OPEN SYSTEMS, SEAMLESS INFORMATION EXCHANGE

How our Mosarc™ Situational Awareness Data Management solution improves data sharing with multi-vendor applications

Collins Aerospace
An RTX Business

INTRODUCTION

Rapid and cost-effective deployment of new capabilities on crewed and uncrewed platforms require next-generation techniques for data management. Furthermore, cutting-edge concepts, such as autonomous aircraft and connected ecosystems, can only be fully realized when software applications can access, integrate and interpret information from a collection of distributed sources.

Mosarc is Collins' next generation modular open system approach to avionics. Mosarc leverages modern open system technologies, standards, tools, and processes to serve market needs across both commercial and defense programs for current and future fleets. The primary objective of Mosarc is to enable rapid and seamless integration of mission avionics, with safe management of civil/flight critical functions and mission functionality, using open standards for interoperability with products both from Collins and external vendors.

To support these needs on both civil and military aircraft, Collins Aerospace developed the hardware-agnostic Situational Awareness Data Management (SADM) software application. The SADM solution enables high-velocity upgradeability and enhanced situational awareness for both legacy and next-generation platforms.

Leveraging modular open systems approaches (MOSA) and agile, digital engineering processes, SADM provides the centralized repository infrastructure and standardized interfaces needed for seamless information flow among collections of multi-vendor components.

Data exchange between multi-vendor systems is challenging

To better understand the capabilities of Mosarc SADM, consider how data is frequently produced, managed and distributed on many existing platforms with federated systems.

In these applications, stove-piped data producers and managers for information, such as obstacles, threats, flight plans and weather, usually present this information directly on the aircraft displays with little to no sharing with other systems.

Moreover, even if information access is permitted by third-party applications, it is typically done through dedicated, proprietary connections rather than standardized application programming interfaces (APIs) and data formats.

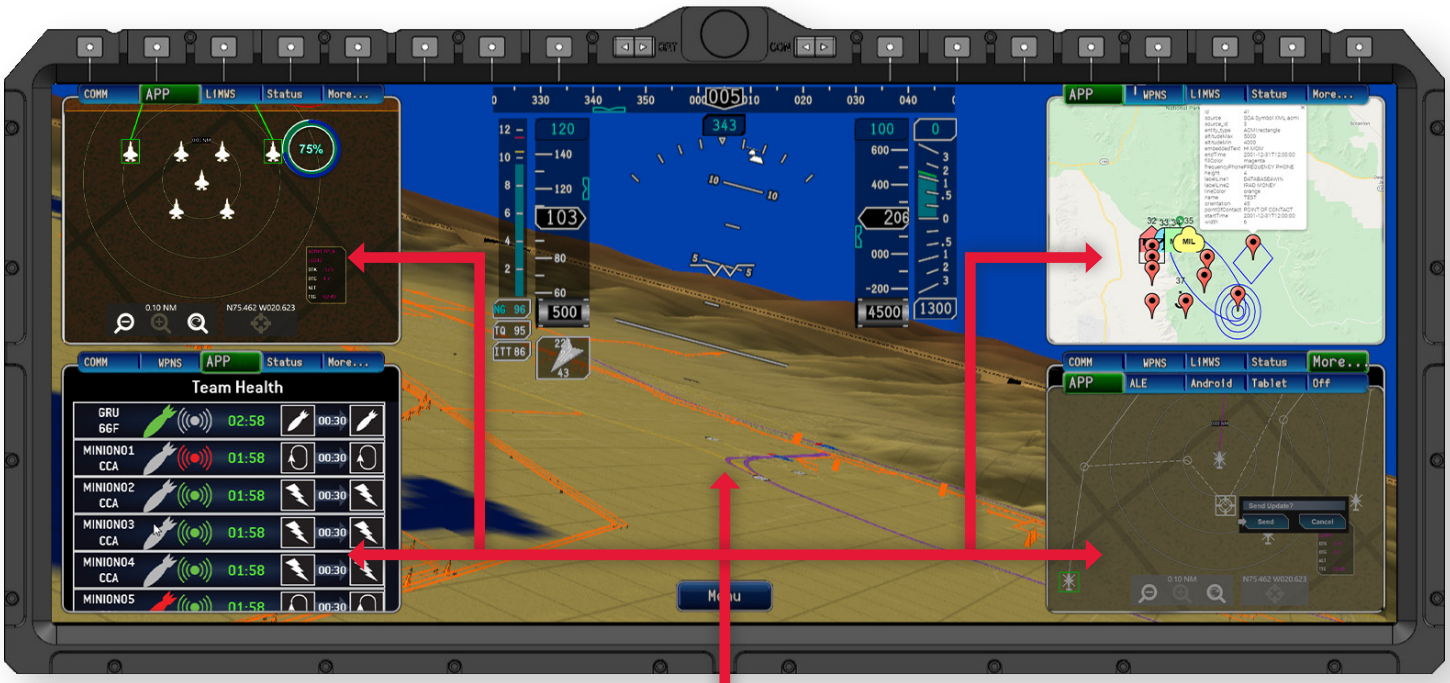
Multi-vendor applications frequently render their contents directly to windows on the aircraft displays or helmets without sharing. These data flow limitations would prevent a new type of application (e.g., smart avoidance re-router) from using all available information to achieve full situational awareness.

