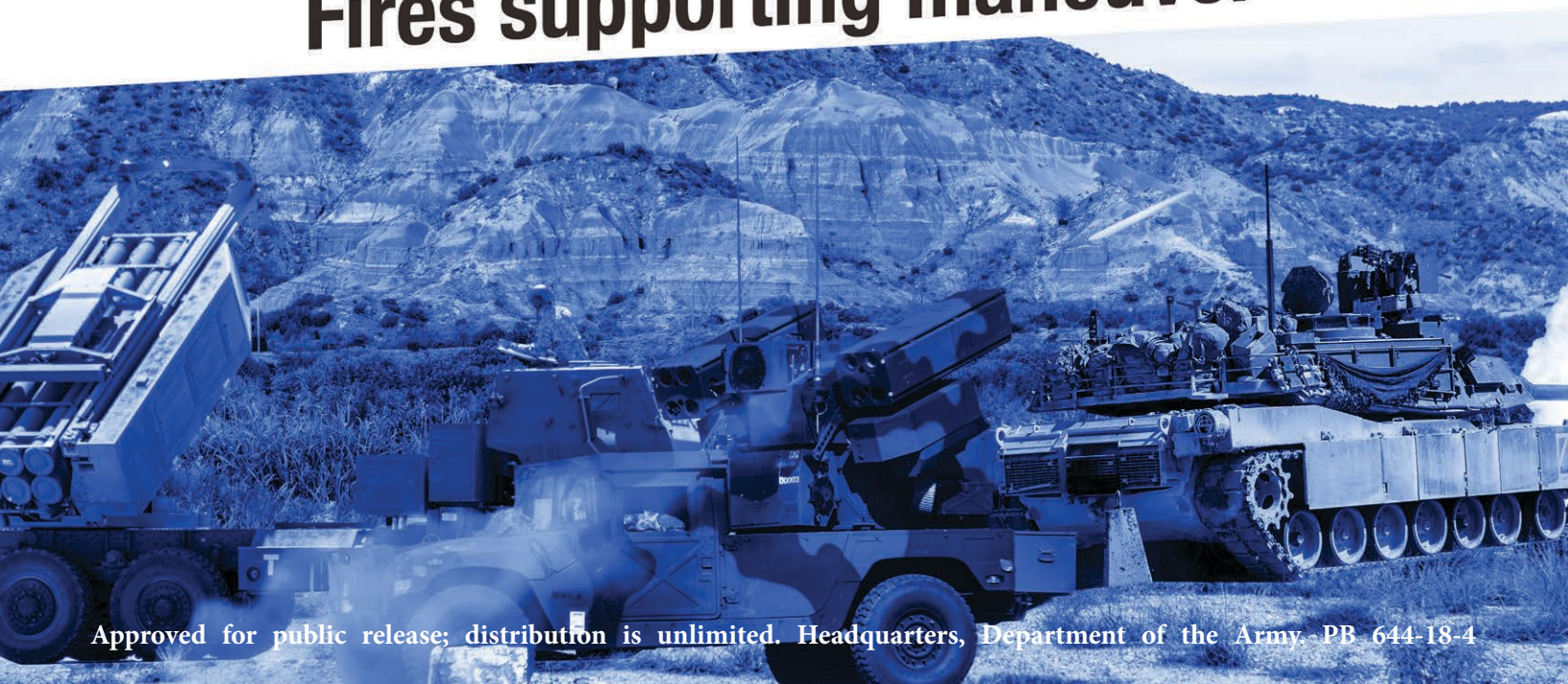
A joint publication for U.S. Artillery professionals

July - August 2018

Fires

Red + blue fight club

Fires supporting maneuver



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Disclaimer

Purpose

Originally founded as the Field Artillery Journal, Fires serves as a forum for the discussions of all Fires professionals, Active, Reserves and National Guard; disseminates professional knowledge about progress, development and best use in campaigns; cultivates a common understanding of the power, limitations and application of joint Fires, both lethal and nonlethal; fosters joint Fires interdependency among the armed services; and promotes the understanding of and interoperability between the branches, all of which contribute to the good of the Army, joint and combined forces and our nation.

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Soldiers of A Battery, 2nd Battalion, 130th Field Artillery, 75th Field Artillery Brigade, 35th Infantry Division, from the Kansas Army National Guard, work with U.S. Air Force crew to load two M142 High Mobility Artillery Rocket Systems (HIMARS), pre-dawn, in preparation for the Operation Diamond Torrent exercise, at an airbase in the United Arab Emirates. (Staff Sgt. Tina Villalobos/U.S. Army)

Rocket artillery and its place in decisive action

By Capt. Clint Custer

As a kindergartner, I remembered seeing images on CNN of these large box-shaped vehicles shooting hundreds of rockets into the sky when the Gulf War started. I asked my parents what was happening and they told me that in some place called Iraq, the Army was defending people that had been attacked and needed our help. Fast forward 20 years, and I found myself leading my own platoon of rocket artillery. Unfortunately, I saw just how much had changed since I saw them in action on CNN. When I was tasked to support a maneuver brigade at the National Training Center with rocket artillery, I was excited to see how effective we would be on the battlefield. Instead, I learned that maneuver commanders do not know how to use rocket artillery to shape their fight.

My next NTC rotation was no different. We were pushed to the side and rarely called upon to engage any target that wasn't a stationary command post. I needed to know why my unit was seen as an afterthought and not an asset and it was not very hard to find the answer.

Decades of fighting in Afghanistan and Iraq against insurgent cells and terrorists have decimated our Army's rocket artillery capabilities. The Gulf War was the last time the U.S. Army successfully employed rocket Fires in support of combined arms maneuver in a decisive action fight. The collapse of the Soviet Union and the shift to counter-insurgency (COIN) warfare eroded our capabilities as we reorganized to fight a different enemy. Emerging threats in North Korea and Europe have further highlighted the gap in firepower that has developed since the War on Terror began.

Our maneuver brothers and sisters have forgotten our role in decisive action. When they stopped calling for our support, we changed ourselves to stay in the fight. These changes have not been good. We are no longer organized to effectively support maneuver in a near-peer fight. Our weapons are not designed to provide mass firepower over a wide front. The Air Force has supplanted us in shaping the deep fight. All of these changes have negatively affected our

Marines with S Battery, 5th Battalion, 11th Marine Regiment, stage a High Mobility Artillery Rocket System in preparation for a Command Post Exercise (CPX) aboard Camp Pendleton, Calif., Feb. 6, 2018. (Cpl. Andre Heath/U.S. Marine Corps)

ability to fight and win our nation's wars. It is critical we address these changes and take steps to reverse them or we will have significant challenges shaping the fight for our maneuver forces in the future.

At the height of the Cold War, a Multiple Rocket Launcher System (MLRS) battalion was three batteries of nine launchers each for 27 launchers in a battalion. The same battalion has nearly half the fire power 30 years later, reorganized as two batteries of eight, for a total of 16 launchers. Additionally, there are only three field artillery brigades providing Fires to shape the deep fight for maneuver. Eighteenth Field Artillery Brigade supports special operations, 17th Field Artillery Brigade supports I Corps and 75th Field Artillery Brigade

supports III Corps. To make matters worse, 75th FA allocates three of its five rocket battalions on rotation to Korea. This leaves two battalions from 75th FA to support III Corps operations worldwide.

The Army has wisely reconstituted division artillery (DIVARTY) to be the force field artillery headquarters for divisions, but it has not given DIVARTY any organic long-range artillery to shape the fight for the division. Division and even corps artilleries previously had organic assets that could engage targets and shape the deep fight. However, these were deemed superfluous in the COIN environment. Bringing DIVARTY back is a step in the right direction, but without organic long-range Fires, they are little more than administrative headquarters. Giving DIVARTY organic rocket artillery would enable them to shape the fight without taking resources from the brigade combat team. Currently, National Training Center rotations simulating a decisive action fight only allocate a single platoon of rocket artillery to the division headquarters. What was 27 launchers at a minimum is now only four.

The COIN environment has forced rocket artillery to innovate in order to stay relevant. This has led to increased focus on precision guided, high explosive weapons. The use of forward operating bases (FOB) has also changed how rocket artillery is employed in the field. Establishing and securing a position area for artillery on the battlefield is a lost art among section chiefs and platoon leaders that never left the FOB. The High Mobility Artillery Rocket System (HIMARS) is a fantastic weapon system that enables long-range rocket and missile precision Fires to be readily employed around the globe. By reducing weight and placing the launcher module on wheels instead of tracks, it is air mobile, however, it sacrifices half the ammunition capacity of the M270. Another consequence of the War on Terror is the U.S. Army's pivot away from Dual Purpose Incendiary Cluster Munitions (DPICM). DPICM creates unexploded ordnance on the battlefield and that has many negative long-term consequences for military personnel and civilians alike. Those consequences do not make them less important in a conflict with a near-peer adversary. The Guided Multiple Launch Rocket System (GMLRS) rocket and Army Tactical Missile System (ATACMS) are precise munitions that work great for high-value targets, but are not capable of disrupting large formations. The Russians have continued to use the BM30 Smerch against ISIS with great success and are clearly advancing their capabilities while we are content refurbishing Reagan-era technology.

This shift in priorities has given commanders the freedom to quickly move launchers from FOB to FOB in Afghanistan and Iraq to eliminate high-value targets with precise strikes and virtually no collateral damage. As a platoon leader, executive officer, and fire direction officer at the battery and battalion level of a HIMARS unit, I know how effective this platform can be when used in the COIN fight. I also have experience with how ineffective this vehicle is when employed as if it were a M270. The

A High Mobility Artillery Rocket System is fired by U.S. Marines with Headquarters Battery, 5th Battalion, 11th Marine Regiment, 1st Marine Division, in support of Fire Exercise 2-18 at Marine Corps Base Camp Pendleton, Calif. (Lance Cpl. Alexa M. Hernandez/U.S. Marine Corps)

high weight of a launcher on a light medium tactical vehicle chassis leaves it susceptible to mud and limits its travel to local road networks. When employed in a traditional rocket artillery role, the HIMARS is actually less mobile and delivers less steel on target than its counterpart. This is not to say that the HIMARS is not a valuable asset to the Army, but it is not designed to tackle the massed armored formations coming through the Fulda Gap or crossing the 38th Parallel. The tracked M270 certainly has its problems, but conducting operations in a decisive action fight is not among them. It outshines the HIMARS in this environment.

Maneuver commanders have grown accustomed to operating with air superiority. Our adversaries are aware of this and have spent time developing and manufacturing effective air defense systems. Their doctrine states they will not contest our air superiority from the sky, but through a proliferation of man portable air defense systems and surface-to-air missile systems. Operating under the assumption that the AH-64 and close air support will be available is wishful thinking at best, and irresponsible at worst. To exploit our overmatch in the air and maximize our ability to fight across multiple domains, it is absolutely critical to suppress enemy air defense. Rocket artillery is one of the few platforms with the range and munitions capable of performing this mission. A platoon of M270 launches enough rockets in one volley to saturate a 500M radius with DPICM. Anything within that circle is going to feel those effects, moving or stationary. The GMLRS and ATACMS also provide the commander with the ability to reach stationary targets at range regardless of how much enemy air defense is present, eliminating the need to send an aircraft into a dangerous situation.

We may have forgotten how critical a role rocket artillery plays in combined arms, but our enemies have not. We need more rocket battalions now, and they need to be structured within the DIVARTY in order to shape the fight for the division and brigade. The Army and Department of Defense need to rethink their prioritization of expensive, precision guided munitions and bring DPICM back into the fold. Commanders at the brigade level and their fire support coordinators need to be aware of the awesome capability rocket artillery brings to the fight and use it in conjunction with air support, not as a last resort. The rocket artillery community continues to be overlooked in the Army, even by some fellow Redlegs from the cannon world. A perception exists throughout the Army that our equipment is old and outdated and we provide limited utility on the battlefield. It is our duty as field artillerymen to address this knowledge gap. Rocket artillery can shape the deep fight when air power can't, due to weather or enemy air defense. In the fight against a near peer, this capability is invaluable and it is our responsibility, as fire supporters, to ensure commanders use it effectively.

Capt. Clint Custer is an Eighth Army fire support officer. Custer commissioned at the Virginia Military Institute and has been a field artillery officer for six years in all rocket units. He has been a platoon leader for a High Mobility Artillery Rocket System battery, a battery fire direction officer, a battery operations officer and battalion fire direction officer. He has participated in three National Training Center rotations as the battalion fire direction officer and liaison to the brigade Fires cell.

Soldiers of 1st Battalion, 6th Infantry Regiment, 2nd Brigade Combat Team, 1st Armored Division, discuss their plan of attack during Decisive Action Rotation 17-08 at the National Training Center in Fort Irwin, Calif. (Spc. Dana Clarke/U.S. Army)

Learning to speak maneuver

By Capt. Joshua Urness

I am not what you would consider to be a "car person" which means that I usually pay for maintenance and don't look under the hood unless I see smoke. Sometimes when car people tell me about some new upgrade they made to their car, I act like I understand, but my eyes glaze over because I have no comprehension of what they are saying. When I arrived at my first Patriot unit, I felt exactly the same way.

I had spent the first several years of my career at an Avenger/Stinger unit, and to be honest, we didn't do a whole lot of Avenger/Stinger things. In fact, not too long after I left the Basic Officer Leaders Course at Fort Bliss, Texas, we deployed to Afghanistan where I conducted convoy security missions in support of NATO.

Reading Brig. Gen. Randall McIntire's "Short Range Air Defense (SHORAD) Vision," in the November-December, 2017 issue of the "Fires Bulletin," brought back to life the complexities of cross-branch integration that I experienced transitioning from SHORAD to Patriot. McIntire, the U.S. Army Air Defense Artillery School commandant, used his SHORAD vision as a conduit to describe how the world had changed, so the Army must also change. He explained that the Army divested divisional air defense capabilities during the Global War on Terror, but since the rise of peer adversaries, increased use of drones and greater threats to U.S. maneuver forces, SHORAD is needed now more than ever. In summary, air defense will reintegrate with maneuver units in an effort that began last summer and continues over the next several years.

I think that one of the first and central challenges the air defense branch will face in the early stages of maneuver integration is what I described earlier as the "car person" dilemma.

To non-air defenders, our tactics jargon and joint brevity-based lexicon could seem like a lot of car talk. Similarly, our lack of experience with maneuver tactics and their language could result in a similar glazed-over effect for air defenders. The good news is that we can begin to address this challenge immediately (unlike equipment and personnel availability) by institutionalizing a process to prepare air defenders for integration with maneuver units.

We can do this by visualizing the elements of a relationship that we want to have with our maneuver partners, and some of the communication skills necessary to achieve that relationship. This effort can be further improved through the leveraging of lessons learned by other technical branches, like cyber, that recently undertook a simi-

lar effort. In the following sections, I will outline those elements, skills and some of the lessons that I found most compelling. I will do this through a "LESS is more" framework, the basis of a way of tackling the challenges posed by these initial stages of integration. "LESS is more" is a bumper sticker created to make the concept sticky and is based on the acronym LESS, which stands for learn the language, education, simplify and storytelling. Similar to simplicity or the old adages about being brief and gone, "LESS is more" is intended to draw on that same principle.

L: Learn the language

The first step to maximization of air defense contributions to the maneuver force should be the intentional pursuit by air defenders to research and learn the maneuver language. Because the maneuver language is well established in doctrine and culture across the Army, the research part is not as important as the intentional pursuit of its comprehension. It is, therefore, the key to guiding our development of integration based concepts, concepts that maximize air defense strengths and meet maneuver force's needs.

The goal of learning the maneuver language is fluency: our ability to fully comprehend and communicate naturally in the given language. As many of us have experienced when trying to learn a foreign language, knowing the right words is simply not enough. As in language learning, this increase in fluency often occurs most efficiently through observation and immersion in the culture and language location, not abstractly from the comfort of our own culture or home. Thus, learning the language is not an end in itself but a means by which we attain fluency. In this way, through adequate language preparation, fluency is achievable after immersion, in this case integration with the maneuver unit.

The culmination of this effort should be the codification of language meaningful to air defenders in the maneuver lexicon. This should be promoted at an institutional level through increased presence of ADA related topics in documents like Field Manual 3-0: Operations, the foundational work for developing tactics at training centers and across the Army. The cyber community has adeptly learned the language of maneuver and translated the effects of their operations into tactical mission tasks, such as deception, blocking or denying. These words, customary in the communications of the maneuver community, efficiently convey the mission and intended effect without confusing technical jargon. Because it seems natural, it denotes fluency.

E: Education

The rise and preeminence of air threats on the battlefield pose a new and challenging dimension of warfare for maneuver units that cannot yet be fully understood. As a representative of air defense within a maneuver unit, we must own the responsibility to educate our partners on how to approach decision making and fight air defense systems in this new dimension. This education should be conducted formally through briefs and informally through everyday interaction. It should also be done smartly, taking into consideration the needs of the audience with time and attention span, while focusing on enhancing recollection or stickiness of key principles.

Cyber epitomized education in the creation of their messaging and products, defining both capabilities and limitations, while developing the audience understanding of threats. In the case of air defenders presenting a capabilities and limitations brief to our maneuver audience, as many of us may do as an initial step in our relationship-building activities, we must fight the urge to give the hour-long technical brief. Besides following the guidance on simplicity (discussed in the next section) and language, be very clear about the digestible concepts that you want the audience to remember and make the concepts stick. Inversely, what may resonate more with the audience is beginning with threat briefs. When developing a concept of operations, we always draw where the enemy is first. Painting a clear and poignant picture of the air threat to maneuver forces will clear some of the brush and skepticism off the trail and should empower you to discuss what you bring to the fight; what air defense can do for them.

S: Simplify

If you are reading this quickly you may take this to mean that we should dumb down what we say when we are talking to professionals outside of air defense. On the contrary, out of respect for our counterparts, through endeavoring to learn their language and culture, we also gain an understanding for what really matters to them. What simplicity really means is to avoid "air defense-splaining." That means to unconsciously or overtly explain an air defense-related topic, or concept, to someone who is not an air defender, in such a way that could be perceived as condescending because it assumes their lack of knowledge. Similar to the concept of "man-splaining," a term popularized across the internet over the last year, "air defense-splaining" is corrosive to relationships and does not engender trust or mutual understanding. It should be something that we, as air defenders, intentionally avoid and consciously develop an awareness for.

The greatest challenge of simplicity is that many of us believe our most significant contribution to any organization is our technical aptitude, which we often conflate with effectiveness or intelligence. However, the mark of our effectiveness and usefulness to other staff officers, staff primaries and, by proxy, the maneuver decision maker, is based on our ability to communicate an idea or concept in a way that can be understood. In the case of maximization of the air defense contribution on the battlefield, this challenge is further complicated by time, or the lack thereof, especially in a rapidly developing situation. It should be noted that your effectiveness in maximizing the ADA impact on the battlefield begins long before the first shot is fired with trust earned through our intentional pursuit of relationship. Simplicity is especially important when communicating resource requirements or constraints. Translating a need to an effect on the battlefield that is relevant and comprehensible is key. Demonstrating an awareness of your audience's needs and meeting those needs through efficient communication will also reinforce your credibility.

S: Storytelling

Stories or case studies take complex information or concepts that could be highly technical and challenging to understand and turn them into easily digestible courses. Stories also enhance the stickiness or retainability of an idea. They can be written as complete fiction with the purpose of teaching a lesson or concept, or can be true stories delivered in a way that emphasizes lessons learned. One example of how the maneuver community uses stories to better understand how to make decisions is the book, "The Defense of Hill 781," which takes place at the National Training Center at Fort Irwin, Calif. This story (expected reading for maneuver officers) provides a mechanism for how to solve problems at a tactical level based on a conventional warfare context. It even includes an example of failures of SHORAD to defend the maneuver force (based on what appears to be the "stinger under armor" concept).

