SPOTLIGHT:

JADC2:
The art of
filling gaps

JADC2 and the art of filling gaps

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Data has been, arguably, the US military's most valuable-but-untapped resource since the founding of the US Army in 1787 and the US Navy a decade later.

Paratroopers establish a communication strategy during the beginning of Project Convergence 21 in Yuma, AZ, Oct. 7, 2021. (U.S. Army photo by Pfc. Vincent Levelev).

In the film Rocky, Balboa explains why he's attracted to Adrian. "She's got gaps, I got gaps. Together, we fill gaps."

The Defense Department also has gaps, and in many areas it's still looking for its "Adrian." That's especially true for the architectural concept called Joint All Domain Command and Control (JADC2), where arguably the most important gap relates to data and the sharing thereof among services for both targeting and command and control.

It's a gap because it's often locked in proprietary systems, where the ability to view, make sense, share, and act upon is hindered by siloed solutions and protocols that have remained in place since the US Army was founded in 1787 and the US Navy a decade later.

The DoD's JADC2 strategy signed by Defense Secretary Lloyd Austin in mid-2021 says as much. The strategy identified five major "lines of effort" the DoD is tackling to create true jointness, with data standardization being one of them, along with development of a more secure, resilient network to transport data, and better collaboration with allies and partners.

"We have a lot more gaps than we can cover; that's probably not a surprise to anyone," said Joint Staff J6 Lt. Gen. Dennis Crall, director, Command, Control, Communications and Computers/Cyber and chief information officer, who is the de facto lead for the JADC2 effort. "Despite all the capability that we have, there's a pretty long list of things that we believe we need to improve upon and really fulfill."

Part of the answer to solving the gap as it relates to data is through what's called a "data fabric." It's a concept that's key to sharing data between clouds in a hybrid-cloud environment, and is integral to the establishment of the DoD's new cloud environment called Joint Warfighter Cloud Capability (which is the replacement for the canceled Joint Enterprise Defense Infrastructure program that is better known as JEDI).

Gartner, a technology research and consulting firm, describes a data fabric as an environment with a unified architecture across which data is shared and delivered in a "frictionless" fashion to endpoints both in on-premise data centers and in multiple clouds, as well as out to the tactical edge.

WEAVING A DATA FABRIC

With data being the cornerstone of JADC2, the movement from network-centric operations to data-centric operations gained traction in 2021 through a number of contract awards related to the creation of data fabrics. In one, the Army Futures Command's Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Center awarded a contract to create a data fabric for its Project Rainmaker solution.

"Rainmaker approaches data fabric from a distinctly Army tactical vantage point, prioritizing the need to mediate data between existing programs of record, warfighting functions and echelons," according to the service. "It targets data synchronization across disadvantaged, disconnected, intermittent and latent communications environments that commanders and soldiers encounter at the tactical edge."

Maj. Gen. Robert Collins, Robert Collins, program executive officer for Command, Control, Communications-Tactical (PEO C3T).

In another data-fabric-related award, the US Army's Program Executive Office for Intelligence, Electronic Warfare, and Sensors is moving forward with development of an intelligence data fabric for the second capability drop of the Distributed Common Ground Systems-Army system.

The topic of data fabrics was recently addressed in a Breaking Defense interview with Maj. Gen.

Robert Collins, program executive officer for Command, Control, Communications-Tactical (PEO C3T), and Brig. Gen. Jeth Rey, director of the Network Cross-Functional Team at Army Futures Command.

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"In order for JADC2 to be realized, in order for us to share data and for sensor-to-shooter information to be at the point of need for the commander, a data fabric is going to be required," said Rey. "Moving to a data-centric environment is going to allow us to do that."

Building upon that comment, Collins added: "We're trying to transition from a very network-centric environment to understanding the types of data that we need to enable the joint warfighting construct. What we're recognizing working across the joint community is there may very well be multiple data fabrics.

"However, we'll federate those within JADC2 and we'll leverage things like reference architecture and implementation to help collectively link those areas together. The data fabric is going to be the underpinning and the horsepower that will help enable analytical engines and the visualization layer.

Collins identified two specific areas where data will enable what he called "single-pane-of-glass" situational awareness for interoperability between joint forces and partners, via secure transport that will stay up and running even during a potential Great Power conflict. These areas are: all-domain situational awareness or common operational picture, and engagement fires areas.

To attain those, the DoD must work within the joint community to identify the interfaces and the minimum essential areas that need to be agreed upon to achieve common graphics, common overlay, and common terrain background.

LEAVE THE INTELLECTUAL PROPERTY IN THE BOX

Along those lines, both the DoD and industry must do more to think about data as arguably the most important strategic asset that will enable joint operations with sister services and

Marines and Army Special Forces soldiers exit a CH-53E Super Stallion during Castaway 21.1 at Ie Shima, Okinawa, Japan, in 2021. Marines train to integrate with the joint force to seize and defend key maritime terrain, provide low-signature sustainment and execute long-range precision fires to support naval operations. (DoD photo)

partners. The keys to unlock the data: standards and open systems. It's not just a job for the military but also for industry.

"I think that the standards need to be addressed fundamentally by just kicking open the doors on closed systems and demanding that industry implements modular open system approach, or MOSA, as it applies overall to the entire JADC2 architecture," said Ross Niebergall, vice president and chief technology officer for L3Harris. "Something that industry needs to do is leave the IP in the box and open up the standards between systems and subsystems to let industry innovate.'"

That is one of the first steps in giving warfighters the ability to fuse data through artificial intelligence and machine learning — a key pillar of JADC2. Other pillars include: secure and resilient communications, all-domain sensing from seabed to space, and the application of kinetic and non-kinetic precision-guided munitions.

Ultimately, those pillars all work together in an enterprise architecture designed not just for sensors, shooters, and targeting in an improved OODA (observe, orient, decide, act) loop, but for command and control (C2) of operational units in a theater context. Hence the rationale behind the "C2" part of the JADC2 acronym.

"One of the reasons why the US has been such a force internationally is because of a powerful collection of command and control systems that have served us very well," said Niebergall. "Unfortunately, many of those command-and-control systems were developed in a time of centralized command working in an expectation of uncontested electromagnetic environments. The realization of JADC2 is that networks will oftentimes be challenged.

"That's why industry needs to be focused on delivering resilient communications — not just the promise of resilient communication, and not just the lightning bolts and diagrams, but the reality. This is a critical facet to actually delivering on the promise of JADC2, which is building adaptable systems since the techniques for contesting the environment will continue to evolve long after we deploy them."

In conclusion, the necking down of JADC2 into five lines of effort was a major step in transitioning from the phase where the construct fundamentally meant all things to all people to a beginning point of maturation where the capability most important to all services — namely data sharing — make it possible to "sense, make sense, and act" jointly.