JADC2 via ABMS

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ABSTRACT

"*JADO requires changing how the United States Air Force thinks about and conducts operations*" – CSAF David Goldfein

Given the complexity of the topic, there will hundreds of opinions and solutions flowing up to leadership for the next several years. Determining the most feasible, cost effective, secure solution will be the difficult piece. This problem has several complications in a single service, let alone multiple services and multiple nations. Advanced Battle Management System (ABMS) is front and center laying the groundwork for the Air Force and sister services to operate as a joint team. The effort will focus on connecting sensors, decision makers and weapons through secure data networks enabling rapid decision making and "all-domain command and control". This paper will detail the applications being developed today and the challenges the programs will face when deploying.

Introduction

To deter and if necessary defeat adversaries, the United States Air Force must contribute to joint all-domain operations (JADO) to rapidly sense, command and control, target and support actions across all warfighting domains. [1] The Air Force's approach to this challenge is called Advanced Battle Management System (ABMS) and it will be the "technical engine" leading the way and creating a framework for JADO. ABMS will consist of several applications the users will be able to use and subscribe to in order to complete a specific mission. Some of these applications include commandONE, platformONE and fuseONE and they all have a very specific use that will be applicable across the services when fielding the capability of JADO. Inevitably there will be several challenges when trying to implement JADO to include security of the networks and the data flowing on those networks, obtaining an Authority to Operate (ATO) that satisfies the cyber community and how the Development/Security/Operations (DEVSECOPS) is implemented and maintained to match the speed of operations. The Air Force is still operating aircraft built over 50+ years ago that will need to be interoperable with 5th gen aircraft today and retrofitting the older airframes may prove the biggest challenge in cost, schedule and performance.

CommandONE

One of the several applications that could be applied to the ABMS concept is CommandONE. CommandONE looks to facilitate the ingestion of thousands of sensors and collection sources through developed applications that mission focused across all domains and tailored to meet the

[1] National Defense Strategy of the United States of America, 2018

Joint Operational requirements at all security classifications.[2] CommandONE applications will provide the operator multi-domain and joint operations courses of actions (COAs) to provide battle management at the tactical and operational level of warfare.[3] With the help of Artificial Intelligence and Machine Learning (AI/ML) the end product aims to give the operator the ability to make an informed decision quickly and efficiently while reducing the kill chain timelines. Most C2 tools like TACS, AWACS, JSTARS and CRC were built around a particular sensor or capability and only existed at the SECRET level. CommandONE aims to provide battle management across all mission sets utilizing sensing and information from all domain sources across all security levels to provide weapons to target pairing all forces in a joint fight.[4]

FuseONE

With applications like CommandONE allowing for the operator to choose from thousands of sensors in order to complete the mission, there needs to be a fusion application that can visually display all of the incoming data. FuseONE is a cutting-edge capability that fuses the all-domain sensor inputs in temporal, spatial and contextual object focused environment.[5] Current sensors build an air picture in a stove-pipe and often use formats that are not compatible with any other C2 enablers. Often times the classifications of the sensor data also will limit its dissemination to the users and a cross-domain solution (CDS) is typically developed in order to bridge the gap between sensor and user. FuseONE will be a unified multi-domain engine architecture that will build and maintain objects with high accuracy.[6] In order for thousands of sensors to fuse together under one application, a specific format will need to be created and managed. All of the legacy

[2] ABMS Product Book
[3] Ibid
[4] Ibid
[5] Ibid
[6] Ibid

sensors in the field today would need to update to the new message format in order to put their data on an ABMS capable platform.

Multi-Level Security

The idea behind multi-level security allows a user to simultaneously import, export, process, and store data at different security classification levels and compartments. This concept will also allow users with different clearances to use the system at the same time and allow users to access the system without being cleared for all of the data that is stored on the system. Currently operations can come to a stand-still due to classification issues and restricted access to information. Properly classifying data is important to safeguard the information but when classification of data actively impedes the mission it was meant to inform then we are essentially defeating ourselves. Multi-level security will allow users to connect to multiple networks at different security classifications through high assurance interfaces. This multi-level network will need to have a centralized ATO and constantly be monitored by a team of information security professionals for patching, updates, additional networks, etc. The greatest concern with this effort will be the government accreditation process and the risk the IT community will need to take on to manage such a network. ATO's for systems should be delegated down to the lowest level possible to ensure speedy approval process.

