HEXAGON

Case Study

Luciad Technology Used to Support NATO Air and Joint Operations Capability

The Integrated Command and Control software (ICC) is an integrated system that provides decision and information management support to NATO operations during peacetime and wartime, and during exercises. It is used by NATO and all of the NATO Nations, as well as by some of NATO's Partnership for Peace (PfP) partner countries, making it arguably the world's most widespread command and control system currently in use. As new technologies were developed, NATO reached out to LuciadLightspeed to allow ICC to become more suitable for its Command, Control, Communications, Computer, and Intelligence, Surveillance, Targeting Acquisition and Reconnaissance (C4ISTAR) role in a services-oriented era.

Full mission planning and execution capabilities with LuciadLightspeed

The NATO-wide ICC was developed by the organization that is today known as the NATO Communications & Information Agency (NCIA). Initially, ICC was destined to support Air Operations only. Thus it has steadily served as NATO's Air Command and Control system of reference. Some of the critical Air C2 functions it supports include:

- Planning and tasking
- Air Task Order (ATO) and Airspace Coordination Order (ACO) generation
- Current operations
- Targeting
- Recognized Air Picture Display
- Disseminating orders, mission reports and imagery between the NATO Combined Air Operations Centres (CAOCs) and the command echelons above and below the CAOC.

ICC has known a very large user adoption, above and beyond the Air C2 community. Especially since NATO adopted the use of LuciadLightspeed, ICC development has taken it far beyond its initial focus on Air C2 operations.

ICC today offers leading joint capability for mission planning and execution to include all military operations. This powerful Common Operating Picture (COP) capability can handle many consecutive live feeds and display a truly rich picture.

Database replication keeps information relevant on all fronts

Time is of essence in the planning and execution of Air and Joint operations, and ICC networking continues to allow information to be shared in real-time and non-real-time through database replication. From small command posts to large headquarters, operators access feeds and data to address specific challenges and plan for future tasks. The multi-user system is used by:

- NATO military personnel
- National headquarters
- Command posts.

Whether an operator is working on the most effective flight path for one or 100 missions, ICC is able to aid in visualization through live radar feeds.

ICC multi-faceted capabilities

Through a variety of capabilities, ICC is a tool that offers multi-faceted capabilities to a network of operators both in the air and on the ground. Its ISR full-motion video handling allows unmanned aircraft to generate visuals that effectively map and surveil areas and to observe the routines of civilians under security. This technology also aids in:

- Reducing civilian fatalities
- Pinpointing unusual occurrences
- Tracking
- Detecting roadside bombs.

Air operations planning and execution is at the heart of the ICC capability, and it gets to work upon the generation of Air Task Orders to plan the use of various aircraft types including fast-jets and Unmanned Aerial Systems (drones). All air units involved are able to access the resulting tasks and employ them during execution of current operations. In the event modifications are necessary, manual operation is available to re-task missions.

ICC was intensely used in the ISAF coalition operations in Afghanistan. And not only for air operations. Ground troops in Afghanistan faced a daily threat from insurgents including the Taliban. From roadside Improvised Explosive Devices (IEDs) to attacks on civilian supply convoys and more, ICC proved critical in its part as a member of a convoy tracking system that supplied full rich operating pictures to commanders. The ability to assist in such joint missions is made possible through data received through GPS receivers and satellite transponders of civilian truck envoys.

Enhanced situational awareness through geospatial visualization

In its mission to develop the graphical capabilities necessary to effectively visualize geospatial information from multiple sources, NCIA made updates to the mapping system of ICC back in 1999. This allowed ICC to provide a COP that was second to none and help to increase the situational awareness of commanders. The challenge faced was the need for technology capable of disseminating data involving fast-moving objects and changing situations.

NCIA turned to Luciad technology to provide such capabilities. Through its flexible programming, NCIA could implement their own insights to develop an end user system capable of adapting to future needs. Ever since 1999, NCIA remained a loyal and highly satisfied user of the LuciadLightspeed technology, adding capability over time.

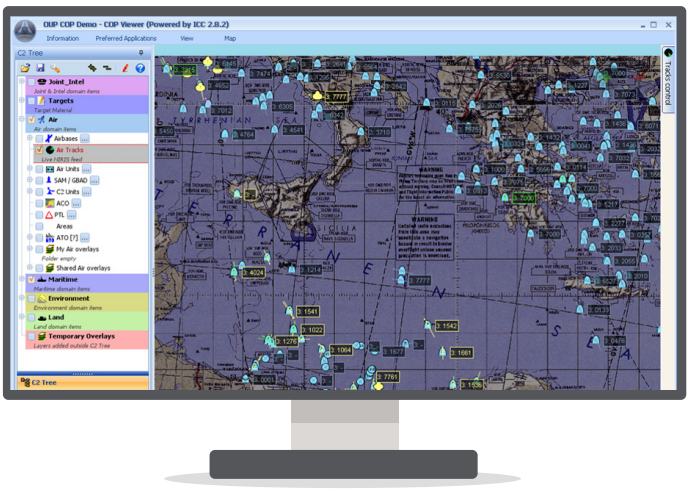
LuciadLightspeed evolution to present day

Over time, new demands of the evolving military networked environment meant that enhancements were required in the geospatial capability of ICC. LuciadLightspeed was able to provide the necessary upgrades and meet the challenges of combining OGC services with a variety of file-based and services-based COP layers: a demanding environment, and one that ICC continues to excel in. Luciad technology provided a quick response to changing needs, and NCIA was presented with the first C2 system capable of offering increased situational awareness at the theatre, operational, and far more tactical (local) level.

Keeping the pace with real-time performance needs

Real-time performance needs will continue to grow, and LuciadLightspeed has proven to keep the pace, especially through highly advanced GPU acceleration. Among the many enhancements made to ICC, some impressive features include:

- Ability to cope with updates to over 10,000 air tracks in display cycles a miniscule as 300 milliseconds – allowing ICC to show the Recognised Air Picture (RAP)
- Multi-core processing abilities
- Ability for commanders to utilize geospatial data in various formats in a single view
- Direct support for war-fighting symbology in APP6 and Mil2525



Handling many thousands of live air tracks, rich OGC service backgrounds and more is easy for ICC.

- Outstanding support for KML and NVG
- Support for multiple grid formats that include GARS and CGRS formats.

Paving the way for future technologies

The ICC program has paved the way in design requirements for future technologies of its kind. Successors including ACCS (Air Command and Control System) and NECCCIS (Northern European Command C2 Information System) have learned from the extensive use of NATO – and are also based on the award-winning Luciad technology. ICC with its map-based situational awareness enabled by LuciadLightspeed will continue to be utilized in order to improve situational awareness both on NATO and Nation level.

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Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous — ensuring a scalable, sustainable future.

Hexagon's Geospatial division creates solutions that deliver a 5D smart digital reality with insight into what was, what is, what could be, what should be, and ultimately, what will be.

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