# Scalability demands and C4ISR in the modern operating environment.

As communications, intelligence, and data become more critical in fulfilling military missions, the requirements for scaling C4ISR capabilities are increasing. Operations can range from discrete small team operations to multidivisional deployments, and cover a range of scenarios that include peacekeeping, drug interdiction, counterinsurgency, and conventional warfighting. The resulting information requirements mean that scalable solutions to transferring critical data are growing in importance.

Systematic's SitaWare suite enables critical decision-making and battlefield awareness to be delivered from the corps level to the dismounted soldier. Integrating blue-force tracking, intelligence sharing, and operational planning, SitaWare allows operators to deploy a solution rapidly, and to scale to the userbase with as little infrastructure footprint as necessary.

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Partners and allies

Mobility and challenges

Sites & Nodes

Users

Data
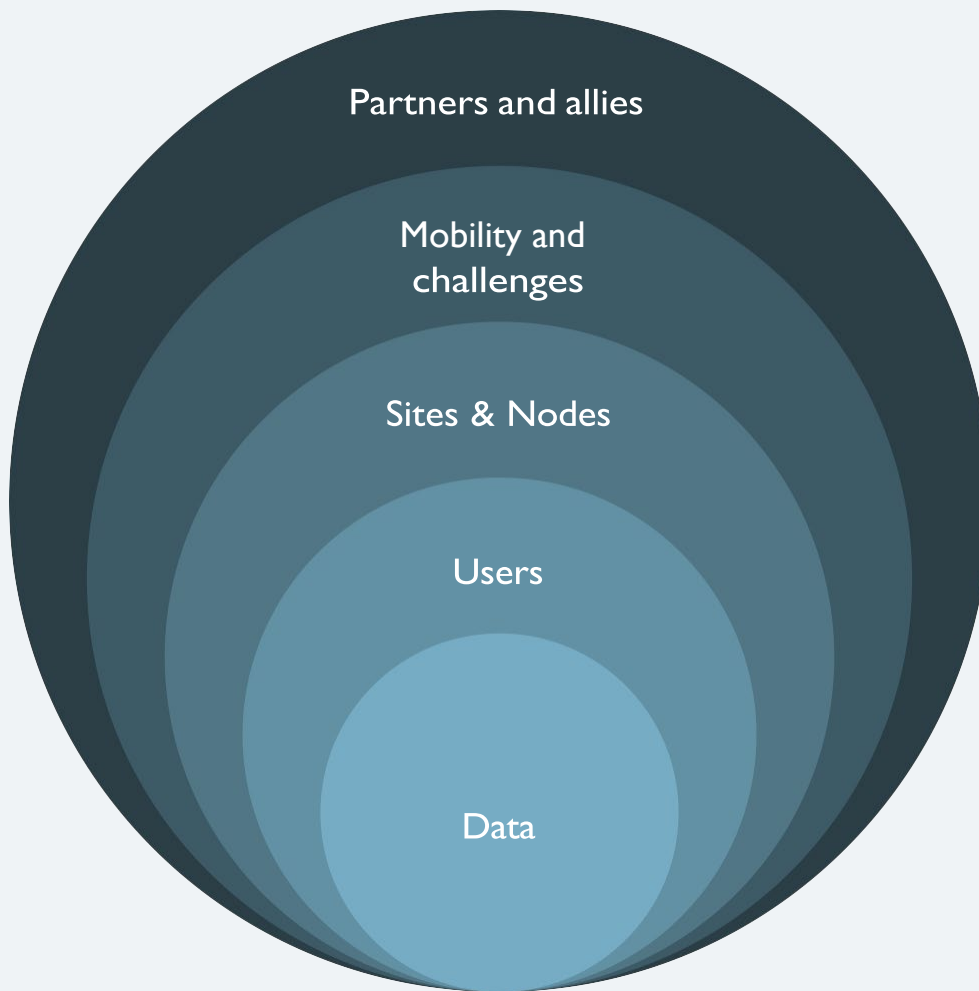
In envisaging the concept of scalability within the information technology domain, our mind is most likely to take us to answering the challenge around the number of concurrent users of a system. How many users can be supported? How quickly can a system's userbase be increased, without a loss of functionality for existing network users? If we are moving from no infrastructure to an advanced, installed solution, what are the hardware and software requirements for deploying increasingly larger formations?

