Actionable Intelligence for the Warfighter

Tactical ISR Technology

ISR Integrator

Brig. Gen. Harold J. Greene

PEO U.S. Army Intelligence, Electronic Warfare & Sensors

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TISR

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Exclusive Interview with:

Col. James D. Edwards
Commander
525th Battlefield Surveillance Brigade
U.S. Army

Unattended Ground Sensors ✯ Electronic Warfare ✯ Intel Imaging Assets
Secure Communications ✯ Medium Range Maritime Unmanned System

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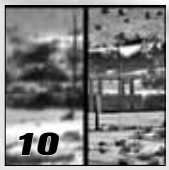
FEATURES

Unmanned Sentries Team Up

Unattended ground sensors are often likened to sentries. Like human sentries, they can best work as a team, with each assigned the duties it does best and all collaborating to provide a comprehensive picture of threats.

By Henry Canaday



Intel Imaging Assets

Lighter weight, with greater resolution: Infrared imaging asset tools become more valuable to operators. The smaller the device, the more likely it will be used in the field.

By William Murray

The EW World

Electronic warfare is the backbone of the tactical arena. Today's electronic warfare is focused on any weapons system or device that operates on a frequency, from radios and radars to controls for improvised explosive devices.

By Peter Buxbaum

Secure ISR Comms

While ensuring that high capacity comms and data links are in place is a given, increasingly sophisticated opponents are placing greater demands of the security of those links either from being hacked, spoofed or jammed

By Adam Baddely

Commanding and Controlling Full-spectrum Operations

An exclusive interview with Colonel James D. Edwards, commander of the U.S. Army's 525th Battlefield Surveillance Brigade.

COVER / Q&A

Brigadier General Harold J. Greene
PEO U.S. Army Intelligence,
Electronic Warfare & Sensors

DEPARTMENTS

INDUSTRY INTERVIEW

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EDITOR'S PERSPECTIVE

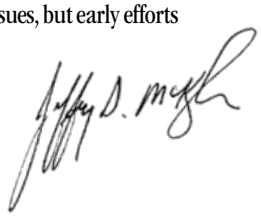
Jeffrey D. McKaughan
EDITOR-IN-CHIEF

Acting Assistant Secretary of Defense for Special Operations/Low Intensity Conflict Michael Lumpkin was recently on the Hill testifying before the House Armed Services Subcommittee on Emerging Threats and Capabilities on the future of special operations forces 10 years after 9/11 and 25 years after Goldwater/Nichols. It is apparent from his comments that one of the key enablers of the success of special operations forces has been the increasing numbers and technologically advanced ISR capabilities. Obviously this is no secret or surprise but a fact that needs to be driven home to the Congressional bodies constantly is that while the kinetic end of an operation gets the public side of the glory, it is everything that comes before that makes the opportunity for success possible.

The path to future defense funding is certainly muddy right now. Can our warfighters maintain the tactical edge over today's adversary with yesterday's budget level?

As storage and warehousing is a particular area of interest in the logistics community, there are cost and space considerations that drive the interest in reducing those needs as much as possible. In a similar—but different—vein, storage and warehousing of information and resources in the IT community have much of the same implications. Cloud computing is a challenging but promising opportunity to address the need for so much hardware, power and space in the information sharing and data collection arena. Brigadier General Greene's interview in this issue offers some great insight into the progress that the Army is making in utilizing the cloud as part of the Distributed Common Ground Support system. The Army has already placed the system in use in Afghanistan. The experience and lessons learned will be used to formulate the future architecture, be the foundation for a long-term strategy and formalize the project as a program of record. He discusses the progress and the challenges of using the cloud which, except for the combat nature of the environment, are similar to the issues of the cloud in a stateside, commercial environment. Bandwidth, differing levels of access, and overall security remain primary issues, but early efforts are proving that the cloud will be part of the DoD LOG community.

As always, please feel free to contact me with your thoughts on today's ISR world or on TISR.



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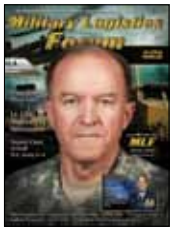

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Manned Unmanned Systems Integration Capability (MUSIC) Exercise: Mission Accomplished

By Marty Shelton

The Army's Program Executive Office for Aviation's (PEO AVN) offices Project Manager's (PM) Unmanned Aircraft Systems (UAS), PM Armed Scout Helicopter (ASH) and PM Apache have worked together with the goal to make the most capable, automated, lethal and interoperable systems available to our forward deployed soldiers and our allies.

On September 16, 2011, PEO AVN sponsored the first ever manned-unmanned systems integration capability (MUSIC) exercise—the largest demonstration of manned-unmanned interoperability ever attempted.

The exercise has been in the works for over one and a half years. The integrations and evaluations culminated with a live demonstration before an audience of leaders from across the Department of Defense as well as civilian onlookers.

Tim Owings, Deputy PM, UAS was a great proponent in bringing this exercise to realization. "I am most proud of the teamwork and selfless attitudes demonstrated by our industry and government partners," said Owings. "You can't make MUSIC without an orchestra and everyone playing their instruments. This really is an amazing story of teamwork and perseverance."

There were many objectives to this exercise including: demonstrating advancements made in manned-to-unmanned teaming (MUM-T); demonstrating interoperability among unmanned systems through the Universal Ground Control Station (UGCS), mini-UGCS (M-UGCS), and the One System Remote Video Terminal (OSRVT); and highlighting PEO Aviation's open architectural approach that allows multiple control nodes and information access points via the tactical common data link (TCDL).

The combination of M-UGCS, UGCS and OSRVT serves as the catalyst for interoperability amongst the Army's manned and unmanned aviation fleet. Interoperability translates into cost savings and increased efficiency through common hardware and software. Interoperability is also helping to mitigate the ever-increasing threat to our soldiers, due to advancements in enemy technologies, and increasing our Army's overall combat edge.

Colonel Tim Baxter, PM, UAS stated, "In my short tenure here as the PM, the work I witnessed, day in and day out was brought together and displayed in the first ever MUSIC Exercise." He went on to say, "Although I had been briefed about this thing called MUSIC, I couldn't fathom the amount of effort given by each member of PM's UAS, Apache and attack scout helicopter. The heavy lifting done by a workforce comprised mostly of civilians, and for the good of our soldiers, is heartfelt and makes a positive impact every day to the lives of those operational folks we send into harm's way."

The event established seamless integration of the manned systems (Apache Block II and Kiowa Warrior) along with the Army's complete fleet of UAS (Raven, Puma, Hunter, Shadow and Gray Eagle). Video was exchanged flawlessly among all the systems. Additionally, the ability to control the UAS payloads of the larger aircraft from both the M-UGCS and the -OSRVT were demonstrated.

The demonstration clearly illustrated the remarkable capability and synergy that the combination of tightly integrated manned-unmanned systems provides. Furthermore, the demonstration showed clearly how this information could be rapidly provided to individual soldiers on the ground.

Here is a breakdown of operating systems and technologies explaining desired effects and actual recorded accomplishments.

Universal Ground Control Station

For the first time the UGCS demonstrated its ability to control the larger unmanned aircraft consecutively from a single ground station through common hardware and software. The results were seen immediately as handoffs occurred between the Shadow portable GCS (PGCS) to the UGCS, the Gray Eagle ground station to the UGCS, and finally the Hunter legacy ground station to the UGCS. This new capability has also paved the way for the universal operator concept. This is a single operator with the ability to fly multiple unmanned aircraft. During the demonstration, the same aircraft operator and payload operator flew all three aircraft consecutively marking a huge milestone for UAS.

One System Remote Video Terminal

The role of OSRVT was showcased throughout the MUSIC Exercise by demonstrating interoperability with all the participating platforms. OSRVT received the video from the small unmanned aircraft via the digital data link (DDL). Video from the large platforms was received via TCDL. The new bi-directional capability in which the OSRVT operator controlled the payloads of the Shadow, Hunter and Gray Eagle platforms demonstrating the ability to receive the video and simultaneously transmit commands back to the aircraft to guide the camera to the point of interest. The combination of the OSRVT and manned aircraft were shown to be able to share targeting data and insure a common operating environment.

All of these capabilities are based on a standard approach, so when the OSRVT understands the language of one platform it understands it for all the platforms, enabling efficient use of the available development time. The success demonstrated in the exercise is a direct result of the years of effort spent developing the standards and the hardware and software that implement those standards. In the coming months these capabilities will be refined to give the soldier unprecedented situational awareness through an impressive array of tools on the battlefield.

Mini-Universal Ground Control Station

For the Army's fleet of small UAS the Army continues to move toward an M-UGCS. For the MUSIC exercise, the M-UGCS Block 0 demonstrated the first step toward that goal. The M-UGCS Block 0 is a software upgrade to the existing Raven GCS, which is currently being fielded by the Army in the thousands. While this GCS already has the ability to control the Raven and Puma UAS currently being fielded, a software upgrade to the system now allows the GCS to control the wing-mounted sensors on the TRICLOPS configuration of the Gray Eagle. The TRICLOPS configuration adds two additional payloads to

the wings of the Gray Eagle in addition to its main payload on the fuselage. These payloads can be accessed independently of the main payload, thus providing the ability to track three geologically separate targets with one air vehicle asset.

The M-UGCS will provide frontline soldiers with Level of Interoperability (LOI)-3 control of highly capable sensors using hardware that is already in place. And in keeping with the nature of true interoperability, the interface follows the same Standardization Agreement 4586 standard as the UGCS for the messaging protocol.

Additionally the audience was able to see the M-UGCS Block 1 on display, which provides the functionality of a Raven GCS in a single, consolidated package. The handheld M-UGCS Block 1 combines the Windows-based functionality of FalconView and video/data logging with the highly reliable real-time operating system functionality required for real-time UAV control. Touch screens for ease of use, hot-swap batteries and a mini-DDL radio also combine to provide a stand-alone package. While still in prototype form, this system is fully functional, and has been evaluated by Raven and Puma operators with a good deal of positive feedback.

Tim Owings provides closing comments during the MUSIC demonstration Day, 16 September 2011. [Photo courtesy of U.S. Army]

Gray Eagle unmanned aircraft with TRICLOPS payload configuration. [Photo courtesy of U.S. Army]

Manned-to-Unmanned

AH-64D Longbow - Apache

The Apache Block II demonstrated video transmission to the OSRVT via the Efficient TCDL. The TCDL link allows the Apache to send and receive video and metadata. The Apache is currently using the Visual User Interface Tool (VUIT)-2 system in theater with outstanding results. The VUIT-2 system can transmit both Apache and UAS video to the soldiers on the ground equipped with OSRVT. VUIT-2 provides positive target identification for the soldier on the ground. Once the target is confirmed, Apache aircrew can engage the target with its weapon systems.

Manned-Unmanned Teaming -2 (MUMT-2) is the next step for Apache. MUMT-2 is a fully compliant TCDL system. MUMT-2 is currently being fielded and provides the Apache an integrated system within the Apache systems architecture. MUMT-2 reduces the weight of the Apache by over 40 pounds while providing all the functionality of the VUIT-2 system. With MUMT-2 the Apache has the enhanced capability of transmitting both Apache and UAS video to the soldiers on the ground as well as ship-to-ship. The future for the Apache is Block III. MUMT is a bridging strategy to provide this capability until Block III is fielded. Block III will roll out its first production aircraft in November 2011. Block III goes beyond MUMT-2 and VUIT-2 by fully integrating LOI-4 into the next generation of Apache.

OH-58D - Kiowa

The Kiowa Level 2 Manned-Unmanned (L2MUM) system succeeded in demonstrating three of its major capabilities that are inherent to this system—a system that is currently in the process of being fielded. The Kiowa Warrior equipped with L2MUM carried out its portion of the MUSIC exercise at a range of 22 kilometers from the OSRVT ground station. The Kiowa L2MUM system successfully received Hunter unmanned aircraft TCDL video and displayed it in the cockpit on the co-pilots multi-function display.

Second, the Kiowa L2MUM system retransmitted the received Hunter video to an OSRVT ground station 22 kilometers away using TCDL, thus proving out its capabilities to share what the Kiowa pilot is viewing with what the ground OSRVT user is viewing in real-time. Lastly, the L2MUM system demonstrated its capability to transmit its on-board mast-mounted sight video and own-ship metadata to an OSRVT user or other teammates capable of pulling this data into their prevue. Kiowa closed out the demonstration with a live fire of Hydra rockets, demonstrating the lethality of these systems when they work together.

Baxter now turns his attention to incorporating the positives discovered during this exercise and refining those areas needing attention. He stated, "As we turn the page on the first ever MUSIC Exercise, I along with the Training and Doctrine Command capabilities manager for UAS, must continue to keep pace with combatant commanders increased demands in developing and fielding advanced UAS and personnel to operate these apparatus that change how we fight and win on today's and tomorrow's battlefields."

Marty Shelton is a contractor with Wyle Inc./CAS Group, for the Unmanned Aircraft Systems Project Office. ✯

Compiled by KMI Media Group staff

DCGS Upgrade

Raytheon Company has upgraded the Distributed Common Ground System (DCGS) nodes for the Kansas and Indiana Air National Guard with the latest net-centric, cost-efficient and service-interoperable capabilities.

The DCGS upgrade allows the Guard's 181st and 184th Intelligence Wings to process data from the Predator, Global Hawk and U2 aircraft. The upgrade provides a twofold increase in imagery processing capability and also gives the Air Force DCGS enterprise more capacity and flexibility for high-altitude missions, reducing operating and maintenance costs as well as costs associated with future upgrades.