A Soldier with D Troop, Regimental Engineer Squadron, 2nd Cavalry Regiment talks on the radio during a Low Level Voice Intercept as part of Exercise Allied Spirit VII at the 7th Army Training Command's Hohenfels Training Area, Germany. (Gertrud Zach/U.S. Army)

The cyber community has leveraged the "LESS is more" principle to bridge their own gap with maneuver forces. They did this, without "cyber-splaining." Instead they created a story-based product through the Asymmetric Warfare Group, "The Defense of Battle Position Duffer: Cyber Enabled Maneuver in Multi-Domain Battle." This product follows all of the elements of an ideal relationship that were outlined above. It is simple and easy to read. It uses maneuver language to tell a story that facilitates the creation of sticky concepts on how to operationalize, exactly as the title implies- maneuver conducted with support from cyber. It also communicates how to think about cyber threats that may be faced at a tactical level. The best part is that the product tells the story through the conduit of a seminal work that all maneuver leaders read in professional military education called "The Defense of Duffers Drift." See the citation below to read it for yourself. I think a storytelling or decision making (like choose-your-own-adventure but to hone leadership or skill focused decision making) based concept like this could serve the air defense-maneuver integration very well.

Adhering to the "LESS is more" guideline and following the examples and lessons learned from our cyber counterparts, air defense can efficiently bridge the gap with maneuver forces. Efforts such as a "Duffers Drift" type project could be further complemented, as described earlier, by increased involvement in the development of operational level concepts or key Army doctrine, such as FM 3-0: Operations. Additionally, our institutional knowledge could be greatly increased through the sending of more ADA officers to maneuver professional military education, especially the Captain's Career Course. Finally, greater emphasis on "Project Warrior" type programs will surely enhance our branches ability to dynamically adapt as we continue through this integration. These recommendations are certainly not a panacea of relationship building but they are a good first start to avoiding the "car person" dilemma.

Capt. Joshua Urness is an air defense artillery officer that has served in both Patriot and Short Range Air Defense battalions. He has deployed to Afghanistan and the Kingdom of Bahrain. He also serves as the editor for the "Weekly Interceptor," a product focused on air defense current events.

Fires supporting maneuver

The need for an update

By 1st Lt. David Brister

With current technologies, artillery units cannot effectively defend against any future near-peer adversary with their outdated assets. Dave Majumdar, who wrote "The U.S. Military Isn't Ready for a War with Russia or China," quoted Gen. Mark Milley saying "While the United States would ultimately prevail in a hypothetical high-end war, Washington would pay a high price in blood and treasure."

The current possibility of war with North Korea, China or Russia has the United States re-evaluating its assets to combat these possible scenarios. According to Sydney J. Freedburg in his article, "Army Races to Rebuild Short-Range Air Defense: New Lasers, Vehicles, Units," the Army wants artillery to play a more significant role in future conflicts. However, artillery units will struggle with adapting to updated technologies as they have primarily been conducting counter-insurgency operations for over 17 years. In order to succeed in a near-peer conflict, many variables must be re-examined. From technologies, to training operations with foreign allies, artillery units are in need of an update to meet the demands of the Army.

Since Operation Enduring Freedom was launched Oct. 7, 2001, the United States Army has primarily focused on counter-insurgency operations. During that time, artillery units were issued the M109A6 Paladin. Its ability to lay itself and move with any maneuver element assisted greatly in Afghanistan and Iraq. In addition, its ability to carry its own ammunition, travel up to 60 mph, and defend itself with a crew-served weapon increased its lethality as a weapon system. The Paladin proved to be a favorite for many Soldiers on the ground due to its ability to provide accurate and responsive Fires. It is able to displace in less than three minutes and occupy a firing point in less than five minutes, however, all machines have their faults. The M109A6 consumes a significant amount of fuel. The armor plating was reduced to make it

An M109 Paladin gun crew with B Battery, 4th Battalion, 1st Field Artillery Regiment, Division Artillery at Fort Bliss, Texas, fires into the mountains of Oro Grande Range Complex, N.M. 4-1 FA conducted a combined live fire exercise with 2nd Squadron, 13th Cavalry Regiment, 1st Armored Division to maintain combat readiness. (Spc. Gabrielle Weaver/U.S. Army)

lighter for movement, but subsequently left it vulnerable to armor piercing 7.62 mm. It also limits the crew's and chief's movements due to its compact space.

After considering all these problems, the U.S. developed the M109A7. It is currently being evaluated to see how it meets the demands of Soldiers and chiefs. It comes with the Paladin Integrated Management system, a 600 horsepower engine, provides extra room to maneuver inside, holds additional rounds and is heavier in order to reduce the recoil. Many countries have similar capabilities of the Paladin, but none are able to operate with its effectiveness. The M109A7 upgrade will provide artillery units the ability to effectively combat any enemy force.

Other systems that are being updated to combat neer-peer adversaries is the Multiple Launch Rocket System (MLRS). It can effectively range any target within a 60 kilometer radius and provide effects that gave it the nickname "The Grid Square Removal System." Its guided munitions proved true to its name during the Afghanistan and Iraq wars. They gave lethal effects with limited collateral damage. However, the need for Short Range Air Defense (SHORAD) and missile defense has peaked the Army's need to conduct further testing with MLRS. Some MLRS units will be modified in order to be converted into a Integrated Fire Protection Capability (IFPC) to fire the AIM-9X missile. The AIM-9X has the ability to destroy a low-flying cruise missile from the ground. In addition the IFPC will operate off a new command and control network, the Integrated Air and Missile Defense Battle Control System (IBCS). Freedburg said this network will work off a wide array of radars to provide targeting data.

The IFPC and IBCS will go into service in 2020 and will potentially receive updates to fire lasers to combat ballistic missile threats. Since the IFPC will mirror MLRS control systems, artillery units can limit the need to change established tactics, techniques and procedures (TTP) for operating the IFPC.

The IFPC will greatly benefit the Army as a whole as it serves as a cheaper alternative to firing a Patriot missile in the event of a combat ballistic missile threat.

Besides howitzer and MLRS units, SHORAD units are also about to receive an update that will shape the outcome of potential conflicts. The United States has discovered that unmanned aerial systems (UASs) are a severe problem to maneuver units due to their ability to observe unit locations. This was demonstrated during the ongoing conflict between Russia and Ukraine. The Russian MLRS destroyed many battalions due to UAS flying over Ukrainian units and sending the location to Russian command centers. These effects raised awareness of the lethality of UAS not only in Europe, but how it can eliminate U.S. maneuver units as well.

Currently, the U.S. Army has no means to combat UAS other than using the Avenger system or Patriot missiles. There are two active SHORAD battalions in the active Army and only seven in the Natinoal Guard. This is mainly due to the Army's decision to cut funding to SHORAD during counter-insurgency operations. The Army is now refunding SHORAD battalions as Russia and China's current capabilities grow and possibly outmatch the U.S.

The United States Army reached out to Boeing for assistance in developing a cheaper alternative to the Avenger system to combat this problem. The alternative in question is a laser that is positioned on top of a Stryker that fires up to five kilowatts of power to shoot down any UAS. It has proven effective while also maintaining the ability to carry up to nine Soldiers inside the Stryker. This platform will still allow for transportation of Soldiers while providing them with more effective defensive capabilities. With further development, these lasers could be attached to artillery unit's prime movers in order to combat UAS and counter-battery threats.

At the Fort Sill Fires Conference in 2017 Milley said, "Currently, if you are in a position longer than three hours, you're dead," in response to how the U.S. would fare in a near-peer conflict.

According to Milley, U.S. radar systems will need to be upgraded to not only combat counter battery, but small UASs as well. This is in direct response to North Korea's and Russia's military capabilities as they have increased the use of their radar units. With the capability to combat UASs and counter battery, artillery and SHORAD battalions will be able to push more lethal effects at any near-peer adversary.

Although the U.S. is more than capable of maneuvering artillery units in war, operations with allied nations will need to be reassessed. Relations with other nations have been engraved in our nation's history since the Revolutionary War. Since North Korea has developed a nuclear program, joint operations have become more frequent. In a show of force, operations such as War Fighter simulations with the U.S. and South Korean Army are held. These simulations have demonstrated an increase of cohesion between both countries to defeat a simulation against North Korea. Other examples include when the 2nd Brigade, 4th Infantry Division deployed to Eastern Europe to conduct presence patrols to deter the Russian Army from invading. NATO forces alongside U.S. personnel conducted large-scale transportation exercises, infantry maneuvers and war simulations. With further joint operations, near-peer conflicts can end more quickly due to the cohesion between allied nations.

In conclusion, technologies that are in development for artillery units will greatly benefit the U.S. in a potential near-peer war. However, there is still room for improvement as a potential high-end war will bring more issues to light. Many adversaries are prepared and waiting for a chance to go to war with the U.S. The past 17 years have allowed them the time to combat our current abilities and develop their own methods for combating our TTPs. Artillery units must rely on updating their technologies in order to combat air threats and support maneuver. The U.S has granted the field artillery more funding for its 2019 budget allocating for further advancements and training operations. Corresponding with these greatly needed updates and additional training opportunities, the U.S. military will surpass any adversary for years to come.

1st Lt. David Brister is the 1st Platoon leader in B Battery, 2nd Battalion, 11th Field Artillery Regiment stationed at Schofield Barracks, Hawaii. Brister trains Soldiers to be proficient in their gun line tasks and ensures they are prepared to take on any mission. He commissioned as a field artillery officer in May 2016 after graduating with a Bachelors in Industrial Technology from Tarleton State University in Stephenville, Texas.

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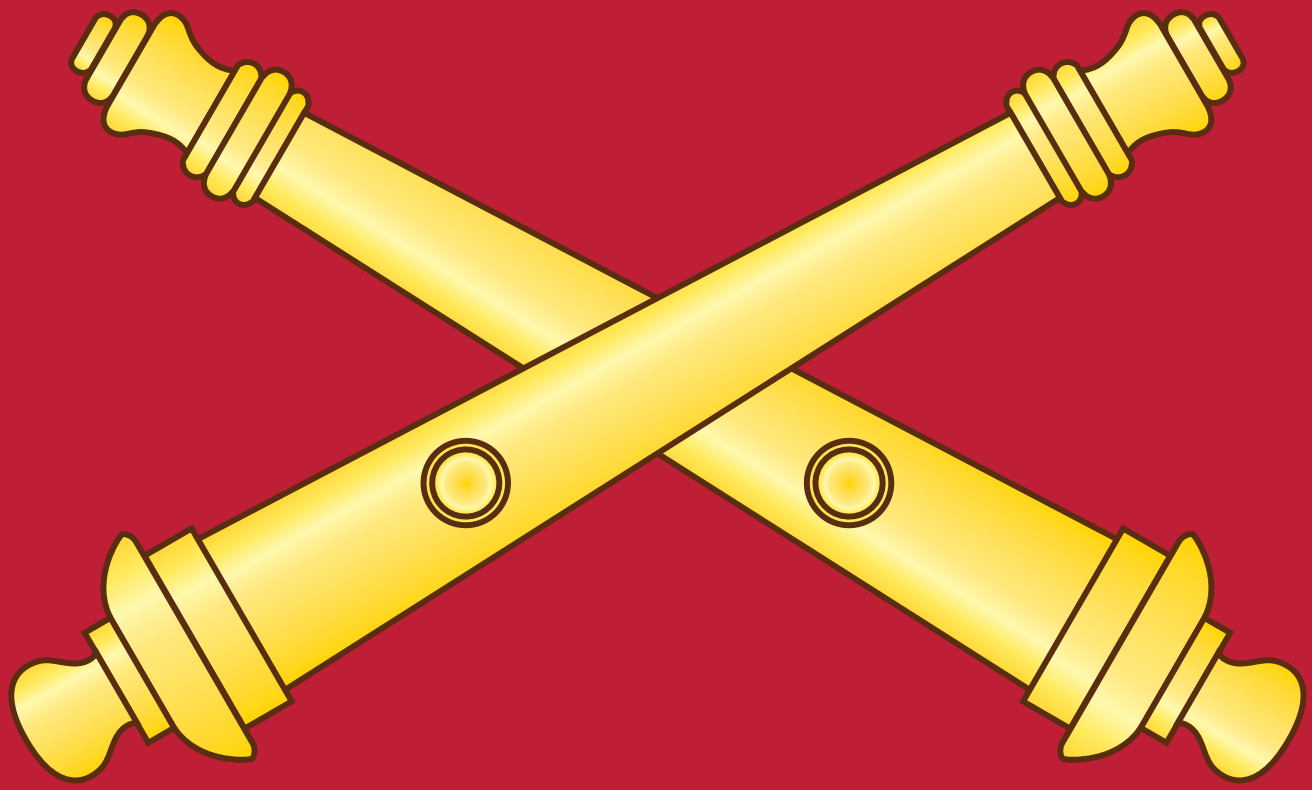


The 2017 Knox, Hamilton and Gruber Awards

The U.S. Army Field Artillery School has announced the winners of the 2017 Knox, Hamilton and Gruber awards for excellence within the field artillery branch. These awards are presented annually and recognize excellence by unit (active and National Guard) and individual. Congratulations to the 2017 award winners.

FIELD ARTILLERY HENRY A. KNOX AWARD

Soldiers assigned to C Battery, 1st Battalion, 320th Field Artillery Regiment, 2nd Brigade Combat Team, 101st Airborne Division, fire a M777A2 howitzer in support of Iraqi security forces at Platoon Assembly Area 14, Iraq, Dec. 7, 2016. C Battery conducted the fire mission in support of Combined Joint Task Force - Operation Inherent Resolve, the global Coalition to defeat ISIL in Iraq and Syria. (Spc. Christopher Brecht/U.S. Army)

The Knox Award is named after the first Chief of Artillery and first Secretary of War, Maj. Gen. Henry A. Knox. Originally called the Knox Trophy and Medal, the award was established in 1924 in order to recognize the best field artillery battery and best enlisted Soldier. The award was lost during World War II, but reinstated in 2002 for active-duty FA units, with the individual Soldier award being replaced with the Gruber Award. For accomplishments in the year 2017 congratulations are owed to C Battery, 1st Battalion, 320th Field Artillery Regiment (101st Airborne Division, Fort Campbell, Ky.) as the recipients of the Henry A. Knox Award.

During their deployment for Operation Inherent Resolve, C Battery massed 2,079 rounds against enemy forces in Mosul and Northern Iraq. During that same deployment, C Battery impressively earned the coveted Gold Air Assault streamer for achieving higher than a 90 percent air assault qualification rate. Upon returning from their deployment, C Battery quickly reset and initiated an intensive training regimen driven by the lessons learned from their previous deployment. Beginning in May and ending in September 2017, the battery conducted two platoon air assault artillery raids, one battery air assault infiltration operation, Table VI through XV certifications and a battery field training exercise. They also completed the battery artillery readiness test concurrently with an emergency deployment readiness evaluation. In keeping with the battery's high level of excellence and commitment to the mission Staff Sgt. Nicholas Davis stands out as an individual who embodies the battery's call to community service. Davis received the Soldier's Medal after he saved the lives of two civilians with no regard for his own well-being. C Battery stands out as a testament to its high level of dedication to mission, standards and adherence to the Army Values.

FIELD ARTILLERY ALEXANDER HAMILTON AWARD

Top: Soldiers of A Battery, 1st Battalion, 129th Field Artillery Regiment, Missouri Army National Guard, pose for a unit photo. Bottom: Soldiers of A Battery, 1st Battalion, 129th Field Artillery Regiment, Missouri Army National Guard, conduct a live-fire exercise. (Courtesy photos)

The Hamilton Award is named after the first Secretary of the Treasury and Continental Army Artilleryman, Alexander Hamilton. The award was established in 2002 in order to recognize the best Army National Guard field artillery battery. For accomplishments in the year 2017, congratulations are owed to A Battery, 1st Battalion, 129th Field Artillery Regiment, Missouri Army National Guard, as the recipients of the Alexander Hamilton Award.

Fiscal Year 2017 was an outstanding year for A/1-129th FAR. The unit's excellence in all duties exemplify the outstanding traits and characteristics for which Alexander Hamilton stood. A Battery earned the battalion's coveted Thunder-Stick award for demonstrating superiority in all objectives, outperforming other units in the 1-129th FAR.

A Battery continuously exceeded the demands of its higher headquarters by completing all mandatory tasks, online training requirements, annual briefs, Warrior Tasks and Battle Drills in addition to howitzer section and crew training. When A Battery is not putting steel on target in the field, it is accomplishing assigned missions at home station during individual duty training (IDT) weekends. Preparation and robust training is the unit's focus during IDT weekends which drives excellence and high levels of morale and retention. The unit excelled in all organizational inspections, including a commendable rating on its S1 combined staff inspection and a satisfactory rating on the training management inspection.

A Battery is an organization that is extremely proud, motivated, and determined to face any challenge and to produce remarkable results. The Soldiers of A Battery live up to the battalion motto of "Send your mission."

FIELD ARTILLERY EDMUND L. GRUBER AWARD

Sgt. 1st Class Jaime Castro (left) is congratulated for being awarded the 2017 Edmund L. Gruber Award. (Courtesy photo)

The Gruber Award is named after a noted field artillery officer, Brig. Gen. Edmund L. Gruber, who as a first lieutenant in 1908 composed the "Caisson Song," which was later adapted to the "Army Song" in 1952. The award was established in 2002, but was once part of the Henry A. Knox Award from 1924. The award recognizes the best field artillery Soldier for their significant contributions to enhance the field artillery. For accomplishments in the year 2017, congratulations are owed to Sgt. 1st Class Jaime M. Castro, 5th Battlefield Coordination Detachment, Hawaii, as the recipient of the Edmund L. Gruber Award.

Castro's performance as the senior fire control noncommissioned officer for 5th BCD during Fiscal Year 2017 has been nothing short of exceptional. Through his own initiative, he worked directly with Advanced Field Artillery Tactical Data System (AFATDS) field support representatives (FSRs) to improve the functionality and capability of the AFATDS software that will be incorporated in future versions. His progress and abilities to work through current technological deficiencies has been noticed, highlighted and his implementations have been provided to the Fires Center of Excellence, the FSRs and AFATDS software designers to ensure the progressive efficiency of the field artillery's force operating equipment.

Taking his understanding and expertise within the realm of the field artillery and its application, Castro has a truly advanced understanding of his craft and has worked to great lengths to make our "inter-branch" cooperation more efficient. Castro's efforts to integrate the Army and Air Force mission command systems on Global Command and Control System-Joint ensured that the Joint Forces Land Component commander was able to transmit their equities to the Joint Forces Air Component commander and ensure targets were collaboratively and holistically serviced regardless of domain or kinetic/non-kinetic effects.

First Lt. Logan Wilson, Sgt. Alec Pawloski, and Spc. Dakota Davis celebrate the completion of Mountain Peak 18, an 18-day Brigade Culminating Training Exercise at Fort Drum, NY. Their fire support team conducted over 70 calls for fire while supporting A Troop, 1st Squadron, 89th Cavalry Regiment's reconnaissance and security missions. (Courtesy photo)

Resurrecting the light cavalry's fire support

Restructuring the IBCT squadron fire support teams to maximize capability

By Capt. Kyle Robert East

"Reconnaissance assets, like artillery assets, are never kept in reserve. When committed, reconnaissance assets use all of their resources to accomplish the mission."

- Chapter 1: Reconnaissance Field Manual 3-90-2

Over the course of the last year, 2nd Battalion, 15th Field Artillery Regiment has identified significant shortfalls in the utilization of our three fire support teams (FSTs) tasked to support the reconnaissance squadron. Currently, troop commanders are faced with the challenging decision between utilizing the fire support team's M1200 Armored Knight to execute their fire support plan, or retain their fire support officer (FSO) within the troop command post to conduct fire support planning. It has become common practice during troop field training exercises and combined arms live-fire exercises for troop commanders to only utilize Option 2 when employing their fire support team. This results in the team's M1200, the brigade's most capable target location platform, to remain in the troop command post instead of observing mission critical targets.