Systematic's SitaWare suite provides the solution to meet the rapid scaling requirements for the number of users, as well as increase interoperability among different national forces, alliances, and civil-military partnerships.

However, while the number of users is an important parameter within scalability, there are many more facets that need to be considered. As C4ISR technologies are an increasingly important part of the toolkit for commanders

to make critical decisions to drive battlefield superiority, ensuring the distribution of intelligence and command data has never been more critical. As a result, the need for rapid scaling – both upwards and downwards – is increasingly important for users to preserve limited network resources that can include bandwidth, connectivity, and data storage.

As joint operations between different service branches, foreign allies, and civil agencies become increasingly commonplace, scaling access and data transfers has also become important to ensure that the right people receive the right information at the right time, particularly as the potential to be overwhelmed by data can hinder mission aims.

In this brochure we will examine scalability from the perspectives of data, users, sites & nodes, networks, and services and nations, as well as how SitaWare works to support scalability from a variety of approaches.

The volumes of data being generated by C4ISR systems can rapidly change between user environments. Smaller amounts of data may be transmitted between lower levels of command (brigade level and below), while division and above can demand significant data processing requirements as greater numbers of data feeds can be added and require processing and presentation to more users operating in a variety of roles. Increased demand for battlefield data and intelligence to support missions – both at the planning stage and during execution – mean that the requirements to scale data delivery are constantly growing.

Within this environment, data from C4ISR assets can range from situation overlays, track feeds from sensors, intelligence gathered from ISR platforms such as UAVs, reports, plans, chat messages, and reference information. Demands for lower levels of command to generate, capture, and manage sensor and intelligence data has come with added pressures on limited computing and communication resources. Higher levels may possess more computing power, but communication capabilities from lower levels can also be significantly constrained.

The SitaWare suite is able to meet these demands to provide this link, helping to ensure mission success. Simplifying the architecture and hardware requirements of a C4ISR system allows for easier distribution and dissemination of information, while also ensuring that critical intelligence reaches users in often complex environments.

The changing face of battlefield data volume

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Scaling to
concurrent Headquarters staff users

At the division and corps levels, several hundred staff officers can be involved in collaboration across a variety of tasks, ranging from intelligence collection and dissemination, to monitoring operations and planning future tasking orders. As a result, the demands of the C4ISR system needs to be capable of supporting the number of users, as well as the organization and management of the data that is being produced, distributed, and correlated.

As the demand for advanced battle management software has increased, SitaWare has been able to demonstrate its capabilities at the command level in exercises by several nations. The SitaWare suite is delivered with performance technical specifications that describe scalability in terms of users, data volume, and system usage as a function of server performance. This helps to guide system managers in sizing and configuring SitaWare systems easily to support headquarters units at upper echelons.

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Scaling to
multiple sites

Conflict over the last two decades has been dominated by counter-insurgency operations, which has meant that large headquarters units have been able to be co-located with other command teams in more secure locations. This has come with a corresponding requirement for scaling systems to deal with greater numbers of users. Future near-peer conflicts will mean that headquarters will be more likely to be moved onto disparate, mobile sites, to ensure redundancy, security, and the ability to remain flexible.

SitaWare supports both scenarios, offering a very high number of concurrent users per server, and enables organizational

clusters so that multiple servers at different sites can be configured as a single organization. SitaWare also automatically ensures sites are synchronized when they are online, with the system's redundancy also allowing any one of the sites to continue operation as the lead headquarters if others are being relocated or become incapacitated.

Scaling to multiple sites can also be performed as part of a staged deployment of forces from home base to theatre staging area, and then to support in-country units. The requirement for a small formation to reach back to a distant home base in an austere environment means that processing power, bandwidth, and system architecture need to be factored in to how a solution is delivered. In creating this solution, the combination of various solutions of the SitaWare suite allows for easy communication of complex C4ISR information, ranging from simple messaging and common operating picture sharing, through to streaming video.