"The Kansas and Indiana DCGS upgrades streamline the intelligence-sharing process, making it more operationally efficient, and establish an open-system architecture that is more affordable to maintain and upgrade," said Todd Trapp, director of tactical intelligence solutions for Raytheon's Intelligence and Information Systems business.

Because Raytheon's next evolution of the system is Web-enabled, it can more easily integrate applications and workflow, allowing the system to be readily updated with the latest technology as mission tactics change. In addition, Air Force and Army users will have access to each other's data, making intelligence gathering and command and control of ISR situational awareness more effective.

More Bots

IRobot Corp. has received a $21 million order from the Naval Sea Systems Command, the fourth order under a $230 million indefinite delivery/indefinite quantity contract, bringing total orders under this contract to $36 million. The latest order calls for delivery of more than 100 Man Transportable Robotic System (MTRS) MK 1 MOD 1 robots and spares kits. MTRS MK 1 MOD 1 is modeled after the iRobot 510 PackBot. These combat-proven robots perform bomb disposal and other dangerous missions while keeping warfighters out of harm's way. "Improvised explosive devices (IEDs) remain one of the biggest threats to our forces overseas," said Robert Moses, president of iRobot's Government and Industrial Robots division. "IRobot's unmanned ground vehicles save lives every day by providing our troops with the ability to identify and dispose of IEDs from a safe standoff distance. We are pleased that the Navy is continuing its investment in this technology."

PEOPLE

Captain Robert V. Hoppa, who has been selected for promotion to rear admiral (lower half), will be assigned as director, National Maritime Intelligence Center, Washington, D.C. Hoppa is currently serving as chief of staff for intelligence, U.S. Fleet Forces Command, Norfolk, Va.

Captain Dewolfe H. Miller III, who has been selected for promotion to rear admiral (lower half), will be assigned as director, intelligence, surveillance, and reconnaissance capabilities, N2/N6F2, Office of the Chief of Naval Operations, Washington, D.C. Miller previously served as commanding officer, USS George H. W. Bush (CVN 77), Norfolk, Va.

Rear Admiral Samuel J. Cox will be assigned as director of intelligence, J2, U.S. Cyber Command, Fort Meade, Md. Cox is currently serving as director, National Maritime Intelligence Center, Washington, D.C.

Rear Admiral (lower half) Sean R. Filipowski will be assigned as deputy director of operations, J3, U.S. Cyber Command, Fort Meade, Md. Filipowski is currently serving as director, Cyber, Sensors and Electronic Warfare, N2/N6F3, Office of the Chief of Naval Operations, Washington, D.C.

Brigadier General Linda R. Urrutia-Varhall, senior military assistant to the director of national intelligence, Pentagon, Washington, D.C., to director of intelligence, Headquarters U.S. Southern Command, Miami, Fla.

Rear Admiral (lower half) Matthew J. Kohler will be assigned as deputy commander, Fleet Cyber Command/deputy commander, 10th Fleet, Fort Meade, Md. Kohler is currently assigned as deputy chief, Tailored Access Operations, S32, National Security Agency, Fort Meade, Md.

Captain Willie L. Metts, who has been selected for promotion to rear admiral (lower half), will be assigned as deputy chief, Tailored Access Operations, S32, National Security Agency, Fort Meade, Md. Metts is currently serving as director of intelligence, J2, U.S. Cyber Command, Fort Meade, Md.

Rear Admiral (lower half) Jan E. Tighe will be assigned as director, decision superiority, N2/N6F4, Office of the Chief of Naval Operations, Washington, D.C. Tighe is currently serving as deputy director of operations, J3, U.S. Cyber Command, Fort Meade, Md.

The Boeing Company has named **Tim Peters** vice president and general manager of Surveillance and Engagement, a division of Boeing Defense, Space & Security's Boeing Military Aircraft unit. In his new position, Peters is responsible for ensuring delivery of the airborne early warning and control and P-8 programs, and for developing and expanding surveillance and engagement capabilities in the United States and internationally.

Unmanned Sentries Team Up

Letting sensors do the work of guarding spaces.

By Henry Canaday
TISR Correspondent

Unattended ground sensors (UGSs) are often likened to sentries. Like human sentries, they can best work as a team, with each assigned the duties it does best and all collaborating to provide a comprehensive picture of threats.

Even as individual sensors continue to improve, much emphasis is now being placed on teamwork. Defense is seeking UGS technologies that can plug and play easily together and be integrated quickly and effectively.

The Communication-Electronics Research, Development and Engineering Center (CERDEC) is soliciting for a Reduced Manning Situational Awareness (RMSA) system. The solicitation seeks two command-and-control prototypes to integrate smart systems, 3-D visualization, video analytics and bandwidth management. RMSA Project Lead Robin-Lynn McClean explained, "The purpose is to automate monitoring of a wide array of sensors, reducing manning and operator fatigue while raising detection."

RMSA will demonstrate cutting-edge technologies using feeds from many electro-optical and infrared (EOIR) sensors to provide a common operating picture with optimized imagery and automatic alarms. RMSA would also have open architecture allowing for plug-and-play sensors.

RMSA is not intended to be fielded. CERDEC wants demonstrators so it can study alternative tactics, techniques and procedures for optimizing sensors and reducing manning. The prototypes must be mobile or semi-mobile for ease of deployment in tests.

The Defense Intelligence Agency's (DIA) Terra Harvest program seeks to make all UGS components interoperable. The Army Research Laboratory (ARL) does technical oversight and compliance testing for Terra Harvest.

"We now buy turnkey UGSs from OEMs," explained Jeff Houser, ARL's UGS team leader. "It's difficult to get them to talk together." Interoperable UGSs need common interfaces, cabling, message format and other features.

Intellectual property is one hurdle to communication. Terra Harvest will permit vendors to retain intellectual property where it affects performance of UGS components, like clarity or power consumption. "But we must not have intellectual property in connectivity," Houser emphasized.

Terra Harvest will allow units to quickly reconfigure UGS systems with the right components for each mission, no matter the device or vendor. "They will be able to pick the ones they want affordably, without asking the vendor to modify software," Houser said.

UGS components include sensors, radios and controllers, the brains of UGS. DIA wants vendors to write standard software that can be loaded into controllers. Terra Harvest will also develop a common lexicon for items such as time and location.

DIA has interim interoperability standards and is working on reference implementation standards. Scheduled for publication in the first or second quarter of fiscal 2012, standards and reference implementation of software will be free to vendors and backward compatible with legacy UGSs to the extent practical.

Connecting UGSs with sensors in unmanned aerial vehicles (UAVs) is an important goal that Terra Harvest does not directly address in the near term. "We are not doing one standard for all, but our framework accommodates command and control with ground, air and maritime robotic devices," Houser explained.

No single office buys all UGSs, so Terra Harvest standards cannot be forced on the industry. "Fortunately, the UGS community is coming together under the UGS Standards Working Group, chaired by DIA," Houser noted. Terra Harvest will use existing standards where possible, modify these when necessary and develop new standards only when essential.

Several controller and asset vendors are working under interim Terra Harvest standards. Terra Harvest will be demonstrated at exercises in the third quarter of fiscal 2012. Houser hopes publication of reference standards will allow more firms to participate in these exercises.

The future of UGS is interoperability, emphasized Kevin Bobier, director of advanced technology at L-3 Nova Engineering. "Systems used by the Army, Navy and Marines are not interoperable now."

Kevin Bobier

kevin.bobier@l-3com.com

With partner University of Dayton Research Institute, L-3 Nova is developing software architecture for interoperability, Terra Harvest Open Source Environment (THOSE). Other integration contracts are expected in six to nine months.

"Another goal is integrating images from UGSs with those from UAVs. "That integration is underway with L-3's UGSS and ROVER products," according to Bobier. L-3 plans to demonstrate this capability at exercises next year."

L-3 Nova is also developing Intelli-Sense, a system of UGSs that fuse detection from multiple sensors for target tracking, display and imager cueing. Intelli-Sense algorithms

Tactical ISR

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consistently detect personnel and vehicles at significant stand-off distances with a near-zero false alarm rate, even with interference or clutter. Intelli-Sense declares alarms only after all sensor data are exhaustively analyzed. "The system's false-alarm rate is drastically lower than any conventional system," Bobier said.

The company's Imager II UGS can be triggered by sensors or remote command. Visible or IR imagery is captured and software automatically selects the best image for transmission. Bobier said the Imager's target-detection algorithm is the best in its class. Software also selects the best compression ratios, transmission rates and encryption.

Imager-II is central to the U.S. Marines' Tactical Remote Sensor Systems. Other L-3 Nova TRSS gear includes the radio repeater for extending communication range and the Signature Data Recorder II that monitors data from multiple UGSs. L-3 Nova's handheld programmer monitor supports system emplacement with integral GPS and crypto-key generator.

Ed Nichols

Qual-Tron provides UGSs and intrusion-detection systems to the U.S. military and other agencies and to foreign militaries. Dan Chambers, vice president of sales and marketing, said these operate for four to 12 months on standard 9-volt batteries. "We emphasize integration with camera systems. We have low-power receivers that integrate with cameras. You can turn on sensors to save cameras or cue the cameras to a different location."

Qual-Tron makes turnkey systems of sensors, transmitters, relays, base stations, power supplies, data logging and satellite communications. "They are simple to set up and operate and can be integrated with high-level networks with minimum effort," Chambers noted. Recently Qual-Tron added satellite-relay upgrades, proximity door-switch sensors, multi-channel receivers for integration with cameras and easy-to-use remote camera systems.

Qual-Tron is working on a next-generation Enhanced Mini Intrusion Detection System that will be even smaller and lighter, with longer battery life and other features, all modular so different transmitters can be used.

Millennium Sensor primarily makes tactical sensors, explained Chief Executive and Chief Technology Officer Mike Roberts. "Our sensors are meant for high speed; they are always ready and easy to deploy—and they will sit out there for more than six months." Millennium's primary customers are Special Operations Command (SOCOM) DHS, intel services, federal law enforcement agencies and selected allied governments worldwide. Millennium is now in production with an active motion sensor that will operate up to 30 days on internal batteries and its seismic sensor operates from 6 to 18 months on internal batteries for village-stability operations. Motion sensors in current development will operate in excess of 200 days. All current sensor and video kits can trigger third party devices and can transmit and receive any third party video source.

Roberts described his equipment as "personnel-centric." Images are sent first to soldiers and then may be sent upstream to networks. Video may be sent to cell phones if there is cellular infrastructure available.

Millennium makes motion sensors that "can see through walls," Roberts said. "If you put three sensors on three windows you can track your target inside." Millennium sensors include seismic and other devices. "They augment passive IR very well." Millennium is looking at more sensor types and just opened a new research and development center.

The company can develop and deliver new equipment very rapidly and stays close to users. "I sit on wet rocks with 19 year olds and listen to their complaints about what they don't like and what they wish for very frequently," Roberts said.

Trident Systems Inc. is on the "bleeding edge" of UGS technology, according to Program Manager Ed Nichols. Trident first worked for SEAL teams and then found interest in the Army and SOCOM.

Trident UGSs have integrated still-image cameras, video and other sensors, including chemical and wind detectors, for battlefield awareness. "You can detect if there is a sandstorm," Nichols explained. The next step was connecting UGSs in wireless networks and facilitating deployment. "They have to be quick to set up, secure and hard to detect. And they must withstand extreme temperature ranges."

That required UGSs and relays that kept a low profile, often only six inches above ground. "There are no 300-foot towers like your cell phone has, and yet they can still talk to each other and relay information."

The military also wants long life, low maintenance and "always much better information," Nichols said. An appetite for color pictures was satisfied by compressing pieces of pictures before transmission and later reassembly for analysis. UGSs also must be rugged enough to endure truck or ship transport and used and reused over many months.

Nichols predicted that future UGSs will be even more user-friendly for soldiers who are used to working with iPads and easy to fix in ways familiar to people who are accustomed to consumer electronics.

Northrop Grumman's Xetron makes a family of sensors, communications and UGSs tailored to specific roles and mostly focused on defense and intelligence applications, explained Mike Coster, Defense Business Area manager. Scorpion and Scorpion II use passive IR, magnetic or seismic sensors to detect activity and then cue daylight, IR or starlight cameras to snap pictures and transmit them "from anywhere in the world to anywhere in the world." Warfighters get the images, plus time stamp and geo-location.

These are long-lasting UGSs, capable of operating from six months to two years, as power-consuming cameras are turned off until detection of movement, then woken up to operate. The cameras can take five frames per second, enough for choppy video but not full motion video. Long-wave IR imagers are un-cooled to save energy.

There are about 600 Scorpions deployed with Central Command and 1,000 deployed worldwide. The new Scorpion II is half the size and weight, making it easier to deploy and hide. It is less expensive and has a higher-resolution IR camera. It also supports ad-hoc networking so it can connect to local networks quickly to provide intelligence in the battlefield.

Xetron will join the Terra Harvest working group and will comply with the final standards when they are published. Xetron already integrates with more than 57 sensors made by different manufacturers. The Scorpion family uses the best sensors for each mission, wherever these are made.

Seraphim Optronics makes the Mini Unattended Ground Imager (MUGI) sensor, an EOIR UGS. Gadi Bar-Ner, vice president

for marketing & business development, said that MUGI comprises high-resolution day and IR cameras that recognize moving persons at 2.5 kilometers in daylight and 1.5 kilometers in complete darkness.

"Seraphim customers vary from special forces to border protection forces that require a fully autonomous system to close gaps in surveillance," Bar-Ner noted. Fixed surveillance towers have gaps due to topography, and these are usually the first choice for infiltration. MUGI gives operators automatic alerts when gap breaches occur.