Stove Piping: In the context of software systems, these are applications that are isolated in a way that hinders communication and cooperation with other system components.

Application Programming Interface (API): A documented way for two or more computer programs to communicate with each other using a set of common definitions.

MOSARC SITUATIONAL AWARENESS DATA MANAGEMENT (SADM)

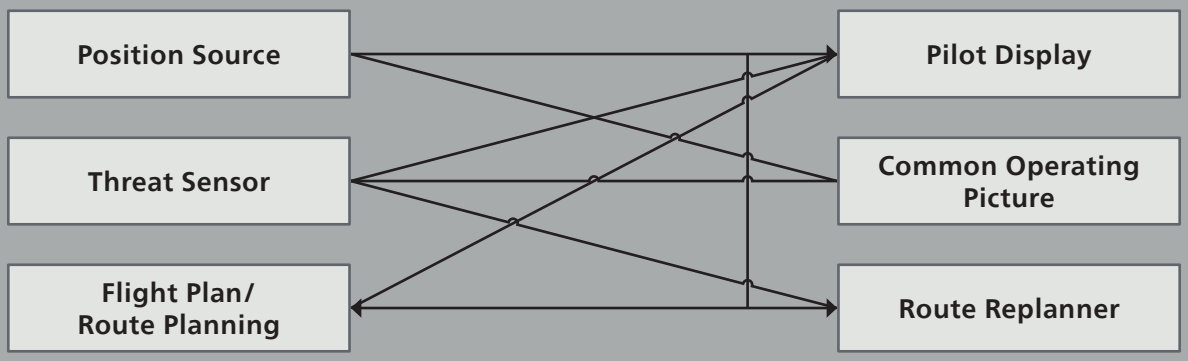
Mosarc SADM introduces a paradigm shift in information management by providing centralized infrastructure for the collection, management and dissemination of geospatial entity data for multi-vendor applications.



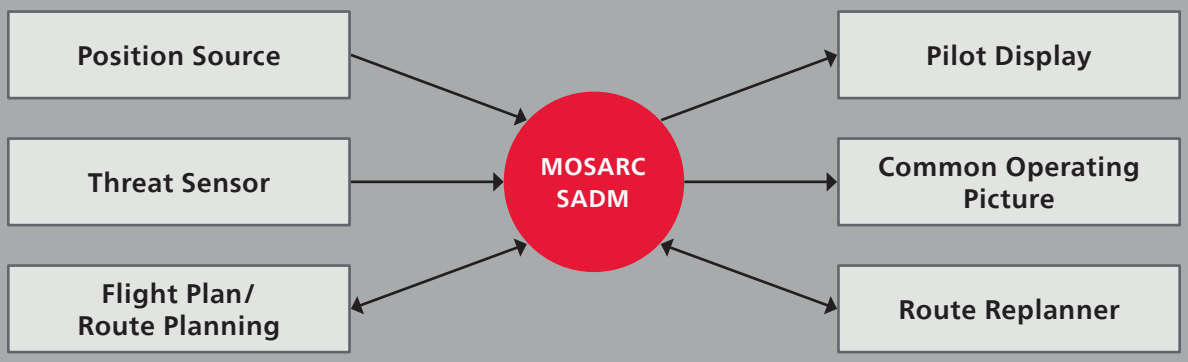
Mosarc SADM decouples applications by providing a standardized, publish-subscribe (i.e., "pub/sub") architecture – vastly improving the ability for multi-vendor applications to share data.