Due to the current manning within our fire support teams, we are unable to utilize the M1200 Armored Knight's full capability while simultaneously supporting the troop commander's directed placement of their supporting FSO. Ultimately the long-term solution requires a modification table of organization and equipment change which our battalion is working to address through white papers. Still, we must continue to support the squadron with the resources currently available within the artillery battalion. We have identified a course of action that, with minor changes to the current fire support structure inside an infantry brigade combat team's field artillery battalion, would fully support the troop commanders

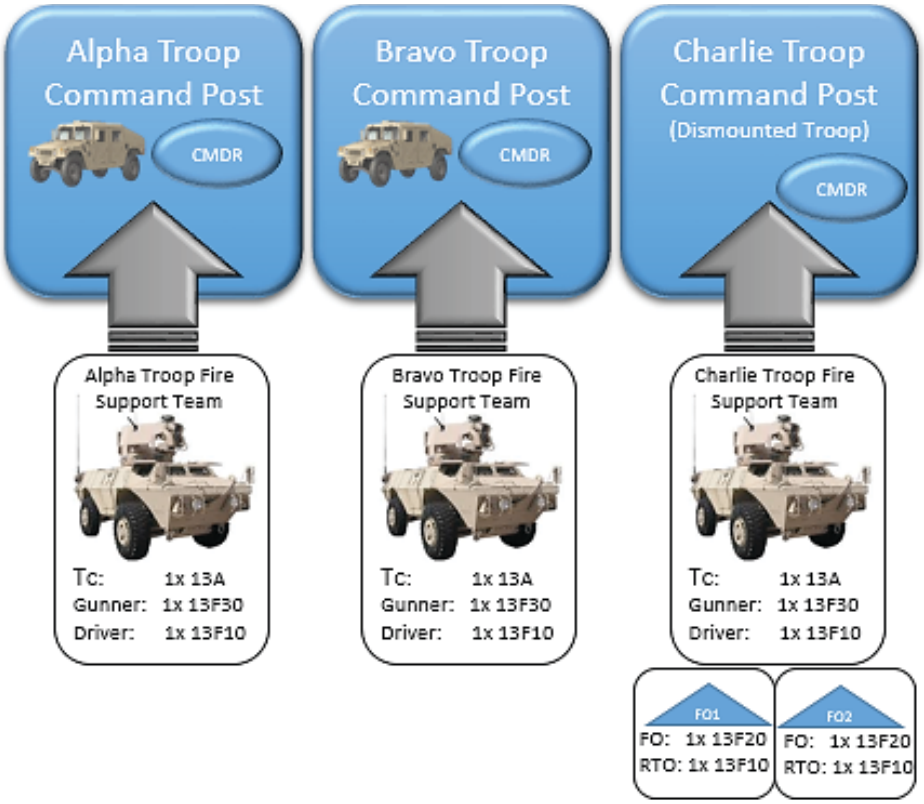
while providing three precision weapon teams to the squadron.

Currently the cavalry squadron in an IBCT is comprised of two mounted and one dismounted reconnaissance troops. The two mounted troops consist of three platoons and are supported by a three-Soldier fire support team. The dismounted troop consists of two platoons and is supported by a seven-Soldier fire support team. The issue arises due to the M1200 Armored Knight requiring three Soldiers to operate, while troop commanders require their FSOs to remain in their troop command post (CP). We have proposed the addition of one 13F20 and three 13F10 Soldiers to allow moving the troop fire support officer into the troop commander's vehicle.

The addition of these four Soldiers would allow A and B Troop to retain the fire support officer within their CP, and have a precision weapon team (PWT) with the capability to perform similar to the combat observation lasing team concept. C Troop's typical fire support team would remain dismounted with their troop CP, however the addition of a 13F20 and two 13F10's would allow for a third PWT within the squadron. These PWTs would have the capability and flexibility to support troop, squadron or brigade targets, while keeping an FSO in direct support of their assigned troop. Not only does this significantly increase the squadron's capability, but it falls in-line with doctrine by not keeping reconnaissance and artillery assets in reserve.

The cost associated with this restructuring is to under-man other FSTs in order to weigh the troop FSTs. Additionally with the fire support officer inside the commander's vehicle, this would require the troop to install an additional 92F system in order for the FSO to monitor the squadron and troop Fires nets.

Second Battalion, 15th Field Artillery Regiment will validate this restructuring of our squadron fire support teams during the brigade's Joint Readiness Training Center 18-08 rotation this summer. The intent of this validation is to re-establish the necessity of the brigade's best equipped and highly trained fire supporters being deliberately utilized to shape the brigade's fight. Additionally, these fire supporters must become an integral piece of the light cavalry's reconnaissance and security mission in order to truly meet the fundamentals of reconnaissance.



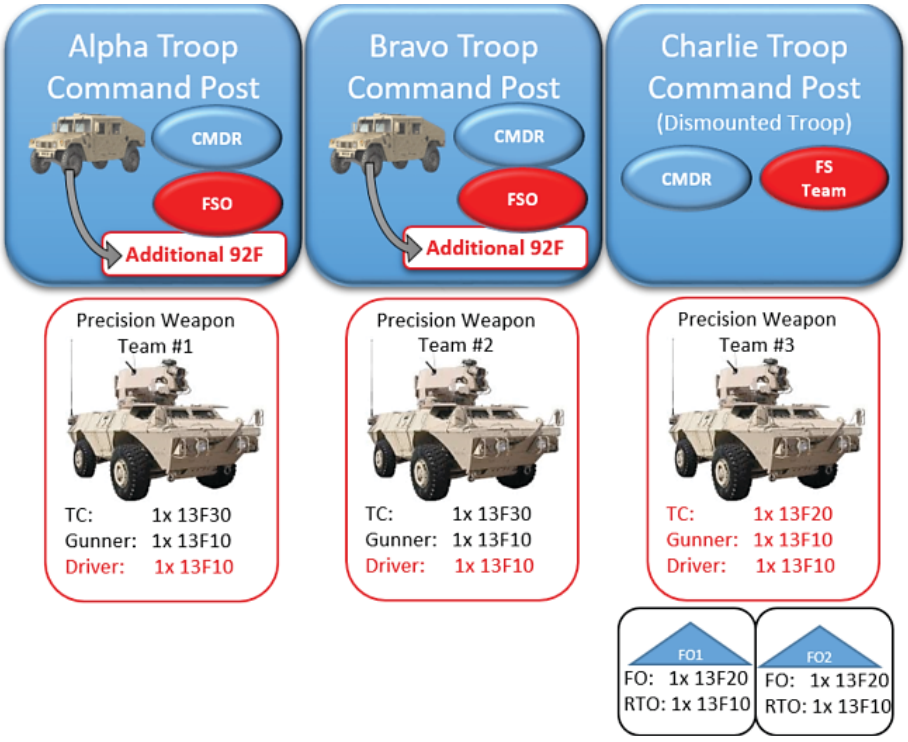


Figure 1. Current cavalry fire support team configuration. Figure 2. Proposed cavalry fire support team Diagram. (Courtesy illustrations)

Capt. Kyle Robert East currently serves in the 2nd Battalion, 15th Field Artillery Regiment as the fire support officer supporting 1st Squadron, 89th Cavalry Regiment in Fort Drum, N.Y. East has participated in numerous brigade and squadron level training exercises. Previously he was 1st Stryker Brigade Combat Team's Combat Observation Lasing Team platoon leader and a D Company, 52nd Infantry Regiment fire support officer at Fort Wainwright, Alaska.

Head, heart, gut

A personal, ethical decision-making methodology

By Lt. Col. Seth Hall

"Ethics involves not only our thinking, but also our feeling."

-Valdemar Setzer

Ethics and ethical behavior is not merely the intellectual determination of right and wrong. It goes much deeper. To fully understand and validate the ethical framework from which a person claims to live, one must understand the foundation on which that framework rests, the resulting decision-making process used by the individual and the manner in which one conducts his or her professional life. This paper explores three components as they relate to an ethical, decision-making philosophy; a philosophy that acknowledges moral absolutes, rejects relativism and maintains the flexibility to make decisions based on individual variables.

Each officer's personal, ethical framework is unique to him or her. To best illustrate this decision-making process, I'll share mine. Mine rests firmly on two supporting pillars. Each one embedded in me at an early age and, on which, I continue to build during adulthood. The first supporting pillar of my ethical foundation is my parents. My mom and dad have always been people of few words. The lessons they taught me were never overtly stated. Instead, they were modeled by how they lived their lives. They intentionally cultivated ideas in me such as a man's word must be his bond, and honor is something for which to fight. To them, reputation is everything. These principles do not make them popular. Their circle of trusted friends is small, but to this day, they remain fiercely loyal to those they love and everyone with whom they interact respects them. Both traits I learned as a child and emulate today.

The second supporting pillar that influences my ethical perspective is my faith. Personally, I follow the teachings of the Bible. One example of the many verses by which I try to live my life is Proverbs 22:1, "A [good] name is to be chosen rather than great riches."[1]

I strive to allow God to guide my thoughts, words and interactions with others and doing so affects all areas of my life. According to Army Regulation 600-63, "The regulation defines a spiritually fit person as someone who 'recognizes there are multiple dimensions that make up a human being and seeks to develop the total person concept … needed to sustain one during times of stress, hardship, and tragedy.'"[2]

An ethically actualized leader does not behave ethically because he or she fears the stick or seeks the carrot. Instead, his or her ethical behavior is an outward expression of an inner conviction that defines him or her as an adult, a person of integrity, and an Army officer. The countless lessons taught to me by my parents, in combination with the values instilled in me by childhood counselors, manifest themselves in the life I choose to live. I have distilled all the morality lessons and spiritual education into three, single-syllable words that espouse my ethical philosophy: head, heart, gut (HHG).

Throughout my adult life, especially during my years of service as an Army officer, I have come to understand that when these elements align, I am living honorably and leading ethically. Furthermore, using HHG, I can make difficult decisions and experience inner peace about them. Before offering this ethical decision-making philosophy to others, it is important to define each of these elements and explain how they relate to each another.

The first element is head. Head is the intellectual exercise of determining right from wrong and choosing right. Head removes emotion from the equation and simply applies logic to facts to make the best decision. The world is black and white. Head rejects a moral relativist point of view that claims truth is subjective. Head's base of knowledge originates from scholarship, head values cold, hard facts. It receives and processes data on its face, without sentiment. It is essential to this philosophy because it demands that the standard be upheld. Without head, absolute right and wrong would not exist as a decision-making authority.

Heart opposes head. Heart cannot remove emotion from decision because heart is emotion. It is empathy and compassion. Rather than thinking of the world as black and white, heart feels only shades of grey. Heart forgives and redeems. Heart empathizes. Heart is essential to this philosophy because, without it, decisions would be cold and uncaring.

The final element is gut. Gut is instinct and intuition. It is the embodiment of years of experience and practice. Gut pays attention to head's logical arguments and heart's passionate pleas, equally weighing individual justice and mercy against justice and mercy for all. It informs every challenging decision one must make. Some researchers, such as Malcolm Gladwell, author of "Blink: The Power of Thinking Without Thinking," would classify gut as a cognitive response/feeling based on pattern recognition.[3] Gladwell's writing seems to reject the idea that the gut element is distinct from the head. Instead, he advocates that as one develops as a leader, one becomes more adapt at recognizing patterns quickly and determining a course of action that leads to a successful outcome. Therefore, Gladwell would likely combine head and gut leaving only two elements, head and heart.

With all due respect to Gladwell, there is room in the model for head and gut. Think of head as an intentional process through which each piece of new information is systematically, meticulously and consciously evaluated to form the decision. Contrasted with gut, a process that one truncates, typically subconsciously, through pattern recognition.

Head, heart and gut are unique lenses through which one views the ambiguous decisions one must make as a leader. Through experience and practice, one can transform this decision-making process from the intentional to the subconscious. With practice, these individual elements only become conscious when they are in disagreement. It is during those times one must learn to intentionally slow down his or her decision-making process and seek trusted counsel, if possible. Conversely, the decision one is making is most likely legal, moral, ethical and "best" for the organization when all three elements align.

Although I believe very firmly in this ethical philosophy and trust it implicitly as my decision-making mechanism, I acknowledge a potential criticism. HHG emphasizes the spirit of the law over the letter of the law, a position that some could label moral relativism. In response, consider the following words, "The President of the United States has reposed special trust and confidence …."[4]

Commissioned officers must take their oaths seriously and execute their respon-

1 *Multiple Authors, "The Bible." (Grand Rapids, MI: Zondervan, 1999), 1640.*
2 *US Department of the Army, Army Regulation 600-63, Army Health Promotion. April 1996.*
3 *Gladwell, Malcom. "Blink: The Power of Thinking Without Thinking." Boston, MA: Little, Brown Company, 2005.*
4 *US Department of the Army, DA FORM 71, Oath of Office – Military Personnel. July 1999.*

As an officer's decision-making responsibilities change from the company-grade level to field-grade level, so too should his or her ethical decision-making mechanism.

sibilities with the utmost professionalism and care. Unlike the oath of enlistment taken by Soldiers and noncommissioned officers, commissioned officers do not swear to obey anyone. This omission of obedience was not an oversight. Instead, commissioned officers are charged with using their experience and judgment to make judgment calls. Leadership demands more than merely reading a regulation or manual and following a step-action-drill to administer reward or punishment. If it were that simple, computer programmers could write "leader algorithms" to generate stimulus and response leadership. Authentic leadership demands more and Soldiers deserve more. Thoughtlessly following the letter of the law obviates the responsibility of real leadership. When HHG align, a consistent, ethical standard is maintained, AND the uniqueness of every situation receives consideration, for the best decision to be reached.

The Army's expectations of officers changes from company-grade to field-grade. "Iron majors" are the engine that runs the Army's staffs, from battalion to corps. Field-grade officers must embrace a natural evolution in their primary leadership style from direct, which serves them well at the company-grade level, to organizational, which offers them a broader scope of influence over more Soldiers. Field-grade officers who embrace and master organizational-level leadership set themselves, and more importantly their units, up for success. Those field-grade officers who do not understand this necessary change in leadership style often work very hard, but do not succeed because the scope of their responsibilities outpaces what they can effectively influence, directly. Regardless of one's position, he or she must not change their ethics. They must remain resolute as one transitions from direct to organizational leadership. The two primary reasons that one's morals must remain constant through the direct to organizational transition is the increased responsibility placed on organizational-level leaders and the increased ability to influence more Soldiers. As a field-grade officer, one does not have the time to communicate a personal, ethical philosophy to each Soldier in the formation. Instead, field-grade officers must work with other senior leaders to develop an ethical climate. A climate in which Soldiers evaluate new, potentially ethically ambiguous situations and act ethically without direct supervision. As Edward Hennessy, WWII veteran and former Chief Justice of the Massachusetts Supreme Court, said, "Ethics must begin at the top of an organization. It is a leadership issue, and the chief executive must set the example."[5]

As an officer's decision-making responsibilities change from the company-grade level to field-grade level, so too should his or her ethical decision-making mechanism. As it relates to head, a field-grade officer should grow in two ways. First, a field grade officer's general knowledge base should be more significant than it was when he or she was a company-grade officer. For example, one's knowledge about warfighting functions and its role in combined arms operations must increase. Second, one's ability to process more information and at a greater speed should increase. Simply put, dots have to connect quicker.

As this transition relates to heart, a field-grade officer should exercise more empathy towards Soldiers. It may seem counterintuitive, the farther away one gets from direct-level leadership, the more empathetic one should become. While discussing a Soldier's explanation for failing to meet the standard during his Uniform Code of Military Justice hearing, a tired battery commander remarked, "The sad stories are not sad anymore."

Of course, all leaders tire of taking corrective action on Soldiers who fail to achieve the standard or live the Army values, but a field-grade officer cannot allow him or herself to become jaded or callus.

Finally, about gut, a field-grade officer's intuition may be challenged as the scope of his or her responsibility increases. The breadth and complexity field-grade officers face increases exponentially, allowing less pattern analysis to enable decision-making and potentially exposing gut's shortcomings. The good news is that in the model gut does not make decisions alone. Head and heart work in conjunction to inform each decision. The gravity of field-grade decisions, combined with the amount of new and dissimilar decisions, should cause the decision maker to intentionally slow down the process when the situation allows.

Words are cheap. The ideas mean nothing unless one's actions match them. Difficult, ethical decision-making must be intentional and systematic. When performed correctly, the ethical decision-making philosophy of head, heart, gut informs one's conscience and one's decision-making process. It rejects moral relativism and simultaneously retains the necessary flexibility to account for the individual variables unique to each situation, thereby creating and enforcing an objective organizational standard.

As one's rank and responsibility increases, the complexity of the professional decisions one must make also increases. Therefore, it is imperative that leaders intentionally select the manner in which they will make those difficult decisions. Head, heart, gut would serve them and their Soldiers well.

Lt. Col. Seth Hall is Cameron University Army ROTC professor of Military Science. Hall holds a bachelor's degree in Public Administration from the University of Northern Iowa and a master's degree in Organization Psychology with an emphasis in Leader Development from Columbia University. His assignments include platoon leader, battery executive officer, and battery commander at Fort Lewis, Wash., and tactical officer at West Point, NY.

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5 *Edward Hennessy, "Edward Hennessy Quotes, 2013) http://thinkexist.com/quotes/edward_hennessy/ (accessed 27 March 2018).*

E-62 Terminal High Altitude Area Defense (THAAD), Picture taken upon first historical Gunnery Certification, completed at Fort Hood, Texas, Sept. 21, 2017.

E-62nd THAAD and Patriot interop success

By Sgt. 1st Class Sergio Arana and Sgt. 1st Class Marcus Wofford

During their first ever Missile Defense Agency Flight Test, Soldiers from Battery E, 62nd Air Defense Artillery Regiment, 69th Air Defense Artillery Brigade and 4th Battalion, 5th Air Defense Artillery Regiment, 69th Air Defense Artillery Brigade conducted a Congressionally mandated interoperability test between the Terminal High Altitude Area Defense and Patriot weapons at White Sands Missile Range, New Mexico April 6, 2018. The test was designated Flight Test Other-35 (FTX-35) and was executed by MDA as an operational test with Army Test and Evaluation Command and Director of Operational Test and Evaluation oversight.

While the Army has plans to further integrate the two weapon systems within the next two years, this testing focused on what can be done now. Prior to the test, E-62nd THAAD made history while stationed at Fort Hood, Texas. They were the first THAAD unit to qualify on the weapon system, breaking in their new site on West Fort Hood. After receiving equipment, the unit was designated as the test battery for the Army's THAAD program which prompted them to assume the mission of FTX-35.

FTX-35 progressed in three phases, which led to the culminating live-fire event. The success of the mission ultimately means a more layered defense for the air defense community and is slowly shaping the future of the way air defense fights.

"Conducting tests such as FTX-35 in an operational environment utilizing trained and certified THAAD Soldiers is absolutely vital to understanding both the strengths and weakness of the new hardware and software before it is fielded to the Army. Without these type of tests, Army leaders cannot accurately assess the effectiveness, suitability and survivability of the systems to accomplish their assigned air and missile defense missions," said Chief Warrant Officer 5 John Fallin, ATEC.

During the test, Soldiers using the THAAD and Patriot were able to detect the short-range Lynx target and exchange Link 16 messages with data produced by each of the weapon systems. This created a common air picture and supported situational awareness of the target and what asset it was threatening. The Link 16 information was constantly exchanged between both weapon systems and allowed Soldiers operating them to conduct simulated engagements.

Not only did this test prove THAAD and Patriot could work concurrently, but it also gave THAAD Soldiers the ability to test THAAD 3.0 software upgrades, making E-62nd THAAD the first unit to use such software. The upgrades are crucial to not only improving THAAD radar capabilities but also strengthening the THAAD interceptor arsenal.

"This was an excellent training experience to give our Soldiers the opportunity to grow tactically and become more efficient on their weapon system. Being a part of these software upgrades gives our operators direct influence on what is crucial to the warfighter during real world applications," said Chief Warrant Officer 2 Benjamin Schunn, E-62nd battery trainer.

The success of this mission is just a small taste of the potential working relationship that both THAAD and Patriot have together. With the most recent THAAD deployment to South Korea, alongside Patriot, this test gives way to the possibility of other such deployments not only to the Pacific Command theater but to other operations around the world.

Read more here: https://www.army.mil/article/195987/69th_adas_thaad_battery_is_mission_qualified

Sgt. 1st Class Sergio Arana is currently the E Battery, 62nd Air Defense Artillery Regiment fire control platoon sergeant at Fort Hood, Texas. Arana has served as a launcher crewmember, team leader, Terminal High Altitude Area Defense System maintenance noncommissioned officer, sensor platoon sergeant, launcher platoon sergeant and fire control platoon sergeant. He was part of the first THAAD deployment to Guam in 2013 as the system maintenance NCOIC, the unit movement NCOIC and the forward base evaluations and training NCOIC.

