Airman fastens GPS mechanism inside RQ-11B Raven B hand-launched remote-controlled unmanned aerial vehicle (U.S. Air Force/Gustavo Castillo)

Unifying Our Vision

Joint ISR Coordination and the NATO Joint ISR Initiative

By Matthew J. Martin

Every night and day that you flew into Kosovo or into Serbia, you had to accept that you were in the lethal range of a surface-to-air missile, because they were moving all the time. We could not identify their locations all the time, so the kids just accepted that.

—Lt Gen Michael Short, USAF
Joint Force Air Component Commander, Operation *Allied Force*

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Imagine an aging but still lethal SA-6 surface-to-air missile (SAM) sitting a few miles from an international border in a suburb of a city in a conflict zone. The SA-6 is active and protects the illegal and belligerent activities of its master. Across the border and 60 miles up-range, a Norwegian DA-20 on a North Atlantic Treaty Organization (NATO) mission detects and geolocates the SAM. Due to the location and concern for potential collateral damage, the NATO joint task force (JTF) commander directs that a positive identification (PID) and collateral damage estimate (CDE) be conducted before he is willing to authorize an airstrike. But there is poor weather in the area. The NATO fighters on station with their targeting pods are unable to peer through the clouds and visually identify the SAM. What to do?

What if there was an allied special operations force on the border? And what if

it could launch a small Raven unmanned aircraft to fly to the SAM site below the clouds and provide the PID and CDE? If the aircraft could transmit images back to a NATO intelligence exploitation center, imagery analysts could accomplish the task. Moreover, if they had access to the data from the Raven, they might even be able to convert that data into a set of high-fidelity coordinates. This would enable the employment of GPS-guided weapons to destroy the SAM. It would only be a matter of transmitting those coordinates (somehow) to a NATO fighter and directing that fighter to engage the target.

This scenario and others like it were demonstrated June 18–29, 2012, at the NATO Joint Intelligence, Surveillance, and Reconnaissance (JISR) trials held in Ørland, Norway. The training and live trials involved land, maritime, and air forces and were conducted not only to demonstrate improved NATO JISR integration but also to build and refine tactics, techniques, and procedures (TTPs).

NATO is already deep into planning Unified Vision 2014 (UV14) with the hope of refining TTPs and the technical aspects of JISR integration to the point where they can then be incorporated into NATO doctrine and tactics manuals and be available to NATO commanders for future conflicts. But it has been a long road to get to this point, and the work of allied JISR integration is far from over.

This article provides an overview of the aims and results of Unified Vision 2012 (UV12), identifies the key requirements of operationally relevant JISR integration, and makes a few modest proposals for a way forward. As this article makes clear, the key to JISR integration is not only the technical connection of various ISR data sources (as important as that is), but also the operational integration, command and control (C2), and tactical employment of ISR capabilities. That simply is not possible without a sound and mature body of doctrine, TTPs, and training for those who will operate, employ, integrate, and control JISR.

The Initiative

Recent operations have highlighted NATO's limitations when it comes to conducting well-integrated JISR operations. In an April 2012 letter to the NATO Secretary General, the permanent representatives of the so-called Multi-intelligence All-source Joint ISR Interoperability Coalition (MAJIIC) nations stated:

Operations in Afghanistan, and more recently in Libya, underlined several shortfalls in Alliance JISR processes, which have also been identified as BI-SC Priority Shortfall Areas: among others, scarce JISR assets, lack of efficient intelligence sharing for dynamic targeting, insufficient JISR dedicated staff preparedness, and over-dependence on a few nations for skilled officers trained in dynamic targeting operations.[1]

The letter goes on to propose a "Smart Defense Initiative" to "put a concrete JISR capability in place for use by all Alliance nations."

Of course, the NATO ISR gap is nothing new and was made obvious as early as Operation *Allied Force*, where the United States contributed approximately 95 percent of the ISR capability as measured in hours flown.[2] While NATO has made great strides in equalizing the pro-rata contributions of Allies to operations in other mission areas (particularly in precision-strike and electronic warfare), the enabling capabilities such as air mobility, command and control, and ISR in particular remain stubborn areas of overreliance on the United States. This is evidenced by the comparison of sorties flown in *Allied Force* to those flown in Operation *Unified Protector* in 2011.