Seraphim combines high levels of system engineering and integration with years of operational experience. Its systems can be left buried in the field for years, be woken by its own or external sensors and almost immediately send live video feed. Pan and tilt enable coverage of 80 to 90 degrees horizontally and 10 to 20 degrees vertically.

MUGI supports video transmission and reception via various media, including Internet Protocol, radio and satellite. A processor compresses video, while real-time players in base stations prevent latency. Seraphim is integrating short-range radar, seismic and acoustic sensors in MUGI to hermetically seal an area of more than 1.5 square kilometers.

3e Technologies International (3eTI) is a recently acquired subsidiary of U.K.-based Ultra Electronics. President Benga Erinle said 3eTI specializes in secure wireless networks that enable critical systems security, infrastructure security and industrial automation for the military and customers who seek confidentiality, integrity and availability of their data. Encryption methods, parts and manufacturing processes are thoroughly vetted by security officials and meet the highest level of security required by the federal government. The company's network equipment interfaces with EOIR sensors and video cameras.

Benga Erinle

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3eTI also offers a virtual perimeter monitoring solution, VirtualFence, which includes sensors made by other OEMs, and video analytics that can apply rules to select areas of interest and alert users. "If someone loiters for a predetermined amount of time or enters into an area of interest, it sends an alert," Erinle explained.

3eTI is the primary wireless vendor in this area for the U.S. Navy and its VirtualFence is used by several military units around the world, including many Navy bases and the U.S. Marines at Camp Fallujah during the early stages of the Iraq war. The company recently launched GunfireGuard, a system to locate a sniper and direct a camera in his direction. ✯

For more information, contact KMI Media Group Editor-in-Chief Jeff McKaughan at jeffm@kmimediagroup.com or search our online archives for related stories at www.TISR-kmi.com.

Intel Imaging Assets

Lighter weight, with greater resolution: Infrared imaging asset tools become more valuable to operators.

By William Murray
TISR Correspondent

First developed for military use during the Korean War, infrared (IR) technology requires no illumination to make objects visible, making it an excellent tool for the military. With IR technology, military forces can conduct nocturnal operations with a distinct advantage over the enemy. IR technologies are used in image collection devices to support ground combat with instruments such as cameras, detectors, wireless networks and night vision goggles, to enable servicemembers to detect objects emitting energy, even when they are not visible to the human eye

Thermal imaging cameras, meanwhile, are sometimes used for parameter defense and force protection and can be connected to a wireless network with sensors that would set off an alarm when an intruder enters the parameter. Thermal imaging is valuable because it detects emitted energy that is present in IR wavelengths and thus can operate in total darkness. Such a camera can automatically pan and record a parameter continuously and can detect energy emitting from objects in day or night and through smoke, fog, sand, rain and snow.

"It allows the military to sleep at night," said Katey Grogan, director of sales and marketing for HurleyIR Inc. of Mount Airy, Md., speaking of thermal imaging cameras and parameter defense, since they require less manual intervention. She should know. During the last decade, HurleyIR has supplied more than 3,000 mounted camera systems to the military, including one model that sells for less than $10,000, weighing less than 5 pounds. The company's mounted camera systems are tested to Military Standard 810-F.

HurleyIR Rapid Deployable Camera (RDC) systems can operate continuously on a power outlet or as long as eight hours on a supplied rechargeable battery power module. Military operators can set up and operate the HurleyIR RDC in less than 15 minutes, according to Grogan. Their system transmits video, camera, and positioner control through encrypted wireless technology, allowing for up to two kilometer line-of-sight operation.

Katey Grogan

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Grogan noted that the U.S. military operating in Iraq has required very long range cameras for parameter security. The country, after all, features four distinct geographies: sparsely populated desert in the west and southwest, highlands in the north and northeast near Kurdistan, the rolling uplands between the Tigris and the Euphrates rivers, and the plain through which the Tigris and Euphrates flow. Rough, mountainous terrain dominates much of Afghanistan.

Don Gill

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Short-range cameras, meanwhile, are particularly valuable in Afghanistan, especially in mountainous areas. The scope has changed, between Afghanistan and Iraq, and this has affected the military needs in those two wars, Grogan said. Cameras usually can handle closer ranges for human detection and longer ranges for vehicle detection. HurleyIR is a woman-owned value-added engineering and manufacturing small business contractor that has been operating for more than 25 years.

The military and its supporting contractors are using the long-wave infrared, mid-wave infrared and near infrared spectra to sense light as a means to detect and identify objects in nighttime darkness. The military generally uses thermal—or heat-seeking—sensors for long-wave and mid-wave infrared, while using light intensifiers with near infrared.

Long-wave and mid-wave IR sensors are best at quick detection of objects of interest, such as vehicles or humans hiding in plants or urban environments with a lot of activity, and it's easy to grasp their parameter security advantages. These sensors are particularly good at contrasting objects with heat signatures markedly different from their surroundings.

Like HurleyIR, L-3 Cincinnati Electronics has also carefully evaluated changing needs among its military customers, and company officials have diligently worked to meet those requirements. Military commanders are used to viewing high-resolution, high-definition documents and events through their electronic devices, including televisions, computers and handhelds. They have high expectations about presentation and resolution. When they view standard definition sensor data supplied through unmanned aerial vehicles (UAVs), however, they may get 640-by-480 pixels resolution at best, which is an improvement over the previous highest resolution possible. Nonetheless, the quality of the resolution means that the viewer is limited in his ability to zoom to get more detail about an aspect of the image.

"It's like looking at the world through a soda straw," said Don Gill, director of business development for IR products at L-3 Cincinnati Electronics of Mason, Ohio. Military commanders and intelligence analysts are looking for much better resolution.

L-3 Cincinnati Electronics has developed a high-definition sensor for long range surveillance cameras that can enable warfighters to perform surveillance activities on broader geographic areas than before while having improved ability to zoom in to areas of interest with greater image clarity, with images up to 1,280-by-1,024 pixels. Long range surveillance cameras can enable what Gill calls "wide area persistent surveillance."

L-3 Cincinnati Electronics and HurleyIR aren't the only players in the intelligence imaging assets market. Sensors Unlimited-Goodrich ISR Systems of Princeton, N.J., introduced in April 2011 a 1.3 megapixel, military-hardened 1,280-by-1,024-pixel shortwave infrared camera, the GA-1280J-15A. The uncooled camera can image through fog, smoke, haze and dusty conditions. The camera can operate in low light or daylight.

Lockheed Martin's Missiles & Fire Control line, meanwhile, has fielded more than 1,000 infrared units with the Defense Department. Making sensors into self-contained units helps to protect them from the sand, dust, heat and other physical elements, according to Mark Fischer, Lockheed Martin's Missiles & Fire Control line's senior manager for business development in Orlando, Fla. He agreed that parameter security is a leading application for infrared cameras.

Infrared cameras are also becoming more durable, and many can last 20,000 to 25,000 hours in operation, according to L-3 Cincinnati Electronics' Gill.

Lockheed Martin produces the Gyrocam line of optical surveillance systems. The Gyrocam 9 Series includes thermal and high-definition color imaging, laser pointing, geo-location, and eye-safe laser range finder for surveillance targets with a range up to 20 kilometers away.

Through the use of long-range optics, Gyrocam camera systems can magnify up to 100 times what the human eye can resolve. The Gyrocam 15 Series offers multiple optical and laser payload configurations to satisfy many mission requirements for airborne, land and maritime applications.

Custom thermal imaging systems can also be configured to be laser rangefinders, which use a laser beam to determine the distance to an object.

Infrared technology is also used in laser designators, which identify a target using a laser light source and can be effective at fighting the enemy in clear atmospheric conditions, unless the adversary possesses laser detection equipment.

The long-term outlook is intriguing for military commanders interested in infrared imaging assets for use on the battlefield. L-3 Cincinnati Electronics is developing a 4,000 to 5,000 pixel Large Format Infrared Imaging System, initially developed in conjunction with the Naval Research Laboratories. Once developed, this system would enable analysts to perform surveillance over 30 times as much territory as currently possible under IR systems on the market.

While the next generation of products is fascinating, it's also interesting to note the intel imaging asset orders that the Defense Department has made this fiscal year end for battlefield surveillance. On August 30, FLIR Systems Inc. of Portland, Ore., announced that it had been awarded a three-year, fixed-price contract worth up to $52.1 million from the Naval Air Warfare Center Aircraft Division (NAVAIR) for its Star Safire 380-HD digital, high-definition, full-spectrum imaging systems.

The Navy's initial order with FLIR Systems is for $25.6 million, and the service is using the imaging systems in its Persistent Ground Surveillance System program, according to FLIR Systems.

FLIR Systems prides itself on funding its own research and development activities yet still developing products that meet military specifications.

Axsys Technologies, a Fairfax, Va.-based division of General Dynamics Advanced Information Systems, designs and manufactures high performance, electro-optical infrared systems, multi-axis stabilized HD cameras, infrared lenses, optical systems and components and motion control products. The company produces a long wavelength infrared camera, which operates in the "far infrared" region of thermal imaging, where sensors can obtain a passive picture of the outside world from thermal emissions. These forward looking infrared systems need no external light or thermal source such as the sun, moon or infrared illuminator to operate.

Through its Advanced Information Systems unit, General Dynamics supports the Air Force's National Air and Space Intelligence Center (NASIC) at Wright-Patterson Air Force Base, Ohio. Under a $4.7 million task order announced in June, General Dynamics supports overseas operations and missile defense through hyper-spectral and multi-spectral imagery production and analysis, data processing and analysis, analytic support, publishing and distribution, and training, according to a company announcement. NASIC works with intelligence data collected from radar, electro-optical and IR technical sensors.

Recent years have seen significant progress in uncooled IR detectors, as a result of breakthroughs in uncooled focal plane array technologies and product capabilities. Detector pixel dimensions have continually decreased with an increase in pixel performance, making large format, high-density array products affordable and resulting in a proliferation of uncooled IR detectors in the commercial and military markets.

Uncooled detectors are widely used in firefighting, surveillance, industrial process monitoring, machine vision and medical applications. Uncooled detectors are also widely used in Army soldier systems such as weapon sights, driver's viewers, and helmet-mounted sights. Uncooled detectors are also employed in airborne and ground surveillance sensors, including UAVs and UGVs.

For night vision use, the military places a high value on small size, low power consumption, and light weight for easy deployment with infantry soldiers or light vehicles, and today's infrared sensors are starting to fit the bill. Reducing size and weight typically requires elimination of any external coolers, and long-wave and mid-wave IR sensors both can operate at room temperature.

Long-wave and mid-wave infrared are usually used by the military for quick detection of objects of interest, such as vehicles or humans hiding in foliage or complex urban environments. Long-wave IR sensors, meanwhile, have served as the standard for ground-based applications, such as thermal viewers on the U.S. Army M-1 main battle tank and M2 Bradley Fighting Vehicle.

Long-wave and mid-wave infrared are usually used with thermal sensors, while near infrared is where light intensifier tubes, the heart and soul of night vision devices, come into play. Unlike IR, night vision devices need some light, such as that emitted by the moon or starlight, to operate. Mid-wave infrared has been used often for airborne applications.

There is very little quality difference between long-wave and mid-wave infrared quality, according to Mike Scholten, vice president of business development for electro-optical components and technologies at IR sensor designer DRS Technologies in Dallas.

Mike Scholten

One of the advantages of using the IR wavelength is that it is longer than the visual light wavelength. As a result, thermal imagers can detect emitted energy through dust, fog, rain, sand and smoke, making these imagers more valuable to military operators. Visible light wavelengths, on the other hand, bounce or are reflected off the obscurant particles due to the wavelength being short.

In addition to force protection with the U.S. military, imaging asset companies such as DRS Technologies have found several applications for their technology, including border patrol, airport and base security, law-enforcement, search and rescue, and vulnerable critical infrastructure protection, including utility-company facilities. The robustness of the overall market for this technology will help encourage these companies to invest funds to develop even better technology and products to sell the U.S. military in the years to come. ★

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The EW World

Electronic warfare is the backbone of the tactical arena.

By Peter Buxbaum
TISR Correspondent

Electronic warfare (EW) used to refer to the detection and jamming of radio frequencies, making communications by an adversary difficult. No longer.

Today's electronic warfare is focused on any weapons system or device uses or creates signals in the electromagnetic spectrum from radios and radars to controls for improvised explosive devices. Electronic warfare countermeasures also protect vehicles and aircraft by identifying and evading munitions based on their electromagnetic signature. Electronic warfare refers to the use, and the denial of use, of the electromagnetic spectrum by a broad range of electronic technologies.

One growing challenge in the electronic warfare arena involves the protection of unmanned aerial vehicles, which are increasingly being deployed to gather tactical ISR. Advances in computing, which allow UAVs to exercise greater degrees of autonomy, are helping in this area. EW applications often must detect, tune to and locate a transmission in an extremely brief period of time. Specialized antennas and tuners as well as high-speed real-time computing capabilities also help protect lives and assets by identifying threats and deploying countermeasures within very narrow time frames.

"Everyone used to think that electronic warfare was tied to the jamming of radios signals," said Roger Nadeau, vice president for land and C4I solutions at Elbit Systems of America. "That is not true anymore."

Electronic warfare today has moved conceptually beyond the compromise or protection of communications and other assets. "Electronic warfare in a wider sense is about creating situational awareness," said Steve Roberts, chief technical officer for electronic warfare at Selex Galileo. "It is about collecting information that can contribute to situational awareness, not just for the platform but also for the force the platform is supporting."

