, simulation-based analysis, design, and experimentation of capabilities.

CEDA™ begins with the development of architectural frameworks which apply our team’s unique expertise in the definition and analysis of operational views of system-of-systems of the defence and homeland defence & security sectors. Using a suite of tools, user and subject matter expert feedback is captured to develop the architectural framework which serves as the blueprint for developing user-centred, simulation-based experiments.

Our library of architectural framework analysis from a wide range of projects in the defence and homeland defence & security sectors provides an efficient reference tool for analyzing new challenges and demands to capability structures. Our depth of experience in the domestic security and C4ISR domains position our team as a leader in this field.

User-centred, simulation-based system design

CAE Professional Services applies a user-centred, simulation-based approach to system design. Our historical strength in human factors, human factors engineering, and human systems integration provides the basis of our design methods for system and capability level projects for the defence and homeland security sectors.

Our goal is to focus the design on the user’s operational needs. Extensive stakeholder engagement and focused requirements direct the evolution of design concepts so that they meet relevant design standards and criteria, which, in turn, enhance operator and maintainer performance, increase situational awareness, and reduce the risk of human error.

CAE Professional Services’ integrated team of human system integration and modelling & simulation professionals support client design teams through a user-centred, simulation-based approach to system design. Our processes and laboratories provide our team and our clients’ teams with the tools they need to rapidly develop concept designs and prototypes, to conduct highly immersive design reviews using advanced visualization environments, and to conduct efficient simulation-based experiments to evaluate design alternatives using constructive or virtual simulation.



Human system integration

Through our user-centred approach to design, CAE Professional Services applies internationally recognized human factors standards to the designs to ensure the safety and health of the operator and maintainers. Human system integration (HSI) services ensure effective linkages between human factors, personnel, training, and safety in system development. The conduct of mission-function-task analyses ensures that user requirements are captured and entrenched in the design of new technologies. These analyses combined with interface and workspace design analysis and experimentation are fundamental to the HSI planning required in the design of system interfaces, workspaces, operator stations, vehicle layouts and vehicle maintenance access spaces. CAE Professional Services HSI team has extensive experience designing real-time operational interfaces, vehicle crew stations, and command centres.

A system or capability is more than the hardware and software components properly integrated to support individual or team performance. A system or capability includes operational and maintenance procedures, training systems, and personnel selection and development, working in concert with the more physical aspects of design. Through our core skill sets, the training expertise of our parent company CAE Inc., and the personnel expertise of our partners, CAE Professional Services has extensive experience in the areas of procedure, training, and personnel system development. These skills are essential and complement our clients' strengths in operations or engineering, filling a necessary gap in the overall completion of the design process.

Program example - multi-mission virtual vehicle

The Multi-Mission Virtual Vehicle (MMVV) program is a collaborative effort by the Canadian Department of National Defence and General Dynamics Canada to design and evaluate a series of advanced vehicle concepts that include multi-mission capabilities in a net-centric environment, with additional unmanned tactical air and ground vehicles for remote target identification and engagement. The Human System Integration team is providing the full-scope human factors and human systems integration (HSI) support for the MMVV project. Additional support is provided through the conduct of extensive user reviews to evaluate the HMI and review operational concepts pertaining to the role of the MMVV within the force structure and the conduct of distributed constructive and virtual simulation-based lab evaluations to evaluate the proposed MMVV technologies, battlefield effectiveness of the multi-mission capability, and interoperability with US forces.



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