The bulk of mobility, C2, and ISR capacity came from the United States, but an even more important point is that the Alliance relied on America to provide the communications networks, trained personnel, and the body of tactical expertise needed to integrate those capabilities into a coherent operation. According to Lieutenant General Ralph Jodice, the Joint Force Air Component Commander for Operation *Unified Protector*:

We were able to do things like cross-cuing, but it took us a few months to get that going and get it right. And I think the point that you've been working on with Unified Vision is that we need to have those things in place right now so that when the next operation comes about—humanitarian assistance, disaster relief, or a kinetic operation in support of whatever it might be up through Article 5—that we have all those things in place so that you don't have to develop these TTPs as you're conducting the operation.[3]

Even before *Unified Protector*, the trend was clear: ISR standardization, connectivity, and integration were areas in need of laser-like focus for the Allies. Informally at first, then codified at the 2012 Chicago Summit,[4] the NATO JISR initiative was born.

At first the work of the NATO Joint Capability Group for ISR (JCG-ISR—reporting indirectly to the North Atlantic Council and made up of national delegations and a few representatives from NATO organizations) was technical in nature. A few small working groups under the JCG-ISR put forward a great deal of effort to improve NATO's ISR interoperability. The result was the NATO ISR Interoperability Architecture, a series of standardization agreements (STANAGs) governing everything from data link format to database configuration to the kinds of film still used in some imagery sensors.

But there is more to ISR integration than data formats. Likewise NATO depends on allied nations who have ratified and declared compliance with the various STANAGs to self-certify their forces when contributing them to Alliance operations. NATO requires a forum—beyond regular exercises where the focus is on evaluating the ability of specific combat units to perform NATO missions—where nations and NATO organizations can connect and test out forces in an operational environment with an aim of practicing ISR integration and

confirming STANAG-based interoperability.[5] At the 2010 Lisbon Summit, the JCG-ISR was given the task of providing just such a forum—which brings us back to Unified Vision 2012.[6]

Unified Vision Series of Trials

Unprecedented in size and scope, UV12 brought together the capabilities of 14 NATO nations and approximately 1,250 personnel to Main Base Ørland, Norway, for 9 days of live-trail execution. The trials were conducted in accordance with a plan that called for a realistic operational environment to test technical objectives. The bulk of the effort was invested in network design, data flow, and connectivity.[7] Since the JCG-ISR is made up of national delegations versus NATO operational commands, the planning of UV12 was heavy in technical expertise but light in operational experience. While the networks assembled for UV12 enabled some of the best ISR connectivity ever seen in a NATO event, the operational and tactical C2 structures needed to coordinate joint sensors real-time per command priorities were absent at the start of the trial.

The trial was organized around mission threads—one for every area of JISR to be tested per the objectives. The vignettes were standalone events, with four or five conducted each day of the trial. As the focus was on the technical aspects of connectivity and data flow, the trial plan did not call for a continuous scenario. Each day was a fresh start, with no scenario elements carrying over from one day to the next. Likewise, because the vignettes were not part of an overall scenario, ISR data collected in one vignette was not transferable to any other.

The trial plan specified 159 technical objectives covering areas such as multi-intelligence connectivity, delivery of data in STANAG-compliant formats, and latency and accuracy of data delivery. There were even operational objectives concerning speed of the kill chain and the distribution of a common operating picture. Of these objectives, 97 were passed with 14 others blocked due to circumstances beyond the control of the trial team, such as weather. This resulted in an overall 61 percent success rate. Of course, the results were due in part to normal growing pains—becoming familiar with the geography, mission tools, and relationship-building. But much of it resulted from the fact that the trial did not have an operational or tactical ISR C2 construct in place at the beginning. In fact, the C2 arrangement ultimately used was built on the first day of the trial and refined over the first week to become effective.