"Electronic warfare now covers a variety of things that involve what you can do to influence an adversary and to protect your own systems against the influence of others," added Nadeau. "Gone are the days where radios function on specific frequencies. There is no longer a push-to-talk mentality. You can't design a radio system in which electronic warfare countermeasures are not designed into the system."

Elbit Systems of America is a subsidiary of Elbit Systems Ltd. (ESL), a company based in Haifa, Israel. ESL divisions have supplied electronic warfare systems to a European country and have supplied electronic warfare equipment for a Canadian Navy frigate modernization program as a subcontractor of Lockheed Martin.

The technical challenges faced by today's electronic warfare is often compounded by the need to rapidly develop and deploy new application capabilities, sometimes on small platforms operating in harsh environments. "We help address these challenges by developing innovative technologies, then integrating them together to create powerful, effective solutions," said Tom Roberts, solutions marketing manager at Mercury Computer Systems.

The broadening of the scope of electronic warfare has been facilitated by developments in weapons systems. "Most weapons use some portion of the electromagnetic spectrum," said Steve Roberts. "It could be radio transmissions or radar to control a missile, the ultraviolet flash of a missile launch, or ultraviolet or infrared activity from a gun."

Selex Galileo's AGP integrates a suite of sensors to provide an aircraft crew with a combined threat picture and countermeasures which recommend a tactical response.

"The AGP has been selected by Boeing for integration into the Block II and Block III AH64D Apache and a variant is used by the United Kingdom Ministry of Defence for front-line combat helicopters," said Steve Roberts. "The box provides enhanced platform survivability and reduced crew workload by increasing situational awareness of the threat environment and the initiation of optimized countermeasure responses."

Prioritized threats are shown on multifunction displays with coordinated audio warnings. "This box knows the capabilities of the platform and the available countermeasures," said Roberts. "It knows what to do when it sees a particular threat." The AGP evolved from the Helicopter Integrated Defensive Aids System (HIDAS), first deployed on the British variant of Apache.

The technology was first deployed 15 years ago aboard Royal Navy vessels. The size of the system has since been reduced to a box weighing less than eight pounds.

HIDAS protects rotary wing aircraft by identifying hostile weapon systems and initiating appropriate tactics and countermeasures. HIDAS utilizes multispectral sensors and preloaded intelligence to produce comprehensive pictures of the operating environment.

Components of HIDAS include radar and laser warning receivers and a missile warning system as well as infrared and radio frequency countermeasures. "HIDAS detects, identifies, prioritizes and counters threats to helicopters, without the need for crew intervention," said Steve Roberts. "It is an advanced integrated defensive aids system tailored for helicopters. HIDAS utilizes mission-specific data entered by the user at the flight line." After extensive testing and trials on airborne platforms, HIDAS has been very successful on operations.

An advanced countermeasure system which recently emerged from laboratory and toward flight tests is Selex Galileo's

Economic Compact Lightweight Pointer-tracker System (ECLIPSE), an infrared pointer tracker. Selex Galileo recently won the competition to supply its next generation ECLIPSE to a U.K. Ministry of Defence aircraft protection program.

Selex Galileo has also developed a product to defeat radar in the form of the Ariel towed radar decoy. The technology was first deployed during the first gulf war and then in Kosovo. "Variations of the towed decoy have been in service since 1990 and used on the Eurofighter Typhoon, Tornado and Nimrod aircraft," said Steve Roberts. "The first generation of towed decoys was flown successfully in the Balkans and over Iraq enabling crews to operate with a higher degree of safety in hostile skies providing protection against numerous surface-to-air systems."

The Ariel countermeasure is towed behind the aircraft to lure enemy missiles away from their targets by providing a larger radar cross section than the aircraft. The decoy also incorporates the latest jamming techniques. Ariel communicates with onboard systems to transmit specific deception techniques designed to defeat incoming missiles and hostile radars.

"Ariel has been proven to defeat radio frequency-guided weapons," said Steve Roberts. "The decoy can be installed and operated from all types of fixed wing aircraft including high-performance supersonic combat aircraft." The increased use of UAVs for tactical ISR calls for somewhat enhanced electronic warfare capabilities. "The threats are similar to those facing manned aircraft," said Roberts. "The difference is that the aircraft requires some degree of autonomy to detect threats and take evasive action and countermeasures." In other words, UAVs can use systems similar to those found on manned aircraft but without the crew making the final decision on evasion and countermeasures.

Roger Nadeau

Steve Roberts

Tom Roberts

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Electronic warfare capabilities have continually been scaled down in size in recent years so that even smaller UAVs can be equipped with sensor suites and decision-making capabilities similar to those found in larger aircraft, according to Roberts.

Within the guts of these electronic warfare systems are the high speed computing capabilities as well as the specialized antennas, tuners, converters and digital receivers required to absorb information and make decisions on the fly. Mercury Computer Systems does not produce electronic warfare systems but works with prime contractors who do, providing those kinds of components.

Mercury contributed its high-speed tuners to the Joint Counter Radio-Controlled Electronic Warfare (JCREW), said Tom Roberts. "IEDs are activated by a variety of devices such as cell phones and garage door openers," he explained. "The system had to be able to tune quickly so that jamming can be put in to place before the circuit is completed. The components also had to fit on a small platform."

JCREW 3.3, the latest iteration, is being developed to be adaptable to a variety of applications such as mounted and dismounted soldiers as well as protection for fixed installations.

Last year, Lockheed Martin won the contract for the Block 2 upgrade of the Surface Electronic Warfare Improvement Program (SEWIP) using Mercury components. SEWIP is providing the Navy with a series of enhancements to its current EW system in an approach that incorporates commercial off-the-shelf electronics.

Mercury Computer recently introduced three new components for electronic warfare applications: the RFM-1802, a dual-channel wideband microwave tuner; an eight-channel digital receiver; and a small multichannel digital receiver. "When combined with powerful processing power, these innovations unleash new capabilities such as fast and sophisticated direction finding," said Tom Roberts.

The new tuner is attractive to new EW programs based upon its fast tuning capability, said Roberts. "With ultra-fast tuning speed," he explained, "a single channel views a very wide instantaneous bandwidth over an even larger frequency range. This window can be shifted, or retuned, nearly instantaneously, allowing systems to track sophisticated, modern-day waveforms. Fast tuning to help with direction finding is critical to the SEWIP."

The RFM-1802 tuner has been complemented by a new 8-channel option added to Mercury's digital receivers, which include the necessary resources for signal processing functions.

"Every electronic warfare program has its own needs," said Tom Roberts. "With SEWIP one of the needs was very fast tuning. Threats are getting more sophisticated, employing frequency hopping and quick short signals making them hard to find."

Mercury's products are built to open standards, Roberts noted. "That makes it easier to refresh subsystems," he said. "Newer, faster and more advanced components can be incorporated into systems quicker and at lower cost. Proprietary interfaces can lock customers in. The Department of Defense and industry participants have moved away from that."

Future developments will see sensor and processing packages getting ever smaller, according to Roberts, allowing them to be mounted on platforms such as smaller UAVs. "These systems won't be limited to use on platforms like the Global Hawk or Predator," he said. "Aircraft like the Shadow will also be able to carry EW packages."

For Steve Roberts, future innovations will likely revolve around the processing of data absorbed by EW sensors. "Different kinds of sensors will be able to pass messages among themselves and to the central system," he said. "The decision making element won't need to know much about what kind of sensor detected a potential threat or how the detection was made."

Much as UAVs will require greater on-board autonomy to evade and counter threats, coming EW systems will also exercise discretion about what data and information to present to their human handlers. "Sensors remain important but the processing of the data is becoming increasing important," said Roberts. "The processing will be focused on extracting information from pictures rather than presenting pictures to humans to for them to process. We have been working on reducing and simplifying the amounts of data presented to those showing changes or events or interest." ✭

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Comms On the Move

Answering the need to enable military vehicles to serve multiple mission roles, Lockheed Martin has developed a mobile network in a carrying case. Lockheed Martin's communications-on-the-move (COTM) kit gives warfighters access to various networks without having to incorporate racks of equipment in their vehicles.

"Lockheed Martin offers the potential for each vehicle to be a network node without having to return to a depot for extensive installation of communications equipment," said Jim Quinn, vice president of C4ISR Systems with Lockheed Martin IS&GS-Defense. "This kit offers warfighters a proven, transportable communications capability."

Lockheed Martin's Whetstone COTM network kit is an affordable, platform agnostic system for extending the network to soldiers at the tactical edge of the battlefield. This "network in a box" has a configuration that can be tailored to meet changing mission requirements, eliminating the need for vehicles to be tailored specifically for mobile communications. Depending on the mission performed, the kit can be integrated from one platform to another in less than one hour. This sophisticated suite of communications gear includes servers, solid state storage, a network switch and a router. The kit can push various types of broadband data, such as satellite imagery down to small, company-level units that lack wideband connections. It can also equip vehicles with communications link to satellite, Enhanced Position Location Reporting System, Single Channel Ground and Airborne Radio System and UHF/VHF line of sight.

Developed as a Lockheed Martin research and development project, the COTM kit was recently tested at the 2011 Joint Users Interoperability Communications Exercise. During the exercise, a larger scaled version of the kit showcased a tailored network infrastructure system which can insert additional functionalities to a third party system. As a result of its participation in the exercise, the kit is designated at Technological Readiness Level 7, which means that the technology is sufficiently proven, and can be immediately incorporated into vehicles.

Shrike is Here

In August 2008 AeroVironment announced the receipt of a contract from DARPA (the Defense Advanced Research Projects Agency) to develop a portable, stealthy, persistent perch and stare (SP2S) unmanned aircraft system. Shrike VTOL represents the conclusion of this development effort.

"With more than four years of customer funding behind it, our new Shrike VTOL unmanned aircraft system is designed to address the need for a small, lightweight hovering aircraft that delivers unique surveillance and intelligence capability not provided by current solutions," said Tom Herring, senior vice president and general manager of AeroVironment's UAS business segment. "Not only does Shrike VTOL hover for more than 40 minutes with a high resolution video camera, but its innovative design also allows for the transmission of several hours of live video as a remotely emplaced perch and stare sensor. This new solution adds an important set of new capabilities to our existing and battle-proven family of small unmanned aircraft systems that are saving lives in theater today."

Herring said the Shrike VTOL system delivers the superior imagery, endurance and encrypted video found in all AeroVironment small unmanned aircraft systems. Operating quietly enough to go virtually undetected, Shrike weighs approximately five pounds and is small enough to fit in a backpack

Autonomous Landings

Rockwell Collins' Tactical Targeting Network Technology (TTNT) played a key role in the U.S. Navy's recent demonstration of an autonomous carrier landing capability developed as part of the Unmanned Combat Air System Carrier Demonstration (UCAS-D) program.

During this operation, an F/A-18D aircraft served as a manned surrogate for the Northrop Grumman-built X-47B unmanned aircraft, completing a series of carrier integration objectives that included launches, touch-and-go landings and arrested landings. All of these maneuvers were supported by Rockwell Collins' TTNT equipment, which enabled digital communications between the carrier and the F/A-18D, without human intervention.

"Successful autonomous carrier landing scenarios for unmanned aircraft require pinpoint navigation accuracy as well as absolute minimum data link latencies to ensure that the X-47B tracks and adjusts its flight path based on deck movement," said Bob Haag, vice president and general manager of communications products for Rockwell Collins. "Our TTNT technology delivers very low latency, precise navigation and ad hoc networking capability that directly enabled this demonstration of carrier capable unmanned aircraft."

The F/A-18D used in the demonstration was equipped with a subset of the avionics and guidance, navigation and control software that will allow the X-47B to perform precision landings on the carrier, he added.

Micro Unmanned Ground Vehicle

QinetiQ North America has developed a new micro unmanned ground vehicle for military and first responder robotic missions. At just over 10 pounds, Dragon Runner 10 (DR10) is small enough to carry in an assault pack and rugged enough to throw into buildings and hostile environments. With multiple sensor and payload options, DR10 is ideal for reconnaissance and surveillance missions to support small military units, patrols and first responder teams.

The warfighter uses a wearable controller to send DR10 in first, to assess the situation in advance. Whether it's being driven or thrown into a potentially hostile area, DR10 can quickly gain situational awareness and report information back to the operator. Its day and night sensors enable DR10 to serve as the team's forward eyes and ears, while carrying out critical missions such as explosive ordnance disposal, setting counter-IED charges, delivering remote sensors, gathering intelligence and conducting surveillance.

"Military robotic missions save lives, and if possible, it's better to send the robot in first," said QinetiQ North America Technology Solutions Group President JD Crouch. "Dragon Runner 10 is a practical solution that makes it easier to carry and operate sophisticated robots in theater."

The Max-Rooster

The Max family includes compact, multi-functional command and control solutions for the Rooster, the lightweight man-portable remote operation surveillance and observation system that can be integrated with most available EO sensors and handheld thermal binoculars being used by military forces around the world. Providing enhanced situational awareness, the units enable precise control, monitoring and operation of the Rooster pan-tilt unit, bringing all CCD/thermal camera functions to the operator's fingertips.

The Max-Rooster combination is a self-contained quick deployment system, carried by individual soldiers, that decreases their exposure to enemy fire by enabling intuitive, remote operation of the surveillance system from secure locations. In addition, these compact, lightweight, ruggedized units provide a remote powering solution for the Rooster and the observation EO sensors via the ESC BAZ power-pack, thus making it unnecessary for soldiers to frequently visit the usually unsafe surveillance position to change batteries.

According to president and CEO of ESC BAZ, Benny Zviran, "We are proud to launch the Max family—the result of an extensive development process and operational feedback that emphasized the need for a universal system easily integrated with any EO observation system."