Scaling mobile nodes and operating challenges

As the battlefield has become increasingly digitized, the operational environment has become challenged by factors such as hostile and fratricidal electronic warfare measures, high latency, and reduced bandwidth. Deployments to challenging geographical environments have also made communications difficult, as mountainous terrain can block signals, and troposcatter communications can also be hampered by meteorological factors.

Within this operational environment, C4ISR systems have to be able to scale information exchange to mounted and dismounted mobile operators over low bandwidth networks, as well as connect multiple headquarters over medium bandwidth networks such as satellite communication.

Within the SitaWare solution, Systematic has optimized, tested, and proven the SitaWare suite through many years of research, development, and refinement. We have also scaled the communications backbone of the software suite, documenting its performance specifications when delivered alongside the SitaWare suite.

SitaWare Tactical Communication is at the heart of the SitaWare suite and utilizes a mesh-based communications network. This provides users with the ability to maximize information sharing over limited bandwidths, employing advanced knowledge-based compression to ensure only the latest and most appropriate data is transmitted, preserving precious bandwidth for users in difficult operating environments.

SitaWare Tactical Communication also provides users with the capability to scale and route over heterogeneous networks, across multiple device types and operating systems, a variety of protocols, and availability. The system links nodes together and offers its own routing and self-learning network management and awareness to ensure reliable and robust communications, as well as supporting network awareness capabilities.

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Partners, allies, and joint interoperability
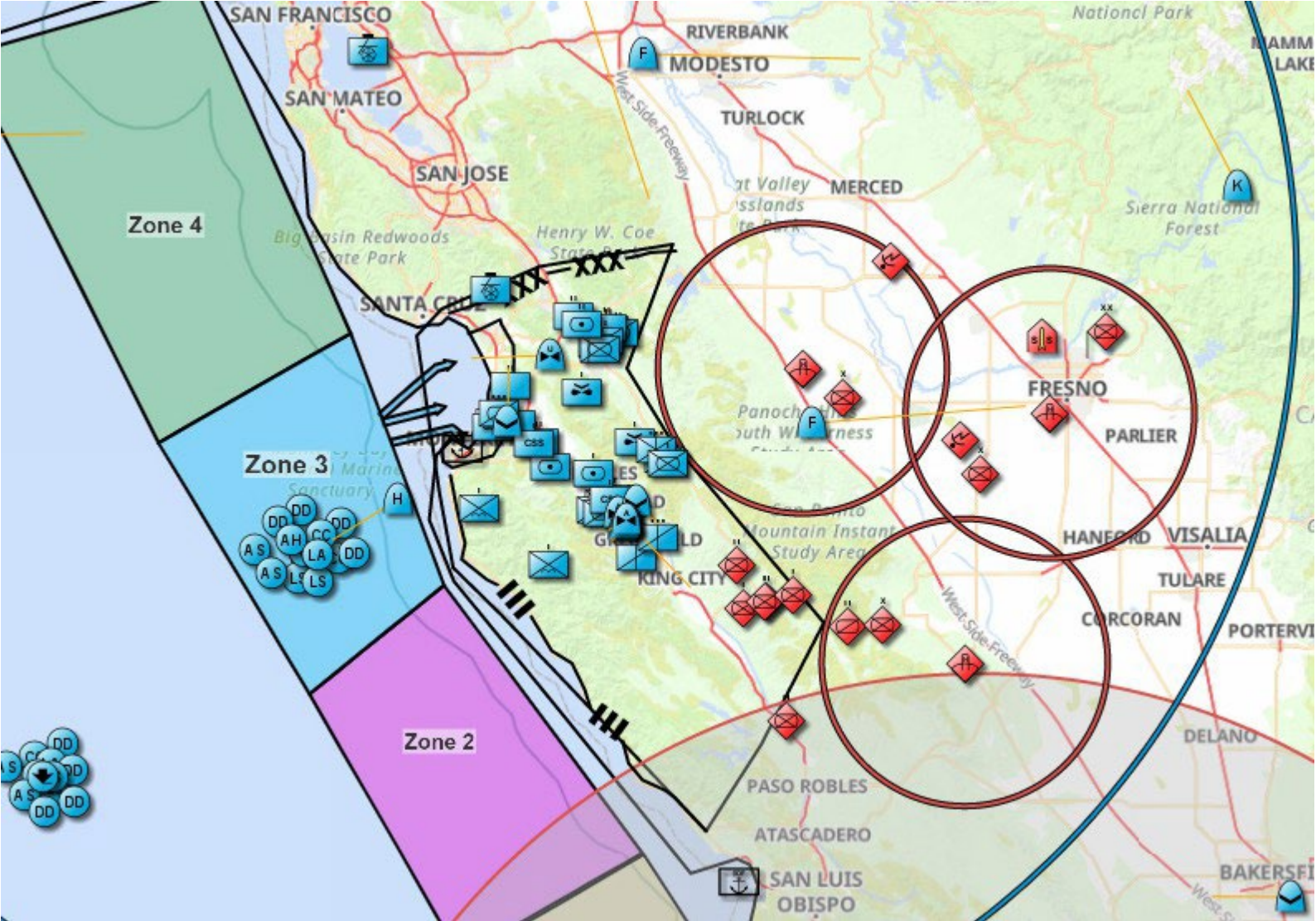
Operating with allied forces also creates a requirement for scalability. Being able to share a common operating picture, sensor feeds, and orders across multiple national users helps to ensure success in missions that can range from high-intensity operations to humanitarian aid and disaster relief.