Sgt. 1st Class Marcus Wofford is the E Battery, 62nd Air Defense Artillery Regiment launcher platoon sergeant at Fort Hood, Texas. Wofford served as a Patriot launcher crewmember, team chief, section chief, Patriot launcher platoon sergeant, Advanced Individual Training instructor/writer, and Patriot Training Assistance field team liaison. He has deployed in support of Operation Enduring Freedom in 2012 and was part of the first mobile training team to Taiwan in 2015 where he served as a primary instructor for the Patriot Launcher Station Enhanced Operator/Maintainer Course.

Brigade deep battle 2.0

UAV-Fires teaming in support of the brigade deep fight

By Capt. Joseph Schmid

During the ongoing Russo-Ukrainian conflict, military professionals throughout the globe witnessed Russia's ability to systematically project "annihilation Fires" leveraging nascent unmanned aerial vehicles (UAVs) teamed with massed rocket and cannon artillery. In their article titled, "Russia's New Generation Warfare," Phillip Karber, president of the Potomac Foundation, and Joshua Thibeault, a member of the Russian New Generation Warfare study team, detailed the debilitating effects of Russian UAV-Fires teaming. They state "Ukrainian units have observed up to eight Russian UAVs overflights per day … The increased availability of overhead surveillance combined with massed area Fires [have produced] … approximately 80 percent of all casualties."[1]

Russian UAV-Fires teaming served the dual purpose of instantly attriting whole battalions of Ukrainian mechanized infantry as well as having the uncanny effect of disrupting the Ukrainian OODA Loop decision cycle (observe, orient, decide, act).[2] Imagine a U.S. combined arms brigade (CAB) "in a three-minute period … [suffering] a Russian fire strike destroying two mechanized battalions with a combination of top attack munitions and thermobaric warheads."[3]Following the almost instantaneous loss of two mechanized infantry battalions, the imagined CAB will likely no longer be able to perform basic warfighting functions. Consequently, its remaining combat power could no longer successfully close with and destroy a comparatively sized adversarial near-peer formation. This troubling observation from the Russo-Ukrainian conflict has decidedly hastened our own UAV interoperability, especially at echelons above battalion.

Numerous training exercises, both real and virtual, have led to improvements in regards to our own organic UAV-Fires teaming. During Rim of the Pacific Exercise 2016, the Marine Unmanned Aerial Vehicle Squadron 3 (VMU3) tested their RQ-7B Shadow's ability to perform a traditional call for fire. Maj. Jarrod Larson, VMU3 executive officer, said, "One of the things we're designed for and we do really well is that forward observer role. We can go very deep in the battlespace and call for fire with either artillery Fires or with other aircraft, and relay those targets to either the ground controllers or actually control and observe those Fires ourselves."[4]

The VMU3's RQ-7B Shadow became yet another sensor proficient in providing rapid targeting data for responsive artillery strikes based off the target selection standards recommended by a fire support coordinator.

Larson's UAV-Fires scenario described above was internalized by the 25th Infantry Division Artillery after they coupled manned unmanned teaming (MUM-T) with traditional lethal Fires to generate a paradigm for the purpose of maximizing lethality and target handoff in a contested division deep area between the division coordinated firing line (CFL) and the fire support coordination line. The initial concept by Maj. Bobby Sickler, Maj. David Henderson and John Hansen in their article titled "Deep Battle 2.0: An Integrated Division Deep Fight," was "broken into four distinct phases: Shape, find, destroy and accomplish the mission."[5] During the shape phase the DIVARTY tactical opera-

1 *Phillip Karber and Joshua Thibeault, Russia's New Generation Warfare, Army Magazine, June 2016 issue, accessed on Feb. 28, 2018.*
2 *MacCuish, Donald A. 2012, "Orientation: Key to the OODA Loop - the culture factor," Journal of Defense Resources Management, Vol. 3, Issue 2.*
3 *Phillip Karber, Examining Russia's Policy Near, Abroad, and Around the World, 2015 AUSA Annual Meeting and Exposition, Washington D.C., Oct. 12-15, 2015.*
4 *Megan Eckstein, RIMPAC 2016: Marines Test UAVs for Artillery Calls for Fire, Close Air Support, U.S. Naval Institute News, Aug. 1, 2016.*
5 *Maj. Bobby Sickler, Maj. David Henderson and John Hansen, An Integrated Division Deep Fight, Deep Battle 2.0, Center for Army Lessons Learned (CALL), February 2017 issue, p. 1.*

Soldiers fire an M119A3 howitzer during a live-fire exercise. (Courtesy photo)

tions center (TOC) reduced "the enemy air defense posture to a level acceptable to employ rotary-wing aviation with a relative level of freedom of maneuver."[6] Kinetic strikes, usually in the form of M26 rockets fired from High Mobility Artillery Rocket Systems, exploited targeting data acquired by organic Gray Eagle UAV to destroy adversarial air defense assets. "The find and destroy phases took place in a continuous loop within the EA [engagement area]."[7] Lethal indirect Fires were employed for targets such as adversarial long range artillery, light skinned vehicles, command and control nodes and target acquisition radars. Armored targets would be passed to rotary wing. With this system of systems, it's key to note that one umbrella organization, the 25th DIVARTY, collocated both the UAV asset able to transmit targeting data and the firing unit able to rapidly receive the target, compute firing data and fire.

During fiscal years 2016-17 this construct was validated in numerous command post exercises such as Yama Sakura 71, Talisman Saber, Ulchi Freedom Guardian, and culminated in 25th DIVARTY's Warfighter 2017 performance. Key to success was the collocation of Gray Eagle feed directly adjacent to the fire control element, contributing to rapid lethal responsiveness upon target identification.

Keeping in mind the advantages of UAV-Fires teaming portrayed above, while exploiting 3rd Brigade's recent experience at Joint Readiness Training Center 18-04 rotation, in the following pages, I will portray how the incorporation of deliberate UAV-Fires teaming may have increased 3rd Squadron, 4th Cavalry Regiment's ability to project combat power deep within our own heavily contested brigade deep fight area. Drawing on past experiences gained as a troop fire support officer as well as a DIVARTY battle captain, I will isolate certain "Division Deep Battle 2.0" characteristics and apply them to the brigade deep fight in an effort to synchronize dynamic UAV target acquisition efforts with a light cavalry squadron's tactical control (TACON) artillery battery. Ultimately, I will argue for the establishment of a deliberate UAV-Fires cell inside the 3-4th CAV TOC able to act as an umbrella organization coupling UAV target acquisition efforts with a TACON fire direction center (FDC). I believe the realization of these arguments will set the necessary conditions for 3-4th CAV to impose catastrophic disruptive Fires focused wholly on dynamic targets presenting real-time threats between the forward line of troops and the division CFL.

During our recent 18-04 JRTC rotation, I believe two phases of the battle presented unique friction points that would have benefited from the incorporation of deliberate UAV-Fires teaming. These events include 3-4th CAV's initial advance into the engagement area in support of 3rd Brigade's forward passage of lines (FPOL), as well as their screen of 2nd Battalion, 27th Infantry Regiment during the defense. During scenario one, 3-4th CAV's establishment of 3rd Brigade's FPOL, 3-4th CAV retained TACON of one M119A3 105 mm howitzer battery, which generally received calls for fire (CFF) from fire support teams (FISTs), using traditional observation techniques, on-ground collocated with their respective CAV troops. CFF's would be initiated upon dismounted platoon-sized elements or lightly skinned adversarial vehicles, often after making initial contact. Overall, any remnant forces the cavalry squadron encountered were destroyed or retrograded and the screen resulted in a successful FPOL with her sister 2-27th IN and 3rd Brigade Combat Team, 25th Infantry Division battalions. However, in the process, adversarial forces were allowed to make initial contact with ground elements of 3-4th CAV. Lt. Col. Scott Pence, commander of 5th Squadron, 73rd Cavalry (Airborne), recounts from his JRTC experience "The opposing force used light humvees to quietly and slowly occupy dismounted observation points, gain visual contact and harass the rotational unit with indirect Fires."[8]

Therefore, the underlying problem rests with allowing the enemy to gain a position of relative advantage, which granted them the ability to collect positional information on our most forward formations. We were unable to maintain a favorable stand-off distance between ourselves and advancing adversarial forces. Conversely, adversarial forces imposed favorable stand-off distances in the latter stages of the battle as 3rd Brigade busied itself establishing a defense with two infantry battalions abreast and 3-4th CAV screening forward. All attempts to ascertain enemy force posture and movement were frustrated. Our efforts to conduct surveillance within the brigade deep fight along likely avenues of approach were routinely denied resulting in rotary and Fires' inability to initially disrupt advancing columns of mechanized infantry and armor. The failure to project disruption Fires within the brigade deep fight during the defense led to increased attrition of our maneuver battalions during their direct engagement. This failure stemmed from our collective inability to bypass the enemy's disruption zone in an effort to acquire targets behind the forward edge of battle area. Both circumstances, the initial entry of 3-4th CAV and the brigade's defense, highlight an inadequate ability to routinely project coordinated disruptive lethal Fires into the brigade deep fight during key elements of the battle. Consequently, we'll now transition to blending select characteristics of Henderson's Division Deep Battle 2.0 theory with emerging cavalry doctrine in order to generate the conditions needed for rapid lethal Fires within the brigade's contested deep fight, synchronized by an aggressive light cavalry squadron TOC, acting as a UAV-Fires umbrella organization.

In an Armor Magazine article titled, "The Return of Cavalry: A Multi-Domain Battle Study," Majors' Nathan Jennings, Amos Fox, Adam Taliaferro, David Griffith and Kyle Trottier state, "It has become increasingly vital for advance ground elements to integrate indirect, aerial … and informational Fires to dynamically shape battlefield outcomes."[9]

The incorporation of deliberate UAV-Fires teaming during 3-4th CAV's establishment of 3rd Brigade's FPOL, could have potentially shaped the battlefield more toward our favor. Imagine, upon FPOL establishment, all squadron RQ-11 Ravens were leveraged to observe pre-planned likely avenues of approach. CAV small unmanned aerial systems (SUAS) Raven teams would traverse three to four kilometers in front of their troop formations effectively extending the likelihood of observing the adversary for the purpose of dynamic targeting. Think of the Raven section, possibly teamed with a troop FIST, as a multi-domain operation version of the combat observation and lasing team of the early 2000's which "augmented the platoons for an additional target acquisition capability."[10]

6 *Ibid*
7 *Ibid*
8 *Lt. Col. Scott Pence, 2017. "The Lethality Imperative: Training Cavalry Squadrons to Fight for Information." Armor, Summer 2017, p. 4.*
9 *Maj. Nathan Jennings, Maj. Amos Fox, Maj. Adam L. Taliaferro, Maj. David Griffith and Maj. Kyle Trottier, 2017. "The Return of Cavalry: A Multi-Domain Battle Study" Armor, Summer 2017, p.18.*
10 *Robert S. Davidson, 2000. "R&S lessons learned-brigade reconnaissance troop employment." Military Intelligence Professional Bulletin. Vol. 26, Issue 4. p. 62.*

A Raven unmanned aerial vehicle flies overhead during a training exercise. (Courtesy photo)

Brigade Deep Battle 2.0 simply takes a Vietnam-era aerial observer concept and repackages it for today's modern technology in order to maximize UAV-Fires teaming within a light cavalry squadron. As the adversary attempts to probe the FPOL site each troop's Raven acquire targets, triggering the operator's CFF. All CFF's are centralized within the 3-4th CAV Fires and effects coordination cell (FECC) located either inside or slightly offset from the 3-4th CAV TOC. Similar to 25th DIVARTY's technique of collocating Grey Eagle feed with the fire control center, one of the TACON artillery fire direction centers will be either inside or slightly offset from the 3-4th CAV TOC directly adjacent to the 3-4th CAV FECC. This sensor and shooter collocation will promote responsive UAV-Fires teaming as well as grant the FDC enhanced maneuver situational awareness, something battery and platoon FDC's have collectively struggled with.

The idea of exploiting SUAS, such as the portrayal above, is not new. Capt. Christopher Brandt, Headquarters and Headquarters Troop, 3rd Squadron, 89th Cavalry Regiment commander, makes use of this emerging concept in his article titled, "The Future of Unmanned Systems in Cavalry Squadrons." He opens with a vignette in which small cavalry teams, not unlike the Raven/FIST combination advocated for previously, infiltrate adversarial lines for the purpose of generating calls for fire. He states, "At the press of a button, the drone lazes the target, and it delivers a set of triangulated set of coordinates to the enemy position. Artillery begins raining down on the unsuspecting [enemy] troops."[11] Brandt's scenario illustrates the enhanced lethality CAV SUAS infiltration teams coupled with a TACON indirect fire asset, can bring to the brigade deep fight.

The CAV SUAS infiltration teams have the potential to enhance the comprehensive layering of indirect and rotary-wing weapon systems in which forward-positioned Ravens, under centralized control of the 3-4th CAV TOC, engage in MUM-T with the 25th CAB's rotary wing assets. The dedicated TACON artillery battery would provide the CAV's long reach into the brigade deep fight targeting primarily advancing infantry dismounts, light-skinned technical vehicles, and especially any ADA threat attempting to deny freedom of maneuver to friendly rotary wing. As armored targets present themselves, CAV SUAS infiltration teams utilize MUM-T by sharing targeting data with the 25th CAB. Remnant forces, who survive the initial artillery disruption Fires, may continue to advance towards 3-4th CAV troop positions, still tracked by CAV SUAS infiltration teams, and subsequently engaged by 120 mm mortars. Any remnant forces of these two targeting cycles will be severely attrited and dispatched by 50 cal. and/or M240B fire. This echelonment of fire coordinated by 3-4th CAV and supported by 3rd Battalion, 7th Field Artillery Regiment, is what creates a wood chipper-like scenario, ensuring the maximum lethality of all weapons systems, while maintaining an appropriate stand-off range between forward CAV elements and advancing adversarial forces. Now transpose the above described system onto both the FPOL and the brigade defense scenarios we encountered in JRTC. I'd argue by first introducing, then enacting the Brigade Deep Battle 2.0 Theory described above, 3-4th CAV teamed with 3-7th FA and rotary elements of 25th CAB can achieve greater destructive lethality.

In conclusion, the Brigade Deep Battle 2.0 Theory is simply "a way" to achieve enhanced synchronization between a light cavalry squadron, SUAS, and its TACON artillery battery. By layering indirect assets teamed with SUAS infiltration teams we maximize windows of opportunity to attrite advancing adversarial forces, while simultaneously granting increased survivability for forward positioned CAV units. This system can project the destruction observed within Russian UAV-Fires teaming onto adversarial forces seeking to disrupt 3-4th CAV objectives. And finally, by integrating air, land and cyber domains within UAV-Fires teaming, 3-4th CAV can nest more firmly within the Army's emerging multi-domain battle concept.

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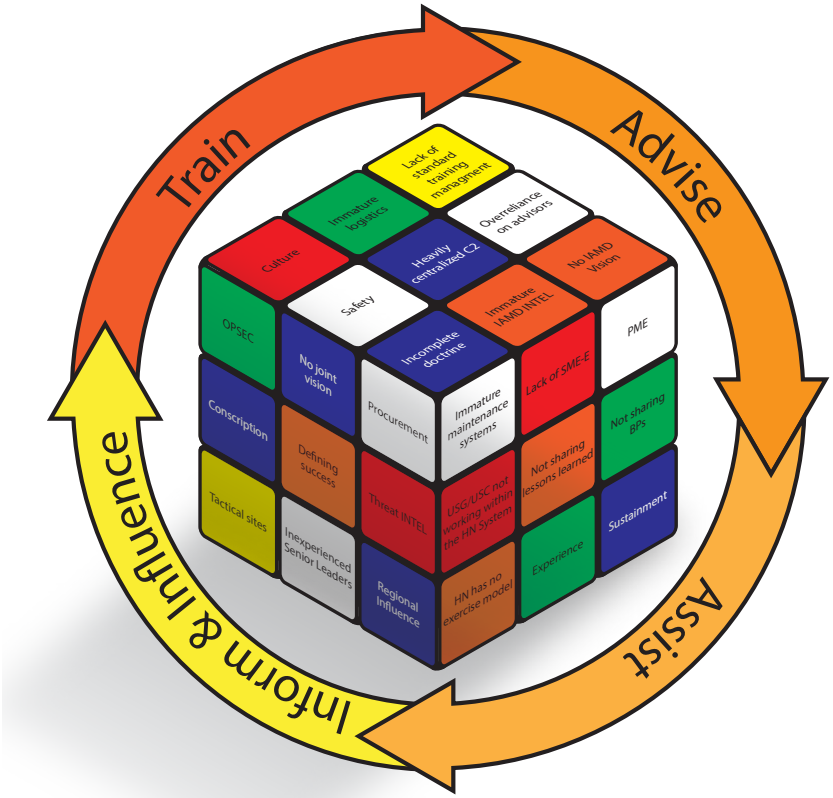
11 *Brandt, Davidson, 2014. "The Future of Unmanned Cavalry in Cavalry Squadrons." 2014 Starry Writing Competition Finalist. p. 1.*

US air defense artillery foreign advising

The strategic NCO leveraging the operational art

By Maj. Christopher Garnett



Working themes

Get them to see themselves

Work within the HN system

Keep it simple

Stay on message

Patience: capabilities take time to mature

A Rubrick's Cube is used to depict some of the challenges faced during the train, advise, assist, inform and influence phases along with the themes to overcome the challenges. (Rick Paape/information provided by Maj. Christopher Garnett)

As the global trend for air defense capabilities to deter regional actors continues, so will the need for U.S. Army air defenders to possess the operational flexibility to conduct theater security cooperation or U.S. State Department-led Foreign Military Sales' long-term advisory missions in order to train, advise, and assist foreign militaries.

For training basic-to-intermediate gunnery and campaign planning implementation to be effective while working in small teams, advisors must go beyond simply providing foreign disclosed documents and training manuals in an effort to train the host nation defense forces. While working with host nation defense forces with highly centralized decision-making, and immature systems and processes, the advisory team leaders must be able to properly assess both the current defense forces' as well as the advisory team's capabilities. This will ensure they devise a realistic plan with broad lines of operation (LOOs) and realistic lines of effort that are supported with attainable objectives.

Though the officer has a defined strategic role on the advisory team, it is the noncommissioned officer that must be able to operate at the tactical level while being able to influence leaders at the strategic level thru key leader engagements, classes and briefings. This article provides both a concept and considerations for advising foreign air defense forces with the end-state of "working oneself out of a job."

Inform and influence

Broad LOOs: train, advise and assist, inform and influence and interagency integration. Advisory operations begin-and-end with influencing decision-makers. Therefore, making it an independent LOO is a safe starting place. For air defense operations, creating three to four classes with a specified target-audience addressing battalion-level maintenance and sustainment operations class (targeting battalion-level staff officers), Battery Commander's Class (focused on battalion and battery commander's, current and future), and a 'Patriot 101' Class (targeting division-level and higher leaders).

Maintenance and sustainment systems

Soldiers from C Battery, 5th Battalion, 7th Air Defense Artillery, 10th Army Air and Missile Defense joined armies across Europe to celebrate and officially mark one hundred years of the Republic of Estonia. (Courtesy photo)

and processes, globally, shows a lack of knowledge for the level of support needed to sustain air defense operations without impeding operational readiness. A further concern, regardless of region, is the special operations force threat against Patriot operations and the need to defend against asymmetric threats. Addressing tactical site manning and design considerations in order to enhance survivability for battery commanders is a class that provides leaders alternative considerations based on the regional threat.

Lastly, a class that broadly discusses basic Patriot capabilities and limitations with senior leaders addresses training and readiness observations made and allows advisors to directly discuss with key decision-makers. This often results in immediate decisions being made. Having a LOO focused solely on informing and influencing leaders at all levels, is a critical component to advisory operations while setting conditions for institutional changes needed.