The Max family includes an 8.4-inch LCD display, 2-channel video input, integrated DVR, programmable preset stations, and controls for thermal sensors, laser devices and additional situation awareness accessories. The units, which can be operated in wired or wireless mode, provide picture-in-picture display capabilities as well as optional direct IP video streaming and video analytics. Among the unique functions are full-activity recordings as well as recording the soldier via microphone—and a playback option, with events easily analyzed on the device itself or using recordings downloaded to a USB device.

Rugged Displays

Curtiss-Wright Controls Embedded Computing (CWCEC), a business group of Curtiss-Wright Controls and a designer and manufacturer of commercial off-the-shelf VME, VPX, OpenVPX and CompactPCI products for the rugged deployed aerospace and defense market, has introduced the latest addition to its Skyquest family of video displays, the new Alpha series of rugged displays for deployed airborne platforms. Alpha series displays speed and simplify the integration of rugged video displays into size, weight and power (SWaP) constrained airborne military, paramilitary, and search and rescue platforms. The series supports a wide array of video inputs. Its standard high-definition HD-SDI input/output supports the highest quality image from HD sensors. The display's touch screen option enables users to easily control moving maps or a PC via a USB interface.

This initial launch comprises two new display configurations, a 15-inch and a 10.4-inch unit, each with identical functionality and options.

Both of these new displays supports a 1024-by-768 (XGA) resolution and features numerous I/O options for compatibility with the wide range of today's latest generation of EO turrets, cameras, moving maps and PCs. CWCEC's Skyquest displays support a market leading dual LED backlighting technology that enables the Alpha series to deliver a very high brightness, full color display for direct sunlight readability in daylight missions while also offering optional night vision goggle filtered backlighting for night flying operations.

"Our new Alpha series now offers designers of air surveillance systems a choice of display solutions from Curtiss-Wright Controls. Either a custom, flexible and integrated display from our AVDU series to operate as part of a video management system, or for a more simplified installation where the display operates standalone, the customer can now choose the cost-effective Alpha series, without compromising on performance," said Lynn Bamford, vice president and general manager of Curtiss-Wright Controls Embedded Computing.

ISR Integrator

Q&A

Delivering and Sustaining Enduring Capabilities to the Warfighter

Brigadier General Harold J. Greene
PEO U.S. Army Intelligence, Electronic Warfare & Sensors

Brigadier General Harold J. Greene was assigned as the Program Executive Officer for Intelligence, Electronic Warfare and Sensors on May 26, 2011. In this position, he leads the organization responsible for research, development, acquisition, and life cycle management of the Army intelligence, electronic warfare and sensor systems with an annual portfolio of $4.3 billion.

The general is a native of upstate New York. He received his commission as an engineer officer following his graduation from the Rensselaer Polytechnic Institute in 1980. Greene holds a Ph.D. from the University of Southern California in materials science as well as master's degrees in engineering from both Rensselaer and Southern California. He also holds a Master of Strategic Studies degree from the U.S. Army War College and is a registered professional engineer in the Commonwealth of Virginia.

Before his assignment at PEO IEW&S, Greene was assigned as the U.S. Army Research, Development and Engineering Command (RDECOM) deputy commanding general and senior commander of the Soldiers System Center, Natick, Mass.

He previously served as the director of material in the Deputy Chief of Staff for Programs, G8, Headquarters, Department of the Army where he was responsible for the resourcing and fielding of the Army's major items of equipment. He also served in the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology as the Battle Command Division Chief. Before serving in the Pentagon, he spent four years as the U.S. Army's project manager, Battle Command.

Greene's other assignments include: assistant director, Directorate for Combat Developments, U.S. Army Maneuver Support Center, Fort Leonard Wood, Mo.; product manager, Aerial Common Sensor at Fort Monmouth, N.J.; division chief in the TRADOC Systems Manager, Engineer Combat Systems Office at the U.S. Army Engineer School, Fort Leonard Wood; staff officer and materials engineer with the Army Aviation and Troop Command, St. Louis, Mo.; brigade engineer and company commander, V Corps, Federal Republic of Germany; assignments with the Corps of Engineers as resident engineer, Athens, Greece and project engineer, Istanbul, Turkey; and company executive officer, platoon leader and battalion staff officer, Fort Polk, La.

His military education includes the Army War College, the Advanced Program Management Course at the Defense Systems Management College, the U.S. Army Command and General Staff College, and the Engineer Officer Basic and Advanced Courses.

His awards include the Legion of Merit with one oak leaf cluster, the Meritorious Service Medal with a silver cluster, the Army Commendation Medal with three oak leaf clusters, the Army Achievement Medal and the Army Superior Unit Award.

Greene was interviewed by KMI Media Group Editor-in-Chief Jeff McKaughan.

Q: You've been in the PEO seat for about four months now. What's your take on the way the organization is structured in relation to the work that it's expected to deliver?

A: What we're trying to do now is determine how we ought to be structured.

We've been in a unique period for the last 10 years where we've had a very large focus on providing quick reaction capabilities [QRCs] as well as working on the programs of record in parallel. What we need to do now as we move into the future is figure out how we sustain those capabilities and quick reaction capabilities that we fielded by bringing those that are appropriate into sustaining funding streams and retire those capabilities that we determine, as an Army, we don't need.

Our current structure has grown over time to accommodate that combination of QRC work and program of record work. The challenge now is to modify ourselves to whatever the enduring capabilities are going to be. Those are the decisions that are being made now, so we're looking at our structure as we develop our programming plans for the future, and we'll be working with the department. I really can't tell you the answer to the question today, but I can tell you the direction we're going.

Q: Is there a timeframe for that? Have you issued a goal to be at a certain point at a certain time or are you allowing the task to take you where it needs to go?

A: We've recently received our program objective memorandum [POM] FY13 to FY17 guidance back from the Department of the Army. The POM will be utilized to make the FY13 president's budget submission, and we're starting work on the program objective memorandum for FY14 to FY18.

In the next couple of months, as we go through that process and as the FY13 president's budget gets finalized, we'll have a much better idea of what capabilities are going to transition into the enduring funding streams and what capabilities and programs aren't going to be sustained.

It's not really about the structure of the organization, instead it's about what mission sets we are going to sustain and how we sustain them. I would argue that this PEO probably more than any other in the Army has been involved in the QRC business both for force protection work as well as counter-IED work and work in support of the ISR task force. We have more than 40 or more QRCs that are out in the field, and we're sustaining those tremendously valuable capabilities for soldiers on the battlefield.

That brings us our challenge, though: We now have to figure out whether or not to migrate those capabilities to sustaining funding streams. We lose a lot of our funding—if you look at our aggregate funding—roughly half of our funding that we're spending right now comes out of the overseas contingency operations [OCO] budgets. As you look at the drawdown of forces in Operation New Dawn and in Operation Enduring Freedom over the next couple of years, the resourcing for those operations in the OCO funding will go down and therefore our workload will go down. We're going to have to look with the department, as part of our budget and program objective memorandum effort, at what capabilities we're keeping up, at what levels it's going to be funded and adjust ourselves to accommodate that. It's going to have a huge influence in this organization in terms of how we structure.

There are some programs that are extremely well-funded right now, things like force protection. How much of those force protection capabilities are we going to keep in the long term and at what level? Those are the big issues that we're debating now. We're going to have to look at different models of how we sustain those capabilities.

The traditional Army model says, 'Let's write a table of organization and equipment and every like organization gets one of those things.' Well, we have a lot of systems now that we've developed in the current fight for the current environment that we would not want to give to everybody, all the time, everywhere, in a given type of unit. But when you need it, you need it.

I'll give you an example: the CREW counter-radio controlled IED system. We have challenges with training those systems in the continental United States because of the impact on the spectrum. So you're probably not going to use them in the form that they're in in the continental United States day-in, day-out. We'd upset a lot of people if we did. But when you're on the battlefield you need it. So how do we sustain that capability? How do we document it? How do we make sure it has an enduring funding stream? How do we train that system and how do we sustain that system?

A major focus that I've put our folks on is looking at what capability we should recommend to the department for resourcing for the long term in an enduring funding stream, and then how would we ramp up that capability if we had a situation similar to the one we're in now?

If you look at the phases of the fight from Phase 0, peacetime training environment, to Phase 4, stability and support operations, we're operating in a Phase 4 now with lots of equipment that we've fielded to support the environment we're in and they absolutely need, but we wouldn't give it to everybody all the time in a Phase 0 scenario.

So how do you make sure we have enough of a capability in Phase 0 that those forces that are in the available cycle of the Army force generation model have what they need to go immediately? Then you can ramp up as you go through Phase 3 [decisive operations] and Phase 4. How do you train it? How do you sustain it? How do you have it available? What's the industrial lead time to buy some of these things?

A lot of the equipment that we put out there for soldiers on the battlefield is integration of off-the-shelf available systems, so how many of those things do we need for the forces that are in the available pool and how fast can we get more from industry? How do we train soldiers so they can operate and sustain it while understanding that we're not going to be able to give everybody everything all the time and train them on everything? Those are the things we're trying to balance.

Q: Have you issued your commander's guidance?

A: I gave the team here commander's guidance the day I took over. From my quick look around and talking to stakeholders I gave them three priorities I wanted to focus on.

The first one is rebuilding our team. We were part of the base realignment and closure [BRAC] for our headquarters and a number of our project management offices moving from Fort Monmouth, N.J., to Aberdeen Proving Ground, Md. In the process we lost a lot of very experienced and talented people so obviously we need to replace them. But I think part of rebuilding involves teams external to the organization, making sure we have the right relationships with our stakeholders so that we can work through the challenges that we have.

The second priority is that we need to work to integrate the capabilities we deliver into the larger system of systems. We've put a lot of capability out there in the last few years and we've put it out rapidly. We didn't necessarily have it integrated into the other parts of the Army C4ISR and force protection enterprise. So now we have the challenge of integrating those systems for the long term. It is a technical issue—how to get it into the technical architecture—as well as a sustainment and training issue. We've put systems out there rapidly where speed was the priority. We didn't have the time to build up a logistics infrastructure, detailed sustainment plans or training plans. To substitute, for that we've used a lot of contractor logistics support. As we look to the long term, part of integrating into the system of systems is more than just the technical integration; it's also on the sustainment training side. As we look at three to five years from now and if we follow the plan the president has laid out and we're out of Iraq and Afghanistan, we won't have OCO funding to pay for all of the contractor support that we have today. How do you train and utilize soldiers to operate and maintain these systems?

The third priority is focusing the team on putting discipline back into our processes. We've had a period over the last 10 years where the Army had a tremendous need in ISR, force protection and sensors to put capability out rapidly. The priority was on rapid, so we've done that. Now, as we look at going into the future, cost consciousness is extremely important because we understand we're going to be in a period with lesser resources. There's some basic acquisition skills in trying to manage programs that need to become a priority again. Areas we need to concentrate on are: how to do risk management, how to do integrated master schedules, how to effectively contract with appropriate incentives for industry. Those are skills that I think we need to work on and will be working on as part of our strategic plan.

Q: How have you divided the most important imperatives? Have you addressed them in terms of the short term and then in the long term?

A: We have. In the short term I'm focusing folks on two things. The first is continuing the support to the current fight. We need to put discipline back into our processes but that doesn't mean we need to become bureaucratic and slow; we have to keep supporting the current fight.

Our second short-term challenge now is that POM 13-17 is done, so we're now starting to look at 14-18 but we're just at the end of FY11. In an OCO environment there's lots of money available in the year of execution; however, in a base budget environment you have to be programming those funds a number of years out, and the situation that our Army will be in in the 14-18 period is very different from what we're in right now.

We're still engaged in Iraq and we're still near the top of the troop levels in Afghanistan. Our forces are going to be out of Iraq, on current guidance, by the end of 2011 and in 2014 we're well into the ramp-down to come out of Afghanistan, so the environment in 14-18 that we're planning for is different from the one we're living with today.

The second task we have to do in the short term is planning for the longer term and focus our team on identifying the tough choices we have to ask the Army to make. We're in the business of supporting the warfighters, not deciding what their requirements are and what their priorities are. But a part of that bargain is that we have to identify the tough choices and frame them in such a way that they can make choices. How much of this do you want or do you want this? What level of resolution do you want in this capability, understanding that the more resolution you get, the more the cost increases, so how much of that do you really want? So it's kind of a dichotomy because while we're in the short term I'm focusing our team on the program objective memorandum briefs for 14-18 and on their vision and framing the choices of the Department of the Army and Department of Defense, so they can make those choices.

It's somewhat the nature of the business we're in that we're driven by the amount of resources given as to how much we can do, and we really have to push out our planning horizon now as we look at the budget reality of 14-18. This is an odd business in that the work that our PMs and their staffs are going to do today on laying out that vision for the future to garner the resources to enable them to execute it, will actually be executed by their successor or their successor's successor. So if they do a great job I will write glowingly about them in their efficiency reports, but their successor or their successor's successor is the one who actually reaps the benefits in terms of a resourced program down the road.

Q: You've mentioned that much of the recent past has been on quick reaction and now you're asking them to look further out. Do you think the people can make that change? How hard will it be to make that change in a philosophical approach to it?

A: They're great people and they'll make the change.

The challenge is that we have to get them to think through the priorities. We have almost a dichotomy in acquisition right now. We have two sets of rules, the rules for QRCs, which essentially trades risk and cost and to some extent performance for schedule. We'll accept the lesser capability if we can get it out there sooner and save soldiers, sailors, airmen and our Marines' lives. And then we have the deliberate DoD 5000 process where we have added some steps in the last few years to make sure we get it right and drive risk out. Those two are very different. We've had our folks focused on the overseas contingency operation-funded QRC, where money will be available in the short term and the primary focus is on getting lifesaving capabilities out there rapidly and accepting that it may be a little more risky; you may not get the full set of capabilities.

