CAE Dynamic Synthetic Environment

Simulation offers a range of compelling benefits, including significant cost advantages, saving wear and tear on weapon systems, addressing environmental impacts, and perhaps most importantly, providing an effective environment for learning and building critical experience. In the current climate of defence budget constraints, the use of simulation is expected to increase dramatically as defence forces look to maintain readiness and capability yet do so more cost-effectively. This means a greater reliance on simulation and synthetic environments for analysis, training, mission rehearsal and operational decision-making.

A major challenge to a dramatic increase in the use and effectiveness of synthetic environments, though, is that they need to be more realistic, easier and faster to create, and less expensive to develop, maintain and integrate. CAE has developed a capability and solution called the CAE Dynamic Synthetic Environment™ (DSE) that aims to create and maintain a virtual synthetic environment that more accurately and realistically simulates the real world.

DSE Objectives

CAE's development and implementation of a dynamic synthetic environment will allow for the real-time modification of the database in response to actions taken by players interacting with the synthetic environment, environmental effects, or by computer-generated entities in the scenario. In other words, the synthetic environment database will constantly change and evolve, just like the real world does.

CAE had four primary objectives guiding the development of the CAE Dynamic Synthetic Environment:

- **Dynamic** – the synthetic environment database had to have the ability to change anywhere in the world in real-time without advance preparation;
- **Persistence** – once the synthetic environment changes as a result of any interaction with the synthetic environment, such as a bomb detonating, those changes had to "persist" in real-time;
- **Scalable** – the synthetic environment needed to support single users on a mobile or laptop-based system all the way up to large, distributed live-virtual-constructive federations;
- **Open** – the underlying database architecture had to be based on an open specification to enforce correlation and interoperability.

Open Geospatial Consortium Common Database (OGC CDB)

The ability to make a synthetic environment dynamic, persistent and scalable has as a prerequisite a requirement for a server-based, common run-time database format. CAE has built its implementation of a dynamic synthetic environment on the OGC CDB standard – an open, non-proprietary database specification that supports the creation of standardized, rapidly updatable synthetic environments. The OGC CDB enforces correlation and interoperability between client devices, simulators, and simulation systems using the synthetic environment by requiring everyone to use a single source database at run-time.

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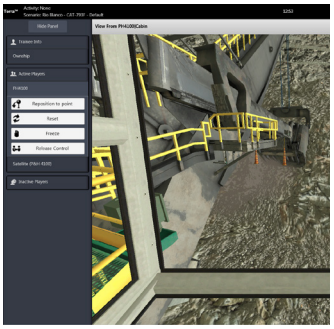
What is a dynamic synthetic environment?

A dynamic synthetic environment is a computer-based simulation of the entire world, including terrain, oceans, vegetation, buildings and other man-made objects. Importantly, CAE's Dynamic Synthetic Environment evolves over time and is changing autonomously based on various simulations that interact with the synthetic environment. CAE's Dynamic Synthetic Environment solution allows for the real-time modification of the worldwide synthetic environment database that would be used within virtual and constructive simulations. So, the synthetic environment database will be modified without stopping the simulations in response to things such as:

- actions taken by human-in-the-loop trainees who are involved in a training or mission rehearsal exercise;
- actions taken by computer-generated forces (CGF) entities that are interacting with the synthetic environment;
- effects on the environment including weather and weapons detonations



Combat Engineering

Weather

Weapons Effects

CGF

Benefits of a dynamic synthetic environment

CAE's Dynamic Synthetic Environment will improve training, mission planning and rehearsal, and operational decision-making because the synthetic environment is more realistic and more accurately simulate the real world. Because the solution is based on the common database, the issues of database correlation and interoperability are eliminated, saving time and engineering effort. Importantly, all synthetic environment content can be shared across multi-domains. Traditionally, synthetic environment databases have been built around a single training device for a specific domain, for example, a flight simulator. There is a growing desire and requirement to use virtual simulation for more joint and coalition training, as well as in command centres for operational decision-making. CAE's Dynamic Synthetic Environment solution provides a general synthetic environment that is dynamic and persistent, and is not constrained to any one domain. This means the dynamic synthetic environment can be used to facilitate networking and interoperability, as well as the re-use of data and content across all domains.

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