Scalability within this context covers data exchange through common, shared, or the support of multiple data standards to ensure the concurrent consumption and processing of data by multiple partners. While some coalition partners or their systems may only be able to support a limited set of data exchange standards, they may not be able to consume data flows at the same rate.

The SitaWare suite supports more interoperability standards than any other system on the market, translating data between standards and throttling data outputs to match the level supported by the weakest system within a coalition's operational network.

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The SitaWare solution

The SitaWare Suite consists of four different systems, each one specifically designed to optimize user experience and scalability at different levels of command. SitaWare Edge, designed for a dismounted commander using an Android device, manages data in a battery sensitive manner while still providing the commander with optimized situational awareness and the ability to exercise command and control. SitaWare Frontline, designed for mounted commander, and SitaWare Headquarters, that offers data scalability appropriate for the command levels and the typical IT resources available. All this is supported by the new SitaWare Insight intelligence fusion and dissemination platform that helps increase situational awareness across the battlefield.

In an overarching management position, SitaWare Headquarters can be used by headquarters units to manage command and control, as well as dissemination of intelligence and data feeds. The SitaWare Headquarters can be scaled out with supporting server infrastructure as required by users to support co-located headquarters, increased users, and allies.

SitaWare Frontline and SitaWare Edge provide decision support for the mounted and dismounted commander, respectively, by providing seamless C4ISR information across the battlespace and improving dissemination of a common operating picture to support comprehensive situational awareness.

The new SitaWare Insight helps commanders gain information superiority through automation of intelligence collection, processing, and dissemination. The platform provides process automation and advanced data-driven decision support using a Kubernetes cluster architecture. SitaWare Insight helps to manage the full intelligence cycle and enable cross-coalition information sharing, with artificial intelligence helping to generate a Recognized Intelligence Picture.

The SitaWare Suite is also supported by a communications infrastructure network, SitaWare Tactical Communication (STC), which enables secure, near-seamless data transmission in a proven off-the-shelf solution that is scalable to every customer's need.

For further details and specifications on how we can meet the demands of a scalable system, please contact the defense sales team at systematicdefence@systematic.com

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About Systematic

Systematic delivers world-leading command-and-control, military messaging, and electronic warfare solutions – providing commanders at all levels of the battlespace with comprehensive situational awareness and advanced mission management tools. Operating across domains, our reliable, user-friendly, and operationally proven C4I software has been delivered to more than 45 customers worldwide.

Contact us

Do you want to learn more about Systematic and how our state-of-the-art C4I solutions are raising the bar for mission management across domains all over the world? Contact Systematic Defense to learn more.

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