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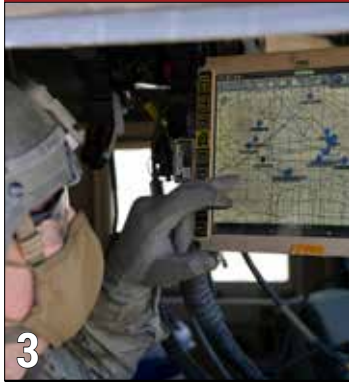
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## STREAMLINING MULTI-NODE COMMAND AND CONTROL

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By Justin Eimers  
U.S. Army PEO C3T

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**COMMANDER'S CORNER**  
**Vice Adm. Tim Syzmanski**  
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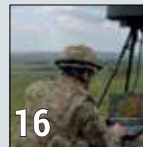
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**Cover:** U.S. Special Forces soldiers search a compound while on a mission as part of Fused Response 2014. The exercise, sponsored by U.S. Southern Command and executed by Special Operations Command South, aims to improve interoperability, tactics, and training techniques between U.S. SOF and Belize Defence Forces. (U.S. Navy photo by Mass Communication Specialist First Class Elisandro T. Diaz/Released)



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# ARMOR & MOBILITY

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## INSIGHTS

The May 2021 issue of *Armor & Mobility* highlights the latest in U.S. Army tactical communications and Future Vertical Lift (FVL), with a special segment on America's Special Operations Forces or SOF. With challenges relating to an ongoing pandemic, efforts to better streamline processes from depot-level legacy systems recapitalization to command-level programs acquisition and procurement are driving mission optempo across the DoD.

As military mobile comms equipment has steadily improved, network integration has followed suit bridging gaps in comms continuity thought unbridgeable not many years ago. Enabling uninterrupted signal connectivity between mounted and dismounted brigade combat team personnel during multi-terrain combat missions is today a goal of the past with the fielding of the latest in Mounted Mission Command (MMC) software. With integrated MMC applications and enhanced service infrastructure, Soldiers are now able to better gauge opposing force maneuver with greater accuracy in position location, situational awareness, and common operating picture. Joint Battle Command- Platform (JBC-P) hardware is no longer limited by network immaturity with the integration of MMC-supported, android-based Command Post Computing Environment (CPCE) capability enabling real-time data flow to and from front line field commander and mission command.

At the center of any mounted combat team is the machinery that makes mission execution possible. In an exclusive interview with Col. Greg Gibbons, Commander, Letterkenny Army Depot in Chambersburg, PA, we get an inside look at some key program priorities that are seeing trusted legacy platforms refitted today and air and missile defense and precision fires capabilities of tomorrow. From ground to air, the future of Army vertical take-off and landing (VTOL) capability rests with Future Vertical Lift (FVL) evolution. As manned FVL application remains a priority, the critical role that unmanned combat air support will play falls to Future Tactical Unmanned Aerial Systems (FTUAS) development. Maj. Ryan Greenawalt, FTUAS Lead Integrator, FVL, spoke with A&M about efforts to replace proven RQ-7 Shadow capability with state-of-the-art stealth capable of surveilling adversarial maneuver amid future multi-domain operations.

This annual May issue spotlights the great work being done clandestinely by the men and women representing U.S. Special Operations Forces or SOF. With the transregional nature of today's global threats to U.S. interests, strengthening international relationships is at the fore of Vice Adm. Tim Syzmanski's focus as Deputy Commander, U.S. Special Operations Command (USSOCOM). The best way to support that focus is to sustain the most powerful SOF capabilities the world has ever known, from targeted acquisition and procurement, to program executive offices charged with ensuring operators have optimal gear in areas such as digital software computing, fixed and rotary wing, and mounted and dismounted command and control.

Be sure not to miss this issue's Industry Partner and Spotlight on Industry perspectives dealing with multi-functional armored protection for guided missile and other threats as well as the latest in radiation detection equipment for use in myriad mobile package configurations.

We welcome your comments and suggestions. Thank you for the continued readership!

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# STREAMLINING MULTI-NODE COMMAND AND CONTROL

Soldiers from the 11th Armored Cavalry Regiment (11th ACR) at the National Training Center in Fort Irwin, California are employing the next-generation of mission command software as part of their Developmental Operation's (DevOps) Partnership with Program Manager Mission Command (PM MC), Program Executive Office – Command, Control, Communications-Tactical (PEO C3T).

By Justin Eimers, Public Communications Specialist, U.S. Army PEO C3T



Cpt. Jonathan DiBianca, E Troop Commander, 2nd Squadron, 11th Armored Cavalry Regiment, uses Mounted Mission Command-Software (MMC-S) during the Blackhorse Stakes field training in March at the National Training Center, Fort Irwin, California. DiBianca said the capability's intuitive user interface and upgraded functionality are enabling the unit to seamlessly conduct training rotation activity. (U.S. Army photo by Justin Eimers)

This next-generation software, Mounted Mission Command-Software (MMC-S), is the Army's initiative to provide simple and intuitive Mission Command on-the-Move (MCotM) and situational awareness down to the platoon level by delivering the integrated MMC-Software to end-users and providing an extensible Software Development Kit (SDK) for third-party Warfighting Function (WfF) convergence onto the secure, hardened run-time Mounted Computing Environment (MCE). MMC-S is targeted to replace the Joint Battle Command-Platform (JBC-P) software beginning in late 2023.

"11th ACR employs MMC-S throughout their formation during every training rotation at NTC, including Regimental Blackhorse Stakes exercises, and provides critical feedback to PM Mission Command that directly influences capability development efforts and design refinements to ensure we deliver the best capabilities to our Warfighters", said Maj. Chad Frizzell, Assistant Product Manager for MMC-S, assigned to PM MC.

According to Maj. Sylvester Azap, Regimental S-6 for the 11th ACR, the unit has integrated MMC-S applications and enhanced service infrastructure to enable Opposing Force (OPFOR) situational maneuver, such as position location, situational awareness, and Common Operating Picture, chat, instant messages, overlays, and more.

"As a result of these simplified services, our on-the-move platforms and command posts have a fully compatible, simplified, and seamless

framework with less complexity that facilitates our PACE (primary, alternate, contingency, and emergency) communications plan for our mounted and dismounted Soldiers' speed and reach," said Azap.

## INTEGRATING CAPABILITY SETS

At the core of MCE, MMC-S leverages the proven, Army investment – the JBC-P hardware and network – and will be deployed as a simple software-only upgrade to replace JBC-P software. The MMC-Software will exploit the transport and hardware capability-maturation, continuously enhancing capabilities, security, and network resiliency that outpaces adversarial countermeasures and threats as the service continues modernizing tactical network technologies through iterative Capability Sets (CS).

The DevOps partnership between PM MC and the 11th ACR is critical as MMC-S executes activities leading to a Limited Deployment Decision on the first iteration of Software in 4QFY22. MMC-S will go through a Limited User Test and CS23 Operational Demonstration in 3QFY22 in order to equip the Army's CS23 target unit, 2nd Cavalry Regiment, beginning in 1QFY23. MMC-S will then shift development focus to integrated platforms – Strykers, Abrams and others – for the next iteration of software targeted for CS25 fielding.

To achieve these goals, MMC-S executes an agile software development process that allows for the deployment of new capabilities to the Operational Force approximately every 12 months. Throughout the development of each software iteration, DevOps partnerships enable tailor-made refinements based on Soldier feedback. During the Blackhorse Stakes Regimental Training, 11th ACR Soldiers leveraged MMC-S while conducting troop leading procedures, maneuver lanes, drivers' training, logistical resupply, communication at echelon, combat-lifesaver training, and medical evacuation training. Feedback from these efforts results in the delivery of fine-tuned capabilities Soldiers require for operational use.

"We're using MMC-S from the Platoon Sergeant level up to Squadron Commanders to populate the COP, share our left and right limits, and increase understanding of the battlespace," said Captain Jonathan DiBianca, E Troop Commander, 2nd Squadron, 11th ACR. "[DevOps] is great, especially in the crawl stage of using MMC-S where we can work out the kinks before rolling this out to a wider audience. Being able to work one-on-one with the program office and the developers to take what works and refine what doesn't, helps create a system that modernizes us across the force and helps us remain at the tip of the spear."

### MAXIMIZING INTUITIVENESS

One of the most touted enhancements of MMC-S as compared to JBC-P is the graphical user interface. As an Android-based software program, MMC-S leverages the Android Tactical Assault Kit (ATAK),

which provides a common look and feel to something Soldiers already use every single day: a cell phone.

"Technology plays a big role in today's day and age. We all have a cell phone in our pocket. Whether it's an iPhone or Android, they all kind of have the same premise," said DiBianca. "Having young Leaders coming out of basic training that are able to utilize their understanding of a cell phone and effectively employ MMC-S is incredibly valuable and goes a long way in maximizing our effectiveness using this capability."

Perhaps even more critical is an improvement below the surface of the software's upgraded look and feel. In technical terms, Nett Warrior, the Handheld Computing Environment (HHCE), primarily communicates using Cursor-on-Target and protobuf message formats while other tactical Army systems, including Command Post Computing Environment (CPCE), Advanced Field Artillery Tactical Data System (AFATDS), and systems on the Blue Force Tracker (BFT) network, interoperate using Variable Message Format (VMF). MMC-S digests both CoT and VMF, and is being built to translate and communicate using either format to link the HHCE to CPCE, which is something that JBC-P software is not able to do.

"MMC-S is critical to modernizing the force. It will serve as the convergence space to meet the Army's requirement to host WF capability in order to deliver a fully-integrated COP – something that JBC-P falls short on," said Frizzell. "The bottom line is that MMC-S is the bridge between all three computing environments. It increases interoperability between CPCE and Nett Warrior, which is essential to generating an integrated COP."

## CONTINUOUS CONNECTIVITY FOR CONCENTRIC AWARENESS

The U.S. Army's latest iteration of its Command Posts' tactical combat communications capability includes a Command Post Computing Environment (CPCE) software element that enables real-time data flow across changing battle zones.

By Justin Eimers, Public Communications Specialist, U.S. Army PEO C3T



Soldiers in three operational units – XVIII Airborne Corps, III Corps and 1st Armored Division – are receiving valuable hands-on time with the latest version of the Army's suite of integrated mission command applications, the Command Post Computing Environment (CPCE). Feedback from this process, part of Warfighter Exercise (WfX) activity, continues to provide valuable risk reduction to CPCE ahead of the system's Operational Assessment during the Joint Warfighting Assessment 21 (JWA 21) in June 2021.