DevSecOps

Typically when referring to a software program, the development and operations are separate entities within the creation of the program. When you combine the two functions of development and operations you ensure rapid release cycles and can be considered an "agile" software program. The idea behind DevSecOps takes security and integrates it throughout the program,

not just at the beginning or end. Development and operations should be built on the foundation of security with constant security patching/updates always being applied throughout the lifecycle of the program[7]. Often times with complex, rapidly moving programs, automation is key to the success of security integration. With respect to JADO, software applications like CommandOne, FuseOne and several others will need to operate at the speed of relevance which is always going to be agile with the environment we live in today. Each application needs to build it's development and operations on the foundation of security in order to be successful in protecting the software applications from adversaries.

Conclusion

Joint All-Domain Operations is a complicated technological challenge which will impact every program office, every user, every sensor and every weapon system in all branches of service. There will never be a perfect solution that is seamlessly integrated, especially when working with 75 year old technology. ABMS presents a promising solution that could function as a subscription service. If a user wants access to a particular sensor, weapon system or data set, that user would login to the multi-layered IT system and subscribe to the material required to complete their mission. In theory it should be relatively straight forward to implement but in practice there will always be challenges. Agile DevSecOps will be the "buzz" word when referring to the development/security/operations of all of these software applications. It is important to stay ahead of the next threat while still hardening the security on all systems; one small crack could bring the whole ship down if not properly managed.

[7] https://www.redhat.com/en/topics/devops/what-is-devsecops

Acronym List

ABMS – Advanced Battle Management System
AI/ML – Artificial Intelligence / Machine Learning
ATO – Authority to Operate
AWACS – Airborne Early Warning and Control System
C2 – Command and Control
CDS – Cross Domain Solution
COA – Course of Action
CRC – Control and Reporting Center
DevSecOps – Development Security Operations
JADO – Joint All-Domain Operations
JSTARS – Joint Surveillance and Target Attack Radar System
TACS – Theater Air Control System

Appendix:

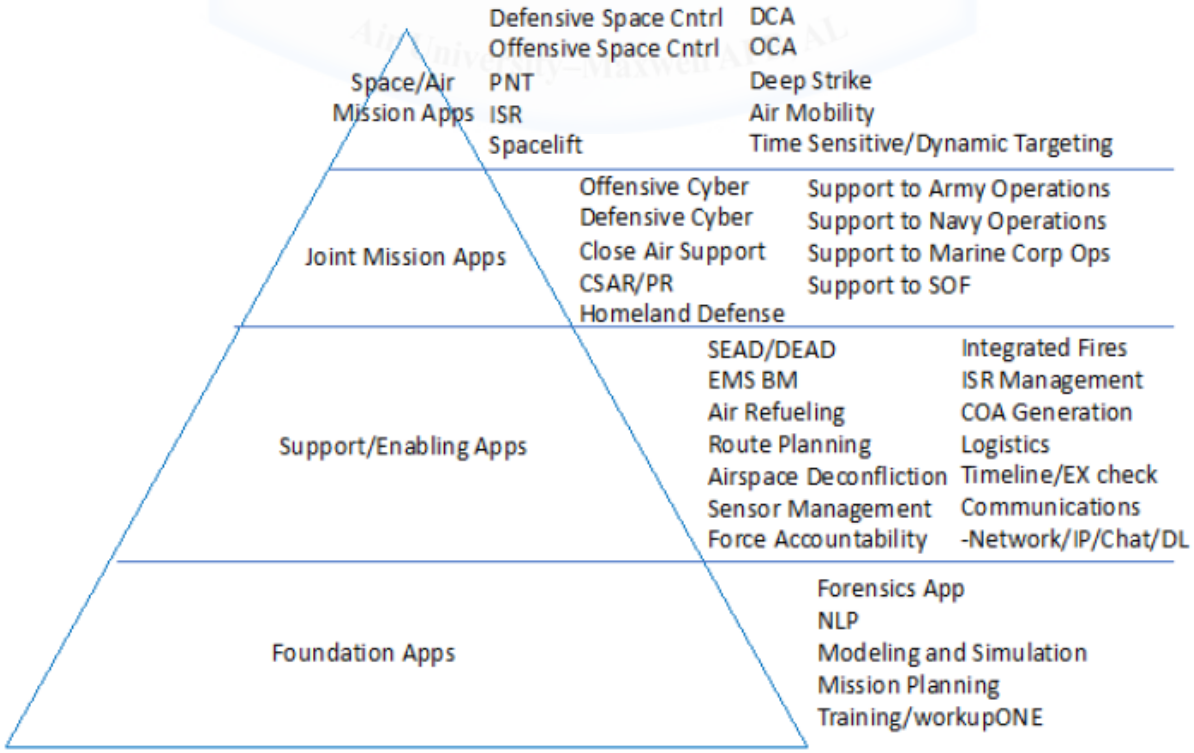

Figure 1. Core Applications and functions being developed for ABMS