While it is easy to point fingers for this seemingly obvious oversight, the trial planners are not to blame. The combined facts of a compressed planning schedule (all of the most significant planning activities took place in the 3 to 4 months prior to execution) and the dearth of operational experience among those who volunteered to conduct the planning explain the shortfall. This article does not delve into the specifics of NATO developmental planning. Suffice it to say that conducting a full planning cycle along with ensuring a high level of operator participation from the beginning were significant lessons learned from UV12.

While this ad hoc structure got the job done, it bears little resemblance to the NATO Response Force joint command structure that will be used in future allied operations. The trial plan did not call for the C2 elements at the joint level—mainly a joint operations center (JOC) and component headquarters with links to their tactical C2 elements such as a combined air and space operations center for air players or a maritime operations center. Likewise the trial plan did not have any provisions for tactical real-time coordination. While the ISR data flowing to the all-source fusion cell (ASFC) could result in a decision to shift assets, there was no initial way to communicate any such change to the assets themselves.

The C2 structure was developed to provide an operational link between the ASFC and tactical players. A J2/J3 role player was put in place to express a changing commander's intent and to determine the priority of asset allocation among the various vignettes. When integrated with the collection management cell, this mini-JOC arrangement had the ability to provide guidance to the components. All that was needed after that was a connection between the components and their assets. This was done through Norwegian air traffic control for air players, "JChat" to the Norwegian maritime operations center for maritime forces, and personal cell phones for ground players.

This was far from ideal, but it got the job done. For UV14, however, things will need to be different. In the subsequent working group meetings to capture lessons from UV12, a consensus was built that UV14 should have an operational focus. In fact, ISR C2 will be foremost on the list of objectives.

Operationalizing JISR

UV12 did a great job of bringing together the latest in NATO ISR information technology and connecting it, per the NATO STANAGs, in an operationally relevant and useful way. Data from any JISR sensor, so long as it is compliant with the STANAGs and connected to the network, can now get to any NATO joint agency or player. But to whom should that data be sent? And what should it be used for? More important, how can we translate that data into desired effects to achieve the commander's intent? UV14 needs to answer these questions, and the JISR construct that follows can help. It all begins with the commander's intent.

Before any operation can begin, NATO will need to know how to determine commander's intent based on a desired strategic outcome. But the Alliance is a defensive organization. It is unlikely that ISR professionals charged with carrying out the commander's intent will know what that intent is until operations begin. So what is to be done? Be flexible. The best way to achieve flexibility is through complete operational as well as technical joint integration. Now that we have the ability to send any piece of ISR data wherever it needs to go, we must also build the ability to use that data to support any joint player. To do that, every JISR sensor will need to have the ability to be responsive to every joint C2 entity

NATO E-3A Sentry AWACS patrols over Germany (U.S. Marine Corps/Colby Brown)

that may be participating in a NATO operation. We need an *operational view*.

First, the sensor needs the ability to push ISR data to tactical players such as special operations or general purpose ground units, to tactical aviation, to maritime forces, or to operational air units be they fixed-wing strike or other ISR platforms. The JISR sensor will also need to be able to push its tactical ISR data to tactical (such as a battalion tactical operations center), operational (such as a component headquarters), or even strategic (the JTF HQ or NATO HQ) echelons of C2. But just as important, the JISR sensor must have the ability to be responsive to every level of joint C2. At every phase of the campaign, when the JTF commander determines where the weight of effort will be and which component commander will be the supported commander, the JISR sensor must be able to flex to the appropriate level of C2. ISR assets that are typically tasked at the operational level—such as the RC-135 or the NATO RQ-4 Alliance Ground Surveillance aircraft—must be able to integrate at the tactical level and provide direct support to tactical units. Likewise, a traditionally tactical ISR sensor such as the hand-launched Raven unmanned aircraft must be able to support operational objectives and be tasked by the air component commander when needed.

Exploitation elements such as the U.S. Air Force Distributed Common Ground Station (DCGS) must be operationally integrated as well. In a STANAG-compliant ISR data environment, this will allow a U.S. exploitation team to receive and process ISR data from allied sensors so they can produce joint, allied ISR products and push them to the joint-level fusion cell to feed the decisionmaking process.