SITUATIONAL AWARENESS DATA MANAGEMENT (SADM)

Existing approach to integration



New Mosarc SADM approach for integration



CORE FOUNDATIONAL SERVICES

Mosarc SADM provides storage and interfaces to write, query, filter and subscribe to collections of entity information like obstacles, threats, flight plans, weather, and other points of interest. Mosarc SADM server predominately manages geographically oriented data, enabling the efficient retrieval of specific types and regions of data, continuous data around ownship position, as well as continuous data around entities or areas of interest.

Multi-vendor applications can receive entity details, perform correlation calculations, and update entries in Mosarc SADM. Moreover, this information can be collectively rendered by a graphics application onto multiple types of displays – heads-up, heads-down and helmet-mounted. Example use cases include:

- **Flight Management System (FMS):** Querying flight plans and navigation database (NavDB) information to generate route updates.
- **Automatic Dependent Surveillance–Broadcast (ADS-B) Receivers:** Loading airborne traffic, airspace restrictions or weather radar polygons for detect and avoid (DAA) systems.
- **Radar/LIDAR Sensors:** Detecting and interpreting entities of interest using a collection of multi-wavelength sensors.
- **Connected Ecosystems:** Sending/receiving situational awareness data bi-directionally between on-ship and off-ship systems using civil/military communications networks.

ENHANCED SAFETY AND RESILIENCY

- To satisfy airworthiness regulations, SADM is designed to the highest design assurance levels (DALs) to cost-effectively integrate mixed-DAL components over time. Additionally, the Rust programming language source code base reduces potential cybersecurity vulnerabilities and eliminates common classes of software bugs.
- Altogether, Mosarc SADM is assured to support both mission and safety-critical applications.

Mosarc SADM is MOSA-ready

- Hardware agnostic
- FACE™ conformant
- Runs on multiple operating systems
- Provides open APIs*
- Containerized for seamless portability across systems
- Using model-based SysML artifacts and a certification-focused DevSevOps pipeline, Mosarc SADM can be rapidly deployed on both legacy and next-generation platforms

** Based on commercial standards, such as Protocol Buffers (protobuf)*

Data from local and remote sensors (via various communication links) can be fused with Mosarc SADM to create a holistic viewpoint.

USING MOSARC SADM TO RAPIDLY DELIVER NEW CAPABILITIES

By aggregating information from multiple sensors and communication networks, Mosarc SADM cultivates a more complete picture of common operations. To demonstrate how this enhances situational awareness, let's consider the integration process for a new ADS-B feed over a commercial low-Earth orbit (LEO) satellite link.

Traditionally, entity information from this new data feed would be isolated within its respective data link application and only presented on the flight deck map. Information sharing with other components, such as a flight management system (FMS), would be limited.

While custom software could potentially be written to support entity sharing among disparate applications, any subsequent changes to either data producers or consumers would drive changes in this specially-made connection. Alternatively, Mosarc SADM's flexible, MOSA-aligned architecture decouples these data producers and consumers to create an environment where new insights can be generated through sensor fusion.

Using Mosarc SADM, an avoidance re-router (ARR) application can leverage both the ADS-B entity information from the commercial LEO satellite network and flight plans from the FMS to generate optimal trajectories that avoid obstacles, promote collaborative routing or reduce flight times. Additionally, none of these applications need to be from the same supplier, as SADM facilitates multi-vendor environments.

As new technologies and communication links become available over a platform's lifetime, you can expect Mosarc SADM's streamlined modification process to accommodate their rapid deployment – further reducing lifecycle integration costs.

NEXT STEPS

Collins Aerospace and our Mosarc SADM application can support your adoption of modular and open solutions on both next-generation and legacy platforms. We can offer new ways to achieve unprecedented levels of agility and resiliency in delivering new operational capabilities.

To learn more, contact Collins Aerospace at mosarc@collins.com for a free evaluation.

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