A NEW APPROACH TO GEO-INFORMATION AND INTELLIGENCE

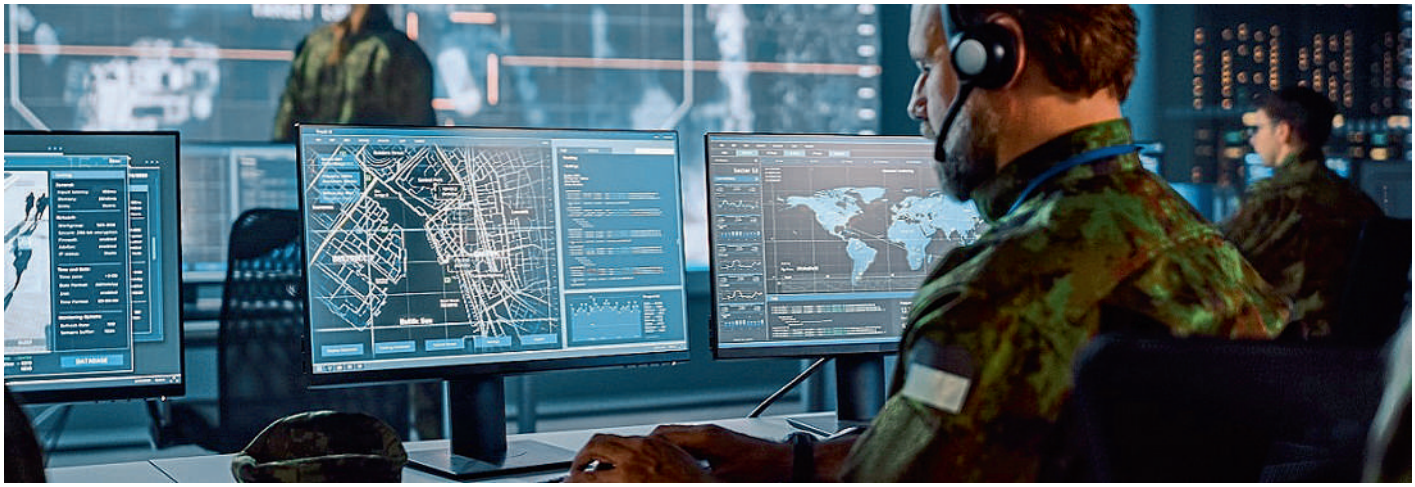
WOLFGANG RICHTER ARGUES THAT WE NEED A SOLID SET OF BUILDING BLOCKS TO RAPIDLY DEVELOP AND DEPLOY INTEGRATED OPEN SOLUTIONS THAT CAN EVOLVE WITH THE NEEDS OF ALL MILITARY USERS

Military forces often manage and distribute their geospatial data, intelligence and real-time information using isolated, stovepipe applications and non-standard services. As a result, forces suffer interoperability problems and find it hard to deliver the rich maps and intelligence, surveillance and reconnaissance (ISR) services required for accurate and efficient operations.

While command and control (C2) systems at headquarter level are commonly based on high-bandwidth networks, tactical mobile forces employ battle management systems (BMS) that are frequently based on low-bandwidth radio networks. Additionally, these systems are often built based on vendor-designed standards that lack interoperability so sharing mission plans, reports and real-time geo-information and intelligence between command levels can be difficult.

These limitations are significant because shared situational awareness (SSA) is essential for sound decision-making. There is a clear need for new enterprise-level approaches to efficiently connect to, manage and use geospatial data, analytics, information products and real-time information.

While GISes have been crucial in military information technology and communication (ITC) infrastructures, typical GIS capabilities can be cumbersome, require specialist support and need high-end hardware and power supplies to drive them. These demands can be hard, if not impossible, to meet in the deployed environment. Moreover, the military demands of today evolve at a tremendous pace. A more agile and open solution is required.