As all this happens, all JISR players must possess a high level of situational awareness regarding the tactical scenario. This will allow them to make the best possible real-time decisions on how to employ their sensors in a collaborative way to achieve the commander's intent. To do this, each JISR player must be fully integrated into the Joint Common Operational Picture (JCOP)—more on that in a bit.

The NATO Joint Task Force and C2 of ISR

As every good operator knows, achieving tactical success calls for starting at the target and working backward. But operational effects flow from the commander's intent. Therefore, to achieve operational success, the C2 structure must be built from the top down.

This brings us to NATO doctrine. While still not fully developed regarding operational integration of JISR, it does provide with a few key concepts to build on. For example, Allied Joint Publication–3 (B), *Allied Joint Doctrine for*

the Conduct of Operations, identifies the key C2 elements required at the joint level.[8]

Of course the JTF commander is at the center. Moreover, while there are many joint-level players and organizations important to a campaign, there are only a few that bear directly on the operational C2 of ISR. For instance the JOC serves as the primary C2 instrument to transmit the commander's intent to all tactical elements in real time. Likewise, there must be joint-level coordination cells for ISR and Signals Intelligence/Electronic Warfare (SIGINT/EW), as well as other specialized operations such as personnel recovery or civil-military relations.

But for our purposes, the joint-level ISR and SIGINT/EW cells are the most important, as they will conduct real-time joint coordination with ISR- and EW-tasked assets. Of these two, the SIGINT/EW Operations Center (SEWOC) is the more mature concept.[9]

The Role of the SEWOC

While the specific guidance on the role of the SEWOC is not publicly available, we can deduce a number of things it would need to do to achieve JISR and EW integration:

- own and maintain the Electronic Order of Battle (EOB)
- act as the Signals Identification Authority (SIA)
- manage the electromagnetic spectrum for joint players
- facilitate joint SIGINT and EW cross-cueing
- conduct real-time coordination of the component EW Coordination Centers (EWCCs) as well as the EW-tasked assets themselves
- coordinate GPS-denial and other navigation warfare responses
- ensure a high level of situational awareness among all EW-tasked players
- provide advice and recommendations on all matters relating to SIGINT and EW.

To accomplish these functions, the SEWOC will need access to the same real-time data as the joint-level ISR cell and the JOC. It also will need the ability to pull situational-awareness data from the JCOP as well as manually push new data into it. Much of this will be accomplished via a STANAG-compliant Cooperative Electronic Signals Measures Operations network whereby EW data will be filtered, fused, and routed to the SEWOC for processing.[10]

The SEWOC could be configured any number of ways, but it must have the core functions of information management; liaising with EWCCs; expertise on component capabilities and operations to facilitate joint cross-cue, SIGINT, and SIGINT-fused analysis to both positively identify signals and build the EOB; and the ability to nominate EW targets for insertion into the collection management and targeting processes. During joint operations, it should therefore be composed of experienced EW and SIGINT operators as well as SIGINT analysts who not only understand the role of SIGINT and EW but also are empowered to make decisions and direct actions for EW-tasked assets

While the doctrine regarding the SEWOC function and set-up in NATO is fairly mature, there is little guidance available on the TTPs of SEWOC interaction at the joint level. A key objective for UV14 should therefore be to refine and practice the TTPs needed to integrate the SEWOC and its subordinate EW forces into NATO operations at the joint level.

The Role of the Joint All-source Information Center

We will need a comparable entity at the joint level to coordinate ISR. There have been many concepts used in previous operations with names such as the Joint Intelligence Center, the Joint Fusion Center, and the ASFC, which was used in UV12. However, since NATO AJP-3(B) specifically talks about a Joint All-Source Information Center (JASIC) organized under the J2 and responsible to the Joint Collection Manager, we will stick with JASIC.

