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Intel Internet

U.S. Air Force pioneers joint-services information-sharing network

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The U.S. Defense Department's effort to establish an Internet-like, global intelligence-sharing network across the military services and defense intelligence agencies — the Distributed Common Ground System (DCGS) — continues to progress rapidly and has gained greater support across the department. DCGS, which is capitalizing on commercial off-the-shelf information technologies, is intended to transform the way the U.S. military processes, exploits and disseminates surveillance data from its airborne, space-based and other ISR sensor platforms.

The network-centric DCGS promises to speed the flow of intelligence to U.S. forces deployed overseas to bring about unprecedented situational awareness and war-fighting effectiveness. U.S. military users worldwide — including unit commanders and their staffs and operational planners rather than just intelligence analysts — will have ready access through the global network to all of the latest intelligence available on an area of interest.

In addition, for the first time, some "raw" sensor data, such as surveillance imagery from satellites, U-2 high-altitude reconnaissance aircraft or Global Hawk unmanned aerial vehicles, will be posted on the network before being fully processed and analyzed. That will allow users who might benefit from the raw imagery before a mission to view it

without delay.

The Air Force's DCGS program is leading the way in creating this new joint-services network by building an interoperable core for it called the DCGS Integration Backbone (DIB). DIB is a set of common interface standards and tools and some common hardware and software that will allow intelligence data sharing and collaboration to occur among the services' distinctive DCGS elements.

The Pentagon has mandated that all the services adopt the DIB as the foundation for their new DCGS systems. Thus, the Army, Navy, Marine Corps and defense intelligence agencies are closely monitoring the Air Force program and have begun evaluating how to integrate their legacy intelligence exploitation systems into the DIB framework.

AIR FORCE PROGRAM

In October 2003, the Air Force awarded its DCGS development contract, called DCGS Block 10.2, to a team led by Raytheon Intelligence and Information Systems of Garland, Texas. Its team members are Lockheed Martin Integrated Systems and Solutions of Denver; BAE Systems Mission Solutions of San Diego; General Dynamics Decision Systems of Scottsdale, Ariz.; and L-3 Communication Systems-West of Salt Lake City. The Raytheon team is developing the multiservice DIB as well as the Block 10.2



SCREEN SHOT COURTESY OF RAYTHEON

PHOTO ILLUSTRATION BY JOHN HARMAN, ISR JOURNAL STAFF

The Distributed Common Ground System will give U.S. Military users worldwide ready access through a global network to all of the latest intelligence available on an area of interest.

upgrade for the Air Force's legacy intelligence exploitation sites.

Raytheon completed a key contract milestone — its Final Design Review — in early April. The company presented its open standards-based DIB foundation architecture for the Air Force DCGS enterprise to representatives from all the services. One of the key elements developed by Raytheon is a Web portal into the DCGS network that a user in any U.S. military service will access through existing classified computer networks.

On May 5, Raytheon conducted a multiservice DIB Technical Exchange Meeting at Quantico, Va., in which it detailed how the DIB will allow interoperability, data sharing and collaboration among the services' DCGS elements.

"We've built the Air Force system on top of the DIB, and that's what we presented as part of our Final Design Review for the Air Force," Morris Johnston, Raytheon's DCGS program manager, told ISR. "However, since representatives of the Army, Navy, Marine Corps, the Office of the Undersecretary of Defense for Intelligence, Joint Forces Command, the National Geospatial-Intelligence Agency and the National Security Agency were all in attendance at that review, there was a strong desire to delve into the DIB in quite a bit greater detail such that the other services could understand how they could



SENIOR AIRMAN CARLY BURKE, U.S. AIR FORCE

DCGS Integration Backbone will allow interoperability, data sharing and collaboration among the U.S. military services' intelligence exploitation systems.

build their particular architectures and service-unique applications on top of it. So we hosted the daylong DIB Technical Exchange Meeting, at which we presented about 250 viewgraph slides. That's where the concept of an 'enterprise of enterprises' started to emerge."

The presentation seemed to be successful, Johnston said.

"Subsequent to that meeting, I think that the Office of the Secretary of Defense and the various services have come to the conclusion that not only do we need an enterprise at each of the service levels, but there needs to be an architecture that puts a sort of enterprise of enterprises together, such that DCGS can have the same kind of functionality and capability across the entirety of DoD as well as other government agencies and coalition partners," he said. "That's new in that what we've been developing for the Air Force DCGS will have a Web portal through which the other services will have access to the Web services available in DCGS.



Johnston

However, by tying the various services' DCGS architectures together in one cohesive system, then the ability to actually share data and applications 'machine-to-machine' without an operator having to come through a Web portal will be enabled.

There would be just one large network of all the DCGS nodes across all of the services."

He added that the services wanted the Office of the Secretary of Defense to take the lead in making it happen, and that the office may provide funding through the Air Force's DCGS 10.2 contract for Raytheon to do the systems engineering work to create the enterprise-of-enterprises concept.