During WfX 21-4, the Army -- alongside U.K. and French Army tactical divisions -- leveraged current network Capability Set (CS) 21 systems and applications -- including the Commercial Coalition Equipment (CCE) network enclave, Common Services-Hub (CS-Hub) and the Command Post Computing Environment (CPCE) -- and flexed them in a coalition Mission Partner Environment, injecting an operational threat with contested cyber and electromagnetic activities (CEMA) to help further develop CS23 and beyond. (U.S. Army photo by Amy Walker)



“What’s unique about this series of Warfighter Exercises is that the training audience was different for each iteration,” said Lt. Col. Shawn Chu-Quinn, Product Manager for Tactical Mission Command (PdM TMC). “What that means for us as a product office is that we get to collect feedback from three different operational perspectives, which allows us to fine-tune the capability and deliver focused improvements.”

### INTEGRATION FOR SHARED SITUATIONAL AWARENESS

CPCE, along with the handheld and mounted computing environments, provides an easy-to-use common operational picture (COP) through a single mission command suite operated and maintained by Soldiers. CPCE provides a software and server hardware framework (common interface, data and services) upon which warfighter applications can be converged and future applications can be built. To date, Project Manager Mission Command has fielded CPCE software to 87 operational units and training

organizations, which includes multiple Mission Training Complexes and centers of excellence (i.e. Cyber, Fires, and Aviation).

CPCE has been optimized through Developmental Operations (DevOps) to improve responsiveness, add briefing capability and implement network management tools. Additionally, to improve system performance and to mitigate unnecessary data flow over constrained tactical network transport bandwidth, program managers and developers are working to address underlying data analytics, data dissemination and federation associated with the use of CPCE. These major efforts are key focuses of Capability Set 23 development.

While the DevOps model is not new, leveraging it across an audience this broad is a first for the program. Historically, the DevOps process for CPCE has involved working in-depth with a single unit at a time, typically for a period of several weeks, and making tweaks to the system as a result of Soldier input. This go-round, program developers worked with the training audience

to identify which CPCE software version would be most suitable to carry out their mission in their respective WfX.

### LESSONS LEARNED FROM PREVIOUS INCREMENTS

During WfX 21.1 in October, in which the primary users were elements of the XVIII Airborne Corps, 82nd Airborne Division and 1st Cavalry Division, units used the latest CPCE DevOps software, known as Increment 0, or Inc. 0. Using this version, Soldiers indicated the need for feeds from unmanned aerial systems (UAS) to enhance the commander’s command post purview, as well as the ability for the G6 to remove a CPCE user if needed.

“Once users identified the need for these improvements, the product office immediately addressed the UAS request and incorporated that change for future software improvements,” said Justin Seehusen, Assistant Product Manager for Tactical Mission Command.

According to Seehusen, the remaining

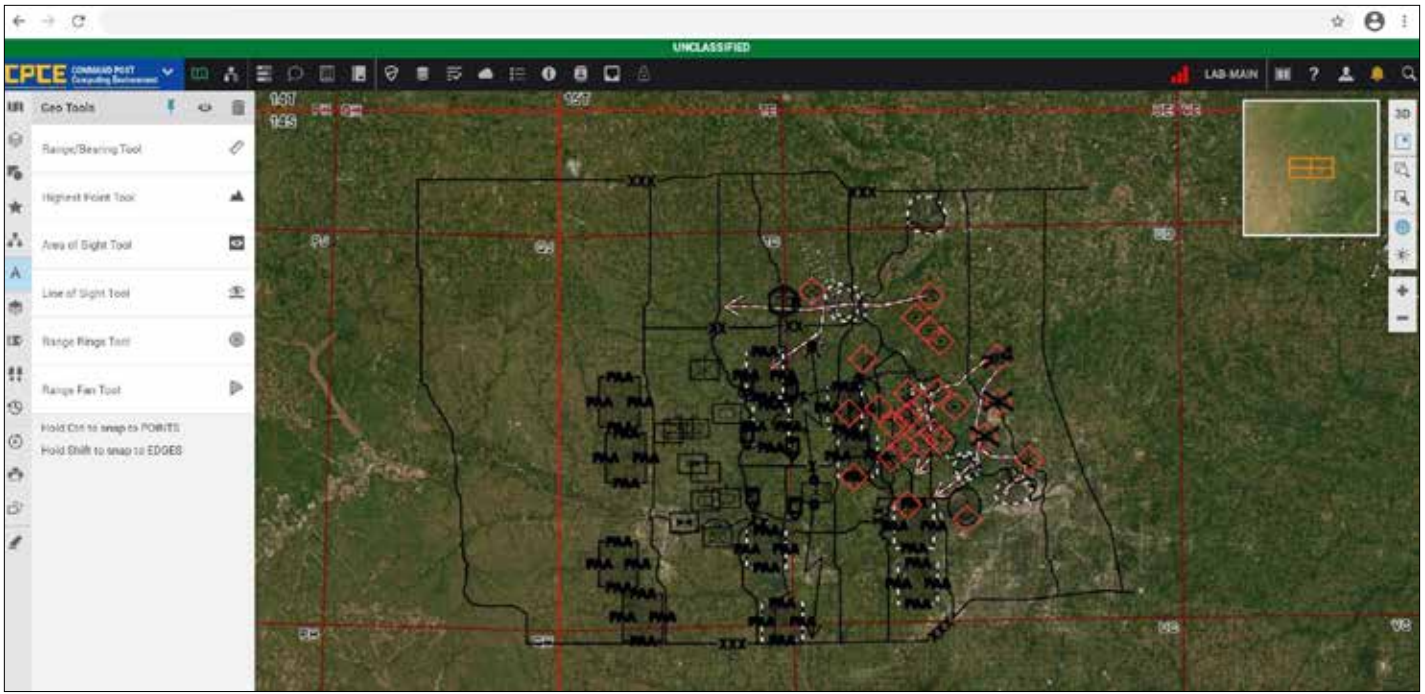
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This screenshot of Command Post Computing Environment (CPCE) software shows operational graphics and layers shared among several simultaneous users in various geographic locations, leveraging a cloud-hosted instance of CPCE for students at the Command and General Staff College. (U.S. Army graphic by Maj. Vincent Cesaro)

requests underwent an assessment to determine the technical level of effort, traceability to requirements and the resources available for execution. The assessment identified a total of 10 categories or areas of improvement and determined it will take approximately eight weeks for software improvements, followed by a 30-day work period to undergo a series of test-fix-test and risk reduction events to determine whether those improvements are ready for operational use.

During WfX 21.4 these improvements

were put through the paces. XVIII Airborne Corps users executed their mission and provided additional feedback for future enhancements. Initial feedback indicates CPCE meets all minimum requirements, allowing the Army to focus on improving the user experience for future versions.

## PUTTING SOFTWARE TO REAL-WORLD TEST

Following WfX 21.4, Soldiers with the 4th Infantry Division (4ID) at Fort Carson,

CO, and I Corps at Joint Base Lewis-McCord, Washington, will utilize CPCE as part of JWA 21 in June, during which a formal Operational Assessment will be conducted using the current Increment 1, or Inc. 1, CPCE software baseline. During the lead up to the exercise, PdM TMC executed a “crawl, walk, run” phased approach with the units to allow users to gain maximum proficiency and provide feedback on the currently fielded CPCE baseline prior to executing the multinational JWA event.

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# DEVELOPING NEXT-GEN UNMANNED AERIAL SUPPORT FOR FUTURE VERTICAL LIFT

*Maj. Ryan Greenawalt serves as Lead Integrator for Future Tactical Unmanned Aerial Systems (FTUAS), Future Vertical Lift Cross Functional Team (FVL CFT).*

*In 2005, he was assigned to the 3-4 Aviation Battalion (Air Assault) at Fort Hood, Texas, where he served as a flight platoon leader, maintenance platoon leader, and operations officer. Maj. Greenawalt also deployed in support of Operation Iraqi Freedom during his tenure with 3-4 Aviation Battalion. In 2007, Maj. Greenawalt served as an Assistant Team Chief of a Military Transition Team that supported the Operation Iraqi Freedom transition effort. In 2008 he served as the Battalion S3 for the Harrisburg Recruiting Battalion, and in 2011 he commanded the Harrisburg Recruiting Company.*

*In 2013, Maj. Greenawalt transitioned to the PA National Guard and served in a multitude of positions to include Lead Emergency Response Planner, Contracting Specialist, Assistant Product Manager (APM) within the Fixed Wing Project Office, PEO Aviation, and Army National Guard Liaison to the US Army Aviation and Missile Command. In 2020, he was assigned to the Future Vertical Lift Cross Functional Team as the Lead Integrator for FUAS.*



## Maj. Ryan Greenawalt

Lead Integrator  
 Future Tactical Unmanned Aerial Systems  
 Future Vertical Lift Cross Functional Team

*Maj. Ryan Greenawalt, Lead Integrator for Future Tactical Unmanned Aerial Systems (FTUAS), U.S. Army Future Vertical Lift Cross Functional Team (FVL-CFT), spoke recently with Armor & Mobility regarding efforts to replace the trusted legacy RQ-7 Shadow UAS with a FTUAS capability in achieving more streamlined support for the Army's future vertical take-off and landing (VTOL) capabilities.*

**A&M: Can you give us some background on the Future Tactical Unmanned Aircraft System or FTUAS?**

**Maj. Greenawalt:** The RQ7 Shadow tactical unmanned aircraft system has been the workhorse for the U.S. Army for more than 20 years and continues to serve our formations with tremendous results today. In response to Operational Need Statements from several Corps and Division commanders for an RQ-7B Shadow replacement with a runway independent, organically transportable, reduced acoustic signature tactical UAS, the Army adopted a "Buy, try, inform" approach to developing FTUAS to meet the needs of the warfighter.

**A&M: What exactly are you looking for in the RQ-7B Shadow's replacement?**

**Maj. Greenawalt:** Specific desired attributes for FTUAS include runway independence, reduced acoustic signature, organically transportable (Army CH47 v. Air Force C-17), and a reduced logistical footprint.

**A&M: What features are most important? Why is it time to replace this system?**

**Maj. Greenawalt:** All of the desired attributes are important and bring advanced capabilities to the Army's tactical UAS. Runway independence provides significant agility to the employment of the system allowing for launch and recovery almost anywhere on the battlefield. The reduced logistical footprint provides a capability to conduct reconnaissance, surveillance, and target acquisition on the move. With a much quieter aircraft, the enemy is unaware of the FTUAS presence and the ability to organically transport the systems provides additional agility to the Brigade Combat Teams (BCTs).