Interagency integration

Working with other U.S. agencies requires an understanding of their culture, how they operate and their expectations and previous experiences in working with the U.S. Department of Defense. However, at the end of the day "people and personalities" ultimately prevail as the single indicator of success for interagency relationships. Similar to a good marriage, striving for 60 percent in a supporting role of the partnership leads to success. This includes adopting their jargon, dress attire and genuinely supporting their organizational objectives.

Advising themes

In lieu of clear-cut objectives while advising, themes at designated phases and levels of leadership across the host nation's organization enables synchronized messaging. This vertical and lateral approach to messaging maximizes the efforts and applies the correct level of support as the host nation defense forces mature in capability. Keeping the host nation's military and ethnic culture in mind, the following 10 advising themes are examples during specific phases throughout an advisory mission:

1. Work within their system: It's multiple-centuries old. We're not here to change their culture, we're here to work in it.
2. Put them into position to see themselves: Host nations won't understand it until they experience it first-hand.
3. Build the bench: Broaden a host nation to train more crews, not just the top performers. Focused training wins out.
4. The Beatles effect: U.S. advisors have immediate legitimacy before walking into the room. Be careful on what you advise as it can quickly become policy.
5. The human connection: The best hip-pocket training with the host nation is to talk about your family and interests back home.
6. BP-OILLs: Best practices and observations, insights, and lessons learned. Spread them and emphasize them.
7. Test and gauge: Use initial host nation engagements to test and assess their understanding of operations, training and sustainment requirements.
8. Patience, staying on target: Emphasize the small things and keep the messaging simple. Basic capabilities take time to mature.
9. Centralized control: Don't let the frustrations detract from staying on course.
10. Tactical assessment messaging: Doctrine, doctrine, doctrine.

Decentralized operations

In order to maximize the subject-matter expertise from an advisory team, a classic and genuine decentralized approach of assigning advisors to individual battalions and brigades, while operating independently over extended periods of time, provides the most influence. This approach rapidly allows the sharing of host nations' observations, best practices, insights and lessons learned amongst the advisory team and enables the team to identify trends while analyzing and assessing the operational needs.

Green-suiter-contractor teams

ADA advisors will find U.S. contractor system support within the host nation. In lieu of operating parallel to each other, constructing two-man green-suiter and contractor teams can have added value and create a balanced approach to messaging training value to the host nation. As the advisory team leader, matching personalities with contractors will create a significant influencing force when messaging is reinforced from both parties, as well as having the organizational reach-back (i.e., doctrine and training as well as material and system support).

Exercising genuine decentralized operations by assigning capable ADA NCO advisors to battalions and brigades, with broad guidance while operating in a degree of ambiguity, unleashes a tremendous amount of influence while simultaneously demonstrating trust among the team. Pushing the envelope by enabling the professional growth that these highly qualified ADA NCOs gain by exercising the operational art of linking the tactical to strategic objectives is not only a concept that should to be embraced, but also a quality that needs to be celebrated.

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Reactive counterfire
An algebraic approach

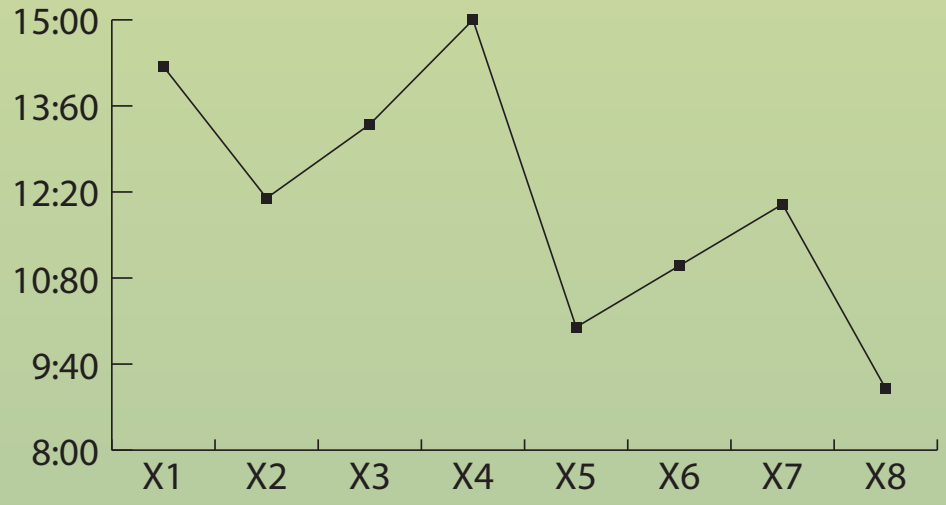
By Chief Warrant Officer 3 Jeremy Taylor and Capt. Steven Hojnicki

The threat of high volume near-peer adversary indirect fire is a reality for allied and partnered artillery units stationed throughout the world. Potential adversary weapon systems cannot only range farther, but can displace quicker, thus making our counterfire problem one that is more difficult to solve. Systems such as the 2S19M1 are capable of delivering devastating effects on the battlefield and conducting a survivability move within minutes. To counter this threat U.S. and allied brigade combat teams (BCTs) employ a counterfire system that spans multiple nodes.

The system starts with the tactical acquisition of enemy rounds by Firefinder radar. Acquisitions are then sent to the brigade's counterfire cell, which processes the target, and in conjunction with the brigade current operations cell who clear ground and air. Once approved for execution, targets are sent to the field artillery battalion fire direction center which in turn selects the firing unit or units to deliver the desired effects. Doctrinally designed to provide effective destructive Fires on enemy artillery systems, the counterfire system in execution does not always reflect reality.

Every month at the Joint Multinational Readiness Center, the Vampire Fire Support Team observes units struggling to decrease counterfire times. In fact, over the last year the average counterfire time (acquisition to shot) across a wide variety of U.S. and multinational units hovers around 12 minutes. Our team observed is that many variables come into play when dealing with counterfire and that it is more than a simple time standard, it is an algebraic expression. By breaking down the variables of the counterfire problem, we can start to understand the distinct challenges BCTs have with their counterfire systems and how by isolating and accounting for various variables, units can start to improve their sensor-to-shooter times.

Top: Figure 1. Total counter fire average time by exercise day. (Rick Paape) Bottom: Figure 2. The reactive counterfire variables. (Courtesy illustration)



Tactical Acquisition	Field Artillery Battalion	Common Variables	Enemy Variables
10-60 seconds Within 10 seconds if round height is corrected by digital maps, 20 seconds if height is corrected manually, and 60 seconds if height is corrected by voice). *Ref TC 3-09.8 NOV 16	BN FDC: 35 seconds BTRY/PLT processing time: 45 seconds (Analog) 35 seconds (Digital) Time at the Guns: 30 seconds (M119A3) 45 seconds (M109A6) 1 minute (M777A2) *Ref TC 3-09.8 NOV 16	• Weapon System (Light vs Heavy) • Terrain (Mountainous vs Flat) • Coordinating Altitude • Fire Support Coordination Measures • Asset Availability • Clearance of Fires • Desired effects • Weather effects • Pattern Analysis • AI vs CAS allocation • Unit Proficiency • Drop Card vs Digital (CTC only)	OPFOR displacement times 2S12: 3 mins 2S9-1: 1 min 2S23: 1 min D-20: 2.5 min D-30: 3.5 min 2S19M1: 1-2 min G6: 1 min BM-21: 2 min 9P140 Uragan: 3 min 9A52-2 Smerch: 3 min *Ref WEG- Volume I - Dec 2015

Target Acquisition + FA Battalion + Common Variables = Unit Reactive Counterfire time
10-60 seconds + 100-140 seconds + Common Variables = (110-200)+X seconds

(Enemy Variables + Common Variables) - Unit Reactive Counterfire time = Success (+) or Failure (-)

*All three CTCs have confirmed there is not a clear doctrinal explanation of what reactive counterfire time standard should be.

Soldiers fire the Paladin weapon system during a live-fire training exercise. (Courtesy photo)

Field Artillery Battalion

Battalion fire direction center:
35 seconds

Battery/platoon processing times:
45 seconds (analog)
35 seconds (digital)

Time at guns:
30 seconds (M119A3)
45 seconds (M109A6)
1 minute (M777A2)

Ref. TC 3-09.8 Nov. 2016

Figure 3. The field artillery battalion's processing times. (Rick Paape)

Field artillery battalion time standards

The field artillery battalion owns the BCT's counterfire process. Their modification table of organization and equipment provides the personnel and equipment that makes the entire system work and therefore plays a vital role in effective return of Fires. Starting with its sensors, the organic radar crews have a time standard between 10-60 seconds to receive and process acquisitions. This process is generally smooth and not the source of a lot of additional time added to the BCT's overall processing time. Typical factors to consider when trying to reduce time with radars include crew proficiency and digital connectivity with the counterfire element.

Whereas radars typically do not inhibit counterfire times, the field artillery battalion can influence the overall time significantly. The FA cannon battalion is allotted 1:40- 2:20 minutes standard by doctrine to process and fire a mission. The time begins at receipt of mission by the battalion fire direction center. This part of the algebraic problem is the area that the FA battalion has the most control of. It is also the area that needs the most focus and repetitions to elevate the training competency of the crews at the fire direction centers and gun lines. Additionally, factors such as weather conditions, adversary threat and incorrect ammunition allocation across the battalion also increase response times.

Common Variables

Adversary tactics, techniques and procedures in combination with the capabilities to emplace, shoot and displace in an expedited manner give the BCT a limited time to return effective Fires. This time, called target decay time, is what the BCT places in their target selection standards (TSS) and decision support matrix. It sets the time standard that the BCT must achieve to have an effective response. Both the friendly and adversarial forces face a multitude of common variables the BCT needs to consider when determining target decay time. Executors continuously find themselves chasing acquisitions while staying frustrated with all the clearance procedures that prolong friendly response times.

The total amount of time the BCT has to respond to adversary Fires is a gap that currently resides in doctrine from sensor to shooter. Current doctrine accounts for the time it should take to process a tactical

Common Variables

- Weapon system (light vs heavy)
- Terrain (mountain vs flat)
- Coordinating altitude
- Fire support coordination measures
- Asset availability
- Clearance of Fires
- Desired effects
- Weather effects
- Pattern analysis
- AI vs CAS allocation
- Unit proficiency
- Drop card vs digital (CTC only)

Figure 4. Common variables for the field artillery battalion. (Rick Paape)

acquisition, for the field artillery battalion fire direction center to process a (fire for effect) counterfire mission, for the battery fire direction center to process a battalion counterfire mission, and the time for the delivery asset to execute the mission. This gap exists at the brigade, regardless of whether the counterfire cell resides at the field artillery battalion or the brigade. The operational aspects and multiple common and adversary variables that must be considered for each counterfire make it extremely difficult, if not impossible, to establish a comprehensive doctrinal time standard from sensor to shooter.

Staff sections can help mitigate some of the frustrations during the planning process by considering the variables (mission, enemy, terrain, troops available, time and civilian considerations) in its entirety. By doing so, planners can truly conceptualize how to select and position each radar, recommend howitzer positioning guidance and integrate other sensors; tying all sensors to available shooters. This is a cyclic process, not a "fire and forget" one. Throughout the planning process, planners must also consider additional variables to facilitate a decrease in friendly response times. Below are some of the most important variables, though this list is not all-inclusive:

1. Weapon systems and size of the element

The artillery weapon type and the size of the element will determine the area required for occupation and target decay time. Here is where we ask ourselves, how much time do we have to respond to the threat? Does this target align with the high payoff target list (HPTL), target selection standards (TSS) and attack guidance matrix (AGM)? An additional element to consider is if the delivery platform is a joint asset. If so, does the echelon possess the requisite mission command apparatus to facilitate a timely response? Is the delivery asset a light or heavy artillery unit? Can they shoot and move prior to the target decay and still support additional fire support tasks?

2. Coordinating altitude and airspace coordination measures

The coordinating altitude (typically recommended by the Airspace Control Authority and approved by the joint force commander), may be adjusted to accommodate specific missions or phases of the operation. An increased coordinating altitude in the early phases of an operation creates a permissive surface-to-surface Fires environment, enabling the attrition of adversary air defense and artillery threats and increasing friendly response times. Environmental assessments (mountainous versus flat terrain), adversary air threats, phases of the operation and operational objectives should continuously be evaluated in order to affect a changes to airspace control measures. Additionally, proper analysis and synchronization of fire support and airspace coordination measures placement of assets by phase can assist in creating a permissive surface-to-surface environment therefore decreasing friendly response times and mitigating the time it takes to clear air space.

3. Fire support coordination measures

The BCT must monitor and scrub coordination and control measures in their area of operations in real-time. If included in rehearsals and maintained in real-time throughout the execution of operations, the BCT can prevent violations of these measures that require coordination to clear. Violations caught during sensor-to-shooter technical rehearsals can resolve issues prior to operations, decreasing surface-to-surface response times. This will reduce violations that require coordination with the creator of the coordinating measure.

4. Asset availability

Allocation of assets to achieve the commander's desired effects for each phase of the operation is vital. Dedicating assets in response to adversary Fires during a high operational tempo (OPTEMPO) period is challenging. Commanders, through their staffs, must visualize the area of operation and area of influence, but conceptualize the area of interest to truly allocate resources and assets deliberately and dynamically in time and space. Units must focus on the attrition of adversary fire support systems in the area of interest through targeting. This effort can reduce the adversary's capabilities to conduct deliberate and dynamic Fires before they can influence the area of operations. Reducing the adversary's capability to deliberately target or respond to friendly actions allows friendly delivery systems to remain in position long enough to deliver the required volume of fire to achieve the commander's desired effects. Through these efforts we can decrease friendly response times in the area of operations and mitigate the chances of friendly assets (Army and joint) becoming overwhelmed during high OPTEMPO periods. This is where the decision to mass friendly FA assets factors into position selection. A common BCT practice that is encouraged, is to give the opportunity to mass the BCT's indirect assets while dedicating a counterfire battery. The table below depicts the benefit of massing.

5. Desired effects

Any single delivery platform can engage a target in a timely manner, but can it achieve the commander's desired effects? The commander's desired effect and type

Number of tubes	Firing time 54 rounds	Average displacement time	Adversary window for effect
18	1 min.	+ 6 min.	7 min.
14	1 min.		7 min.
12	2 min.		8 min.
6	3 min.		9 min.
5	5 min.		11 min.
4	8 min.		14 min.
3	12 min.		18 min.

of munition determines the standard firing order to achieve effects on the target. Dynamically synchronizing and de-conflicting multiple delivery platforms to engage a target to achieve the commander's desired effects will inherently decrease overall response times. Understanding, visualizing and planning for the amount of resources, the amount of ammunition and type of asset(s) required to achieve the commander's desired effect is paramount. The BCT can reduce the time required to achieve these desired effects through massing of indirect or joint assets. Through massing and dispersion of their own indirect assets, the BCT can further complicate the adversaries counterfire solution by forcing the adversary to choose which one of the possible 18 independent acquisitions they will conduct counterfire on.

6. Pattern analysis

The BCT can decrease the response times by using historical data to facilitate pattern analysis. And to add to that, a lack of pattern analysis can contribute to an increase in response times because the BCT now has to react to the adversary instead of focusing their efforts in a proactive nature. Pattern analysis provides the staff with the type of adversary weapon system, times the adversary attacks, locations the adversary occupies and what the adversary is targeting. Prior to conducting reactive counterfire, the BCT uses this analysis to feed into their targeting process. This process synchronizes detection and delivery assets across the BCT and prioritizes the requests for joint assets from higher headquarters. Conceptualizing how the adversary arrays its own detection and delivery forces on the battlefield is crucial. Understanding the previously stated elements in addition to the surrounding terrain and mobility corridors to and from possible artillery movement areas and radar positioning areas will assist in the overall analysis. Pattern analysis helps confirm or deny predictions and decreases response times by informing call for fire zone placement and proactive counterfire.

7. Air interdiction vs close air support

The apportionment (based off the weight of effort) and allocation (mission type by percentage i.e., offensive counter-air, defensive counter-air, air interdiction, strike coordination and reconnaissance, close air support) affects how and when joint Fires engages adversary fire support assets. Joint assets have the ability to be extremely responsive if, through the targeting process, they are allocated to the BCT. Understanding the prioritization and allocation of joint assets, by phase, and the process to request them will guide our request efforts to achieve effects on the BCT's HPTL. Further, we must begin to consider and plan for the contested air effort that a near-peer threat possesses which may ultimately reduce the apportionment and allocation of joint assets in support of brigade operations.

A 2S19M1 Russian artillery system. (Vitaly Kuzmin/Wikimedia)

Enemy Variables

OPFOR displacement times

- 2S12: 3 min.
- 2S9-1: 1 min.
- 2S23: 1 min.
- D-20: 2.5 min.
- D-30: 3.5 min.
- 2S19M1: 1-2 min.
- G6: 1 min.
- BM-21: 2 min.
- 9P140 Uragan: 3 min.
- 9A52-2 Smerch: 3 min.

Figure 5. The opposing forces displacement times. (Rick Paape)

8. Unit proficiency

Understanding the three components of joint fire support: target acquisition, command and control, and attack/delivery systems — tying sensors (layered intelligence, surveillance and reconnaissance) to shooters is vital. Rotational units at the Joint Multinational Readiness Center throughout the last 12 months averaged around 12 minutes from sensor to shooter. Different geometries and common operating pictures created unnecessary coordination violations, increasing response times. Additionally, units struggled with publishing the attack guidance matrix and target selection standards which resulted in increased response times. Without an AGM or TSS from higher, units often attempted to determine the proper delivery asset and desired effects through their default settings on their digital tactical Fires systems, which was routinely insufficient. Further points of friction that increase response times are Advanced Field Artillery Tactical Data System (AFATDS) operator proficiency and proper manning. Units typically under-resource the counterfire cell, dedicating individuals that do not understand how to operate the AFATDS. Furthermore, the counterfire cell is typically undermanned, forcing individuals to focus solely on the reactive side, neglecting the analysis required to be proactive. Units that establish and rehearse a counterfire battle drill saw a decrease in response times and provided the unit sufficient time to conduct analysis on each acquisition to establish a pattern analysis.

Enemy variables

Enemy variables are considerations we must account for in the planning process and throughout each phase of the operation. Enemy displacement times help develop our target decay time by each target type. Once the BCT detects the adversary's indirect fire, target decay is the length of time the BCT has to engage the target before it displaces. A gap resides in determining accurate target decay time for each target type that we may encounter. Factors that must be considered are doctrinal displacement times (as depicted in Figure 5), type of terrain, weather, age of the equipment, volume of fire, crew proficiency and size of the element. These seven factors (not all-inclusive) may increase the time we have to achieve effects prior to target decay. The depicted displacement times are per system. These doctrinal displacement times do not factor in how the common variables affect the adversaries displacement time; such as type of terrain (mountainous or flat), weather (muddy or dry), age and condition of the enemy equipment, and the size of the element (a single system, platoon, battery, battalion, brigade, etc.).

Recommendations

Realistic sensor-to-shooter technical rehearsals are essential to success in driving down the total processing time for counterfire missions. Rehearsals such as the brigade fire support and technical rehearsals help the brigade synchronize the formation and create a common picture of how the brigade will employ its joint Fires assets. Brigades must ensure that time is properly allocated to execute these rehearsals in order to ensure that the entire fire support system understands their role and is able to work out problems within the plan. Counterfire injects must be included in all rehearsals to provide a realistic complex combat environment. Counterfire injects add a dynamic component to a deliberate plan. Counterfire injects during rehearsals allow time for the field artillery battalion, the brigade and both staffs to conceptualize detection and delivery assets in time and space, without overwhelming either. Additionally, counterfire injects during technical rehearsals allow the staff to validate the positioning of the delivery element while taking into consideration the trajectory of the round and gun target line with respect to active coordination measures (fire support and air) based on known friendly howitzer locations and enemy-predicted firing locations. An effective tactic, technique and procedure to facilitate responsive counterfire is the establishment of a quick-fire channel. The quick-fire channel can be established using digital (preferred) or voice communications. A quick-fire channel allows for rapid engagement of radar acquisitions by streamlining the sensor to the shooter process. The unit's ability to establish a quick-fire channel that is linked to a dedicated delivery element, will result in a decreased response time, enabling rapid engagement of radar acquisitions.