Just as the SEWOC would act as the joint-level coordination cell for the EW effort, the JASIC will conduct all joint-level ISR coordination. Specially, it should do the following:

- own and maintain the ground, maritime, air, space, and cyber operations orders of battle
- act as the ultimate PID authority for opposing force targets
- facilitate joint ISR cross-cueing
- conduct real-time coordination of the component ISR divisions as well as the ISR-tasked assets themselves
- ensure a high level of situational awareness among all ISR-tasked players
- provide processed and fused ISR products to the J2 and J3 for planning purposes
- coordinate with the joint collection management to shift the ISR weight of effort as needed to carry out the commander's intent.

Like the SEWOC, the JASIC will interact with both the planning (J2/3/5 collection management, targeting, and operational planning staff elements) and real-time coordination (JOC and SEWOC) at the joint level. It will also coordinate with the ISR planning and coordination elements at other echelons such as the A2, G2, and M2 staff functions within the component commands, the ISR Division within the air component, the NATO Intelligence Fusion Center, and national exploitation cells provided by NATO nations.

It should be stressed that the SEWOC and JASIC are not tactical C2 agencies, but rather they provide operational-level direction. They will conduct neither air traffic control nor terminal guidance. What they will do is provide coordination and guidance to and between the component functional entities to enable rapid cross-cue and retasking as needed to respond to dynamic targets.

In this scheme, the JASIC must have connectivity and the ability to coordinate not just with the component ISR cells, but also with NATO and national exploitation cells. While most exploitation elements provided for NATO operations will be under the operational control of the NATO commander, some

MQ-1 Predator prepares to land (U.S. Army/Thomas Duval)

nations may be reluctant to share their high-fidelity intelligence exploitation capabilities or data feeds with other nations. But in the end the commander will care about conclusions drawn from the data rather than the data itself. Therefore, the JASIC must have the ability to receive finished intelligence products from national exploitation elements and fuse the products with other ISR data.

The Role of the JOC

The JOC will be the equivalent organization to the SEWOC and JASIC for all operational assets not tasked to ISR, EW, or some other special function. Again, NATO doctrine does not provide much in the way of specific guidance as to the roles and functions of the JOC. But based on the roles of functions of the JASIC and SEWOC, and regarding JISR and EW, we can identify the following:

- maintain a high level of situational awareness (SA) on the execution of joint operations including the location and intent on all blue, red, green, and white players
- ensure a high level of SA for all players executing joint tasks (vs. players executing component-specific tasks)
- ensure smooth transition of tactical C2 responsibilities between joint players either as part of planned execution or when needed as a result of unforeseen events
- oversee the identification and satisfaction of Commander's Critical Information Requirements
- provide a means to respond to incidents by hosting a Crises Action Team usually composed of J2/3/5, legal advisor, political advisor, and public affairs representatives, with others as needed
- maintain the JCOP and act as the final authority on all elements contained in it.

To do this, the JOC will need to coordinate with the ISR elements of all component headquarters and feed/interact with JCOP during execution. It will also need to work continuously with all the planning elements of the JTF HQ including the component liaisons.

Collection Management vs. Execution

While it is not the aim of this article to go into detail on the formulation of collected ISR data into actionable intelligence, it must be remembered

that any collection plan is a means to an end—satisfying the commander's information requirements to enable actions and achieve the desired effects. The real-time identification of targets and subsequent action against those targets as part of a planned campaign must therefore not be confused with the process of producing a collection plan to gather that data. In fact, the collection phase is but one of the four basic pillars of the production of military intelligence. Together, these pillars form a continuous process to provide the commander with the information to wage an effective campaign.

The above process is as old as ISR itself, and the NATO process of airborne ISR collection, for example, is mature and refined. But as we have learned in Afghanistan and Operation *Unified Protector*, a process that depends on a processing phase that sometimes lasts several days does not give the Alliance the flexibility to prosecute dynamic targets or to even identify targets and make decisions in what may only be a few minutes between collection against a moving target and its disappearance. According to Lieutenant General Jodice:

We were able to use the NATO system, but it took us a couple of months to refine it and get it into a nice, smooth process. And again that goes back to our intelligence preparation of the operational environment. The dynamic process was one that we really had to tailor for our operation, and I guess you could say that it started from the U.S. process. But then we had to make sure that it was tailored specifically for our operation. [11]

So while the intelligence cycle during a NATO operation must continue unabated, the Alliance must also have the real-time agility to get ISR data—immediately on collection—into the hands of analysts who can rapidly fuse that data with others, make quick assessments on the identification and intentions of opposing forces, and feed those assessments to decisionmakers for rapid action. While a JTF J2 staff must be organized, trained, and equipped to carry out the traditional cycle, the JTF must also be set up for, connected to, and well-versed in the process of real-time coordination inside the execution phase. The JISR process should allow the commander to take rapid action against targets that may already be on an order of battle but whose location may only be known for a very brief time.