Now we're asking them to program for an environment where risk is not as accepted and we're trying to do more risk reduction to get it right. The link we have to make is a philosophical one, and I think the QRCs give us a tremendous opportunity to demonstrate the maturity of technology, to refine it and then bring that into the deliberate programs of record.

I can give you a few examples. We have the Distributed Common Ground System-Army program which, right now, has a program of record that will go through an initial operational test and evaluation [IOT&E] next spring. In parallel with that, funded with overseas contingency operations funding, we've pushed forward a cloud architecture in Afghanistan that is where we think we want to go eventually with that program. That's not in the program of record yet but shortly after we get through our IOT&E, it's our intention to use what we've learned in the QRC and in Afghanistan to leap forward the technology and the program of record. I think there's a win here leveraging the QRCs to push forward the technology and the programs of record. I don't want to lose what we learned in the process of doing QRCs but I want to leverage it for those long-term programs.

Q: Drilling down a little more on the program and equipment side, I understand the Guardrail Program has recently turned 40. You have five modernized aircraft on station now and nine more or so coming on for a total of 14. Can you give me your reflections on Guardrail to date?

A: I actually have a long history with Guardrail as I was the product manager for Guardrail from 1998 to 2000. I was the PM when we fielded what we call System 2, the system that went to the 15th MI Battalion at Fort Hood, Texas.

Now I'm coming back and we're in the next major phase of modernizing the Guardrail. I think the challenge with all of our systems is that we work in an environment driven by Moore's Law. Every 18 months the technology doubles in capability and it's heavily focused on software, so as you look at a program like Guardrail you try to get to a common system, but I would argue that we'll never get to a completely common system. We don't want to, either, because the technology that we put in a system today will be obsolete 18 months from now. We really need to focus on is getting the architecture right and making sure it's an open-systems architecture enabling us to plug in capabilities as they change.

We're really trying to focus in our systems and in particular on Guardrail on getting the architecture right and making sure it's open. When we integrate the first plane, we must maintain consistency on architecture. By the time we get to number 14, the hardware we put in number 1 is obsolete and the software has probably changed a couple of times because it's being driven by the commercial marketplace and that's a good thing. Then we should go back and bring number 1 back up to standard.

This really does allow us to try to keep up with the technology cycle, but the key component is getting the open architecture right, so that's a major focus on the Guardrail program.

Q: Let's talk about acquisition cost for a minute. It's pretty commonly accepted that the acquisition cost is a modest portion of total ownership when you consider the total life cycle. When it comes to systems within your PEO, what role do you have in sustainment over the entire life cycle and where should you be more active in that area?

A: I think one of the major changes we have to make in Army acquisition—and it especially comes home in the C4ISR environment—is that we've traditionally focused on programs and what we have to focus on is capabilities and the enterprise or the system of systems, because when you get into the C4ISR we have interdependencies all over the place.

Every program now has some level of interdependency; everything's in the network so we're inherently dependent on being in the network sharing information, moving information around. That being the case, we can't focus on a single system. I believe one of the major areas this PEO has to work on is how we focus on that larger enterprise and how we sustain it.

As an example, with all the QRC work we've done, we've fielded a tremendous infrastructure of contractors because they could be trained and put out there rapidly utilizing technical expertise available in industry. Now we've got to look at how we sustain that in the long term. We're going to have to go back to depending more on soldiers who are tremendously capable, we just didn't have the time to train them. So how do we bring that together so they are actually trained and have the knowledge and skills to sustain and operate these systems without as much contractor support? I think we need to look at how we gain efficiencies in that. Where we have looked at getting things out there rapidly and sustaining a particular capability one at a time, now we need to come back and take the larger view if we have many similar capabilities. How do we sustain them across the board?

We had one of our program managers very proudly tell me about how he had set up a repair facility for a particular type of sensor that was on one of his systems. Because he'd had a problem getting a responsive enough turnaround, he'd gotten a contractor to put two forward repair sites in Afghanistan. It did a great job of fixing his program; my only concern with it was that we have that same sensor on multiple systems in this PEO and in other Department of Defense systems that were also forward deployed in Afghanistan. We didn't do anything about helping those other folks, but we fixed our one problem on this particular system. The young man was very proud of what he had done, he had fixed his repair cycle time, but we hadn't done anything for the other folks who have the exact same problem on the exact same configuration and similar configurations from on the same manufacturer, because we didn't have that broader view.

What I need to do is expand everybody's aperture to consider the right thing for the enterprise. I've told my folks that I believe they have two customers and two systems they work on. I believe we all work on the system we think we work on and we also work on the larger enterprise which that system's a part of. We need to think like that to take care of our two customers: the people who actually use our equipment on the battlefield and the taxpayer.

The American taxpayer is giving us money to provide for the common defense and they expect us to do the smart thing. If you just think about your particular system you may do the right thing for that system but it may be suboptimal when you look at the larger picture. If you don't take that larger view I don't think you're taking care of both of those customers. In the resource-constrained environment of the future, we'll have enough money to do everything we need to do if we do it smartly, but to do it smartly, we'll have to take that broader view.

Q: Can you share some background on Prophet Enhanced? Could you talk about the status of the program, its enhanced capabilities and I believe the initial fielding with the 504th BfSB?

A: The first thing we did with the Prophet program was separate it from being tied to a particular vehicle. The PM along with the prime contractor has developed the basic infrastructure and we can put it in transit cases or we can adapt it to particular vehicles. The challenge we have is that in the transition from the HMMWV to whatever vehicle comes next, either MRAPs or JLTVs, we can't get ourselves tied to just one particular vehicle. They've done a fantastic job of taking the components and making them modular so we can take them to whatever platform we need to take them to.

The second thing they did is put in an open-systems architecture allowing us to adapt that platform to the signal threat that we're dealing with, so we can add in capabilities to that open architecture that might come from other producers.

The third thing that we're working on is changing the capability set to match the environment that we're operating in today. We've put the first set of them out there and I've authorized the PM to buy enough to meet the requirements in the OEF theater of operations

Now we're looking at what comes next in conjunction with the Army G2 and the intelligence school. There's a desire to look at how we perform more fusion of intelligence at the brigade level and how we leverage the Prophet capability to do that. We're still defining exactly what those capabilities are.

Q: What's the status of the Enhanced Medium Altitude Reconnaissance and Surveillance System [EMARSS]?

A: The EMARSS is designed to be a multi-intelligence airborne platform. We had some challenges as we awarded the contract in the form of a protest. The protests, both the initial one and the secondary, were resolved by June 15 and the Army reinstated the EMARSS contract to Boeing on June 16.

Right now we're in an 18-month engineering and manufacturing development phase which will follow with a low-rate initial production phase of 12 to 13 months, and we expect to put our first platform out in FY14. This really takes what we've learned both from the Guardrail fleet, the Airborne Reconnaissance Low fleet and a number of quick reaction capability airborne reconnaissance assets that we've put in Iraq and Afghanistan over the last few years and puts it into a system that takes it into the future.

Q: Can you share details on the integrated electronic warfare system?

A: That's a program that we're just starting. We're working on the analysis of alternatives right now, preparing for materiel development decision and then moving it into a program of record. We're trying to take the numerous many capabilities that we've developed over the last few years in quick reaction capabilities in the electronic warfare world and build the next generation of those in a system of systems approach. We're not going to eat this thing all at once, instead we're going to build it as a family of systems with components built one at a time.

IEWS will start with the multifunctional electronic warfare system and the electronic warfare planning and management tool and then

move to the defensive electronic attack. All of it will leverage what we've learned in the various quick reaction capabilities put out into the field over the last few years.

Q: Aircraft survivability has always been a focus area of your PEO. Have any of your efforts been reprioritized based on recent events?

A: Aircraft survivability has a very high priority now and what we're doing with our aircraft survivability programs is two parallel thrusts. We're doing a number of quick reaction capabilities to continue to provide the best aircraft survivability equipment we can to the current fight while we're developing programs of record for the long term.

The Common Infrared Countermeasure [CIRCM] system is about to go to a Milestone A and that will give us the long-term solution as part of our work in developing the vision of the future. Our team at PM Aircraft Survivability Equipment is working with PEO Aviation to develop an integrated aircraft survivability equipment vision for the future. The plan is to structure our programs to incrementally add capability in the CIRCM program, as well as utilizing the quick reaction capabilities to inform us of the capabilities to go after for the future.

Q: Night vision devices, at least at the basic level, are more prevalent on the battlefield with our adversaries. In general terms, can you talk about some of the key technology drivers that you think will keep our soldiers at an advantage in night vision?

A: In terms of technology, we're looking at developing the third generation of forward-looking infrared capabilities.
The other area the team is really focused on is figuring out how to network those devices to improve their efficacy on the battlefield and how to share the information that comes from those devices. The goal is to move from situational understanding, "knowing that there's something at a particular point and place on the battlefield," to situational awareness, "not only knowing there is something at a particular point and place but understanding the context in which it's occurring so you can infer why it's there, what's going on and what causes that thing you're seeing in your night vision devices to be where it is."

You're seeing a fusion of multiple feeds to improve your picture of the battlefield, not just IR or night vision sensors but also signals intelligence, human intelligence, fusing on that position geospatially and temporally to build a better picture of the battlefield.

Q: You mentioned the cloud earlier. Could you give me an update on the DCGS-A cloud? Where is the effort now and how would you characterize progress?

A: We have the initial instantiation of the DCGS-A cloud in Afghanistan today and that's really given us the opportunity to learn more about the capabilities of the cloud in a battlefield environment.

Conceptually with the cloud, the data is someplace on the cloud and you can get to it from anywhere by just getting onto the network and pulling the data in. The challenge that we have on the battlefield is the assumption that you have enough bandwidth and you have the quality of service that you can always get to the cloud. On the battlefield you can't guarantee that all the time at all locations, people will have both that quality of service and that quantity of bandwidth to do that, so what we have to do is architect the cloud so that we position the data not only for the customer that has a terrific quality of service and lots of bandwidth but also for the disconnected, intermittent and limited bandwidth user.

Certainly the environment in Afghanistan gives us a good opportunity to kick the tires and figure out how we make the cloud most useful.

The initial instantiation is out there, it's being used and we're learning a tremendous amount about it, and it's a great example of how a quick reaction capability is going to inform our long-term strategy and our programs of record. It's not without some kinks, but we're making great progress and we think that's going to lead us to the architecture of the future.

Q: During the BRAC movement there were people who didn't make the move. What have you done to make sure you have the right people with the right skills that are working on the team right now?

A: The good news was that we had six years to get ready. In December 2005 it was announced and it was finalized on September 15, so we had some time to plan and we could do it incrementally over time.

The PEO has had elements here at Aberdeen since 2008 and was able to incrementally build up our capability here. There was a surprisingly large number of folks who actually moved down here. We had a much higher percentage of government civilians move than would have been historically indicated. I think in the end it has turned out much better and has been much less painful than we thought it would be. I was impressed with the fact that we were not only able to keep doing the mission we used to do but also sustain a tremendous pace on the quick reaction capabilities as we made the move. It took an awful lot of planning and we're still rebuilding some of our areas of expertise, but we're able to supplement the team that we have by getting contract support. In many cases we're reaching back to the people that used to be government civilians working at Fort Monmouth, those people who were truly the oracles of their area, who understood the history and how we got there, and bring them on as support contractors for their expertise and only bring them down here as we need them.

It's going to take a few years to build up the level of expertise that many of those folks had down here at Aberdeen Proving Ground but we still have a tremendous resource that we're reaching back into.

Q: Any closing thoughts on the men, women and mission of the PEO?

A: I'm extremely proud to work with them. If you look at the list of accomplishments we have achieved over the last few years in putting capabilities out there on the battlefield, from counter-IED systems to force protection systems to ISR systems, it's really amazing how much capability they've provided to soldiers on the battlefield. It's always a pleasure to have a mission that you can get excited about, and not only am I excited about it but I'm excited because the team's excited about it. In a lot of places you hear about the 9-to-5 government worker who's only doing the minimum before going home. I don't know where those folks are but they sure aren't in this PEO. I routinely work late hours, and I expect that because I have a position I'm honored to have. What amazes me is that I'm never the last one to leave. There's always somebody else working and when you ask them, 'Why are you still here?' they answer, 'I've got to get something done because we've got to get this out to get something to a soldier, sailor, airman or Marine.' When you have people working like that with that kind of an attitude you just have to be excited about being there. I'm thrilled to say that I get to work with folks like that. ✯

Secure ISR Comms

GAINING THE INFORMATION IS DIFFICULT SO PROTECTING IT DURING THE SHARING PROCESS IS VITAL.

BY ADAM BADDELEY
TISR CORRESPONDENT

Operations are already dependent on the ability of sensor payloads to locate targets; whether that is an individual crawling through a narrow defile in the Hindu Kush or detecting the movement of Iranian or North Korean armoured forces redeploying on a sensitive border. While ensuring that high capacity links are in place is a given, increasingly sophisticated opponents are placing greater demands of the security of those links either from being hacked, spoofed or jammed whether that be for traditional airborne platforms based sensors or increasingly, sensors in the hand of dismounted units which require the secure high capacity communications to match the output of the sensors they carry.