DCGS 10.2 includes a metadata catalog and framework as a key element. Intelligence information that enters the network will be tagged in a standard format and cataloged to facilitate user searches. "That allows one to do a query of all the data that's available within the enterprise across all the nodes that are connected to it," Johnston said. "Today, if you make a request of a particular database, you get a return of what that particular database at that local node has. The federated metadata catalog that we'll provide links all the metadata catalogs across all the systems, but the user will get a single response back of all the intelligence available to him based on time or location or pedigree or a combination of any one or all of

those to satisfy his particular search."

The second unique tool that DCGS 10.2 will provide through the Web portal is a visualization interface, based on the Commercial Joint Mapping Tool Kit from the National Geospatial-Intelligence Agency.

"Over either a worldwide or localized map, depending upon the amount of area you are looking at, the visualization interface will provide, in graphical form, all of the intelligence that's available in the system at that one instant in time," Johnston said. "It will display [icons of] all of the national, theater and tactical sensors and their locations in the theater of operations, what their field of view is, what their collection plan is, what types of imagery or other intelligence they are collecting, where those surveillance areas are on the ground. It also will provide overlays of signals intelligence, ground-moving target indication radar, measurement and signature intelligence and order of battle data."

Johnston said there had been a lot of confusion on the part of the various service representatives as to how they could integrate their existing intelligence exploitation applications and databases into the new DIB-based architecture. As a result, Raytheon devised five levels of integration — 0 through 4.

"Level 0 is the classic way that systems are integrated together today — a point-to-point interface that's developed uniquely for a particular system for one system to talk to another," he said. "Levels 1 and 2 are where we actually create an interface to a legacy database or application. We don't modify them but we create an interface — what we call a data adaptor or an application adaptor — such that their information can be exposed to the rest of the system. Level 3 is a sort of hybrid. We do what we call refactoring a legacy application. In other words, we rewrite some portion of its code in order for it to plug directly into the DIB framework. Level 4 involves writing new applications from scratch that would be completely Web-based.

"That's a lot of what we are discussing now with the other services. They have legacy databases and applications that perform functions that are critical to them. They don't want to do away with them and want to integrate them using the DIB as the glue to create that integration."

Air Combat Command's 480th Intelligence Wing, with headquarters at Langley Air Force Base, Va., is the service's primary existing intelligence exploitation organization, processing and disseminating data from the U-2 aircraft and Global Hawk and Predator unmanned aerial vehicles. The wing has two core Deployable Ground Systems: DGS 1 at Langley and DGS 2 at Beale Air Force Base, Calif., which have long been U-2 processing centers. The capability to receive and process Global Hawk and Predator imagery was added to both in recent years. Other DGS locations are at Osan Air Base, South Korea (DGS 3); Ramstein Air Force Base, Germany (DGS 4); and Hickam Air Force Base, Hawaii (DGS 5).

The 480th also has Air National Guard remote sites at Reno, Nev., and plans to add more Guard sites over the next five to six years. Twenty-nine global sites are planned, and each will be outfitted over time with scaled versions of the DCGS system.

Raytheon will deliver the first full DCGS 10.2 system, consisting of 64 workstations, in

January to the DCGS-Experimental site at Langley for testing, Johnston said. Final site acceptance testing will be completed in March. The Air Force's current plan calls for installing the first major DCGS system at DGS 2 at Beale in the summer of 2005, and then DGS 1 at Langley will receive the second installation.

Johnston said all of the workstations will have a common set of applications and can be used by any operator to perform all types of intelligence exploitation functions. Workstations can be allocated to the highest priority missions at the time, providing a great deal of flexibility. In contrast, the workstations and servers used today at DGS 1 and 2 are dedicated to specific sensor platforms, such as the U-2 or Global Hawk.



RAYTHEON

Raytheon's Distributed Common Ground System displays icons of all the national, theater and tactical sensors and their locations in the theater of operations.

OTHER SERVICES

Johnston said his team is working with the Army in two areas under the Air Force 10.2 contract. "First, we're currently focused in the near term on doing an engineering evaluation of how to bring the DIB and its Army Future Combat Systems equivalent, the System-of-Systems Common Operating Environment, together — how to integrate those two infrastructures to be able to share data and applications as seamlessly as possible. Second, we're evaluating the various Army legacy intelligence processing and exploitation systems that exist today in terms of how those can be integrated into the DIB, and working with the Army on a road map to do that over some period of years to become the Army's DCGS-A system."

In addition, Johnston said, the Army wants to bring human intelligence reports into its DCGS network in addition to data from new ISR platforms such as its planned Aerial Common Sensor and unattended ground sensors.

Raytheon recently received a 10.2 contract option to study how the Marine Corps' legacy intelligence exploitation systems can be integrated into the DIB to create that service's DCGS, Johnston said.

The Navy chose not to exercise options in the 10.2 contract for developing its DCGS architecture. "They plan to integrate their current systems [the Joint Service Imagery Processing System-Navy and the Tactical Exploitation System-Navy] into what they call their Converged Architecture," he said. "They have discussed doing a DIB integration study, but as yet we are not participating in that study. The Navy does not currently plan to start integrating its system into the DIB until the 2006 timeframe. They have chosen to stay with their legacy systems for the time being and plan to integrate them as opposed to rolling forward with a new DCGS-N." ■