**A&M: What types of missions will the system be used for? What types of payloads will it carry?**

**Maj. Greenawalt:** FTUAS will be used for similar missions we see today for the RQ-7B Shadow, however, offers more flexible, innovative, and



Soldiers from the 3rd Armored Brigade Combat Team, 1st Armored Division, Fort Bliss, Texas conduct pre-flight inspections on the L3 Harris FVR-90 unmanned aircraft system. (U.S. Army Photo by Mr. Luke J. Allen)

agile ways of employing tactics, techniques, and procedures. FTUAS is not only becoming more expeditionary, but will deliver additional capability and battlefield sensors and effects for the Brigade Combat Team Commander in a modular and upgradable architecture.

**A&M: Can you tell us about the recent FTUAS rodeo and how successful it was?**

**Maj. Greenawalt:** The FTUAS Rodeo was the capstone event following a year-long exercises supporting the BCT. The FTUAS Rodeo was

**A&M: What was learned during the demonstrations?**

**Maj. Greenawalt:** Much was learned during the yearlong Soldier touchpoint both from tactical employment of these VTOL systems and technical specific aspects of the systems. Most notable was the relatively ease of set up and employment of the FTUAS. With just two or three Soldiers, the FTUAS were operational in under two hours as compared to the seven hours it takes six or seven Soldiers to employ the RQ7 Shadow.

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“We saw agile systems from every performer and the Soldiers uniformly fell in love with their assigned systems. FTUAS gives commanders the ability to command and control on the move, something Shadow cannot provide.” — MG Walter T. Rugen, Director Future Vertical Lift Cross Functional Team

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extremely successful. In addition to highlighting Army Futures Command innovative approaches to modernizing our Army, the final input from the Soldiers was collected and set conditions for the Army to accelerate finalizing extremely well-informed requirements.

**A&M: How were the systems tested and what was the reaction to them?**

**Maj. Greenawalt:** The systems were used by the Shadow Platoons of each BCT instead of their RQ7 Shadows during the approximately six months they were assigned. Each platoon took their FTUAS to a Combat Training Center as part of their BCT’s training exercise. Soldier reactions were very positive and while some recommendations for improvements were offered, generally most preferred their VTOL FTUAS over the RQ7 Shadow. Most of the Soldiers liked the ease and speed that it took to set up and employ the FTUAS.

**A&M: Can you talk about the hands-on experience the five brigades had with the four systems over the last year?**

**Maj. Greenawalt:** Each Shadow platoon had their system for approximately six months conducting home station training prior to deploying to a rotation at either the Joint Readiness Training Center at Fort Polk, LA or the National Training Center at Fort Irwin, CA for participation in large scale combat training and recovery almost anywhere on the battlefield. The reduced logistical footprint provides a capability to conduct reconnaissance, surveillance, and target acquisition on the move. With a much quieter aircraft, the enemy is unaware of the FTUAS presence and the ability to organically transport the systems provides additional agility to Brigade Combat Teams.



# PRECISION DETECTION AND MEASURE

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By Mirion Technologies' Homeland Security Team

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## LEVERAGING MODERNIZATION TO MAXIMIZE MISSION SET

Col. Gregory K. Gibbons serves as Commander, Letterkenny Army Depot in Chambersburg, PA. Gibbons' initial assignment in 1997 was as platoon leader and later executive officer, A Company, 123rd Main Support Battalion, 1st Armored Division, Germany. From 1999 to 2000, he served as the executive officer, Headquarters and Headquarters Company, Division Support Command, 1st Armored Division. In 2001, his next assignment was as support operations plans officer and later commander, A Company, 296 Brigade Support Battalion, 3rd Stryker Brigade Combat Team (SBCT), 2nd Infantry Division, Fort Lewis, Wash., and Iraq.

Upon returning to the U.S., he was assigned to I Corps as the supply and service material officer in the G-4. In 2005, Gibbons was assigned as Detachment executive officer, 2nd Joint Special Operations Air Component, Special Operations Command Pacific, Okinawa, Japan. From 2008 to 2009 he served as Plans Officer, 101st Sustainment Brigade 101st Airborne (Air Assault) Division in Afghanistan. His follow-on assignment was as the executive officer and support operations officer, Brigade Support Battalion, 3rd Brigade Combat Team 101st Airborne (Air Assault) Division, Fort Campbell, Ky., and Afghanistan. In 2012, Gibbons was assigned to the Pentagon as a plans officer in the Strategic Initiatives Group and assistant executive officer to the Assistant Chief of Staff Installation Management, Department of the Army.

Gibbons commanded Hawthorne Army Depot from 2014 to 2016. Following command, from 2016 to 2017, Gibbons was the assistant executive officer to the Commander, Army Materiel Command (AMC), Huntsville, AL. From 2017 to 2018, he attended the Army War College, Carlisle Barracks, PA. From 2018 to 2019, Gibbons served as the Acting Deputy Chief of Staff, Combat Service Support and the G-4 for the NATO Rapid Deployment Corps - Turkey (NRDC-T), Istanbul, Turkey.



**Col. Gregory K. Gibbons**  
Commander  
Letterkenny Army Depot

*Armor & Mobility spoke recently with Col. Gregory Gibbons, Commander, Letterkenny Army Depot (LEAD), regarding some of the depot's top priorities for 2021 and beyond as the installation works to maintain peak operational effectiveness amidst an ongoing pandemic.*

**A&M: What is the mission of Letterkenny Army Depot and, specifically, your mission as LEAD Commander?**

**Col. Gibbons:** Letterkenny Army Depot rebuilds, repairs, and modernizes Air and Missile Defense and Precision Fires systems to enable multi-domain operations for U.S. and Allied forces. When an AMD or PF system has reached its life cycle, we tear it completely apart, add all the updates and modernizations and rebuild it. When

that system comes off of our assembly line we provide "better than new" systems back to the warfighter. When that Soldier, Marine or Airman receives a system from Letterkenny it can do things it never could when it first came off the assembly line 20 years ago.

As commander, I have multiple missions; to ensure the LEAD team has the tools they need to deliver exceptional systems to the warfighter today and posturing the depot to meet future requirements. For today's mission, we want to deliver to our Performance to Promise metrics. We will deliver on time and at cost the best quality systems. For the future, it's my mission to provide the strategic vision and path to ensure that Letterkenny has the facilities, equipment and capabilities to execute future systems maintenance.

**A&M: With the past year presenting challenges for most agencies and businesses, how has LEAD done staying on mission?**

**Col. Gibbons:** Even when the COVID-19 pandemic hit last year, we knew the warfighter would still require their systems. Letterkenny





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never stopped producing. What I'd like to focus on is how quickly the depot adapted to a new and ever-changing situation while maintaining mission readiness. As part of the Army's Organic Industrial Base, we maximized telework where possible, but rebuilding systems and conducting maintenance cannot be done from home. For the majority of our workforce, about 95%, it was imperative that we create a safe work environment for our employees to report to each day.

We instituted mitigation efforts such as social distancing, use of masks and frequent sanitation to protect our employees. Although we were adapting and learning about COVID every day, I'm happy to report that impacts to LEAD were minor. Letterkenny was also instrumental in supporting the national response to the COVID-19 pandemic through repurposing our industrial capabilities and artisan skillsets to produce masks for our employees and other Department of Defense organizations. Additionally, Letterkenny provided community support by partnering with a local health care company to produce protective isolation gowns for their doctors and nurses. These additional efforts didn't impact our core mission whatsoever and allowed us to maintain readiness and adapt to the constantly changing environment. Safety is one of our top priorities at Letterkenny. I'm proud of our team for all the work done to protect each other and aid our community during this ongoing crisis.

**A&M:** From a programs perspective, speak to the state of some efforts such as the High Mobility Multipurpose Wheeled Vehicle (HMMWV) Recap, Avenger, and Patriot.

**Col. Gibbons:** Letterkenny Army Depot works on over 150 different major end item programs and over a thousand secondary programs in support of the Department of Defense. As the Air and Missile Defense and Precision Fires depot, we reset, overhaul or recapitalize the PATRIOT system, PATRIOT missiles, Terminal High Altitude Area Defense, Avenger etc., and all of the support equipment related to those systems. In addition, LEAD is the Depot Source of Repair for Power Generation, Materiel Handling Equipment All-Terrain Lifter Army System forklifts, Mobile Kitchen Trailers, Mobile Integrated Remains Collection Systems, Route Clearance Vehicles and the prime movers for all. LEAD's capabilities range from rebuilding a generator, axle or launcher to circuit cards and sensors. Our artisans are some of the most highly skilled welders, mechanics, electricians, and machinists working within the DOD. While LEAD's programs are diverse, our Quality Assurance teams ensure every system is ready for the warfighter.

Letterkenny resets the most deployed units in the Army, which are currently the Air Defenders. LEAD works on every system in the battalion as a system of systems. From the PATRIOT radar, Battery Command Post, prime movers to the PATRIOT launcher, LEAD artisans expertly execute the reset of all of these assets. Normally, the depot resets one battalion a year. Today, LEAD is in different stages of reset on four separate battalions. Our promise is to have the entire battalion modernized and reset in 240 days to guarantee the unit has time to train and redeploy on time.

Our engineers and artisans are working diligently to stand up a waterfall process to reduce repair cycle times with our PATRIOT reset program. The waterfall process will essentially switch out one ADA battalion's equipment for equipment that has already been reset or recapitalized. We estimate that this method will reduce repair times for select components by up to six months and provide the units with serviceable equipment immediately upon their redeployment. This



COL Gibbons and Damian Bess, deputy to the commander, LEAD (left) oversee employees from the Directorate of Supply and Transportation at LEAD as they load PATRIOT Semitrailer Mounted Launching Stations onto an Antonov An-124 at Harrisburg International Airport, Harrisburg, PA. LEAD's mission was in support of a Public Private Partnership with an industry partner to deliver the launchers to the partner's customer. (U.S. Army photo by Dorie E. Heyer, LEAD Public Affairs)

will allow warfighters to have more time to train on their equipment at their home station and prepare for their next mission.

In addition to the reset and recapitalization of PATRIOT, Letterkenny also executes the PATRIOT new build program, which complements our workflow. As a part of the Public Private Partnership program, LEAD builds brand new PATRIOT launchers and missiles. This supports our allies and partners and provides facility and equipment upgrades across the depot.

LEAD's High Mobility Artillery Rocket System overhaul program supports the Army, Army National Guard and Marines. The Letterkenny HIMARS team is often recognized for using their expertise to provide solutions to systemic maintenance issues with the HIMARS system.