Janet Kumpu

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FORTRESS

Fortress Technologies, acquired by General Dynamics C4 Systems in July, provides secure communications platforms for tactical military, critical infrastructure and the emergency response market, supporting a range of mission critical applications including ISR and Situational Awareness applications. This level of operations has seen users demand the ability to bring together disparate feeds from a diverse range of powerful computing devices as well as low level ISR sensors at locations such as forward operating bases (FOB) and similar austere environments. Janet Kumpu, business unit director for General Dynamics C4 Systems Fortress Technologies explained the company's role enabling tactical last mile solutions for the collection of surveillance data, "The network enables the ISR sensors and devices that have matured over the past several years to have true, real time situational awareness whether they are with soldiers, on vehicles or any intelligent device at the tactical edge of the network."

The core technology used is wireless, adapted by Fortress Technologies for rugged outdoor and secure applications, supporting standard unlicensed bands such as 2.4GHz and 5GHz but also 4.9GHz for public safety roles and 4.4GHz licensed C-Band that is designated for U.S. and NATO military use. Graham Celine, director of marketing at the company noted "huge interest" in 4.4GHz in recent years but added that, the majority of their products were standard 802.11 Wi-Fi with optimization of the RF interface for outdoor use and longer ranges. Fortress will continue development efforts to support other radios and frequency bands in the future.

Rather than wires going back to a central cabinet in an office, in an outdoor tactical environment, wireless mesh networks are installed on a mast in a FOB, vehicle or with an individual soldier walking with a mesh point manpack type capability. The man-portable system is ruggedised and able to run on batteries and power systems found on the tactical edge.

The militarization of COTS solutions requires government-grade security. Celine explained that Fortress provides this capability through encryption at the client level, enabling the use of very high performing applications including high definition streaming video over very long distances in a completely secure environment. He commented, "Our products are designed to be able to support tactical secret communications in theater and thus extend the tactical edge of the network with a high performing mesh architecture to address sensitive applications." The systems are validated to FIPS 140-2 and the company's systems support National Security Agency guidelines for Suite B IPSEC based encryption which is interoperable with Type 1, HAIPE based Suite B found in manpack, vehicular and hand held radios, enabling seamless continuity between the two down to the tactical edge.

BLOS ISR Access

High capacity SATCOM from theater, back to CONUS allows for the provision of key ISR data and imagery to be exchanged over great distances, allowing TOCs for example to access available national security databases and ISR libraries which clearly necessitates the need for security. Segovia offers a secure managed service to customers in the ISR world that includes all components of the link in an end to end chain.

Historically, these types of solution have been delivered in a piecemeal fashion; the space segment being obtained from one contract vehicle, the terminal segment from another and the terrestrial segment from a further third party. This approach creates a challenge for the government user, both from a cost and operational perspective.

Andy Beegan, Segovia's chief technology officer said, "The customer has latched onto the managed services concept because of the associated cost and operational efficiencies. When you go into the ISR world, those advantages and those benefits become amplified because of the very high data rates that the customer requires. The problem with procuring an end to end solution in a piecemeal fashion is that there is no incentive on the industry to make efficient use of the spectrum. When the customer buys it as a service and they need a real-time video feed off an ISR platform, Segovia takes on the responsibility to make the most efficient use of all resources, reducing the spectrum required and ultimately those cost savings get transferred to the government."

Segovia and Inmarsat are planning the launch of a Ka-band platform, designed to provide a service in a more secure fashion, addressing the sensitivity requirements that the government demands both from a satellite space and ground network architecture perspective. Beegan said, "We are building the system from the ground up and so are able to layer in the security requirements into the architecture from the beginning. For existing commercial satellite teleports, most of the resources predate any of the current security requirements that we are seeing in contract vehicles today. The first Global Xpress Ka-band satellite is scheduled for launch in 2013, with full global coverage scheduled in 2014.

Beegan believes that most significant value added that Segovia brings to L-band ISR platforms is the security piece. To use the BGAN service today the user typically procures a solution that delivers data out to the commercial Internet and in most cases, it is up to the end user to figure out how they get that data back to headquarters locations in Europe or the US. To address this issue, Segovia has implemented a BGAN secure terrestrial access architecture, which utilizes a private entry point directly connecting the Inmarsat core BGAN network to Segovia's private terrestrial MPLS backbone with accredited extensions to SIPRnet and NIPRnet. Beegan said, "From the customer's perspective they have an increased security posture because they know that they have an accredited solution, and from a performance perspective they are able to guarantee quality of service because that data never touches the commercial Internet. We are able to layer in the quality of service profiles on our network that are required to ensure prompt delivery of that data."

An Air Force and tactical air control party practice using a PRC-117F (primary man-portable radio) during a TACP exercise. The TACP members are specialists who are assigned to combat units. They advise ground forces on aircraft employment and capabilities, coordinate and control aerospace operation and participate in battle planning. (U.S. Air Force photo/Airman 1st Class Amber E. N. Jacobs)

SVM-3

The core of SEMCO's SVM-3 capability is the provision of full frame video from small teams out in the field, supporting intelligence gathering, at the lower tactical echelons, back to the tactical operations center (TOC). Critically, it does these using only the existing, narrowband tactical radios as the bearer network.

The solid state SVM-3 is roughly the same size as the PRC-117F manpack radio it typically operates with and uses the same batteries and battery box. It is also ruggedised to the same standard and so can operate in exactly the same environment expected of the radio. Smaller, tactical configurations are in development that can be unattended or carried by a dismounted soldier/marine.

The SVM-3 was tested with the Marine Corps at Camp Pendleton where it was employed in line of sight (LOS) and non line of sight (NLOS) satcom, radio to radio modes. "[After] a little bit more time with the Marines over the next couple of weeks we intend to confirm that the things we have modified since the last operational tests did not have an effect on the overall performance of the system. Once we are satisfied with the test results, we will go into production," said Michael Samuels, director, marketing and sales at SEMCO.

"We believe the SVM-3 is most appropriate to missions at the company and platoon level," Samuels continued. "Users can go out on a mission, with a handheld camcorder, do some level of ISR collection, can walk back to their HMMWV, plug the recording in and send it back to HQ several hundred miles away. Our current focus is to provide conventional forces this capability."

The heart of the SVM-3 is a software encoder engine from partner Essential Viewing which enables five frames per second (fps) (or greater) imagery to be passed over austere, narrow band radio data networks. Samuels explained, "Traditional compressor encoders do not have the capability to compress and transmit real time video over tactical data rates of only 9.6 Kbps or 16Kbps. Depending on the conditions, commercial encoders can take from 5-10 minutes to send just one frame." SEMCO has integrated the encoder into a ruggedized enclosure and with tactical

employment features. As well as LOS, SVM-3 supports UHF satcom with standard 5kHz or 25 kHz bandwidths. BGAN or SWAN satcom at rates of 25 fps via an RJ-45 connection, the latter bearer used by Corps' reconnaissance groups, or a Telit sourced, small form factor GSM modem to a secure server and from there onto any commercial type device such as an iPad, iPhone or Android device.

The SVM-3 has no internal encryption. Instead it using the encryption system from the radio to transmit the video; typically, this is the Type 1 PRC-117F. Samuels explained, "The SVM-3 automatically uses the radio's own encryption to synchronize the signal so we cannot send the video unencrypted. At the TOC the signal can be decrypted via software, eliminating the need for second hardware box. Once it gets to the TOC it can be Trans-Coded to H.264/MPEGx for later Viewing and Storage. There is also a mode on the viewing screen called IP link which allows user to encrypt the received video again, put in on a server and send it out again. If you have something that is very important from that small ISR team out in the field, you can securely view it anywhere in the world on a number of devices."

Between the transmitter and the receiver are a host of systems that tie together to ensure comms and security. [Photo courtesy of Fortress Technologies]

G-WASP

The Ground-Wide Area Surveillance Platform (G-WASP) has been put together by a team of four companies; ITT, Thales, Meridian and Ultra Electronics and is designed for roles such as border security and force protection. A trailer mounted ISR solution, G-WASP combines a mast mounted, high resolution optical head and E-scan frequency modulate wave Doppler ground surveillance radar, with the G-WASP itself being sensor agnostic. The key to G-WASP is its Command and Control applications, addressing integration management and the administration of multiple sensors which are then linked via IP networks to transport the sensors outputs, back to the command centre for full processing.

G-WASP as an integrated, turnkey system is a 'new' product. However, all the components, minus the integration, that make up G-WASP have been already been fielded independently, with each of its components being Technology Readiness Level 9 and in service in Afghanistan with UK forces and U.S. Special Forces.

In the G-WASP team, ITT is responsible for the secure communications component of the solution which has to be flexible in order to meet the requirements for both LOS and BLOS requirements. Ross T. Osborne, responsible for communications and force protection at ITT Electronic Systems explained the company's secure communications segment in G-WASP; "G-WASP uses a combination of systems of systems communications, including ITT's Spearnet radio and High Capacity Data Radio terrestrially and for BLOS its GNOMAD Ku satcom on the move system which is now deployed with the 4th Infantry Division in Iraq and potentially our MIMMC, Microsat, manpack, VSAT system. They link G-WASP back to an ISR command centre or force protection post. To secure those links, you can use any encryption means AES 256 on the router or HAIPE (high assurance internet protocol encryptor). If it's IP you can integrate it into the system. G-WASP is also very adaptable supporting as many as 56 different sensor nodes such as UAVs, radar and UGS in a single system.

Rockwell Collins

The needs for secure, high capacity communications is being driven by the exponential increase in the number of payloads with applications being developed to fully harness the raw data they produce. For its part, Rockwell Collins has created 3D Digital world, currently at TRL is 6 or 7, to exploit multiple sensor feeds via sensor fusion and enable further manipulation for roles such as mission planning. Its requirements underline the need that ISR sensors feeds have for links that are both generous in bandwidth and also secure to prevent spoofing and other interference so that the user has confidence in the product being seen. Dave Vos, senior director UAS and control technologies, outlined how 3D Digital World operates and using image amended inertial navigation, building a digital world that allows users to plan and execute missions such as GPS denied navigation. He added, "There is lots of functional capability that comes once you have this sensor fusion world created. It is quite exciting. It is very, very powerful tool and it is the next step that is needed right now."

Vos explained the process through which its 'world' is generated, "As soon as payloads go up, the next challenge is all the video streaming from all those platforms. They are not in the same place and have different views of the world in real time. How do you capture all these different sensors and performance grades and put them into a digital rendering of the world. Sensor fusion is not just stitching together images, it is doing optimal minimum variant estimation of all the key features within the field of view to create a high accuracy view of the world. Once you have built that world there are many things you can do with this; zoom into specific areas, get reliable co-ordinates of landmarks that you care about, move around that the world and see it from different viewpoints. 3D Digital World gives you in effect a virtual reality with high accuracy within that virtual reality to be able to move around in and see what you want to see and plan maneuvering strategies." ✶

For more information, contact *KMI* Media Group Editor-in-Chief Jeff McKaughan at jeffm@kmimediagroup.com or search our online archives for related stories at www.TISR-kmi.com.

Commanding and Controlling Full-spectrum Operations

An exclusive interview with Colonel James D. Edwards, commander of the U.S. Army's 525th Battlefield Surveillance Brigade

Tactical ISR Technology recently had the opportunity to talk with Colonel James D. Edwards, commander of the U.S. Army's 525th Battlefield Surveillance Brigade [BfSB] about the role, mission and people of the Army's battlefield eyes and ears.

Q: Is the 525th Battlefield Surveillance Brigade organized similarly to the other BfSBs? Does your headquarters location make you more rapidly deployable than other BfSBs?

A: We're not necessarily configured as a rapidly deployable BfSB; in fact my organization is authorized personnel and equipment the same as the other battlefield surveillance brigades in the active component of our Army. There may be a perception because we're at Fort Bragg and are affiliated within the 18th Airborne Corps that we are rapidly deployable, and we would certainly deploy rapidly if directed to do so, but I'm not unique in terms of my organization from the other active battlefield surveillance brigades.

The brigade's authorization is for 1,323 personnel. Today, we have over 1,700 in the brigade. We are over strength, and that's a function of having just been in combat. The base organization for the brigade is a headquarters company, which provides command and control of the brigade. We have two military intelligence battalions, a cavalry squadron and separate companies for signal and support.

Q: Your brigade combines a multitude of the INTs together. Some of the companies have specific concentrations in SIGINT or HUMINT, for example. How are each of those units organized to best utilize their unique skills sets?

A: Our two intelligence battalions are organized on paper exactly the same. Together, that provides us eight military intelligence

companies. There are two headquarters companies. There are two alpha companies which contain SIGINT and multifunctional capabilities—and then the two bravo companies contain both HUMINT and counter-intelligence, and then the two charlie companies are HUMINT pure.

That's how we're organized on paper, and that's how we train at home station. But when we go to fight, we task-organize them based on the mission requirements. We have most recently even used the headquarters companies as operational intelligence gathering formations, so in Afghanistan recently, it was not unusual for a company to have HUMINT, SIGINT and counter-intelligence all in that company and providing support over a large area that might be numbered in several provinces, as often occurred in Regional Command-East.

Q: What does a BfSB bring to a counter-IED fight?

A: That's a really good question, because the counter-IED fight is so multifaceted. The fight is everything from trying to get ahead of the boom to defeating the device. I think the one thing we really stand out at doing is a sophisticated capability to identify and track IED networks and then interdict the people, both leaders and facilitators, and supplies associated with those IED networks. In fact, the brigade was heavily involved in doing that in Afghanistan most recently.

Q: Can you describe a notional scenario from Afghanistan and describe how would support or execute an operation in the field? How do your capabilities complement the assets from other units?