Real-time JISR—Putting It All Together

To place all this into a practical context, reconsider the opening vignette. Using a traditional SIGINT/EW asset like the Norwegian DA-20 is a longstanding capability. But with JISR, we can send that data immediately to the JASIC and SEWOC, where they can collaborate to make an assessment. In this case, they identify the SA-6 but immediately realize that additional ISR data is needed for PID and CDE.

With their connectivity to the Land Component HQ ISR cell, they are able to redirect the Raven that has already been tasked for that day's ISR collection plan. Since the Raven in this case is organic to the land component, they would likely not have a dedicated exploitation cell. But through JISR, the Raven images and data flow immediately to the JASIC for fusion with the DA-20 SIGINT enabling a rapid, fused assessment. That assessment goes straight to the JOC where the J3 and commander can make an engagement decision—by which time the JASIC or the national exploitation cell supporting the strike aircraft will have derived high fidelity coordinates to enable the use of GPS-guided weapons.

And since the ISR coordinators within the JASIC as well as the JOC are already in contact with the component HQs and their tactical C2 elements (as well as pushing target data into the JCOP), the target data and clearance to strike can be sent to the strike aircraft within minutes, allowing an engagement that destroys the target before it is able to relocate.

In the final analysis, NATO nations need a core capability to locate, identify, and prosecute highly dynamic and often asymmetric targets. They must be able to field this capability in spite of what may be a reduced U.S. contribution to NATO operations in the future. JISR will give us this capability, but it must be built on a foundation of interoperability, technical interconnectedness, the ability to exercise joint C2 of allied ISR assets, and—most important—ISR operators who are organized, trained, and equipped with the right TTPs to get the job done. Here's hoping the UV14 does just that. **JFQ**

Notes

[1] Letter from the Multi-sensor Aerospace-ground Joint ISR Integration Interoperability Coalition to NATO Secretary General Anders Fogh Rasmussen, April 16, 2012.

[2] James P. Thomas, *The Military Challenges of Transatlantic Coalitions*, Adelphi Paper 333 (London: Oxford University Press for The International Institute for Strategic Studies, 2000), 52.

[3] Lieutenant General Ralph J. Jodice II, USAF, interview by author, May 29, 2013.

[4] NATO Media Backgrounder on Multinational Projects, available at <www.nato.int>.

[5] "Improving NATO's Capabilities," August 24, 2010, available at <www.nato.int/cps/ar/SID-92DDB208-23582FA7/natolive/topics_49137.htm>.

[6] "NATO's Joint ISR Concept," June 29, 2012, available at <www.natochannel.tv>.

[7] Colonel Tanguy Lestienne, "Preparing the Alliance for Tomorrow's Challenges: Trial Unified Vision 2012," *NATO ACT Transformer* (NATO ACT, Fall 2012).

[8] Allied Joint Publication–3 (B), *Allied Joint Doctrine for the Conduct of Operations* (n.c.: NATO Standardization Agency, March 2011), available at <www.cicde.defense.gouv.fr/IMG/pdf/20110316_np_otan_ajp-3b.pdf>.

[9] "New NATO intelligence technology on trial in Greece," November 5, 2006, available at <www.nato.int/docu/update/2006/11-november/e1102c.htm>.

[10] Jorris Jannsen Lok, "NATO Tests Networked ESM Concept at Elite 2008," *Aviation Week Blog*, July 17, 2008, available at <www.aviationweek.com/Blogs.aspx?plckBlogId=Blog:27ec4a53-dcc8-42d0-bd3a-01329aef79a7>.

[11] Jodice, interview.