The challenging terrain in the Hohenfels Training Area creates realistic communication challenges within the BCT's counterfire system, causing the counterfire cell, on occasion, to route missions through battalion to forward them to the designated counterfire battery, inherently increasing the response times and causing the brigade to reach target decay time.

While the task of decreasing average counterfire times is daunting, it is certainly not impossible. The best units are those who make counterfire a priority for the entire brigade and consistently work to design efficiencies into the system prior to arriving at a combat training center. Further, this process is continually refined by the BCT and in doing so, the BCT does not relegate this as strictly a "Fires" problem, but as a BCT problem. Training on counterfire must be dynamic and allow realistic variables to influence the system. In doing so, units begin to understand which variables affect them and the adversary the most and start working effective mitigation steps to address those adding the most time.

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Soldiers, with the 5th Battalion 7th Air Defense Artillery Regiment, stage Patriot missile defense systems for a Patriot Shock exercise in Capu Midia, Romania. The weeklong exercise tests the unit's quick response deployment readiness and increases joint interoperability with Patriot missile systems and their Romanian partners. (Tech. Sgt. Brian Kimball/U.S. Air Force)

Preparing air missile defense, joint force against near-peer threat

By Maj Bryan A. Card

In 2014, two events changed the global security environment: the Russian invasion of Crimea and China's militarization of islands in the South China Sea.[1] These events increased the probability of interstate war, which means the United States needs to reemphasize countering near-peer capabilities in a complex, joint environment.[2] One area in particular that requires special emphasis is missile defense training because "against near-peer threats, today's AMD [Air and Missile Defense] force is unfortunately far too susceptible to suppression."[3]

In order to mitigate risk against the near-peer threat, Patriot operators need to regularly participate in joint training and exercises such as Red Flag and United States Air Force Weapons School Integration (WSINT). These events provide complex, joint environments to learn about these advanced threats and friendly operating standards and capabilities, as well as provide the opportunity to develop and hone joint tactics, techniques and procedures (TTPs). Such training will ensure that both Patriot operators and the rest of the joint force are prepared to employ an integrated air defense system against a near-peer threat.

Currently, neither Patriot operators nor the joint force is postured to effectively employ the Patriot system against a near-peer threat. Last year, Capt. Michael Schwartz highlighted some of these challenges in a Fires Bulletin article. He posits that "The majority of Patriot battalion deployments to Central Command … have not likely tested leaders' abilities to encounter a wide range of mixed air threats and complex, integrated attacks," such as those that would be encountered in a conflict with a near-peer adversary.[4]

Near-peer adversaries possess sophisticated airpower platforms and the ability to add more fog and friction to the operational environment by denying and degrading many of the systems and capabilities that the joint force has come to rely upon, thus creating a complex threat environment.[5] Schwartz goes on to state "the norm produced in this unopposed, low air threat era has not flexed air defense artillery leaders' tactical decision-making skills and highlights the need to prepare for a paradigm shift to the future battlefield."[6]

As a result, it is clear that Patriot operators need to train against the advanced threats posed by near-peer adversaries in a joint environment, on a regular basis.

The current lack of a joint training requirements for Patriot crews hurts the readiness of the entire joint force. First, the air battle scenarios that Patriot Soldiers certify and train with do not typically include advanced, complex threats incorporating near-peer tactics. Patriot training is based on air battle management levels (ABML), which specify a certain number of threats and different threat types — e.g. ballistic and cruise missiles, fixed- and rotary-wing aircraft, and unmanned aerial vehicles. However, there is no requirement to develop a comprehensive threat presentation using advanced adversary tactics, nor to incorporate joint TTPs.[7] Lacking a realistic scenario presentation can make it difficult for Patriot operators to determine friend from foe in the ambiguity of a contested environment with electronic attack impacting communications, GPS, radar returns and identification, friend or foe receivers. Second, by failing to mandate recurring joint training for the Patriot unit, the joint force has little exposure to Patriot TTPs and limited opportunities to work with Patriot Soldiers to develop new, joint TTPs incorporating the Patriot system to contend with near-peer threat.

Joint training opportunities

Red Flag is the Air Force's premiere air-to-air combat training exercise. It offers the opportunity to interact with the "air forces of the United States, its allies and coalition partners," incorporating "all spectrums of warfare, including command and control, real-time intelligence, analysis and exploitation and electronic warfare."[8] WSINT is the capstone to the five-and-a-half-month Weapons Instructor Course, bringing all Air Force Mission Design Series together for joint integration and synchronizing effects. Of particular interest to the Patriot community is the defensive counter-air (DCA) mission, which presents "nearly an impossible problem where 'blue' forces are outnumbered nearly four to one." Patriot planners develop defense designs alongside some of the most talented air defense

1 *"Air Force Update: Remarks by General David Goldfein, Chief of Staff of the Air Force at the 2017 Air Warfare Symposium," 02 March 2017, 3: http://www.af.mil/Portals/1/documents/csaf/letter3/CSAF_Mar17_AFA_Transcript.pdf*

2 *"The National Military Strategy of the United States of America 2015," Office of the Chairman of the Joint Chiefs of Staff, June 2015, 4: www.jcs.mil/Portals/36/Documents/Publications/2015_National_Military_Strategy.pdf*

3 *Thomas Karako and Wes Rumbaugh, "Distributed Defense: New Operational Concepts for Integrated Air and Missile Defense," Center for Strategic and International Studies, (Lanham, MD: January 2018, Rowman and Littlefield), 1.*

4 *Michael Schwartz, "Leader development: The air defense artillery transformation's biggest challenge," Fires, March April 2017, 17.*

5 *Franz-Stefan Gady, "China's First Fifth-Generation Fighter Jet Enters Service with the PLAAD," The Diplomat, 14 March 2017: http://thediplomat.com/2017/03/chinas-first-fifth-generation-fighter-jet-enters-service-with-the-plaaf/ and Jeffery Lin and P.W. Singer, "China Builds Its Own 'Wild Weasel' to Suppress Air Defenses," Popular Science, 29 December 2016: http://www.popsci.com/china-builds-its-own-wild-weasel-to-suppress-air-defenses#page-5*

6 *Schwartz, 17.*

7 *"32nd AAMDC Training Circular 3-01.86 Supplement," 32nd AAMDC, August 2016, 101.*

8 *Zade Vadnais, "Air Force Conducts Red Flag 17-2 Exercise at Nellis AFB," Department of Defense News, 6 March 2017: https://www.defense.gov/News/Article/Article/1103651/air-force-conducts-red-flag-17-2-exercise-at-nellis-afb/*

planners in the Air Force.[9] For instance, at WSINT in 2012, Patriot exercised advanced, integrated air defense in a complex air and missile threat environment, requiring detailed integration of friendly DCA aircraft—to include fifth generation fighters—into a joint engagement zone (JEZ). The defense planning and execution created a situation where "Patriot was considered a peer weapon system to fighters, versus a capability of last resort."[10] Red Flag and WSINT delivers at least five opportunities per year to learn about joint air operations, hone TTPs, and "experience realistic combat scenarios in order to prepare and train for future conflicts" such as those posed by near-peer adversaries.[11]

Training at Red Flag and WSINT produces several benefits that prepare both Patriot Soldiers and the joint force for the near-peer threat. First, Patriot planners with their joint counterparts will work through the mission planning process against challenging, if not near impossible, threat presentations. They will help develop new tactics to counter these threats and execute them in practice, learning from their mistakes during the debrief process. They will also have the opportunity to brief Patriot capabilities and limitations to the joint audience and lead mission briefs, enhancing the credibility of the Patriot community.

All of these benefits will in turn help build mutual understanding, trust and confidence between the Patriot and joint communities. This relationship building will then carry over to actual operations. By regularly training with the joint force in challenging threat environments, the confidence that is built will translate into trust during actual operations. Tactics developed during these training events will also carry over to TTPs used in theater to counter the near-peer threat. Furthermore, since each theater's area air defense commander (AADC), usually a senior Air Force officer, sets the rules of engagement (ROE) for Army air and missile defense (AMD), greater exposure to the joint force during exercises can have a positive impact on theater ROE.[12] By instilling trust in the Army's ability to protect friendly aircraft and confidence in the Army's ability to execute specific TTPs to counter advanced threats, the AADC may grant additional responsibility to Patriot units, treating Patriot as a peer-weapon system to DCA fighters, and not simply a counter-missile system.

Another benefit of this interaction with the joint air defense community is the knowledge gained can be brought back to improve in-house Patriot training. The more that is learned about friendly TTPs, the more accurately those TTPs can be represented in Patriot ABML training, leading to more realistic unit training. DCA combat air patrols can also be represented accurately based on the desired engagement zone with correct air-to-air intercept ranges. This will support realistic JEZ operations and DCA aircraft-to-Patriot engagement handoffs in ABML scenarios. Additionally, joint sensors such as the Control and Reporting Center's TPS-75 radars and the E-3 AWACS can be better incorporated into training scenarios to more accurately represent the sensor network displayed on the tactical datalink network. Finally, the composite threat presentation at Red Flag and WSINT will help Patriot trainers create training scenarios that reflect the near-peer threat environment. By integrating knowledge gained on friendly operating standards and TTPs as well as the likely adversary threat presentation into daily Patriot training, Patriot Soldiers will be better prepared to identify and protect friendly aircraft in the ambiguity of a contested environment, while at the same time, engage advanced threats presented by near-peers.

Red Flag at Nellis AFB, Nev., occurs three to four times per year and WSINT is a biannual exercise, allowing multiple opportunities for Patriot Soldiers to train on a recurring basis. Ideally, Soldiers would train on actual Patriot equipment at these events. However, this is not cost effective or logistically feasible. Virtual training presents a realistic alternative to utilizing the actual Patriot system and, fortunately, the Air Defense Training Center at Fort Bliss, Texas, has supported both of these events with the Reconfigurable Table Top Trainer (RT3) and Virtual Patriot (vPat) on an ad hoc basis since December 2014. The RT3 and vPat allow Patriot Soldiers to participate in Red Flag and WSINT without having the actual Patriot system by utilizing the Nellis Test and Training Range Network, which tracks the location, speed and weapons state of nearly all aircraft on the Nellis range. This aircraft information is passed to the RT3 and vPat simulators, which in turn can display aircraft to the operator as organic Patriot radar tracks. These systems simulate terrain and actual detection ranges, and can participate on the tactical datalink network, further enhancing realism. This virtual training closely mimics the training that a real system affords, allowing operators to seamlessly interact with live aircraft and air controlling agencies operating on the Nellis range. Virtual training is an effective use of training dollars as it allows a greater number of Patriot Soldiers training opportunities than would be available if a Patriot battalion's equipment had to be deployed to support every training event. Thus, the RT3

9 *Kevin Tanenbaum, "USAFWS: Defensive Counter Air," Nellis Air Force Base Website, 18 January 2017, http://www.nellis.af.mil/News/Article/1054502/usafws-defensive-counter-air/*
10 *Edward O'Neill, Michael Cochrane, and Doug Blanchette, "Joint Tactical Air Picture: A Technical Approach to Gaining Clarity in the Air Domain," Fires, March-April 2013, 33.*
11 *Ibid.*
12 *Air Force Doctrine Annex 3-30, "Command and Control," 7 November 2014, 36, 38 and JP 3-01, "Countering Air and Missile Threats," 23 March 2012, III-10 and III-16.*

Sgt. Eric Terlau (right) and Pvt. 1st Class Draney (left), Soldiers with the 5th Battalion, 7th Air Defense Artillery Regiment, brief members of the Romanian Air Force on Patriot Missile Launcher capabilities during a Patriot Shock exercise in Capu Midia, Romania. (Tech. Sgt. Brian Kimball/U.S. Air Force)

and vPat simulators allow Patriot Soldiers to train with the joint force in a complex environment against near-peer threats on a regular basis and work with joint partners to plan missions, develop TTPs to deal with advanced threats, and to debrief what went wrong and what can be done better.

"Train as you fight" is a familiar phrase in the Army and for good reason—you will fight as you have trained. Currently, both Patriot Soldiers and the joint force are ill-prepared to utilize the Patriot system against the near-peer threat simply because Patriot Soldiers are not regularly training with their joint partners to combat this threat. In order to overcome this training shortfall, Patriot Soldiers should deploy to Nellis AFB to train at Red Flag and WSINT on a recurring basis. This will allow Patriot Soldiers to learn from other service partners and in turn, will teach joint partners about Army AMD while developing TTPs to counter the near-peer threat. Once validated, this practice can be adopted for use in theater and the relationships developed between the Patriot and joint communities during training will help build mutual understanding, trust and confidence, ultimately leading to the utilization of Patriot as a peer-weapon system to DCA aircraft. In order to facilitate this increased joint training regimen, virtual Patriot training systems should be utilized to incorporate as many Patriot Soldiers as possible and grant the widest exposure to the joint community. The result of such joint training, whether using the actual or virtual Patriot systems, will be a joint force that is much better prepared to deal with the near-peer threat.

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Artillery's role in sea-based expeditionary Fires

By Maj. Adam Ropelewski

Fire support and maritime history was made in late October 2017 during exercise Dawn Blitz 2017. R Battery, 5th Battalion, 11th Marine Regiment supported the 1st Marine Expeditionary Brigade and Expeditionary Strike Group 3 by successfully demonstrating the ability to fire a Guided Multiple Launch Rocket-Unitary (GMLRS-U) from an M142 High Mobility Artillery Rocket System (HIMARS) off the flight deck of the USS Anchorage (LPD-23), an LPD-17 San Antonio Class Amphibious Ship.

There were two training objectives for the sea-based expeditionary Fires (S-BEF) demonstration: the successful launch of one GMLRS-U rocket from an amphibious platform and the successful engagement of a land-based target at the range of 70 kilometers. Both were achieved. This successful demonstration of S-BEF identified a cross-domain capability that can be utilized by a task force to precisely strike enemy targets from the sea.

The scenario for the S-BEF demonstration required an enemy island-based coastal defense cruise missile (CDCM) site to be neutralized. This would allow the amphibious task force (ATF) to maneuver into position to attack additional targets on the island and establish expeditionary advanced bases to support the ATF's future operations. As the enemy force was identified on the southern portion of the island, the ATF determined all available assets would be required to destroy the defending enemy force. Intelligence, surveillance and reconnaissance identified the targets for the S-BEF, as Naval Surface Fires Support from Arleigh Burke Class Destroyer, a rotary-wing attack aircraft, as well as Joint Strike Fighters from amphibious ships. The S-BEF was sequenced to fire first in order to neutralize the CDCM and allow for other ATF assets to position themselves and attack the remaining enemy forces. Upon identification, S-BEF destroyed the CDCM's radar, with the newfound freedom to maneuver, the ATF's ships repositioned as required.

Prior to demonstrating this capability, approval to stow, transport and live-fire off a Navy combat ship was required from the Navy's Weapon System Explosive Safety Review Board (WSESRB). A variant of the HIMARS fire control software was developed by Lockheed Martin Company to enable firing from a moving platform. Approval to use this, yet-to-be widely fielded software on a Navy ship, was required from the Navy's Software Safety and Technical Review Process. Lockheed also developed a blast pad to protect the Anchorage's flight deck. One of the intents behind the demonstration was to leave the ship undamaged and able to fully participate in the remainder of the exercise. Due to the complexity of the exercise, our window to execute the demonstration was small, and with a busy air plan, if we fouled the flight deck it would have thrown off the timing and events of the exercise. Both the software and blast pad acted as advertised. The software ran without error and the blast pad preserved the deck. Only a small amount of residue remained on the flight deck after the live fire. We were constrained by the WSESRB to only fire one rocket, but since we had a nominal firing event, we could have used the blast pad for additional rounds.

Getting the HIMARS and blast pad into position required training and multiple rehearsals to ensure we were prepared to execute once the ship was in position and we had permission from the range control authorities to fire. The HIMARS and rocket pod were embarked via Landing Craft Air Cushioned through in-stream on load. While the blast pad could have been stored in the bed of a resupply vehicle (RSV), it was stored in the hangar bay to increase setup response time, and the HIMARS was stowed in the upper vehicle stowage area of the well deck alongside other Marine vehicles that would later be disembarked. The rehearsals identified that the HIMARS could be stowed on any of the ship's stowage decks, but the upper vehicle stowage area, had the easiest and quickest access to the flight deck.

The rocket pod was stored in the ship's magazine. We used the ship's organic material handling equipment to transport the rocket pod from and to the launcher and magazine. It was important for us to use the ship's organic systems to move the rocket pod, so we could demonstrate to the force the transportability of the rocket pod within an LPD-17 class amphibious ship. No special or unusual steps were required by the HIMARS section to load the rocket pod and the selected stowage point provided sufficient room to load the pod without moving it too far from the elevator.

Once the HIMARS was loaded, it was driven to the flight deck and secured. All system initiation steps were recorded for purposes of the demonstration evaluation. Before initialization, the HIMARS and blast pad were secured to the flight deck by a combination of the ship's organic chains and straps the battalion provided to secure the axles. The use of the ship's organic chains proved the HIMARS could be secured to any ship that has similar tie-down points to an LPD-17. Next, the ship traveled to the predetermined coordinates as the amphibious force and range control cleared the surface and airspace of the entire surface danger zone (SDZ). The WSESRB prohibited any personnel or equipment from being within the SDZ. Due to the demonstration's nature, the SDZ was quite large and clearing it required the use of multiple Navy and Coast Guard air and watercraft. Range control identified a five-mile course along which the Anchorage could travel and the HIMARS could fire. The ship reached it and maintained the appropriate speed, roll and pitch parameters required by the updated fire control software. The fire mission was pre-scripted to observe the administrative constraints, but an F-35 Joint Strike Fighter from the USS Essex (LHD-2) was present and spotted the rocket's impact and could have easily been incorporated as the fire mission's observer. Further, the administrative constraints required the battery fire direction center to verbally send the fire mission to the HIMARS section, but multiple rehearsals proved the battery's ability to digitally control the S-BEF Fires. The GMLRS-U was fired at a replicated radar site on land at a range of 70 kilometers. The rocket destroyed the 10 foot by 10 foot fiberglass dome. Our assessment showed it

struck within the munition's circle error of probability.

Upon completion of the fire mission, the flight deck was inspected for damage and foreign objects were mapped and documented. With the minimum amount of debris from the launch, the officer in charge of the flight deck was satisfied that the deck was safe for flight operations. The HIMARS and blast pad were recovered to the upper vehicle stowage area and hangar bay and flight operations resumed within 30 minutes of the live fire.

The purpose of the S-BEF demonstration was "to allow the fleet to assess HIMARS as a potential future candidate for integration as a sea-based Fires alternative." We linked our purpose to the Marine Corps Operating Concept published in September 2016 and the Navy's Littoral Operations in a Contested Environment. After the successful S-BEF demonstration, it is fair to ask "What's next?" And "Is this a capability we want to further develop?"

There were a series of administrative constraints, which should be removed for future training. The removal of these constraints will allow for the rehearsal of S-BEF as the delivery function of a digital kill chain. It would also allow the HIMARS section and ship's crew to work at a rapid pace and the after action review would shape future S-BEF capability developments and tactics, techniques and procedures. Future evolutions could look at the possibility of firing other munitions from the MLRS family of munitions (MFOM), particularly the Army Tactical Missile System (ATACMS). The range and explosive power of the ATACMS would provide the amphibious force a tremendous long range sea-based Fires alternative. If the MFOM were expanded to include an anti-ship missile, the addition of that capability to S-BEF would provide the amphibious commander with a complement to the AGM-84 Harpoon Missile. The anti-ship capability would also invite experimentation with the kill chain. If a sensor identified an enemy surface combatant, S-BEF could serve in an anti-ship role as the primary or alternate shooter. Or, a time on target could be chosen for multiple platforms to mass on the surface target.

The type of headquarters S-BEF could support opens the discussion to one of requirements and embarked trade-offs. The command structure of Dawn Blitz 2017, combined the 1st MEB and ESG-3 staffs into Amphibious Force 3. S-BEF was organic and general support to AF-3, but it could just as easily have been organic to a multi-domain task force and general support to a geographic or functional commander. S-BEF could also have been direct support to any of the task force's subordinate warfare commanders or the battalion landing team.