A: Some of the intelligence battalions' assets were farmed out to other task forces to provide intell, but that's not what the brigade headquarters and the cavalry squadron do. We were used very much like a small brigade combat team in Afghanistan in an economy of force role to control an area of operations and achieve effects within that area. And so a typical operation for me in the field at the brigade level is different than say, a military intelligence team supporting a maneuver force.

The brigade is capable of commanding and controlling full-spectrum operations in a complex COIN environment. What that really means is we are applying all the resources we have to achieve effects across multiple lines of effort. One of those lines of effort is the security line, and it might involve attempting to interdict IED components or networks. That same security line might require us to conduct operations to protect the people, and it certainly also involves helping develop the Afghan nation security forces, and whom we are partnered with and live and fight together with.

Beyond security, the brigade was heavily involved in other things like governance and development, trying to promote the socioeconomic growth of the people in our area, trying to improve services like health and basic infrastructure, and then we were also heavily involved, in trying to improve the Afghan customs system, because my brigade controlled about 140 miles of the Pakistani border. We had one of the two major border crossing points between Afghanistan and Pakistan in our area. We were heavily involved in mentoring the Afghans in the development of their customs processes and also trying to modernize, in a sustainable way, the infrastructure there to support the growth of the economy. When I say in a sustainable way, I'm not talking about build a U.S. port of entry; what I mean is build something that increases the capability and capacity of the Afghans to do business but is sustainable by them in the long term.

I think what would probably interest you most is how we would use our ISR capabilities to perhaps detect an enemy and do something about that. A typical scenario in Afghanistan would involve my brigade attempting to interdict IED networks that are based in Pakistan and moving supplies from Pakistan across the border and up into a population center such as Kandahar City. We would develop our knowledge of that network over time using multi-disciplined intelligence collection and analysis, and obviously intelligence preparation of the battlefield. As we refined that analysis, we would go through a targeting process in which we identified the key people, key places and key things within that network we'd like to interdict, and then we would focus both our organic intelligence collection assets as well as request support from theater and national assets to help us actually detect indications of that network, and then go out and generally either kill or capture the people associated with it. So something that would be very typical is, I'm trying to grab bad guy X, or prevent him from moving 10,000 pounds of ammonium nitrate from Pakistan into a waypoint—where it might be refined into IEDs—and we use a variety of sensors to detect that movement. We cross-cue using all of our technical capabilities and if we have the capability to maneuver a ground force onto him without spooking him, we will do so, and if not and if we could gain positive ID, we would engage him indirectly with fires from a variety of joint aerial platforms.

Q: You actually owned battlespace in Kandahar Province. Were you still providing capabilities to others or focused on your area of operation?

A: Around 80 percent of my intelligence capabilities were farmed out to others, and I was employing about 20 percent of them myself. Both missions were important, being a battlespace owner and providing forces to other task forces, but what dominated my time and energy was the battlespace owner mission, because that required me to synchronize all types of resources, including ISR, maneuver, engineers for force protection, mobility, and countermobility, communications, and a host of other things such as civil affairs and the capabilities our Afghan partners brought to bear.

Q: There has been conversation about the crowding of bandwidth—a lot of demand for a limited amount of bandwidth. How do those concerns impact your collection and dissemination of data?

A: Limited bandwidth is still a problem. I guess it's a glass half-full, glass half-empty sort of discussion however, because the amount of available bandwidth has expanded dramatically in the past 25 years that I've been doing this stuff and the amount we have today really would have been unprecedented for any organization 10 years ago. So I am confident that we've made great strides there, but the fact of the matter is, we still fill it up.

Limited bandwidth did have some effects on our brigade early on; we deployed in July 2010. Of course last summer was the summer of the U.S. up lift in Afghanistan when the U.S. significantly increased the number of troops there. You can't increase those

numbers without also increasing all the services and infrastructure. Some of the communications and ISR architectures did not grow as quickly as the footprint of things that needed to plug into them. We did experience issues with our SIGINT systems plugging in, also our Distributed Common Ground Station-Army (DCGS-A) plugging in.

We also experienced some issues with communications early on—we would try to collaborate in meetings via Adobe Connect and the communications architecture was just not sufficiently robust to enable that sort of collaboration. So we quickly defaulted, in this case, to conference calls over secure VoIP phones, where you get a bunch of people around a speaker and talk and you have to email slides around. So yes, limited bandwidth did have an impact on us, but you've always got to work with what you've got.

Q: What are your most important unmanned assets? Are the systems as durable for the operational environment as you would like them to be?

A: Unmanned assets are a bit of a sore subject for us, as the Army has intended to provide battlefield surveillance brigades with unmanned aerial systems for a while, but has yet to do so. The only unmanned asset I have in my brigade today is the Raven, a hand-launched UAV. It's very small, and has a very limited flight time, distance, all that. We were quite fortunate while deployed to receive into our task force a Navy, government-owned, contractor-operated system called the TigerShark, which we used very well. In terms of capability, it's somewhere between an Army Shadow and a Predator, I would say, in terms of its range and mission duration. We were pleased as punch to get it.

We were also users from time to time of other unmanned systems; from my perspective, we could use just about as many as we could get. I think the principal impacts on the operational environment for us, at least in the area I was in, really related to high winds and our inability to launch and recover during heavy winds. That was fairly frequent.

I don't know if you consider aerostats or blimps unmanned assets, they are tethered to the ground with an operator, but in that aspect we were fortunate to have one of those as well. Again, aside from the weather impacts—high winds, lightning—a pretty durable system that I found utility in.

Q: Being the front-end user of a good part of the electro-optic equipment built for the ISR community, what has been your interface? How do you let them—and the Army—know what works? What's a good design and what's not?

A: I didn't have any actual EO collection equipment, because I didn't have the aerial assets to hang it on. I did have some very limited stuff with our ground surveillance guys, so I was mostly a consumer of things other people collected, as you mentioned. The general way I consumed that was through my imagery workstation, IWS, both government-collected stuff and commercial imagery. I would say commercial imagery has real value in a coalition environment like Afghanistan because its unclassified and therefore easily distributable to Afghans and other coalition nations that may not have the ability to receive U.S. national imagery from some of our platforms. I was also fortunate to have a National Geospatial-Intelligence Agency support team that brought their own communications and was able to pull a variety of products. With regard to moving pictures, if you will, full motion video, we primarily tapped into that via either ROVERs or through portal-based dissemination systems over secure communications networks.

Q: Is there a message for them—other than to deliver more capability, that weighs less, lasts longer and is more durable?

A: I think that's a question that resonates certainly with those that have to design aircraft and UAVs, but it also resonates to an infantryman that has to carry something out and set it up. When we're talking aerial assets, multi-INT is best, in my opinion, because given the sort of rules of engagement we operate under today and the requirements to gain positive ID before engaging something, it is highly unlikely you will do so purely from a single INT. It is much more difficult to gain PID and you assume a lot greater risk making that judgment without several forms of INT. So you can either stack platforms, or you can build a platform that does several things. I think multi-INT is best.

Secondly, you already mentioned EO, but obviously IR for night, or FLIR, but another capability I think would be useful to have, and some of our platforms do have it, is coherent change detection capability, because of the utility in the counter-IED fight. I think a plug-and-play sort of sensor array for UAS systems would be a good thing. For instance, if your shadow baseline consisted of four, five, six aircraft, if you had the capability to configure them differently, that would be a good thing.

I would also tell you, as a tactical ISR magazine, one of the assets that we found great utility in was unmanned ground sensors, or UGS. I think we understood how to use them and we took the time to invest in them. We found them very useful. There are, like any asset, advantages and disadvantages. One of the disadvantages of UGS is you have to take the time to plan a mission to go out and put it in, you have to get it inserted unobserved, and you have a limited battery life. But you can work through those things, and in the end UGS greatly increased our ability to observe broad swaths of an international border, detect illegal border crossing and infiltration, and ultimately interdict some of that.

Q: Anything else you care to share about the men, women, and mission of the 525th?

A: I am enormously proud of my troops. They did great things under really rough conditions, sometimes without a lot of resources, and they had a huge impact on the fight in Afghanistan. I am equally proud of our families and our communities back home for the support they rendered to us while we were deployed; that was essential.

I do believe that there's still a huge misunderstanding out there about what battlefield surveillance brigades are—are they military intelligence organizations, are they ISR organizations, are they battlespace owning reconnaissance and surveillance organizations? We do a little bit of all of that, and the fact of the matter is, it doesn't have to be one or the other. You can do several things if you get the right people together, and I've just been absolutely blessed to have great people in this organization. ★

For more information, contact KMI Media Group Editor-in-Chief Jeff McKaughan at jeffm@kmimediagroup.com or search our online archives for related stories at www.TISR-kmi.com.

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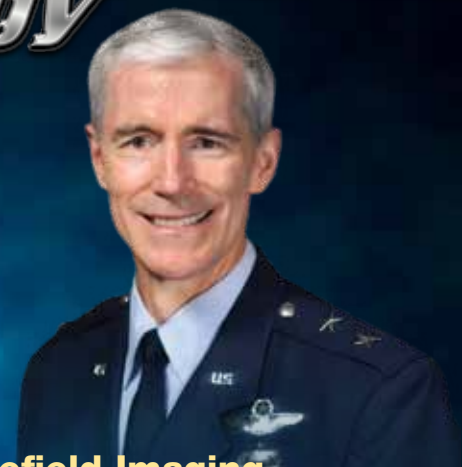
Maj. Gen. Robert P. "Bob" Otto

Commander
Air Force Intelligence, Surveillance and Reconnaissance Agency



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W. Garth Smith
MetaVR, Inc.
Co-Founder and CEO

W. Garth Smith is co-founder and CEO of MetaVR Inc. Smith was formerly a member of the advanced distributed simulation technical staff at TASC (now Northrop-Grumman) prior to starting MetaVR. Before working at TASC, he was one of a team of simulation engineers responsible for the Bolt, Beranek and Newman German version of SIMNET (AGPT). (He was the least talented of the engineers.) SIMNET, a DARPA program, was the original simulation-networking precursor to modern multiplayer games.

Q: What types of ISR related products and services are you offering to military and other government customers?

A: MetaVR's primary product offering to the ISR community is our virtual reality scene generator [VRSG], which is a real-time 3-D render engine that provides simulated video feeds for various intelligence gathering platforms. We provide geographic specific detailed terrain and entity models that are used by our customers to generate both simulated video and geo-referenced still-frame imagery. A key feature of our software is its ability to stimulate real ISR assets with our software's real-time MPEG-2 or H.264 video generation with embedded KLV metadata using either EG 601 or MISB 104.5 standards. The result is that our software can generate video feeds that do not differ in format and contents from the real data feeds from autonomously manned systems.

Q: What unique benefits does your company provide its customers in comparison with other companies in your field?

A: MetaVR is a products-only software company, so we don't charge to add features or 3-D entity models to our software in order to support customer requirements. We treat our customers, or potential customers, as subject-matter experts who drive our product feature requirements such that our products are always converging toward what the market needs. We are not bogged down by endless requirements documents, nor do we ever ask customers for a charge number to add a feature to the software. It is our common practice for our development staff to add multiple features during an evaluation that may take months in order to secure license sales.

Q: What are some of the most significant programs your company is currently working on with the military?

A: Our customers have integrated our products into a number of programs that culminated in their use at the U.S. Joint Forces Command's Empire Challenge 2011. In addition to our traditional UAV video and still-frame imagery simulations, our customers have developed new ground control station embedded systems that use our software to simulate synthetic aperture radar imagery. As an example of the visual and behavioral fidelity that is possible with our software, in preparation for the Empire Challenge exercise, one of our customers requested a series of 3-D models of donkeys with and without packs. The customer wanted to simulate a donkey carrying an IED in a pack hidden amongst a herd of donkeys. The donkey was delivered with various configurations to carry a cart as well as a thermal model for the heat signature of the animal itself to train sensor payload operators.

Overall, MetaVR is the largest supplier of unmanned aerial system [UAS] commercial 3-D visualization software licenses for the U.S. military with over 1,500 active VRSG licenses in the field. Much of this installed base is through the Multiple Unified Simulation Environment/Air Force Synthetic Environment for Reconnaissance and Surveillance (MUSE/AFSERS) simulation system. VRSG drives the visuals for MUSE/AFSERS, which is the primary UAS training and simulation system used in the Department of Defense for command- and staff-level joint services training.

MetaVR visual systems are used in multiple UAS programs, including the embedded Shadow Crew Trainer One System Ground Control Station which used for training Shadow TUAS, Hunter, Aerosonde and Grey Eagle unmanned aerial systems. Our software is used by Northrop Grumman on the Global Hawk for simulating their large format, still frame, high-resolution imagery collection. Insitu uses MetaVR VRSG licenses for simulation training of one of its unmanned aerial systems. Our most recent customers who need to simulate ISR functions for their airborne platforms include Chandler May with their Fury system and Aurora Flight Sciences with their Orion.

Q: Are you currently developing new products and services relevant to military and government customers that you hope to bring to the ISR market in the future?

A: In addition to the ongoing feature addition to our render engine based upon customer input, our most significant product development has been the teaming arrangement and integration with Battlespace Simulations' Modern Air Combat Environment [MACE] which provides a way for our customers to generate very realistic scenarios for simulating an ISR mission and, in particular, for training UAS operators. The MACE software can act as a ground control station, flight model, and semi automated forces generator. There had been a gap in the market of commercial high-quality, mission-creation applications and the MACE product has allowed us to compete in that market. We had previously been unable to provide a mission editor with ground control station capability and the MACE product has added significant simulation fidelity capability to our customer base. ✶

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