I wish I had time to tell you about all programs in Letterkenny's portfolio, that includes Force Provider, Power Generation, Hellfire launchers, and Close Combat Missile Systems, but I think we'd quickly run out of pages. We have a knack for the low density systems, and we're moving toward more of those programs such as the Terminal High Altitude Area Defense recapitalization in support of



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EOS CBWS with the R400S equipped with the M230LF, M240B & Javelin  
(Photo credit: Celeste Johnson)

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EOS R150 with the M134 D  
(Photo credit: Allen Matthews)



EOS R150 with the Sig Sauer .338 MMG  
(Photo credit: Celeste Johnson)



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Benjamin Thomason, metrology team lead, Aviation and Missile Center (AvMC), U.S. Army Combat Capabilities Development Command (DEVCOM) operates a structured blue light scanner to evaluate the surface geometry of a turret that is being converted into an Extended Range Cannon Artillery (ERCA) turret at Letterkenny Army Depot (LEAD). The scans provide mechanical engineers at LEAD with a baseline for the turrets as received from the customer, and will be used as a comparison to the customer provided model to evaluate the work to be executed and areas of concern. The partnership between LEAD and DEVCOM focuses on implementing technologies at the depot level that they might otherwise not have access to. (U.S. Army photo by Pam Goodhart)

the Missile Defense Agency. Moving into the future, we're posturing the depot to execute work on future air and missile defense and long range precision fire systems that include the Extended Range Canon Artillery system, hypersonic launchers and directed energy.

**A&M: As Army Futures Command pushes force modernization forward, talk about some key LEAD modernizing efforts.**

**Col. Gibbons:** What Army Futures Command is doing to develop the Army's future systems and Army Materiel Command's Organic Industrial Base modernization plan is very exciting. Letterkenny is laser focused on modernization and preparing the depot to meet requirements for the systems being developed and acquired by AFC. LEAD is diligently planning for the AFC, Cross Functional Team's 31 +4 projects. CFT Air and Missile Defense, CFT Precision Fires and the +4 are more than 30% of AFC's future projects and fall into Letterkenny's mission and portfolio. We will ensure that LEAD has the capabilities and capacity to meet the future depot maintenance requirements of the DOD.

Our workforce is the keystone of Letterkenny and our prominent factor in modernizing the depot. As we work to modernize our facilities, programs and processes, we place priority in preparing our workforce for the next era of weapon systems. Through training, professional development, developing partnerships and building a culture of innovative thinking, our people will be the driving force in all of our modernization efforts.

While Letterkenny will perform the depot maintenance for these systems in the future, it is imperative that we support AFC's speed of acquisition and fielding in the present. Rather than slowing down the rapid acquisition cycle so that sustainment can keep up, Letterkenny is expanding and developing processes to speed up our support to be relevant to AFC and the Army Rapid Capabilities and Critical

Technologies Office in the first years of development and testing.

One area critical to this modernization is improving and focusing engineer and artisan involvement with Manufacturing Readiness Levels and assisting the developers by partnering to enhance producibility and sustainability early in development. We have substantial experience with this in our new build programs for PATRIOT launchers and missiles. LEAD artisans and engineers have even developed new-build trailers that would reduce the costs associated with heavily corroded and degraded trailers seen more frequently these days.

Much of this experience is an extension of the recapitalization process, but we also gained expertise while partnering with the U.S. Army Combat Capabilities Development Command Aviation and Missile Center on the Indirect Fire Protection Capability – Multi-mission Launcher. Although that system was not chosen, the LEAD team gained extensive knowledge and capabilities for development phase partnering that leads to a

more sustainable system and a smoother transition to sustainment.

We are now using those capabilities on the Extended Range Canon Artillery program with Program Manager Self-propelled Howitzer Systems in Program Executive Office Ground Combat Systems and partnering with the DEVCOM Armaments Center at Picatinny Arsenal, N.J. Our engineers and artisans are also partnering with the Metrology Lab at DEVCOM AvMC to integrate blue light optical scanning as a means of measuring surface geometry of ERCA turrets to set a baseline and monitor surface changes as the turrets undergo cutting, machining and welding. This allows our team to provide better estimates on the amount of work necessary to complete the project, better predict project timelines and ensure a high quality product.

Letterkenny is working side by side with PEO Missiles & Space to look at the Cross Functional Teams and subsequent projects to see how Letterkenny fits into these efforts. With our expertise, LEAD will provide tremendous value to these programs. Letterkenny leadership has established a strategic modernization plan that examines six key areas of our business and how we can leverage those areas to modernize and improve conditions, efficiencies and effectiveness across the depot.

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# KEEPING SOF HEALTHY AND AHEAD OF THE COMPETITION

By Vice Adm. Tim Szymanski, Deputy Commander, U.S. Special Operations Command

In 2021, U.S. Special Operations Command (USSOCOM) is postured to meet the challenges of our nation's adversaries and competitors. In an era of strategic competition, we creatively and effectively adapt to maintain the pressure on violent extremist organizations, while also operating in the competition space with our near-peer state actors. Five overarching priorities continue to guide our efforts: competing and winning for the nation, preserving and growing readiness, innovating for future threats, advancing partnerships, and strengthening our force and families.

When we talk about competing and winning for the nation, we're talking about protecting America's interests abroad and confronting challenges ahead. USSOCOM is a critical component of the joint force; our forces bring unique capabilities to the fight. We will continue to play an active role defending our shores, which is why we need to preserve and grow readiness, our second priority. Special Operations Forces (SOF) cannot be manufactured overnight. Having the right people with the right skills, training, and expertise helps us maximize our competitive edge. Maintaining that edge requires continuous innovation. The hyper-enabled operator effort is a good example of our third priority to innovate for future threats.

Partnering with the Department of Defense, civilian research, industry, and academic institutions is essential to staying ahead of our competition. USSOCOM seeks participation and feedback from all of these institutions and other organizations. We progress further and faster when we work with a diverse set of partners. But we're not only focused on research and development partners at home, we are also dedicated to strengthening our alliances and partnerships abroad.

Today's threats are transregional in nature, so the importance of our international relationships is clear. When USSOCOM enhances its partnerships with allied SOF through collaboration and integration the security of both nations increases. At the heart of all five of our priorities are our operators and their families. We are committed to optimizing and sustaining SOF mission readiness, career longevity, and quality of life after service. Our warfighters and families are indeed our most important resource.

This brings me to a deeply personal focus area of mine and a priority focus area for USSOCOM, and that is brain health. We want to keep our SOF healthy, extend their careers, and help them achieve a high quality of life after service. To achieve this goal, we have historically focused on operator performance and resiliency through a physical, spiritual, psychological, social and family lens. In 2019, we published our Comprehensive Strategy for SOF Warfighter Brain Health, adding the cognitive domain as the fifth pillar of operator resiliency. Our strategy implements a multidisciplinary, holistic approach to brain health through our command surgeon, Preservation of the Force and Family office, Warrior Care Program-Care Coalition, and Science & Technology directorate. Our teams of brain health experts and caring leaders are driven to not only optimize the lethality and cognitive abilities of



our operators but also improve their welfare and dignity beyond their military service. USSOCOM and its service components have made tremendous progress on a number of fronts in brain health, but we have a long road ahead to clear, pave, and travel.

As the science of brain health has rapidly evolved over the last decade, so too has USSOCOM's ability to understand and sharpen the cognitive ability of our SOF. The first step is collecting the data to identify symptoms, assess the results, and provide easy access to care in order to quickly address any concerns. Years ago, SOF did not collect this data. Today, every operator in SOF goes through a baseline assessment, which is crucial to identifying variations in cognitive performance over time. Over the course of a career, SOF personnel may develop and exhibit several symptoms related to brain health. USSOCOM is committed to

monitoring exposures that could create these adverse health effects, in addition to advancing science and technology to assist in these undertakings and protecting our personnel to the extent possible.

A primary concern for USSOCOM is to better understand the effects of repetitive low-level blast exposure over the lifetime of a warfighter's career. Low-level blast exposures are those that do not necessarily cause concussions. These seemingly small events are common in SOF, most happening during training, not in combat, like when a service member experiences the back blast of a shoulder-fired weapon. This is similar to studies that show that more head trauma happens in football practice than the actual game. SOF stakeholders down to the unit level are playing critical roles in helping us better understand this concern. The Army, Navy, Marine Corps and Air Force service components have worked with academic institutions on several USSOCOM-funded studies that use special neuroimaging techniques and other measures to determine the effects of repetitive low-level blast exposure. For example, U.S. Army Special Operations Command is working with an academic research institution in North Carolina that is not only looking at blast exposure effects but also the long-term health of warfighters in areas such as vision, behavioral health, and musculoskeletal injury.

As we move forward, we are implementing other assessment tools across the force to better understand each service member's concussion and blast exposure history as well as symptoms that could be related to brain health. This will help us improve screening for potential and actual traumatic brain injuries, exposures to adverse environmental factors, post-traumatic stress, depression, anxiety, headache, sleep apnea, or other medical conditions.

At the tactical edge and at home, USSOCOM partners, innovates, researches, and trains to keep our operators lethal, healthy, and cognitively sharp. I hope you enjoy the articles from our acquisition, technology, and logistics professionals that will describe some of the many exciting technology opportunities and partnerships occurring worldwide – technologies that will help keep our SOF ahead of the competition for years to come.

# MULTI-FUNCTIONAL ARMORED PROTECTION

By Steve Soucek, Business Development Senior Director, HENSOLDT Inc. Land Systems

HENSOLDT Inc. is a leading supplier of defense and security electronics which have been pioneered, introduced, and fully fielded by HENSOLDT AG including the first Allied armored vehicle “soft kill” (SK) Active Protection System (APS), the Multi-Functional Self Protection System (MUSS), for use against guided weapons and other threats.

Over the years, the battlefield has seen the emergence of a large variety of anti-tank guided missiles and unguided rockets, rapidly evolving from simple first-generation wire guided missiles to Tube-launched, Optically-tracked, Wire-guided (TOW) anti-tank missiles and more recently modern beam-riding, third-generation fire-and-forget, and top-attack missiles capable of defeating passive and add-on armor and destroying targets with tandem warheads. This proliferation of Anti-tank Guided Missiles (ATGM), capable of being launched from a variety of mounted platforms and dismounted troops now equals or surpasses threats posed to a tank from conventional tank-fired projectiles and munitions. This situation necessitated a paradigm shift in Armored Fighting Vehicle (AFV) protection and spurred development of new technologies within Size, Weight, and Power (SWaP) limitations to enable APS. These systems utilize electronic sensors to detect and track incoming direct-fire ATGMs and High-explosive Anti-tank (HEAT) munitions not to mention laser and directed energy threats, defeating them by launching countermeasures to jam, deflect, or destroy threats. These APS are changing the calculus by enhancing AFV protection without significantly impacting vehicle SWaP.