Marines from 5th Battalion, 11th Marine Regiment fire an M142 High Mobility Artillery Rocket System while aboard the USS Anchorage. (Mass Communication Specialist 2nd Class Matthew Dickinson/U.S. Navy)

Accounting for its mission, the Marine Expeditionary Unit and Amphibious Ready Group commanders would have to survey the missions and decide if the stowage requirements, and area of operations (AO) is right for adding S-BEF to the MEU's table of organization. Necessary redundancy would be required if S-BEF were deployed, likely two HIMARS. As previously stated, the blast pad(s) could be stowed in the RSVs, but ammunition must be stored in a magazine. The rocket pod's size could quickly overcome a magazine. How much room is reserved for the rocket pods depends on what else is embarked aboard that ship, but it is a serious consideration that must be taken into account. Further, commanders must decide if the AO requires precision Fires from the sea. Traditionally, those Fires would be provided by the embarked UH-1 detachment, but if the air defense threat prohibited their use, S-BEF could be a possible answer to unilaterally destroy that threat or as part of sequenced Fires with the UH-1's against the threat. Tactics, techniques and procedures would need to be developed to ensure the flight deck was not fouled in case an UH-1 needed to recover to a flight deck. Perhaps another ship's deck would be used if the HIMARS were still top-side, or it could land near the HIMARS between fire missions and be recovered into the hangar bay. These procedures require development, and flight deck management would require multiple staff elements to work through contingencies, especially if the HIMARS were required to fire multiple missions. S-BEF provides the amphibious commander the first rocket system that is reloadable while underway, a capability that should not be discounted.

The S-BEF demonstration during Dawn Blitz 2017 proved that HIMARS can be safely and effectively fired from the flight deck of an LPD-17 Class amphibious ship as an alternative sea-based Fires capability. With further development, it could be incorporated as organic Fires for a task force that requires a capability to provide fire support from the sea while retaining the option to send the asset ashore where it could continue to provide deep Fires.

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Big sky, little bullet

Tackling the Army's airspace and joint Fires integration problem

By Maj. Daniel Threlkeld

On March 24, 2001, Major League Baseball pitcher, Randy Johnson, threw a fastball that hit and killed a dove during a spring training game. The poor bird happened to fly between home plate and the pitcher's mound at the exact moment in time and space for it to collide with a ball roughly three inches in diameter. Video of the collision between bird and ball can be seen on the internet today, and if social media and viral videos existed then, as they do now, it would have been internet gold.

Airspace 'collision zones'

What does Randy Johnson's infamous pitch have to do with joint Fires integration you might ask? It is certainly an example of how the concept of "big sky, little bullet" can go terribly wrong. What if our military had the right procedural controls and situational awareness to execute this concept of joint Fires integration? This article analyzes the pitching incident to illustrate the utility of using collision zones to orchestrate joint Fires processes to be more efficient and clearer.

Let's examine the pitching incident for a moment (see Figure 1). The odds of a bird being hit and killed by a baseball in most places on planet earth is close to zero. So, we could consider the airspace outside of a baseball diamond as having a low probability of midair collisions with a baseball (i.e., low collision zone). If the bird dives into the confines of a baseball diamond (during a game or practice), the odds of colliding with a baseball somewhat increase as there are more chances the bird could be struck by either a hit or thrown ball. We could classify the general airspace within the baseball diamond (during a game or practice) as a medium probability of collision zone (i.e., medium collision zone). Although the bird now has an increased risk of being struck by a baseball, the odds are still in the bird's favor. However, if the bird flies in between the pitcher's mound and home plate during a game, the odds of a midair collision increase exponentially. During an average Major League Baseball game, pitchers throw approximately 150 times, catchers throw the ball back to the mound, and batters can rocket a ball into the air off of a good pitch. This small 60-plus foot patch of airspace, during a game, could be classified as a high probability of collision zone (i.e., high collision zone). If the bird flies into this high collision zone, it increases the risk of being struck by a baseball. Those collision zones define a specific volume of airspace as it pertains to the odds of being struck by a baseball.

Airspace planning, use of collision zones on the battlefield

Now that we are clear on the baseball analogy, let's translate it into a military area of operation (AO). We assign maneuver commanders, at various echelons, an AO that encompasses a geographic region, to include the three-dimensional block of airspace when delegated that responsibility from the airspace control authority. Current joint and service doctrine uses maneuver control measures, airspace coordinating measures (ACMs), and fire support coordination measures (FSCMs) to plan for and manage joint Fires and airspace. Generally speaking, Fires and airspace planners design unit airspace plans using ACMs and FSCMs to define specific three-dimensional blocks of airspace for aircraft (fixed and rotary wing) to safely operate. This is done through the use of airspace coordination areas, restricted operations zones and air corridors.

Figure 1. A comparison of the playing area on a baseball field and the collision airspace zones. (Courtesy illustration)

Additionally, a coordination level and coordinating altitude is established to separate and delineate entire blocks of airspace. Coordination level is used to separate fixed and rotary-wing aircraft by determining an altitude below which fixed-wing aircraft normally will not fly.[1] Coordinating altitude is an ACM that uses altitude to separate users, and defines the transition between different airspace control elements.[2] Airspace coordination areas are defined as "a three-dimensional block of airspace in a target area, established by the appropriate commander, in which friendly aircraft are reasonably safe from friendly surface Fires."[3] A restricted operations zone (ROZ), is defined as "airspace reserved for specific activities in which the operations of one, or more, airspace users is restricted."[4] Lastly, an air corridor is "a restricted air route of travel specified for use by friendly aircraft and established for the purpose of preventing friendly aircraft from being fired on by friendly forces."[5]

What about surface fired projectiles? Joint Fires planners often forget that artillery projectiles are airspace users just like aircraft, although the flight path (ballistic solution) cannot be controlled like an aircraft once fired. One could argue this makes planning airspace for Fires easier than aircraft. With the exception of precision-guided munitions, conventional cannon and rocket artillery generally follow a very predictable flight path and/or trajectory. There is a relatively unknown doctrinal ROZ called a surface-to-surface munition (SSM) ROZ which is "airspace of defined dimensions established specifically for surface-to-surface munitions route of flight and launch and impact point."[6] A variant used in United States Message Text Format (USMTF) 2004, and compatible with our digital systems, is a special use airspace (SUA) ROZ called a Surface-to-Surface Missile System (SSMS).

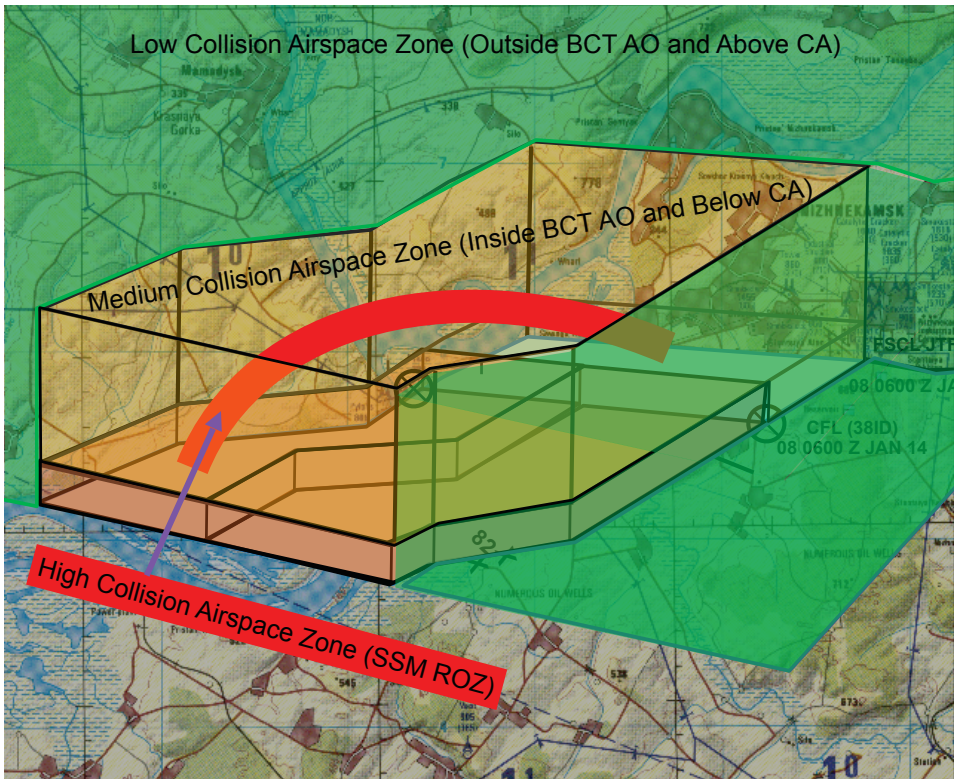
The SUA/SSMS ROZ is used to identify airspace requirements for firing guided multiple launch rocket system munitions, Army tactical missile system munitions and cannon artillery. Only the SUA/SSMS ROZ is compatible with USMTF 2004 used to communicate between Army mission command systems and the Air Force's Theater Battle Management Core System. One reason that the ROZ SSM / SUA SSMS is addressed here is that its implementation requires coordination between the Fires cell and the airspace element. Army airspace users need to identify the most appropriate ACMs that closely correlates to their airspace requirement and integrate those measures into a clear, concise, and understandable unit airspace plan. Now on to airspace collision zones and why understanding levels of collision risk could facilitate a better airspace plan. In planning, an airspace collision zone could be designated by the calculated probability of an aircraft being struck by surface Fires (high, medium or low) after analysis of all variables. This probability would be linked to defined levels of risk underwritten by a commander for specific blocks of airspace during specific time periods. The level of collision risk for a particular block of airspace would be inversely proportional with the level of restrictions placed on artillery and/or other indirect fire units assigned to an AO.

For instance, low collision airspace zones would be most restrictive to surface Fires, while high collision airspace zones would be least restrictive. In keeping with the baseball analogy, we will use a brigade combat team's (BCT's) AO as our baseball diamond (see Figure 2). Anything outside the BCT's AO and above a particular altitude (the coordinating altitude) could be defined as a low collision airspace zone because we determine that the majority of our surface Fires will not travel outside of the BCT's AO (baseball diamond). Therefore, limiting the risk to transiting aircraft. Our medium collision zone (inside the baseball diamond) could be defined as everything below the coordinating altitude and inside the BCT's surface boundary. The medium collision airspace zone is crucial because it requires detailed planning and synchronization of airspace in order to expedite joint Fires. Our high collision airspace zones would equate to three-dimensional air corridors (ROZ SSM/SUA SSMS) between firing unit locations and enemy targets. This would expedite Fires through airspace that we have planned for a high volume of fire. In order for this concept and methodology to work, a staff must understand where surface Fires will shoot from (i.e., the pitcher and/or pitcher's mound), where the majority of enemy targets will be (i.e., the catcher and/or home plate), and a pretty good estimate of the types and number of aircraft that will be operating in the AO.

Firing unit restrictions (further mitigating risk while expediting Fires)

Back to baseball for a moment. What if

Figure 2. An example of an airspace collision zone in a brigade combat team area of operation. (Courtesy illustration)



1 *Joint Publication 3-52, Joint Airspace Control (Washington, DC: U.S. Government Publishing Office [GPO], 13 November 2014) C-6.*
2 *Ibid.*
3 *Ibid., C-7.*
4 *Ibid., C-4.*
5 *Ibid., C-2.*
6 *Ibid., C-5.*

we helped manage and/or mitigate the risk of a pitcher hitting a bird with a baseball by implementing some pitching restrictions as well? We could do this by using a simple green, amber and red pitching status (red being the most restrictive). If we gave the pitcher a green pitching status, because we observe that no birds are flying around the ball field (or we predicted this during planning), it would allow him or her to pitch freely. This would expedite pitching efforts and the risk would be relatively low because we do not see any birds in the medium or high collision airspace zones (or we have a way of keeping birds out of the medium or high collision zones through coordination and control measures).

If we see some birds fly into the ball field's airspace, we may tell the pitcher that they are now in an amber pitching status, which means they must look around before making a pitch to ensure no birds are heading towards their location. This would slow up the play a bit, but would mitigate the risk of any pitches hitting a bird. Now, let's look at the red pitching status. In this scenario, we will say that there are a lot of birds flying around the baseball field, especially near the pitching mound and home plate. To help mitigate risk, we employ bird "spotters" who we could equate to as the airspace control element. Before the pitcher is allowed to throw a ball, there must be a thumbs up from the spotters that the pitching lane is clear from the pitcher's mound to home plate. Then and only then can they release a pitch. This would significantly slow down play, but would ensure that no birds get hit by a baseball.

This same concept could be applied to firing units to help mitigate risk (see Figure 3). A green fire status could be defined as: procedurally clear airspace; notify all users on a common net and fire immediately unless someone calls check fire. This would produce the most responsive Fires and could be paired with a high collision airspace zone that has been built as an SUA/SSMS ROZ (high volume of surface Fires). This would make the airspace permissive for surface Fires, but restrictive for aircraft.

An amber fire status could be defined as: procedurally clear airspace; notify all airspace users on a common net and fire one minute after notification unless someone calls check fire. This would slow Fires slightly and could be paired with a medium collision airspace zone as long as it is complemented with the appropriate coordination and control measures. Note, the time of one minute is an estimate and could be adjusted in accordance with a command's risk tolerance (shorter or longer). Theoretically, one minute would give all airspace users adequate time to ensure they are not in the wrong place at the wrong time. The point is to keep it long enough for a quick check, but short enough not to stifle the fire mission timeline. We must be confident in our unit airspace plan, but to be confident, we must have personnel who understand how to construct that plan. This would take a balanced approach to the airspace when talking permissive versus restrictive.

Lastly, a red fire status could be defined as: additional airspace clearance required; notify all airspace users on a common net and fire only when given clearance of air by the appropriate airspace control element. This is the most restrictive firing status for a unit and could (by default) be paired with a low collision airspace zone. This would make the airspace permissive for aircraft but restrictive for surface Fires. The firing status is fluid and could always be adjusted if the unit has a clear picture of its airspace. The air defense artillery community already employs a similar form of firing unit control via a weapons control status, though it is designed around the enemy and not airspace. Their weapons control statuses are free: fire at any target not positively identified as friendly; tight: fire only when targets identified as hostile; and hold: fire only when ordered or in self-defense.[7]

The good thing about aircraft is that

7 *JP 3-01 , Countering Air and Missile Threats (Washington, DC: U.S. GPO, 21 April 2017), V-24—V-25.*

Figure 3. Examples of firing statuses and airspace collision zones. (Courtesy illustration)

Firing Status	Details	Airspace Collision Zone
Green Fire	• **Firing Status:** Procedurally clear airspace; notify all airspace users on common net and **fire immediately** unless someone calls "check fire" • **Airspace:** Permissive for Surface Fires; Restrictive for Aircraft	High Collision Airspace Zone
Amber Fire	• **Firing Status:** Procedurally clear airspace; notify all airspace users on common net and **fire 1 minute after notification** unless someone calls "check fire" • **Airspace:** Balanced	Medium Collision Airspace Zone
Red Fire	• **Firing Status:** Additional Airspace clearance required; notify all airspace users on common net and **fire only when given clearance of air** by appropriate airspace control element • **Airspace:** Permissive for Aircraft; Restrictive for Surface Fires	Low Collision Airspace Zone

they are much more predictable than a bird. That is, if we published the collision zones and unit firing statuses to all pilots and/or operators, then they would do their best to avoid certain airspace collision zones at certain times. New guidance would also need to be developed for aircraft operations within airspace collision zones. For instance, avoid high collision airspace zones as they correlate to a high volume of surface fire, and adhere to published ACMs and FSCMs inside medium-risk zones to reduce the risk of midair collision with a surface projectile. The good news is that we already have several venues to publish this information to include the airspace control order, special instructions, notice to Airman and operations orders.

Simplifying airspace plans, management

Could this perspective of airspace be used in joint Fires planning to identify risk zones and help expedite clearance of Fires, and/or could it be integrated into current joint Fires and airspace planning procedures to simplify the overall plan? In this complex and ever-changing battlefield we must be bold yet cognizant of risk. Let me pose a simple question: Do we really need to go beyond a quick procedural clearance in a "high collision" airspace zone that is clearly defined and articulated to all airspace users? I have witnessed, firsthand, units painfully try to clear airspace in an area that we knew, with a high level of confidence, that there were no aircraft present. During my time at the Joint Readiness Training Center as a Fires support observer, coach, trainer, clearance of Fires was the thorn in everyone's side. Maneuver commanders complained that it took too long so they eventually reduced their use of surface Fires. We, the military, have published tactics, techniques and procedures, standard operating procedures, and doctrinal manuals to address the problem to no avail. We have created the Joint Air Ground Integration Center concept with some recent success, but it is far from perfect and located at the division level.

If airspace collision zones were developed and published properly, aircraft could avoid high collision zones (i.e., SUA/SSMS ROZs), therefore reducing the time to shoot surface-delivered munitions. The crux of the problem has to do with planning and the ability not only to accurately develop a coherent airspace plan, but manage that airspace after the plan is in place. Even with current doctrine, we hardly have enough trained personnel who understand how to make it all work. There are very few staff officers (and commanders) across the Army who fully understand airspace planning and management. We have maneuver planners who only think about the ground fight, field artillery personnel who only think about surface Fires, air liaison officers and joint terminal attack controllers who only think about fixed-wing aircraft, and air defense officers and brigade aviation officers who only think about their pieces of the puzzle. We have gotten better at collaborating over the years, but we still have a tendency to conduct stove-piped planning in our area of expertise. Additionally, staff officers still have a hard time understanding their own digital mission command systems let alone how those systems integrate with others on the network.

Proposed solutions

I propose two solutions to help expedite safe and responsive surface Fires, both of which could complement current procedures. The first solution is to adopt the aforementioned airspace collision zones and unit firing statuses into doctrine and train personnel on their use. The methodology is still in a conceptual stage and must be discussed among Fires and airspace professionals and proofed and tested in real-world scenarios. Additionally, we must do a better job at training personnel on current joint Fires and airspace doctrine. Our 13A field artillery officers and 13F fire supporters must be trained on airspace planning and management early on in their careers. The buzzwords are integrate and synchronize "multi-domain" Fires, but in order to do this we must have well-rounded officers and noncommissioned officers who understand airspace planning and management. It must be learned early in the training pipeline and practiced often to create true experts. We must also start looking at artillery as an airspace user and plan appropriate airspace measures (i.e., SUA/SSMS ROZs) for surface-to-surface Fires. These blocks of airspace can work concurrently with other coordination and control measures.

The second solution involves mission command systems. The Army must subscribe to the Link 16 architecture employed by the Air Force and distribute these tools and/or systems to the lowest echelon possible. Additionally, BCTs need organic radar systems like the Sentinel Radar, or another comparable system, to provide a real-time air picture. We have counter-fire radar systems at all BCTs and radar systems to facilitate airspace are just as important today. This is an uphill battle due to equipment procurement, cost and personnel training, but it would be worth the effort in the long run. Our airspace is only getting more congested. We can no longer rely on antiquated technology and procedures from a time when there was no such thing as an unmanned aircraft system or remotely piloted aircraft. Getting Link 16, radars and other mission command systems down to the brigade combat team to facilitate airspace control may be a pipe dream at this point but it is something that needs serious consideration. In the interim, we need to fully leverage the capabilities of the systems that are sitting in all of our command posts. The latest versions of the Advanced Field Artillery Tactical Data System, the Tactical Airspace Integration System, and the Air and Missile Defense Workstation provide powerful tools, but we often fall short of leveraging their true capability due to lack of training and understanding of how they complement each other. Additionally, our operators and leaders need comprehensive training on these systems to include detailed instruction on interoperability.

It is time to get out of the old airspace mindset and generate new ideas. The concepts and methodologies discussed in this article may not be the right solution, but the hope is that it generates discussion that eventually turns into action to make clearance of Fires and airspace planning and management that much better in the future.

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Rethinking risk, airspace for decisive action

By Lt. Col. Dave Pasquale

United States Combat Training Centers observe overreliance on positive control of airspace by rotational training units (RTUs), which diminishes the unit's ability to employ timely joint Fires from the North Atlantic Treaty Organization (NATO) against a near-peer. The result is unnecessary risk to force and mission.

