Airmen balance weight of U-2 Dragon Lady, which delivers critical imagery and signals intelligence to decisionmakers throughout all phases of conflict (U.S. Air Force/Marie Brown)

Distributed Common Ground System—Future
Moving into the 22nd Century Today

By Eugene Haase

While supporting a free medical clinic in western Afghanistan, U.S. and coalition forces question local villagers about an increase in recent enemy activity. They learn of unusual vehicle movements and a larger number of fighters in the village over the past several weeks. After returning to base, this information is passed to the unit intelligence officer who annotates it in an initial report that is made available through a shared intelligence database. Several hours later, a known enemy signal is intercepted not far from the village and is passed by way of secure joint chat rooms and product reports. At nearly the same time, advanced imaging data from a Navy Triton unmanned aerial vehicle (UAV) shows unusual disturbances in the same area. Shortly thereafter, an Army unit begins a patrol in the vicinity with a Shadow UAV performing overwatch. As the patrol reaches the area where the disturbances were noted, they are ambushed and take significant losses.

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Joint terminal attack controller sights target with AN/PED-1 Lightweight Laser Designator Rangefinder to mark simulated hostile threats for air assets (U.S. Marine Corps/Devon Tindle)

While notional, this scenario highlights a problem: Department of Defense (DOD) inability to conduct tailored data-sharing between processing and exploitation facilities. Unfortunately, the information necessary to warn the patrol of enemy activity is most likely available in various systems and databases, along with an overwhelming amount of valuable intelligence not necessarily pertinent to this specific mission. Today, DOD has limited automated tools available to pick this relevant information out of the trillions of bits of data routinely collected. There is only a rudimentary combined information-sharing architecture to ensure that the right person gets the right information at the right time. A key missing link is that the intelligence professionals processing and exploiting data streams from different sensors do not operate in a single collaborative environment where all applicable information is cross-displayed, allowing analysts awareness and mission synchronization between collection sensors.

Without this shared picture, the mission operation commander of the processing, exploitation, and dissemination (PED) crew does not have a real-time or complete view of the battlespace, which would have allowed them to detect the advancing ambush and warn the patrol. Although this scenario highlights a permissive counterterrorist environment, the lack of PED interoperability and a shared common intelligence, surveillance, and reconnaissance (ISR) picture is a factor regardless of the operational setting.

Expanding PED Capability

Operational usefulness of a shared information environment, combined with declining budgets, new technologies, and the future strategic landscape, is driving the need for more collaborative PED. The merging of joint, interagency, and coalition partner PED capabilities leads us down the path of better and more efficient warfighter support.

The concept of a global federated PED enterprise builds upon existing and emerging capabilities where the PED task can be quickly assigned to the most qualified entity to process and analyze the data anywhere, regardless of the sensor, and then pass it on to support any shooter and/or decisionmaker at the right place and time. The organization or platform providing the intelligence should be indistinguishable to the customer.

The global federated PED concept would allow each joint, interagency, or coalition member to continue to build on his own core competencies without recreating or duplicating the core competencies of others. This future PED enterprise is achievable, but requires buy-in from all stakeholders and more attention to community standards and policies. The Distributed Common Ground System–Future (DCGS-Future) requires a proactive effort to move to this structure now, during a time of declining budgets.

The Value of ISR

Over the past 13 years, the conflicts in Iraq and Afghanistan have unquestion-

ably demonstrated the value of ISR—particularly airborne ISR. Ongoing investment and modernization by the Services, Intelligence Community (IC),[1] and our coalition partners—as well as the increasing number and type of ISR collection platforms to meet future situations of national interest—reflect this.

Airborne ISR collection has moved well beyond the historic capabilities of still imagery and basic radio intercept/direction finding. State of the art development has led to multi- and hyperspectral sensing across a broad range of the electromagnetic spectrum, wide-area motion imagery, high-definition full-motion video, light detection and ranging, advanced radar-sensing, and advanced motion detection and tracking. Optimal use of ISR now requires much more innovative exploitation skills and accompanying PED technology improvements. However, enhanced skills and new technology will not automatically provide more cost-efficient PED. Appropriate organizational structure changes are required to successfully leverage ISR manpower and technical capabilities. Now is the time to use existing PED infrastructure to combine ISR capabilities and deliver more than what the Service components can provide individually. The Armed Forces have historically focused on providing intelligence and analysis in direct support of each military Service's core missions. Currently, each Service provides PED of Service-centric sensors with limited joint commonality, little mutual support, and varying implementation concepts (such as reachback, in-theater, and reach-forward PED).