HENSOLDT’s core competence has been to recognize a wide range of threats and provide practical, optimized solutions to improve the safety and operational effectiveness of ground combat vehicles and other military platforms. HENSOLDT’s MUSS evolved in parallel to become what is now the most advanced in-service, cost effective, and practical solution to improve the survivability of Main Battle Tanks (MBT), Infantry Fighting Vehicles (IFV), and Armored Personnel Carriers (APC) or Combat Support platforms.

MUSS® is a SK sensor and effector-based APS with fully Passive Detection (PD), delivering a key protection layer against ATGMs and laser (guided) threats. The system is comprised of three segments including the on board processor; passive sensor modules, each of which includes a missile warner (MW) and laser warner (LW); and two countermeasures – a 360 degree rotatable Infrared (IR) jammer and Directable Smoke Dispenser (DSD). The system is a modular, flexible, easy to install, cost-effective solution. The modular Open System Architecture (OSA) makes it easy to customize configurations for specific vehicle ergonomics and operations by combining selected sub-systems to deliver desired performance. MUSS is an in-service system fitted on the SPz PUMA, the most modern IFV of the German Bundeswehr Armored Infantry Brigades. MUSS was designed to be the APS solution for the PUMA; but, can be easily adapted to meet other platform and mission requirements. HENSOLDT’s tailored approach also includes continuous product improvement to meet the supported Allied customer’s evolving needs and requirements.

### Key product differentiators:

- Modular and scalable system for different vehicle types (wheeled and tracked) and missions/ operational requirements against multiple threats for vehicle protection;
- Proven and highly cost-effective solution;
- Reduced Size, Weight and Power (SWaP) and continuous protection advantages over HK APS;
- Undetectable, jam-proof; continuous replenishable electronic countermeasures

- No collateral damage to host vehicle, other platforms, dismounted troops, or local area;
- Easy to integrate, loosely coupled OSA (no significant alteration/ degradation of platform);
- Complementary and can be used with traditional HK APS; however, HK APS requires reloading and only protects against certain threats, not rocket propelled grenades (RPGs);
- MUSS system roadmap includes interfaces to HK effectors along with improved laser jamming & dazzling, tracking & confirmation sensors, etc. as well SWaP-C improvements;
- MUSS interfaces into Command and Control (C2), Situational Awareness (SA), Reconnaissance and Surveillance, and Targeting systems.

### Some key drivers influencing the use of APS:

- No degradation or adverse impact to operational capabilities and provide 360-degree coverage to address all angles of arrival of threats including top attack munitions;
- Capable of detection, tracking, and neutralization of multiple threats including ATGMs of all types, chemical energy (CE), and kinetic energy (KE) projectiles simultaneously;
- No resultant collateral damage by deployment of countermeasures to crew/other dismounted personnel, soft-skinned vehicles, optical & optronics devices, and other soft points of the vehicle;
- Minimum SWaP specifications and components should not displace existing combat loads with no additional environmental or electromagnetic interference (EMI) impact;
- Components should not enlarge vehicle profile, block or impede access, or functioning of any existing sensors, hatches, ports, observation devices, etc.;
- Cost effectiveness is a key driver with initial and life cycle costs optimized
- Modular OSA and ease of integration for additional systems, sensors, and countermeasures as required for operational missions, emerging threats, levels of protection.

Vehicle APS can be broadly classified into SK and HK systems. SK prevent incoming threats from accurately targeting the vehicle, whereas HK systems are designed to use direct fire, kinetics, fragmentation, and/or explosives to destroy, deflect, and degrade incoming projectiles. Some key differentiators between SK and HK include the nature of sensors used to detect and track threats – passive versus active, the type of countermeasures deployed and effects to neutralize the threat, and persistence in a combat environment. Both systems defeat the threat before impact, SK by electro-optics (EO) jamming (or laser dazzle) or with obscuration, and HK systems by deploying countermeasures using kinetics, Multiple Explosively-Formed Projectiles (MEFPs), etc. to address threats.

Major challenges with technological readiness and maturity of HK systems, integration constraints, and operational restrictions, coupled with logistical and persistence issues, are causing armed forces worldwide to realize the need for scalable and modular solutions with potential to be configured depending on platform limitations and operational imperatives. MUSS can be the solution to answer that need.

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## FACILITATING FORCE MODERNIZATION THROUGH TARGETED PROCUREMENT

*Armor & Mobility spoke with Mr. Jim Smith, Acquisition Executive for U.S. Special Operations Command (USSOCOM), MacDill Air Force Base, FL, regarding some of USSOCOM's targeted procurement focus efforts in Special Operations Forces (SOF) acquisition, technology and logistics.*

**A&M:** As a new presidential administration and new defense secretary settle in, what are some key SOF AT&L priorities for keeping USSOCOM operations potent?

**Mr. Smith:** When he took command of U.S. Special Operations Command (USSOCOM), Gen. Richard Clarke provided written guidance on the command's modernization focus areas. For the most part, these have remained very consistent, but I'll provide some context as we've matured our approach to each modernization area to maintain SOF's sustained competitive advantages. First, Gen. Clarke has set the vision that USSOCOM will be an AI-enabled command. AI and all of its derivatives – machine learning, human-machine teaming, automation, etc. – underpin and enhance each of our six focus areas, which include next generation intelligence, surveillance and reconnaissance (ISR); next generation mobility; precision effects; data and networks; hyper-enabled operator; and biotechnologies.

Next generation ISR reflects the command's continued requirement to find, fix and exploit targets of interest in a contested environment where we may not dominate the airspace or the electro-magnetic space. We are looking for capabilities in the cyber domain and the space domain as well as in small, tactical unmanned autonomous systems and sensors. Next generation mobility focuses on our need to ensure our current platforms are survivable and can gain access in contested environments. We've made a large investment in our fixed-wing and rotary-wing aircraft as well as surface and sub-surface maritime vessels. We need to ensure these platforms have the ability to penetrate and survive, not only in competition, but also in conflict.

The precision effects focus area applies broadly to weapons as well as the electro-magnetic domain and messaging and counter-messaging. We're making great progress with individual weapons and missiles. We have a growing interest to understand and dominate the electro-magnetic spectrum our operators will need to maneuver within when they are on the field with peer competitors. Finally, we need to be able to provide information on the internet that supports our operations and counter false messaging from our adversaries in a timely and precise fashion. Our focus on data and networks covers our software and hardware efforts to provide the appropriate information reliably and securely across the force. Special Operations Forces (SOF) are unique in the amount of information we push to the "edge" of the battlespace – defined in this case as the individual's or small team's need



**Mr. James Smith**

Acquisition Executive  
U.S. Special Operations Command

to have access to rich information, such as full-motion video, in the remote and austere environments they operate in. Further, the operator must have confidence that their communications are assured, reliable and secure even on contested terrain.

Hyper-enabled operator strives to provide that "edge" operator with cognitive overmatch. The operator already contends with an immense amount of data from drones, sensors, partnered forces and others. Our intent is to turn that data into decision quality information and present the information to the operator in a manner that allows them to make decisions in a tactical environment. In biotechnologies, we seek to improve the performance and well-being of the operator. This focus area is tightly linked with the USSOCOM's Preservation of the Force and Family initiative to ensure the operator has the mental, physical and spiritual capacity to accomplish their mission throughout their long career.

Finally, for the first time, we have published our Science and Technology (S&T) priorities. While the six modernization focus areas describe our near-term requirements, the S&T priorities describe our



research and development investment areas for the longer term – but “longer term” for SOF is really only the next 3-7 years. Our S&T priorities are special communications, tailorable lethality, electronic warfare, human performance optimization and data-enabled SOF.

**A&M: From a SOF equipment and services challenge perspective, what are some teaming efforts AT&L is utilizing to maximize mission success?**

**Mr. Smith:** Recently our Marine Special Operations Commander asked us to conduct an evaluation of a precision missile employed from a light vehicle. This evaluation was highly successful leading to its recent effective use in combat. The speed of this deployment was enabled by the vision of our Marine component, the support of the Marine Corps and agile adaptation of acquisition authorities by our Program Executive Office-SOF Warrior. They are actively pursuing more capable missiles that are domestically produced and affordable. Our goal is to extend this program across the USSOCOM enterprise to include employment by our Maritime component from a surface vessel.

Further on the horizon is our Dry Combat Submersible (DCS) Block II. We are conducting pre-program risk reduction activities to clarify the maturity of the technologies and fully understand the cost and schedule requirements. While we don't plan to award a development contract until 2023 or 2024, there will be opportunities to help us with these pre-program activities. I am excited about our PEO-Maritime using digital engineering and modeling in partnership with the Navy to fully understand risks and opportunities, as well as viewing the DCS Block II acquisition strategy as software-defined and hardware-enabled.

SOF AT&L manages just over 80 official acquisition programs but, on any given day, we're managing more than 300 projects, rapid requirements, operational needs, partnered equipping efforts or foreign military sales. I'm very proud of SOF acquisition working in collaboration with our partners to provide the capabilities required to enable SOF operators and our allies and partnered forces.

**A&M: How are you reaching out to non-traditional industry partners to compete on SOF contracting opportunities?**

**Mr. Smith:** We had an AI expert visit the command and I asked him, if industry claims were true that AI was 'shovel ready,' why weren't AI vendors knocking down my door? He answered, "Where is your door?" That response has caused us to rethink how we reach out to our industry partners – whether new to USSOCOM or established, or small business or large, or non-traditional/commercial or defense sector. During the last year especially, we've expanded our outreach by hosting bi-monthly virtual town halls for these partners. And we have other great "doorways."

For starters, we have Engage SOF or eSOF. This is our cloud-based website for vendors to present proposals and receive feedback. We launched eSOF in September 2020, and to date we've had 140 submissions from 120 unique companies. eSOF allows vendors to submit more content than our previous tool allowed, and enables vendors to track their proposal until we provide feedback. We also host a tech scout website for the entire government called Vulcan-SOF. Vulcan allows vendors to provide scout cards – information on their product – for government personnel to review, comment on and assess. It has spread from its origins in SOF to the Department of Defense to use

throughout the government. Today there are over 15,000 government users – 6,500 new users last year – with access to more than 8,000 scout cards. Finally, we have our SOFWERX platform which has 40,000 existing members in their ecosystem and hosted over 20 collaboration and assessment events this year. We've experienced a 70% increase in responses when we request information or proposals via our SOFWERX ecosystem and sam.gov as compared to posting on sam.gov only. We believe our outreach efforts are effective.

However, when you add our other "doorways" for Technology Experimentation events, Broad Area Announcements and contract opportunities on sam.gov, maybe we have too many. We've surmised that we might be confusing industry. So we developed the "foyer" concept – a one-stop website that will provide a single doorway for SOF acquisition. This site will allow vendors to easily review the engagement opportunities available and help find the right one for them.