Ensuring accurate data from all sources

Many classic GIS technologies work with a closed, proprietary geodatabase that manages all geospatial objects, rules and relationships. Such "black box" technology is unfit for advanced military needs.

Today's warfare operations typically imply intensive use of near real-time and real-time data from an increasing number of ISR sensors on the battlefield. These data sources can be moving tracks, radar feeds, live imagery, incident reports and other sources. Operations can also quickly range from peace enforcement or support to conventional warfare or asymmetric warfare in unpredictable locations. The ability to operate in unfriendly environments and under cyber-attack while sharing information across coalition network domains demands reliable and robust geospatial infrastructure.

The common thread in today's warfare operations is the requirement to connect to, visualise and analyse any data source on the fly. This precludes pre-processing and optimising the data – both of which are inherent when working with geodatabases and conventional mapping engines.

Accuracy is also a major problem. Data reprojections and recalculations can lead to inaccuracies of up to tens or hundreds of metres compared to the original source data. In practice, this can mean the difference between targeting the enemy or innocent civilians. Therefore, it is critical to maintain the accuracy of the source data. The best way to do this is to ingest all data in its native format.

Breaking down barriers

In today's networked environment, collaboration across joint and coalition forces must be seamless to allow timely exchange of critical information between many actors, each with specific workflows and needs. Adherence to open and military standards is critical, as it makes it easier to exchange geospatial information. This increases the flow of data between the field and headquarters, which is vital for intelligence analysis and situational awareness to help inform the commanders' decision making.

But more is required than just open standards. Classical GIS tools often address different needs with separate products. This means that one product may be used for map and cartographic data production, while another may be needed for the management, distribution, exploitation and analysis of that same data. As a result, users must deal with an amalgamation of poorly compatible or incompatible products, each offering a piece of functionality in the patchwork of requirements.

What is required instead is a solid set of standards-based APIs or versatile "building blocks" for users to rapidly develop and deploy integrated open solutions that can evolve with the needs of all military users involved. This best-of-breed approach reduces risk, maximises return on investment and future-proofs critical systems.

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Managing very big data

Another issue is the size of the data. Geospatial data is very big. It is an amalgamation of datasets that spread across multiple systems and that are so large and complex that traditional data processing applications are inadequate. Challenges include analysis, capture, data correlation, search, sharing, storage, transfer, and visualisation.

Moreover, the number of users needing to access geospatial data has grown exponentially. Geospatial systems are used throughout the military enterprise and are embedded increasingly into C4ISR systems. Thus, the use has also changed.

Geospatial data used to be static in nature, reporting only what was. With the accumulation of available historical data, users now want to make rapid and easy temporal comparisons between the situation "now" and "then" to help visualise what is. How has the enemy progressed? Has critical infrastructure been destroyed? Modern location intelligence solutions must go beyond 2D and 3D and embrace real-time information such as temporal data (4D) that can be combined with up-to-the-second analytics capabilities (5D) for full situational awareness to show the user what can be, what should be and what will be.

Due to the increasing number and variety of sensors collecting data, advanced real-time capabilities are needed that can potentially handle hundreds of thousands of moving tracks with a sub-second update rate, and live imagery at a rate of 60 frames per second.

All of this requires higher performance than ever, including the ability to model any data format regardless of size, visualise data in an accelerated 2D/3D view (or even a virtual reality stereoscopic view) and rapidly gain a thorough understanding of geospatial data using advanced visual analytics tools.

Conclusion

Threats and the requirements to deal with them are constantly evolving, so the systems that underpin geo-information and intelligence must evolve, too. All individuals need accurate and up-to-date situational awareness which necessitates a new way of thinking about geospatial-based data, systems, workflows and results.

Ultimately, with a new approach that prioritises data accuracy, open standards, advances in data visualisation and analysis and an improved and contextual user experience, defence organisations can successfully fulfil mission-critical operations faster and with enhanced efficiency – a true force multiplier.

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