Case Study

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Calian Develops 3D Constructive Visualizer Solution for Royal Canadian Navy

The Customer

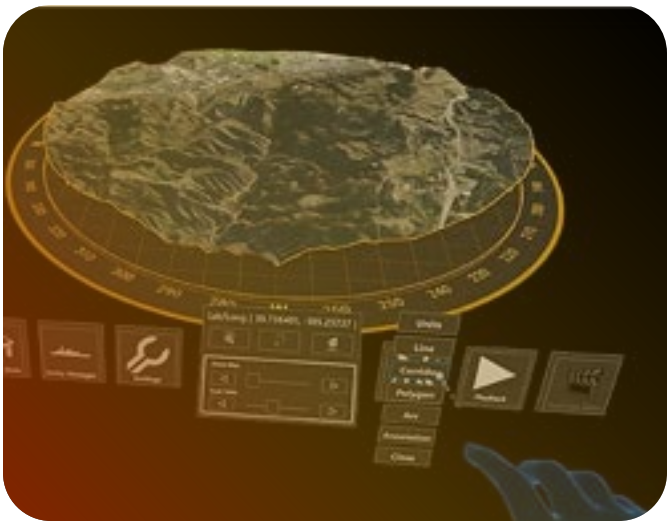
The contemporary global security environment is complex, spanning air, land and space, and includes digital spaces in the cyber and information domains. Assessments of the future security environment point to the resurgence of competition and tension with state-based adversaries. The Royal Canadian Navy (RCN) is expected to play a major role in future security, delivering surface, subsurface, intelligence/surveillance /reconnaissance (ISR) operations, and air defence capabilities for a wide range of maritime operations, including operating in littoral environments.

The RCN can expect to deploy ships in support of Canada-only missions or in joint and multinational task forces as part of a coalition of allies. No matter the mission, the RCN will develop operational plans and will design specific missions during that deployment to meet the needs of the campaign.

The Challenge

The RCN was seeking an improved capability to visualize planning and rehearsing complex operations involving ships, submarines, boats, fixed-wing and rotary-wing aviation, and other participants in the joint and multinational force. Existing methods and tools were outdated, largely manual and did not allow for meaningful visualization.

The challenge was to develop an intuitive planning environment that allows planners and decision-makers to develop plans. Constructive Visualizer (ConVis) allows users to visualize a mission plan or operational plan and see how units and formations will move through the operating environment in time and

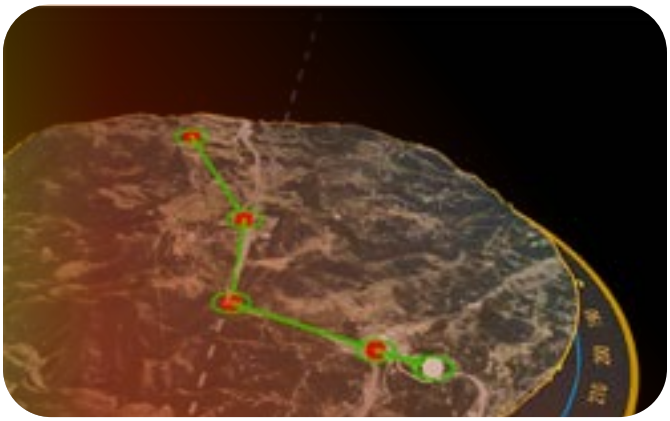


space. The visualization allows planners and decision-makers to see and understand how the plan will unfold. Visualizing helps mitigate risk and inform decision-making by showing how planning concepts will translate to execution.

To achieve this, it was necessary to have accurate representations of the terrain—including the water and airspace where ships and aircraft were operating, and the land on shore—and all the entities operating in that space. Additionally, the visualizer needed to be intuitive and user-friendly, allowing planners and decision-makers to use all the functionality embedded in the solution.

The Solution

The RCN ConVis solution provides a holographic virtual sand table, allowing for maximum versatility for users. They can zoom in and out, spin the map surface and re-focus the perspective to meet their needs. The ConVis solution was designed to provide visualization for multiple users in a classroom setting, allowing the entire planning team—including those in a joint and multinational environment—to see the same imagery and watch plans unfold in time and space. The visualization presents a floating interactive tabletop