It was originally expected that the DOD DCGS concept would provide a vehicle for standardizing PED competencies across the Services. This would help ensure efficiencies and operational necessity leading to a natural synchronization of best-of-breed ideas, processes, technologies, and organizational structures. It was not foreseen that significant differences in operational requirements would drive each of the Services to focus on separate parts of the intelligence cycle, commonly called PCPAD (planning and direction, collection, processing and exploitation, analysis and production, and dissemination and integration).[2]

The Air Force has concentrated its DCGS capabilities on processing and exploitation with an emphasis on worldwide distributed operations, reachback, and minimizing its in-theater presence and workload. The Army has focused primarily on the analysis and production of accessible information and intelligence previously tagged and cataloged (often referred to as conditioned data or metadata tagged information) with the intent of embedding advanced intelligence analysis capability within combat units. Both the Navy and Marine Corps DCGS concepts, while including PED, emphasize analysis and fusion of intelligence in support of tactical and operational commanders' needs. This is partly driven by having a limited number of sensor systems requiring remote PED. However, as both the Army and Navy increase their inventory and type of airborne ISR systems, overall demand for PED is likely to increase.

Moving Forward Jointly

Uncertainty of future operational situations will force DOD to explore new approaches in the way it manages, processes, and presents ISR data to the warfighter. Increasing PED manpower in existing organizations is not an option in a resource-constrained environment. Instead, some tout advanced technology as providing the path forward. Unfortunately, the successes of social media and Google searches do not translate to automated support for imagery and signals processing under militarily relevant conditions. In reality, technology to solve issues such as automatic change detection and machine-only target recognition to ease PED challenges remains years away. Therefore, DOD needs to continue robust research and development in this area, but it cannot solely plan on technology for near-term success. These challenges, combined with a downsizing force, will drive us toward collocation, integration, and information-sharing. This article discusses another alternative—a single, integrated, joint, coalition, and IC PED construct—DCGS-Future.

As envisioned, DCGS-Future would provide PED for all collection platforms and sensors. It complements the joint intelligence centers, whose mandate includes analysis, collection management, targeting, and other missions focused on a single theater. As one part of a larger, integrated, future ISR enterprise, DCGS-Future would operate across the entire PCPAD cycle with the intent of providing all-source fused intelligence to meet joint warfighter requirements. In this future integrated ISR enterprise, DCGS-Future, Service intelligence elements, the intelligence combat support agencies (CSAs)[3], other IC elements, and coalition partners would deliver foundational intelligence and specialized expertise for incorporation into customer-centric products. A robust capability to process, exploit, and disseminate a wide set of raw ISR data from varied collection platforms and the ability to manage PED capability and capacity across the entire collaborative DCGS enterprise are the core advantages of DCGS-Future.

DCGS-Future would also deliver increased operational effectiveness and cost savings within the realities of declining budgets, changing strategic environment, and technological advances. It recognizes that each Service DCGS was has been driven first by Service needs. DCGS-Future, however, seeks to take advantage of Service-specific specialization and expertise to reduce redundancy and improve overall ISR capability. For example, the Air Force would bring unrivaled imagery processing and metadata tagging and a distributed and federated approach via reachback, while the Army would bring in-depth analysis and fusion, robust linguistic capabilities, and a tactical mindset to the fight. In other words, each Service would bring the best of what it does now to the joint effort, providing real-time joint warfighter support. Admittedly difficult to achieve, this vision of DCGS-Future is long term and represents only part of a larger future ISR enterprise. Fortunately, efforts are already under way to attain it.

Air Force DCGS currently has a worldwide distributed exploitation model with global reachback capability. It is fast, efficient, operational, and proven

Air Force 711th Human Performance Wing behavioral scientist creates slides from video snapshots during demonstration of new enhanced reporting, narrative event streaming tool (U.S. Air Force/Wesley Farnsworth)

in combat over the past decade in Iraq and Afghanistan. Air Force DCGS has also matured the operational integration with the CSAs to collectively share and support both national and joint customers. Additionally, Air Force DCGS has established a burden-sharing arrangement with the United Kingdom (UK) to PED remotely piloted aircraft ISR missions, optimizing the expertise possessed by each partner. This U.S.-UK agreement provides concrete proof of DCGS-Future's feasibility and benefits in a real-world, combat-related environment.