**A&M: In terms of meeting agile acquisition expectations, how is SOF AT&L working to better support the nation's special operators across austere global environments?**

**Mr. Smith:** The outcomes and results of the SOF acquisition approach are something I am very proud of – especially our daily contribution to supporting our nation's special operators. Our workforce has demonstrated the agility to adopt and adapt the many acquisition tools authorized for our use by Congress and the Department of Defense. We have leveraged Other Transaction Agreements (OTA) for some of our most critical acquisitions such as Radio Frequency Counter Measures and Armed Overwatch. Last year we executed 40 OTAs. That's nearly six times the number we did in 2019 and 20 times the number of OTAs we executed in 2018. We were also early adopters of the Commercial Solutions Opening Pilot and again used it on two important programs – our Hyper-Enabled Operator project and Mission Command System/Common Operating Picture. Last year Congress authorized us to pursue a pilot to accelerate Small Business Innovation Research awards by leveraging our SOFWERX platform. What was the result? A 200% increase in non-traditional vendors and a 60% reduction in the time to deliver a prototype.

What makes SOF acquisition unique is our adoption of the culture and attributes of the enterprise we support. We adopt the sense of urgency associated with a combatant command and, in particular, the SOF community. We adopt our SOF commanders' approach to risks and opportunities. But what I've been reflecting the most on recently is our adoption of SOF's unique dichotomy of full-spectrum agility with precision effects – operational commanders are required to provide precise deter, de-escalate and defeat options across the full range from competition to conflict. Likewise, acquisition operations need to be both agile and precise. As we consider strategic competition, my priority for our acquisition workforce remains to ensure they have the training and experience to employ a wide variety of acquisition and contracting strategies to achieve the precise effect required by our operators.

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## STREAMLINING PROCESS TO BETTER ALIGN CAPABILITY AND STRATEGY

*Armor & Mobility spoke with Col. Paul Weizer, Program Executive Officer for SOF Digital Applications, U.S. Special Operations Command (USSOCOM), MacDill Air Force Base, FL, regarding some of USSOCOM's focus efforts to align military software acquisition to mirror the best business practices currently used in the commercial industry.*

**A&M:** With its inception in June 2020, what are the primary challenges that PEO SDA is and looks to address for USSOCOM?

**Col. Weizer:** The primary challenge Program Executive Office-SOF Digital Applications (PEO-SDA) looks to address this year is process. From requirements to budget to acquisition, we are upending all of the traditional bureaucratic processes and that makes people uncomfortable. We are spending a tremendous amount of time socializing the new Department of Defense software acquisition pathway. The intent of this change is to align software acquisition in the military to mirror the best business practices currently used in the commercial industry. It is fast paced and replaces most of the serial development strategies of the past with a more collaborative and agile approach that keeps all stakeholders tightly integrated in order to make rapid decisions during highly dynamic development sprints. This requires shared buy-in and willingness to tradeoff priorities in lieu of speed and agility. There will still be rigor to the development process, but it is controlled at much lower levels, and focuses on user-centric design.

**A&M:** In terms of USSOCOM investment in software/digital capabilities to combat violent extremist organizations and nation-state backing of these, what are some examples of PEO SDA focus that are better facilitating legacy to hi-tech maturation?

**Col. Weizer:** PEO-SDA is leveraging various commercial-off-the-shelf software toolsets to meet many of our requirements. By acquiring commercial products through purchase or licensing, we eliminate longer development timelines and provide capabilities immediately to our users. This approach also allows us to seek and acquire best-of-breed technologies without the sunk cost of development and lifecycle maintenance. It becomes easier to switch and replace capabilities as new technologies become available to meet everchanging requirements.

**A&M:** From an Agile Acquisition Framework's Software Acquisition Pathway perspective, how are you basing integration or divestment decision making in moving life-cycle sustainment into next-generation application?



**Col. Paul Weizer**  
Program Executive Officer  
PEO-SOF Digital Applications

**Col. Weizer:** There is always going to be the factor of cost and budget with respect to product management and life-cycle sustainment: Make or buy? Sustain or replace? PEO-SDA is not exempt from the task of controlling costs while providing leading-edge technologies to our SOF warfighters. That said, software is a very competitive marketplace relatively easy to enter; talent, a computer, and an internet connection make you a software developer. Access to non-traditional industry partners opens new opportunity for innovation and technological advancement while also enabling cost control. PEO-SDA will be able to harness an almost limitless supply of talent to help reduce risk while ensuring smart life-cycle management decisions.

**A&M:** Feel free to speak to other challenges or goals moving forward.

**Col. Weizer:** Another specific challenge PEO-SDA faces is the delivery of a Minimum Viable Capability Release (MVCR) for U.S. Special Operations Command's (USSOCOM's) Mission Command System



/ Common Operational Picture (MCS/COP) by this time next year. MCS/COP is the first USSOCOM program of record being executed under the Department of Defense's Software Acquisition Pathway, and PEO-SDA is committed to delivering the MVCR within one year of a contract award. As you can imagine, that's a significant challenge when you're talking about the delivery of a brand new system-of-systems that must meet requirements for all USSOCOM commanders worldwide, but we started smartly, with risk reduction Other Transaction Authority (OTA) prototype agreements in fiscal year 2020 that supported our first-ever use of

the Commercial Sources Opening (CSO) process which utilized a four-phase down-select approach that rewarded industry partners for providing and demonstrating innovative solutions to solve our complex Mission Command problem sets. We are now proceeding into production OTA agreements this fiscal year that should continue to reduce risk and maximize capability delivered. The key will be constant user involvement during the development sprints over the next year to ensure the software matures to meet the needs of our operators.

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## SUSTAINING READINESS THROUGH FLEET MODERNIZATION

*Armor & Mobility spoke with Col. Ken Kuebler, Program Executive Officer for Fixed Wing, U.S. Special Operations Command (USSOCOM), MacDill Air Force Base, FL, regarding some of USSOCOM's focus efforts in legacy fleet recapitalization and latest in intelligence, surveillance, and reconnaissance driven capabilities across all airframes.*

**A&M:** You previously worked in PEO-Fixed Wing and are now back serving as the PEO. Can you provide your perspective of how things have or have not changed?

**Col. Kuebler:** I was fortunate enough to return to U.S. Special Operations Command (USSOCOM) headquarters and Program Executive Office-Fixed Wing (PEO-FW) last summer and have consistently said, "There is no place I'd rather be, and nothing I'd rather be doing," which is not a cliché of mine; it is absolutely true. I say that because there are some things that do not change. For example, the SOF Truths are timeless. "Humans are more important than Hardware" has always been evident in the command especially within PEO-FW. The workforce – the military, civilian, contractor support and industry partners – includes some of the most dedicated, skilled, and professional folks I have ever known. Additionally, the opportunity to relentlessly develop, field and sustain winning capabilities for the Special Operations Forces (SOF) operator has always been part of the PEO-FW mission.

The PEO-FW team has done an exceptional job meeting that mission. We continue to recapitalize the fleet of AC/MC-130 aircraft. When I was previously assigned at USSOCOM, the average age of the SOF C-130 fleet was more than 20 years old; and now it is under five years old. We have made tremendous strides in ensuring a modular, open systems approach, and we will continue to do more with both hardware and software upgrades and modifications. Furthermore, we remain committed to ensuring the SOF C-130 fleet is equipped with the latest precision strike and defensive systems to meet future operational requirements.

Game-changing intelligence, surveillance, and reconnaissance (ISR) capabilities have never been more important. Our goal is to field ISR solutions that are survivable, cost-effective and modular. However, there is not a 'one size fits all.' Cost-effective for manned ISR platforms could be addressed through improved ways that we operate and sustain the programs, while cost-effective for unmanned programs might mean fielding or modifying a family of systems with longer endurance and/or open system software. Additionally, I think the importance we have always placed on improving reliability is sometimes overlooked. To be extremely effective in a 'no fail' mission, we must have systems that are highly reliable. Our Silent Knight Radar program is a good example of continually improving reliability. So is the CV-22; we have worked with the Air Force, CV-22 program office and industry partners to improve reliability and will continue to do so.

Finally, our partnerships with our Service acquisition teams has



### Col. Ken Kuebler

Program Executive Officer  
PEO Fixed Wing  
U.S. Special Operations Command

never been more important. Whether it is working with Eglin's 96th Test Wing or the technical, contracting, and program management subject matter experts at Wright Patterson, Robins, Dahlgren and countless other locations, we will always rely on their assistance in developing, integrating and testing new technology, as well as providing new tools like digital engineering to help us do so. In answering the question succinctly, the capabilities and technology have changed. However, the PEO-FW team has always worked incredibly hard to ensure we are fielding the capabilities our nation needs. We will continue to do so to meet the challenges presented by great power competition, and ensuring SOF is best postured for counter-violent extremist organization operations. I am honored to once again be part of that rich legacy.

**A&M:** As USSOCOM Commander Gen. Richard Clarke mentions, next-generation intelligence, surveillance, and reconnaissance (ISR) capabilities are important to the future of SOF. As much as effective ISR can bring operational fluidity to a mission, how do you see current applications evolving in the fixed-wing domain?

**Col. Kuebler:** There will continue to be a significant role in the future for fixed-wing intelligence, surveillance, and reconnaissance (ISR) in USSOCOM's mission as outlined by the National Defense Strategy and the Interim National Security Strategy. The next generation of airborne ISR assets must be capable of delivering a decisive edge to



special operators competing against a mix of adversaries in a complex multi-domain battlefield including GPS-denied and access-denied environments. We will also continue to provide cost-effective ISR capabilities that provide special operations forces an overwhelming advantage in their counter-violent extremist organizations mission.

To meet these challenges, fixed-wing manned and unmanned ISR platforms will benefit from investments in intelligent technologies including automatic target recognition and fully automated aircraft operations. We will also continue to evolve a suite of advanced electro-optical and infrared sensors with long-range standoff capabilities that, when combined with maritime, ground, and space-based sensors, will give SOF operators a more complete picture of the battlefield than previously possible. Additionally, important evolutions in low-cost, long endurance, survivable aircraft capable of operating in austere or isolated environments will enable future airborne ISR assets to support our lethal warfighters through the next generation.