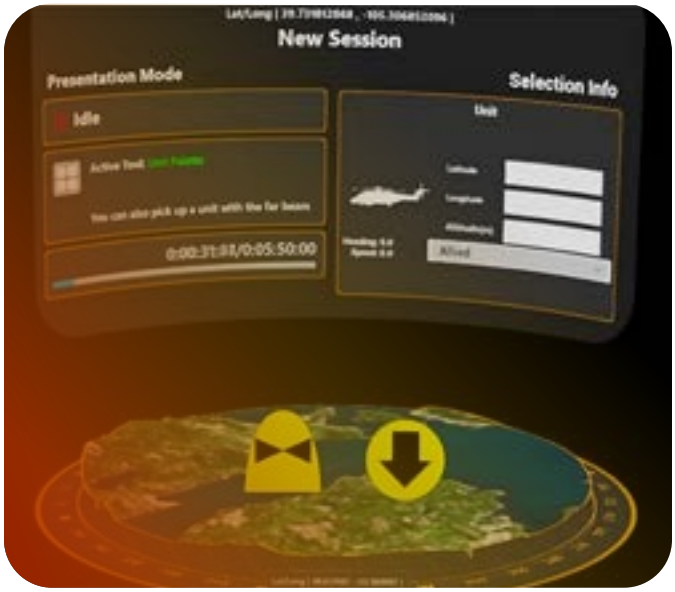


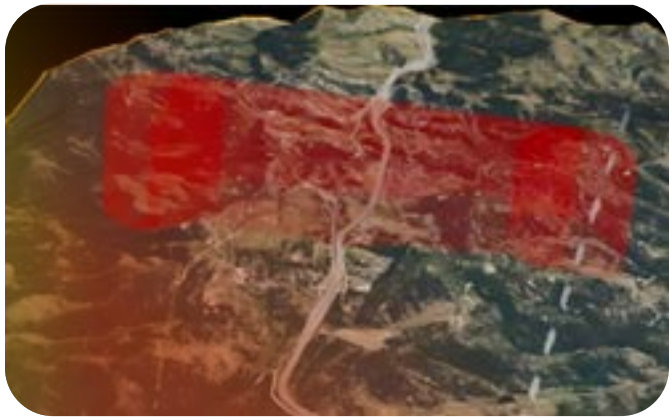
map that can load many different types of geospatial information system (GIS) data that can be scaled, panned and zoomed to provide the most appropriate perspective for planning.

There are two modes of application for the ConVis: editing and simulation. Editing allows users to place units on the map surface and assign them tasks. This is where planners develop their plans by placing all the necessary units on the map board and assigning them tasks and timelines as part of the overall plan. Planners can assign routes, waypoints and timelines for the movements of ships, boats and aircraft as part of mission planning. In editing mode, the users develop their plans to a high level of detail. This process is intuitive and user-friendly, with zoom and spin capability for the optimal vantage point.

The units in the simulated environment have the same capabilities as they have in real life. For example, the air-defence radar onboard a warship will have the same detection range visualized in the ConVis as the ship has in real life. The same applies to helicopters, weapons systems, sub-surface sensors or whatever else is being represented in the environment. The units will perform tasks in a simulated environment at the same rate as they would in real life. Helicopters will fly at the same speed in the simulated environment as they would during a real-life mission. This means that the visualization will accurately represent units' behaviours and capabilities in simulated time and space as they would on operations. This provides a realistic representation of a mission plan in a simulated environment.

In simulation mode, planners can either visualize the plan that they developed, or visualize pre-recorded exercises or simulations. In simulation mode, users can start and stop the simulation and change the perspective to better understand what is happening. This feature is well suited to a classroom setting, where

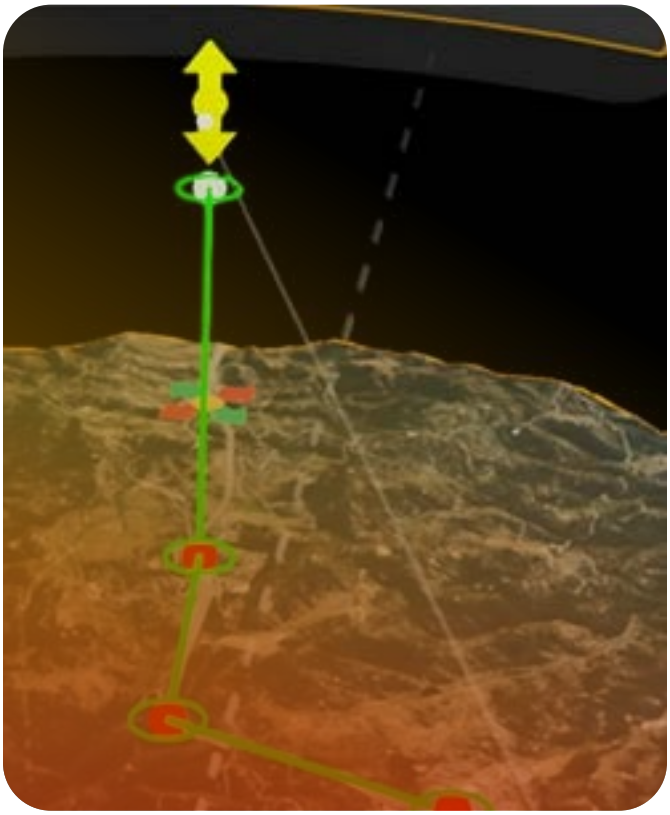




previous plans can be shown to trainees to focus on key learning points on mission planning and resource allocation. Any plan or file can be loaded in a simulation mode that uses a standard DIS protocol. All plans use standard NATO symbology to allow for common understanding in a joint or multinational environment.

Simulation mode also allows users to pause the simulation and make edits to the scenario as required. This is a vital function. By allowing edits in simulation mode, planners can make changes to address limitations or redundancy in their plans. Once changes have been made, the simulation can be rewound and replayed to provide planners with an updated visualization of the plan. This process can be repeated as many times as necessary to improve the plan.

Simulation mode also provides a valuable capability for after-action review. By replaying plans that were developed and executed, trainees can better visualize and understand the strengths and limitations of their plans. The after-action review process is an important learning tool to show trainees a reflection of the execution of the plan. This serves as the basis for improving plans during the next iteration.



The Results

The ConVis capability delivered a visualization sandbox for mission planning and rehearsal for the RCN. The sandbox perspective allowed users to zoom, spin and tilt the environment, and focus on a unit or any part of the mission as needed. Editing and simulation modes allowed for the development and visualization of those plans to give planners and decision-makers a clear understanding of how a plan will unfold in time and space.

Using a digital environment allows planners to rapidly share highly detailed plans and show how they will be executed. It also shortens the time necessary for establishing a shared understanding of an operational plan, and allows more time to refine details and make changes as necessary. The ConVis capability accelerates planning cycles by presenting a common picture of operational plans that can be easily visualized and understood, creating more time for changes and updates.

The ConVis project delivered on its stated intent and is a powerful training and planning tool for the RCN. The ConVis capability can be configured for any environment for any military customer—land, air or sea—with datasets for units and terrain.

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