Army DCGS is developing a PED Center of Excellence physically collocated with Air Force DCGS and National Security Agency (NSA) units. This offers the best of Army, Air Force, and NSA PED capabilities in a single location as an initial joint model of DCGS-Future. Additionally, Army, Marine Corps, Navy, and Air Force intelligence leaders are fostering tighter relationships across PED organizations and finding ways together to move closer to the DCGS-Future construct.

Continued Momentum

While these all show great promise, they barely begin to scratch the surface of actions needed to move DCGS-Future to the level required for tangible operational and fiscal gains. In addition to these early efforts, there are several areas ripe for future consideration. The first centers on the actual PED capability of DCGS-Future. Beginning immediately, the Services should make key personnel exchanges between DCGS organizations. The intent is to provide familiarization, an understanding of mission-level, force-unique capabilities and requirements at the tactical level, and to scope follow-on actions at the Service level. Anticipated near-term follow-on actions could include physical collocation of PED components, technical connectivity, and the development of common training standards, qualifications, and certifications for operators and missions.

The second area for continued action targets DCGS-Future management and operations. The concept would

work most effectively if the IC PED organizations made their PED capabilities available for tasking via a single universal method such as the Global Force Management Allocation Process. Each Service would understandably want the ability to retain a portion of its PED capability/capacity for Service-specific requirements. However, DCGS-Future would offer the remaining PED capacity for global assignment. The amount and type of PED that each Service contributes to DCGS-Future could vary based on schedule and mission specifics. Regardless, all military PED requires standardizing across the force and needs mechanisms (technical and procedural) to manage DCGS-Future as a single entity while respecting and integrating Service-specific requirements. The joint Air Tasking Order process provides one model for consideration. It highlights the improved level of support and flexibility achieved when this capability is aligned under a single manager. By pooling PED resources in DCGS-Future, common management tools, processes, and

RQ-4 Global Hawk covers intelligence collection capability to support forces (U.S. Air Force/Amanda N. Stencil)

training could significantly improve asset use and operational efficiency.

Work also needs to move forward in formalizing the DCGS-Future concept. Such an effort requires collaboration and action on an agreed-upon, documented vision with guidance and direction at a sufficient level to solidify and guarantee participation. Formalized documentation would include Under Secretary of Defense for Intelligence, Chairman of the Joint Chiefs of Staff and Service-level agreements, funding actions to support common DCGS-Future efforts, and joint concepts of operations. To achieve a viable DCGS-Future, we must base it on a solid foundation of codified and accepted tactics, techniques, and procedures. Implementation of a concept of this magnitude requires strong advocacy across the Services.

Capability enhancement, guidance, funding, and documentation represent the initial actions needed to start down the path toward DCGS-Future. They are, by no means, a complete list of the activities required. While this article focuses on the joint PED portion of DCGS-Future,

expanding DCGS as envisioned to include the IC and partner nations requires additional scope and effort. Changing the Service PED paradigms is a large, complex endeavor that will undoubtedly encounter challenges and suffer setbacks. The endgame is a cross-domain, multifunction ISR enterprise designed to make intelligence available at the right place, at the right time, to the right end user, regardless of who collected the data, who processed it, or where it was processed. Optimizing scarce funding and improving combat mission effectiveness make DCGS-Future a logical way forward for current Service capabilities to meet the challenges of the future and fully support the joint warfighter. **JFQ**

Notes

[1] Intelligence Community elements consist of the Central Intelligence Agency, Defense Intelligence Agency, National Security Agency, National Geospatial-Intelligence Agency, National Reconnaissance Office, Air Force Intelligence Surveillance and Reconnaissance Agency, Army Intelligence and Security Command,

Marine Corps Intelligence Activity, Office of Naval Intelligence, Department of Energy Office of Intelligence and Counterintelligence, Department of Homeland Security Office of Intelligence and Analysis, Coast Guard Intelligence, Department of Justice Federal Bureau of Investigation National Security Branch, Drug Enforcement Administration Office of National Security Intelligence, Department of State Bureau of Intelligence and Research, and Department of Treasury Office of Terrorism and Financial Intelligence.

[2] See Joint Publication 2-1, *Joint and National Intelligence Support to Military Operations* (Washington, DC: The Joint Staff, January 5, 2012).

[3] Combat support agencies consist of the Defense Intelligence Agency, National Security Agency, National Geospatial-Intelligence Agency, National Reconnaissance Office, Defense Threat Reduction Agency, Defense Logistics Agency, Defense Information Systems Agency, and Defense Contract Management Agency.