**A&M: In terms of airborne mobility, what are some current PEO-FW priorities for MC-130J Commando II and CV-22 Osprey, particularly regarding infiltration/exfiltration and resupply in hostile operation zones?**

**Col. Kuebler:** Our strategy is to leverage common government modular open systems approaches (MOSA) to increase our acquisition agility and deliver new capabilities at the speed of need. MOSA serves as a backbone for our system-of-systems to integrate and share information across our internal and external networks. This information enables the use of artificial intelligence and machine learning to expedite the decision-making processes throughout our programs and operations. Through airborne mission networking and secure agile software development, the mobility portfolios are quickly converging their infrastructures to continuously adapt to the warfighters' needs in the field for collaborative Joint all-domain operations with both SOF and conventional forces. SOF Acquisition, Technology & Logistics' past and future lies with our ability to identify and integrate best of breed capabilities with timelines measured in weeks or months, not years. With structured processes to deliver dynamic capabilities with speed, we can continue to work side-by-side with the warfighter to innovate enduring new ways of employing the MC-130J, CV-22 and future mobility systems to deliver disruptive effects in execution of the mission.

**A&M: From a precision engagement perspective, talk to current priorities for AC-130J Ghost rider and munitions.**

**Col. Kuebler:** The AC-130J gunship team remains focused on delivering premier close air support technologies. As of April of this year, we have delivered 21 combat aircraft and are positioned to deliver three more by the end of fiscal year 2021. As we look to continued deployments of the AC-130J, near term development will focus on improved defensive and training systems. As the command ensures we are optimally postured for great power competition we continue to incorporate advancements in tactical weapon systems such as the X-net radio enabled data-linked precision guided munitions. Finally, in tandem with the Mobility C-130J community, the AC-130J team will incorporate airborne mission networking and secure agile software development to ensure the platform remains more than relevant in tomorrow's fight.

**A&M: There is a lot of discussion and interest with regards to Armed Overwatch. Can you share any insight into the program?**

**Col. Kuebler:** First, it's important to understand that the Armed Overwatch program's purpose has not changed. The Armed Overwatch acquisition program provides SOF with deployable, affordable and sustainable manned aircraft systems capable of executing close air support, precision strike and armed intelligence, surveillance, and reconnaissance requirements in austere and permissive environments for use in operations against violent extremist organizations.

A year ago, we conducted an Industry Day where we met with industry members who were interested in participating in the program. Through subsequent phases of the ongoing acquisition process, we have competitively narrowed the field of vendors to those who demonstrated a likelihood of producing a successful prototype. Last Fall, congressional defense committees asked USSOCOM to conduct additional analysis to evaluate whether other material solutions or methods of employment of existing aircraft might meet Armed Overwatch acquisition program requirements before we conducted the demonstrations. That analysis is almost complete, and we look forward to further working with Congress to ensure we fully considered the many different facets of this program. If the analysis supports our original acquisition strategy, we are prepared to include up to five prototypes in a command-sponsored demonstration scheduled to take place this summer. We will then use the demonstration results to inform the next steps of the acquisition process toward a potential procurement of up to 75 aircraft.

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## ENSURING VERTICAL LIFT DOMINANCE ANYWHERE, ANYTIME

*Armor & Mobility spoke with Mr. Geoffrey Downer, Director for Special Programs (Aviation), U.S. Army Missile Command, and Program Executive Officer for Rotary Wing, U.S. Special Operations Command (USSOCOM), MacDill Air Force Base, FL, regarding some of USSOCOM's focus efforts in aircraft performance enhancements and incorporation of advanced mission equipment packages in vertical lift.*

**A&M:** From a modernization for future relevance strategic standpoint, what are some vertical lift PEO-RW priorities?

**Mr. Downer:** Program Executive Officer-Rotary Wing (PEO-RW) has received new aircraft from the Army or has procured new airframes for the 160th Special Operations Aviation Regiment's (SOAR's) AH/MH-6, MH-60M, and MH-47G aircraft through new aircraft buys or recapitalization efforts. These efforts will reset the basic airframes' lives, which will extend the aircraft operations for more than 20 years until the Army's Future Attack Reconnaissance Aircraft (FARA) and Future Long Range Assault Aircraft (FLRAA) aircraft are delivered to Special Operations Forces (SOF). With new airframes, PEO-RW's emphasis will be in aircraft performance enhancements and incorporation of advanced mission equipment packages (MEPs) to meet emerging mission requirements and developing plans for the next generation of vertical lift platforms.

PEO-RW will continue to investigate advanced and emerging technologies to provide the operator with the most advanced technology to perform their mission. Enhancements to the aircraft will provide the operator the ability to communicate, navigate, and aviate in all permissive and non-permissive environments. Examples include the Degraded Visual Environment Pilotage System, Common Avionics Architecture System cockpits upgrades, next generation tactical communications and improved multispectral sensors. We are starting to investigate data fusion to utilize the sensors on the aircraft and stitch information together to provide the operator a better picture with reduced system weight. With our required operational mission requirements and the constant growth of threats to rotary-wing aircraft, SOF will continue to look at improving aircraft survivability across the frequency spectrum. PEO-RW will continue to monitor other service efforts and continue to develop advanced active and passive survivability equipment in those areas where technology does not exist to provide the 160th SOAR the capability to operate in high-threat environments.

Lastly, PEO-RW is looking towards the future, developing initial plans to incorporate SOF-unique requirements into the Army's FARA and FLRAA programs to replace the 160th SOAR's AH/MH-6 and MH-60M aircraft. Additionally, the PEO-RW is also monitoring the work that the Army Future Vertical Lift Cross Functional Team is conducting with unmanned aerial systems and air launched effects. These aircraft will bring significant enhancements to SOF rotary-wing operations through improved speed, agility, lethality and open architecture systems as the DoD and SOF focuses



### Mr. Geoffrey Downer

Director for Special Programs (Aviation)  
U.S. Army Missile Command  
U.S. Special Operations Command  
PEO Rotary Wing

on near peer adversaries. The Technology Application Program Office has entered into contracts with the vendors developing the FARA and FLRAA aircraft to conduct design studies for SOF additional requirements of aerial refueling, troop transport, air transportability, and the incorporation of SOF unique MEPs. These studies will form the basis of the modifications that SOF will perform when they receive the aircraft in the early 2030s.

**A&M:** What are some completed and coming enhancements to the light assault/attack A/MH-6 Little Bird?

**Mr. Downer:** The mission-enhanced Little Bird is a versatile platform that can be configured rapidly into an attack or assault (troop carry) configuration. The platform has a long history with the 160th Special Operations Aviation Regiment (SOAR). The current Block 2.2 airframes have reached the end of their service lives with aging cockpits and limited capabilities for operating in high or hot conditions. The Block 3.0 aircraft will provide significant enhancements over the current Block 2.2 aircraft,



providing greater performance, added survivability, and better situational awareness to the operator.

Specifically, the Block 3.0 aircraft consist of a newly built, machined airframe that will extend the usable life of the fleet and expand the performance envelope of the system. The new airframes will be equipped with a performance kit that consists of a new higher performance rotor system with advanced airfoils and longer blades, a longer tail boom, and improvement to the tail rotor system. The Block 3.0 also has an advanced Aviation Management System (AMS) cockpit that has common functionality with the MH-60 and MH-47 Common Avionics Architecture System cockpits at a reduced weight. Both the Block 3.0 airframe and AMS cockpit have recently completed flight testing as Block 3.0 production has recently started.

Planned mission equipment enhancement for the AH/MH-6 Little Bird efforts include adding aircraft survivability equipment to provide aircraft protection, next generation tactical communications to improve ability to communicate with other air and ground assets, and an Improved Rotary Wing Electro-Optical Sensor to replace the current Q-3 sensor.

#### **A&M: What are some completed/coming enhancements to the medium assault MH-60M Blackhawk?**

**Mr. Downer:** The MH-60M program provides the 160th Special Operations Aviation Regiment medium lift assault and attack capabilities through Special Operations Forces (SOF) unique modifications to the Army's UH-60M aircraft. The program is currently in the Block 1 modification phase which focuses on upgrades to improve aircraft performance, situational awareness, lethality, survivability, and sustainability. The specific modifications made to the MH-60M aircraft during the Block 1 program consist of the addition of the Common Avionics Architecture System cockpit which is common with the MH-47G, addition of an aerial refueling probe to extend the operational ranges, incorporation of a wide range of SOF-unique mission equipment packages, and the addition of the General Electric YT706 engine.

Parallel to the Block 1 modification effort, the program is incorporating technology insertions to meet emerging requirements. Specifically, brown-out cameras have been installed to support operations in degraded visual environments, and the program is incorporating Secure Tactical Terminal (STT) and Link-16 radios to support tactical mission networking. We are also increasing the main rotor RPM operational range for improved aircraft performance. The program office is developing additional injections into the Block 1 aircraft with a second-generation Upturned Exhaust System IR suppressor system, Improved Rotary Wing Electro-Optical Sensor (IRES) to replace the Q-2 sensors, and upgrades to existing weapon systems to expand capabilities.

PEO-RW is developing future plans for the MH-60M Block 2 modifications with emphasis on payload restoration and aircraft performance enhancement. The predominant modification will be the incorporation of the Army's new improved turbine engine, which will increase the engine horsepower from 2600 hp to 3000 hp. The Block 2 configuration will also incorporate several weight reduction initiatives to remove nearly 500 pounds from the aircraft to restore aircraft combat load capability, add persistent communications, and continue efforts to enhance the aircraft's capabilities.

#### **A&M: What are some completed/coming enhancements to the heavy assault MH-47G Chinook?**

**Mr. Downer:** The MH-47G Block II is the next variant of the 160th Special Operations Aviation Regiment (SOAR) heavy assault rotary-wing platform.

The program has recently started the Block II modification phase and delivered the first two production aircraft in the past several months. The primary focus of the Block II effort is to replace the current fleet of aircraft with new machined airframes that will extend the life of the aircraft and have additional structural provisions to accommodate any potential future engine growth. The MH-47G Block II was designed to be common with the regular Army CH-47F Block II in order to increase the number of Army common components. The MH-47G Block II program also incorporates several weight reduction initiatives that restore nearly 500 pounds of payload capacity to warfighters. Examples of the weight reduction initiatives are under floor armor, a lighter-weight fuel pod that includes material design improvements for durability and reduced production cost, and wiring changes.

In addition to these modifications, the Active Parallel Actuator System (APAS) will be an upgrade to the current flight control system whereby the pilot will be provided tactile cueing generated from the aircraft systems and sensors. The system will reduce pilot workload and increase situational awareness, allowing the aircrew to increase their focus on the mission and conditions external to the aircraft. A tactile cue is a change in the normal feel and movement of the aircraft controls that alerts or warns the pilot prior to exceeding aircraft limitations. APAS is the first of its kind to be fielded in Army aviation and has tremendous growth potential for more mission systems to be integrated into the system.

And finally, another notable enhancement is the Degrade Visual Environment Pilotage System (DVEPS). It is currently being tested and integrated onto the MH-47G Block II aircraft to support safer mission execution in degraded visual conditions. DVEPS provides enhanced situational awareness information to the aircrews, which is of particular benefit when flying in reduced visibility conditions such as sand and dust. A degraded visual environment is one of the most hazardous conditions in which the pilots operate the MH-47G. DVEPS provides aircrews with aural and visual alerts via real time "see through" imagery on cockpit multi-functional displays. The data display is three dimensional and highlights man-made and natural obstacles, traffic on the ground, adjacent aircraft while operating in degraded visual environments, and suitability of the selected landing zone.

#### **A&M: Feel free to speak to other challenges/goals moving forward.**

**Mr. Downer:** With the Army's future delivery of Future Attack Reconnaissance Aircraft and Future Long Range Assault Aircraft, Special Operations Forces (SOF) will have a unique opportunity to change the way it modifies its aircraft to meet the 160th Special Operations Aviation Regiment's (SOAR's) specific requirements. Historically, the AH/MH-6, MH-60, and MH-47 were developed through a process where the existing aircraft were procured commercially (e.g., AH-6) or delivered to SOF by the Army (e.g., UH-60 and MH-47). After receiving the aircraft, they were then flown by the 160th SOAR to start developing tactics, techniques, and procedures, and identify capability gaps to begin developing/incorporating SOF-unique modifications. The capabilities that sit on the ramp today are a result of a Block modification and incremental technology insertion process that evolved the aircraft with the most advanced mission equipment and capabilities to perform SOF's worldwide mission. The SOF community has been working with the Future Vertical Lift Cross Functional Team lead and the Army's PEO-Aviation as the aircraft designs are being developed. SOF's early participation on the government team, in addition to the Army incorporating a modular open system architecture digital backbone, will provide significant cost and schedule savings on the initial fielding of SOF aircraft variants.

## INCENTIVIZING INNOVATION FOR ENHANCED MISSION OPERABILITY

*Armor & Mobility spoke with Col. Joel Babbitt, Program Executive Officer for SOF Warrior, U.S. Special Operations Command (USSOCOM), MacDill Air Force Base, FL, regarding some of USSOCOM's efforts in hybrid/electric drivetrains to precision strike/intelligence, surveillance and reconnaissance integration, to exploring autonomous/ semi-autonomous operation, to reducing thermal, acoustic, and visual signatures, to reducing cyber and electronic warfare vulnerability.*

**A&M:** From a ground mobility perspective, what are some considerations PEO-SOF Warrior factors into programs in order to maximize operator maneuverability?

**Col. Babbitt:** We're constantly driving innovation within our mixed fleet of vehicles to provide the foundational capabilities our operators need. Examples include more durable chassis, more powerful drivetrains, and modular designs that both meet requirements and deliver superior off-road maneuverability and handling in the most demanding operational environments.

Near-term priorities for ground mobility are focused on modernizing platforms to align with the National Defense Strategy and our commander's planning guidance. These priorities include key capabilities such as hybrid/electric drivetrains to provide silent drive and to support additional electronic capabilities; adapting platforms for precision strike/intelligence, surveillance and reconnaissance (ISR) integration; exploring autonomous/semi-autonomous operation; reducing our thermal, acoustic, and visual signatures; and reducing cyber and electronic warfare vulnerability.

**A&M:** With operator target acquisition and visual augmentation critical to mission success, how is technology advancing capability?

**Col. Babbitt:** Capitalizing on advances in power management has been a focus for visual augmentation systems. More efficient power utilization by consolidating power sources and only powering components individually and when disconnected will free up space and weight on our operators.

Current Small Business Innovation Research Phase I efforts are pushing developments in color, high-definition and digital cameras, as well as more powerful "smart" computer engines, which are being miniaturized to provide more capability in smaller packages.

Additionally, we're always keeping an eye out for promising, yet more radical solutions coming in from the startup culture here in America. For example, we're teaming with AFWERX and other government activities on developments in contact lenses that have



### Col. Joel Babbitt

Program Executive Officer  
PEO SOF Warrior  
U.S. Special Operations Command

augmented reality projected in front of the eye by an invisible display embedded in the contact lens. We keep our hands in these sorts of disruptive solutions because we prefer to disrupt ourselves, rather than wait for a competitor to disrupt us.

Our team relies on industry-driven advancements, big service development solutions that can be modified to SOF needs and other hybrid government/industry collaborations like AFWERX, SOFWERX, Sandia Laboratories, Irregular Warfare Technical Support Directorate and Science and Technology directorates to acquire advanced technology and transition a 60-80 percent solution to us. Once that capability is in the hands of users, we continue to improve it through a constant feedback loop between users and industry partners.

**A&M:** In terms of operator weapon systems, how are today's SOF balancing adequate firepower with low operations footprint?

**Col. Babbitt:** Our operators can be vulnerable without air support. As you know, aircraft require a very large footprint and logistics tail. We



are currently developing a capability to provide our teams close air support and precision fires launched from the ground, organic to our teams. Building on the success of the Switchblade 300 that has been used in theater for almost a decade, these new systems will be highly mobile and easily deployed, giving our operators the organic ability to see with a raptor's eye and strike moving or stationary targets with precision. Although concepts of employment and proliferation through our formations will be worked out over time, systems like this have great potential for not only decreasing our support footprint but also increasing our teams' effectiveness.

In the small-arms portfolio, we are focusing on multiple upper receivers that will provide superior firepower and be able to combine with service provided weapon components to reduce cost and streamline logistics. As an example, our Upper Receiver Group-Improved can increase barrel life of service M-4's by up to 3.5 times (from 10,000 rounds expected barrel life to 35,000 rounds). This will reduce the logistics tail needed to support our operators both in training and combat.

**A&M: As operator equipment is key to protection and survival, can you talk to any improvements in medic kitting and casualty evacuation?**

**Col. Babbitt:** We are always striving for better medical capabilities with a single goal in mind: to decrease preventable deaths on the battlefield. We're driving innovation in this area by maintaining positive relationships with both our outstanding medics and industry partners as well as monitoring for and evaluating shortfalls in our current capabilities and evaluating technologies to address those shortfalls. Through the years, we have constantly modernized our programmatic configurations (e.g. Operator Kit, Medic Kit, Casualty Evacuation Set). Some examples of this modernization include:

**XSTAT:** Advanced hemostatic technology for non-compressible hemorrhage.

**EMMA Capnography:** Advanced monitoring for respiratory management to include validation of surgical airway placement.

**Telemedicine:** Using telecommunication capabilities to transmit real time/near-real time patient data for tele-consultation/tele-surgical support in far-forward and austere environments.

**"Behind the Plate" Operator Kit:** Novel packaging in which operators are able to limit the burden of carrying their individual first aid kit on the outside of their body armor – freeing up much needed real-estate for other operational necessities.

**A&M: Feel free to speak to other PEO-SOF Warrior challenges/goals moving forward.**

**Col. Babbitt:** We have several short-term challenges, but for this answer we're going to look longer than what you normally expect. While we know that any course we set into the future will need revectoring over time, we see several trends and technologies that have the potential of evolving and potentially disrupting our current programs. Here are some of those trends and technologies we see affecting the hyper-enabled team into 2030:

**Zero-Processing, Exploitation, and Dissemination (PED) ISR:** Rather than sending raw data back to a cell of intelligence analysts, as processing power increases (either through quantum computing or increases in silicon-based computing) and artificial intelligence

(AI) makes significant leaps ahead producing useful capability increases, we see today's processing, exploitation, and dissemination being done by AI on servers in a team/platoon/squadron's vehicles, and eventually on the individual operator.

**Zero-Orbit ISR:** Rather than putting large pod-carrying drones and aircraft in the sky to provide target identification and confirmation from altitude, we see tactical cyber exploitation of ubiquitous mobile phones and existing civilian infrastructure, paired with fully-autonomous small drones, as providing all the ISR necessary to execute targets.

**Zero-Signature:** Advancements in signature management will make operators and their mobility platforms virtually invisible in both the visual and infrared spectrums. As night vision proliferates world-wide, the ability to avoid detection will replace the ability to see at night as a dominant competitive factor.

**Zero-Radio Frequency Signature:** As capabilities to detect, categorize, and visualize radio frequency (RF) capabilities emerge and proliferate, we see a team's RF emissions signature as being a primary vulnerability in strategic competition. Conversely, we see the ability to see RF-emitters as game-changing to tactical operations.

**Remote Presence:** Drones are already replacing human operators as the first in the door. As drones become increasingly capable, we see teams of drones executing objectives under the command of humans in increasingly remote locations of relative sanctuary with no presence required near the objective.

**Ubiquitous Flight:** In the United States, flying drone logistics and fully autonomous ground vehicles are already breaking long-standing policy blockages, paving the path forward. While flight will probably never make ground transportation obsolete, over the next decade we foresee a need to change the mix of large flying platforms and ground platforms to include smaller manned and unmanned flying platforms with maneuverability and speed characteristics parallel to what will exist where we operate.

**Untethered Logistics:** As the battlefield becomes more visible to all adversaries, the need to shift bases of operations more frequently and untether from normal logistics processes will increase. As such, we see technologies like water-from-air harvesting, solar/battery systems, and electric vehicles as helping lengthen the time teams can untether from logistics support. Additionally, we see logistics convoys and medical evacuation as fundamentally transforming to autonomous vehicles.

**Mass through Manufacturing:** Humans take decades to produce and train, and the morale effect of casualties is only growing in the hyper-connected, always-on world of social media and constant news. As such, drones will move from enabling humans to replacing humans as combatants. Drones can be mass produced in vast quantities by advanced nations while other nations may continue to use humans. This trend will drive the need to develop lighter, cheaper anti-materiel weapons as well as further develop anti-drone technologies for air, ground, and sea.

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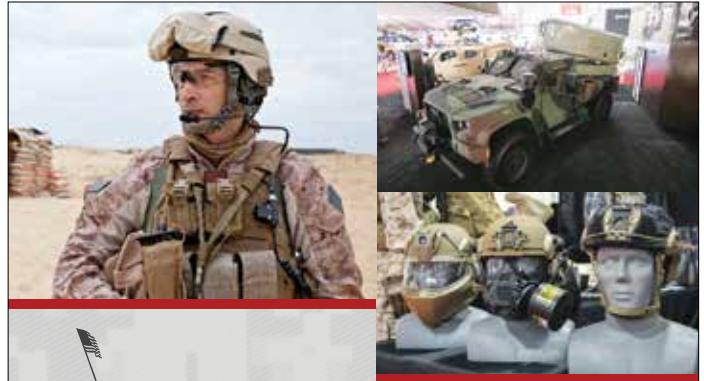
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