The joint airspace planners from the brigade combat team (BCT) to corps need to communicate collective airspace user requirements, emplace associated employment procedures, and properly communicate the associated airspace user risk to the commander. Joint Publication (JP) 3-52, "Joint Airspace Control" states that, "The airspace control authority (ACA) develops an airspace control plan (ACP) for joint force commander (JFC) approval. The plan should take into consideration the likelihood of multinational operations, as well as the need to develop policies and procedures that foster compatibility and interoperability of support systems and methods to accommodate potential civil aviation activities." Further, "The ACP should be closely integrated with the JFC-approved area air defense plan developed by the area air defense commander. Collection of lessons learned information throughout the development of the ACP will assist ACP development for future operations."[1] Field Manual (FM) 3-52, "Airspace Control," incorporates lessons learned as well as the updates associated with the re-write of JP 3-52. FM 3-52 states, "The alignment of air support operation centers (ASOC) with active Army division headquarters allow for the greater responsiveness and flexibility of responsive Fires and division assigned airspace. The central idea of this publication reflects the Army's role within a larger framework (unified action) and its focus on maximum flexibility through a philosophy of mission command and an operations process approach."[2]

The newly published FM 3-0 "Operations" gives maneuver commanders at the BCT-level a framework for airspace management, with the corps headquarters decentralizing airspace control to subordinate elements within their respective area of operations (AO) for the execution of operations. Divisions with direct support ASOCs allow the headquarters to form a joint air-ground integration center (JAGIC). The ACA, mentioned in JP 3-52 and above, may delegate assigned airspace to the division. This delegation, along with further responsibility of airspace to the BCT-level enables the clearance of Fires and control of low altitude above ground airspace congestion given the threats posed by the enemy's integrated air defense system.[3]

How did we get here?

"We must be more sophisticated in our fire support approach. We must help design a battlefield architecture that enables Maneuver commanders to bring all elements of combat power to bear simultaneously at the time and place of their choosing on the battlefield. Techniques that may have been effective in counterinsurgency operations, such as establishing blanket low-level coordinating altitudes, result in unnecessary clearance of Fires drills and ineffective indirect Fires when applied in a decisive action training environment."

-From the Commandant's desk 2017 Year in Review, Looking Back at 2017 & Looking Forward to 2018, Redleg Update November/December 2017

Through years of fighting adversaries without significant peer-level airspace capabilities and decades of allied air superiority, we lost the ability to identify and mitigate risk with respect to airspace. While isolated on forward operating bases (FOBs) or combat outposts (COPs), we had the luxury, at times, to layer our response to the adversary. We could afford to "turn off the guns" when rotary wing entered the area of operations. We did not have to concern ourselves, in general, with the opposing force using large volume of Fires or fixed-wing (FW) aircraft due to the enemy capability. This created the opportunity to establish positive control over everything - to include requesting the maximum ordinate (MAXORD), gun target line (GTL), and time of flight (TOF) for each mission fired. In addition we stove-piped how we communicated positive control of airspace.

We became over-reliant on Upper Tactical Internet (Upper-TI) and the satellite communication systems that gave us the tools to establish this positive control. Upper-TI provided really trapped us into a primary, alternate, contingency and emergency (PACE) plan that lacks the "ACE." A PACE plan that relies, in its entirety, on Upper-TI to be operational and in place is not a true PACE plan. Combat training centers (CTCs) continue to see RTUs establish a PACE that is reminiscent of the communications capabilities we became accustomed to in the counter-insurgency (COIN) fight with the assets available on the FOBs. A PACE plan of: P. Advanced Field Artillery Tactical Data System (AFATDS) to Tactical Airspace Integration System (TAIS) connection/A. Transverse Chat/C. Secure Voice Over Internet Protocol/E. Command Post of the Future Chat is actually only P: Upper-TI. There are some unique capabilities specific to high frequency that we, as an Army, lack training and equipment to take advantage of. Additionally, we tend to forget the options that our Advanced System Improvement Program radios provide.

Airspace control includes the capabilities and procedures used to increase operational effectiveness by promoting the safe, efficient, and flexible use of airspace.

-Joint Publication 3-52, Joint Airspace Control

This type of integrated airspace control system and ease of access to upper-TI fed

1 *JP 3-52. Joint Airspace Control. 13 November 2014.Page I-2.*
2 *FM 3-52. Airspace Control. 20 October 2016. Page iv.*
3 *FM 3-0. Operations. October 2017. Pages 2-31 to 2-32.*

our ability to establish positive control of airspace users.

"There are decisive points in time and space where positive control is warranted, such as [forward arming and refueling points] or [helicopter landing zones], but those specific areas of positive control should be part of an overall plan based on procedural control."[4]

We do not need consistent positive control nor can we afford to establish positive control of all the airspace users. We can no longer afford the risk associated with "turning off Fires" and still achieve the effects we need from the joint force against a near-peer.

Current trends

RTUs are overly reliant on the tools used in COIN, the tools that trend towards positive versus procedural control. As mentioned, in the past, units had time to establish positive control of airspace users given the threat faced or were that when fired upon, counterfire missions were clear due to that isolated location. The culture of COIN remains with RTUs over-clearing airspace, requesting MAXORD, GTL and TOF — even when the RTU knows there are no friendly airspace users. The RTU never wins the counterfire fight when taking this route.

When we shape the battle to provide us the opportunities to synchronize the power of joint assets through coordinated attacks against the maneuver commander's high-payoff targets (HPT) we can defeat our adversaries. As the recently released FM 3-0 states, "The use of aviation assets requires additional detailed planning and synchronization using specific airspace control processes to maximize results."

This does not happen at CTCs with the regularity that is required to defeat a near-peer. An Aviation battalion commander recently stated, "I will fly where I want to fly," versus communicating through staffs and working with the fire support coordinator (FSCOORD) to determine what airspace they truly need to accomplish their specified and implied mission tasks.

Additionally, we cannot afford to hear, "Turn off the guns. We have rotary wing in the air," when fighting a near-peer. To exploit the advantages of the alliance's joint assets and get to the detailed planning mentioned in FM 3-0, staffs must develop a better understanding of the tools available to the joint force.

Further, in the contested environment the RTU operates, we do not see the RTU properly set the conditions in time and space to execute a coordinated attack. Depending on where in the operation the coordinated attack takes place, to integrate air-to-surface Fires (FW and RW) against a HPT with surface-to-surface Fires, the RTU needs to layer detection and delivery assets to achieve local air superiority and reduce the adversaries' ability to counter or disrupt the coordinated attack. RTUs will spend significant time clearing the air for a counterfire mission to ensure that a UAV is not shot down by chance.

Improvements in detailed planning and synchronization begin with understanding the tools listed in JP and FM 3-52. It is clear this understanding does not exist as evidenced by the improper proper titling of airspace coordination areas (ACA) as airspace coordination measures (ACMs) versus what they are, fire support coordination measures (FSCM). The result is the planning of these FSCMs, if staff-planned, by rotary wing or fixed wing representatives on the brigade staff and not synchronized and integrated with the planning and targeting effort required to support the commander's maneuver and Fires plans. This further translates into positive instead of procedural control of airspace, resulting in counterfire missions beyond the time required to have effects against a near-peer. Exemplified best by the RTU spending three to five minutes trying to identify where the Raven or Shadow is during a counterfire mission.

AFATDS 6.8.1.1 gives the commander the ability to incorporate several JADOCS target managers (e.g. Joint Time Sensitive Target manager, Fires manager, Inter-AOC Manager). It will also give the commander the capability of conducting a Fire Support Planning Course of Action (COA) Analysis with his assigned shooters. The FS COA displays tube strength, munitions required for mission success and system, by type, utilization. Attack Analysis will allow a by-type, by target of when each tube will be engaging each target displayed on the scheduling worksheet. This has improved connection capabilities, namely the Link16 protocol. It allows AFATDS to connect to any devise/platform/sensor that uses the JREAP messaging service. These items include the airspace defense system integrator (ADSI), JWACS, JSTAR, Sentinel Radar system as well as organic FF radar systems (Q-53 and Q-50). The units as well as FF radars can be managed for movement from the AFATDS for movement and range fan manipulation. Connections to Theater Battle Management Core Systems (TBMCS), ADSI, Air and Missile Defense Workstations (AMDWS), Airspace information service (ASIS) are now capable.

-Redleg Update, September/October 2016, Advanced Field Artillery Tactical Data System gets dramatic upgrade

When the RTU uses ACAs there are issues that can negate the effort taken in planning the FSCMs. For example, ACAs that do not expire and are active when visibility prevents rotary wing aircraft from flying or AFATDS not loaded with digital terrain elevation data resulting in all fire missions violating ACAs. The new version of AFATDS, 6.8.1.1, gives the future operations (FUOPs) and current operations (CUOPs) staff "… increased capabilities allowing it to dramatically improve integration of organic and joint targeting sensors and effective data sharing of Army and Joint Mission Command systems."[5]

Further stated in the 2016 Redleg update, this software update provides a visual 3-D display of all friendly units, enemy situational template, geometries, FSCMs, ACMs, range fans and munitions flight path for surface-to-surface Fires. The enhanced mapping allows commanders to visualize the operational environment with proper altitudes and elevations providing near-real display of the modified combined obstacle overlay. CTC's observe that rarely does the RTU take full advantage of what this update provides the FUOPS and CUOPS staff.

Completely acknowledging that maintaining a common operational picture is

4 *T. C. Hawn, personal communication, November 27, 2017*

5 *CW4 Trevor Meier and CW5 Robert D. Wilson, Redleg update September/October 2016, Advanced Field Artillery Tactical Data System gets dramatic upgrade*

Soldiers in the M-Stinger course practice target engagement with a Stinger Missile weapon system. Instructors from the Air Defense Artillery Center and School at Fort Sill, Okla., taught maneuver Soldiers how to conduct short-range air defense operations at the 7th Army Training Command's Grafenwoehr Training Area, Germany, from July 31 to Sept. 1, 2017. (Staff Sgt. Kathleen Polanco/U.S. Army)

challenging across a formation operating in the complexities of a decisive action training environment (DATE); understanding the tools (doctrinal, digital or analog) is important. Whether the AFATDS is used to the full capabilities provided by version 6.8.1.1 or the BCT develops the standard operating procedure that facilitates analog understanding of the COP and the airspace plan through an understood and executable PACE plan in a contested electromagnetic spectrum – identifying how the team will build this picture and maintain it is critical to mission success. Rehearsing this prior to arrival at CTC gets the RTU the repetitions required to identify and mitigate friction and ultimately will achieve the commander's intent at a higher rate of success.

The fastest counterfire mission at the Joint Multinational Readiness Center is two minutes and 41 seconds, from rounds sensed to rounds impacting. The RTU achieved this by adapting and learning what they truly had to do with respect to airspace, establishing a quick-fire net that flattened the counterfire process, and executing numerous rehearsals during windows their analysis informed them would be a low-counterfire threat.

Who are the airspace users?

There are airspace users that remain unchanged from COIN. Given the COIN operational environment, there are also those that we never gave consideration. Surface-to-surface Fires, unmanned aircraft systems[6], rotary wing and fixed wing are users that we executed positive control over for the last decade and a half. When fighting a near-peer, we must take into account the airspace users that we did not employ or the enemy did not employ against us – their own fixed and rotary wing aircraft, unmanned aerial vehicles and potential overmatch in surface-to-surface Fires.

Surface-to-air capabilities are returning to the BCTs in the hands of non-14-series who attend a 40-hour Maneuver Stinger Course (either mobile training team or res-

6 *Unmanned aerial vehicle (UAV) is used for adversary aircraft—to include opposing force (OPFOR) platforms. When unmanned aircraft are used by the US, allied, and friendly forces, they are referred to as unmanned aircraft systems (UAS). UA is used in two ways: to denote a system used by a country that is neither friend/ally nor adversary of the US; and as an overarching term that includes any unmanned aircraft, regardless of country. (From Unmanned Aerial Vehicle Classification and Trends Article; authored by Nicole Bier (DAC) and Patrick Madden (BMA Ctr), TRADOC G-2 ACE Threats Integration)*

ident). These Soldiers and systems are airspace users that staffs must account for and the whole system will require repetition to engrain the techniques that make these systems effective. Threat and opposing force's (OPFOR) dominance of tactical airspace at CTCs defined this capability as an absolute requirement. With that requirement comes the necessity to understand how we must design and communicate risk to airspace users while creating the opportunity needed for permissive surface-to-air Fires and preventing fratricide across an alliance.

The next airspace user that we have not accounted for in the last 15 years is the enemy. This is two-fold, from a pure volume of surface-to-surface Fires and the fixed and rotary-wing capability a true near-peer brings to an already complicated airspace. Both present different problems that, in the worst-case situations, occur simultaneously. CTCs do an adequate job incorporating the fire strike into rotational scenarios. However, in order to maximize training opportunities for the RTU, CTCs do not incorporate the fire strikes at the scale, frequency or the capability level of a near-peer — removing an entire maneuver battalion from a rotation is detrimental to readiness gained at a CTC. However, staffs do not take into account the impact of a fire strike on airspace users. Using analysts to determine anticipated enemy firing positions and when the enemy obtained the RTU commander's essential elements of friendly information gives the CUOPs staff the ability to identify potential fire strike opportunities and additional airspace users. Doing so has potential to determine risk to friendly airspace users and the friendly ground units that are the targets of these strikes.

Additional consideration is also required for enemy fixed wing employment. While we are obviously not going to clear the air for enemy fixed wing aircraft, we need to take into account where the air-to-air fight will occur. This is arguably more important than the counterfire fight as we work to establish and maintain local air superiority and remove a near-peer critical capability from the operational environment. JP 3-52 identifies the restricted operations airspace coordinating measure, combat air patrol and the air defense measure, fighter engagement zone (FEZs) as zones that account for the airspace users required for this fight. FM 3-52 expands the joint definitions by adding in Army planning considerations not mentioned in joint doctrine.

The adversary that we train against at JMRC in the Skolkan scenario is a near-peer in every aspect to the alliance.[7] The scenario employs significantly more artillery than the Atropian scenario does, with the RTU direct support artillery battalion contending with up to two self-propelled artillery battalions and a rocket battalion. Depending on the success of the RTU's targeting process and counterfire success, there is a possibility to face a 2 to 1 ratio, realistic when facing a near-peer. Further, that near-peer has an air force, as well as significant surface-to-air capability. These scenarios that do not fit the framework of the last 15 years in both Iraq and Afghanistan. RTUs need to consider these capabilities as airspace users when designing their airspace.

Tools in doctrine

"Our Fires force must enable all of airspace to synchronize, plan and execute a cohesive air deconfliction resolution. To do so, we must design our battlefield geometry to coordinate airspace integration to ensuring that conflicts between ground Fires and air operations are minimized."

-From the Commandant's desk 2017 Year in Review, Looking Back at 2017 & Looking Forward to 2018, Redleg Update November/December 2017

Army, joint and allied doctrine provide tools not used in COIN and are, as RTUs demonstrate, largely unfamiliar to the force. Appendix C in JP 3-52 lists out ACMs, FSCMs, maneuver control measures, air reference measures, air defense measures, maritime defense measures and air traffic control measures. These 21 pages are an unexplored goldmine that gives all planners, just not airspace users, the tools to ensure that they design airspace that creates a permissive environment for surface-to-surface and surface-to-air Fires.

Brigade combat teams need to incorporate airspace control into their leader development program to ensure those responsible for the planning and executing operations are educated on the tools available that mitigate risk to friendly airspace users while creating a permissive environment for Fires. This includes sending maneuver leaders to courses that expose members of the FUOPs planning team and CUOPs floor to the tools available to them – regardless of the warfighting function (WfF) they represent. Just as we cannot afford to stovepipe the planning effort, we cannot afford to educate only leaders who represent airspace users on staff. Doing so often relegates the planning and execution efforts to members of the staff not ultimately responsible for synchronizing operations. Ultimately, this can also reverse the trend of maneuver planners looking to fire supporters for the Fires plan after they create the maneuver plan and develop truly integrate fire plans with maneuver.

JP and FM 3-52 provides the joint airspace planner the tools to tackle several of the trends mentioned within as well as anticipated issues as the Army integrates new capabilities at the BCT level. If joint airspace planners synchronized underutilized tools from FM 3-52 such as, short-range air defense engagement zones, weapons free zone, FEZs, high-density airspace control zone and minimum-risk route, staffs have the potential to communicate and mitigate risk to the associated airspace users. Planning for and communicating our airspace risk mitigation techniques through our digital systems such as the AFATDS as part of the military decision-making process and pushing them to our higher headquarter will allow for a greater understanding of risk as they are promulgated through the special instructions located in the airspace control order. While this can increase the commander's ability to leverage permissive 3-D airspace tools, it is important to ensure the staff understands how to use and communicate via analog means. Across a multinational formation, analog may be the only means through which a task force can share a common operational picture for airspace control.

Brig. Gen. Stephen Maranian, 52nd Field Artillery School commandant, stated in the most recent Redleg Update that the " … Fires force must enable all users of airspace to synchronize, plan and execute a cohesive air de-confliction resolution."

While much of this responsibility does indeed reside within the FSCOORD and fire support officer roles in the BCT staff, the solution does not sit within a single warfighting function. The Army Joint Support Team-Nellis offers training opportunities below the BCT level and echelons above brigade. Courses such as the Joint Fire Power Course are historically under attended when offered through a mobile training team (MTT). Reports of only 40-50 personnel attending versus the capacity the MTT of 120 is a missed opportunity to edu-

7 *https://www.army.mil/article/176321/skolkan_scenario_introduced_at_jmrc*

Battle Group Poland Romanian soldiers set up and test their Oerlikon GDF-203 35 mm twin cannon anti-aircraft weapon during the Saber Strike 2017, at Ben 2017. Saber Strike 17 is a U.S. Army Europe-led multinational combined forces exercise conducted annually to enhance the NATO alliance throughout the Ba grated and synchronized deterrence-oriented training designed to improve the interoperability and readiness of the 20 participating nations' militaries. (Spc. St

cate leaders cross WfFs that work in FUOPS and CUOPS. Commanders often send only fire supporters to these courses, limiting the ability to increase the knowledge of their entire staff when it comes to the requirements to properly plan, deliberately and dynamically, the airspace that minimizes the conflicts for responsive joint Fires.

How can CTCs improve the training environment?

The above lays out the opportunities for brigades and divisions to identify the manner in which they will operate in the environment defined by the level of risk the commander deemed acceptable for the airspace users. It is incumbent upon the CTCs to ensure that the higher command (HICON) operation order (OPORD) lays the proper foundation for the RTU to build an order that communicates the appropriate level of risk for all airspace users. Additionally, CTCs need to create the ACMs and FSCMs in the HICON AFATDS database that allows the BCT to tie in to an operational environment with established procedural controls. It is unrealistic to require a RTU to create everything from scratch. CTC HICON orders need to create a framework for procedural control that rewards BCTs for leveraging procedural control. When possible, the CTCs need to replicate the quantity of airspace users that we, along with our allies, would see in decisive action.

Currently, the RTU does not take full advantage of the capabilities in planning and execution allowed by the new version of AFATDS and neither do CTCs. We need to create the airspace and fire support plans

nowo Piskie Training Area near Orzysz, Poland, June 13, ltic region and Poland. This year's exercise includes inte- efan English/U.S. Army)

that BCTs would use within a division plan and include those in an AFATDS database.

As the only CTC that has a secondary training audience consisting of a division-level staff, JMRC is unique. Division staffs, from National Guard to allied, perform the functions of a HICON at JMRC. In just the last two rotations, JMRC saw the division HICON performed by the 40th Infantry Division from the California Army National Guard (Allied Spirit VII)[8] and Multinational Division-Northeast[9] from Elblag, Poland (Allied Spirit VIII). This allows JMRC to experiment with how a division exercises mission command for a BCT that is "in the box" against a world-class OPFOR and the additional BCT in a constructive environment, controlled by a live BCT staff. Further, the operational environment is always multinational, with the BCT in the box having multiple allied or partnered units attached. This allows for the use of Artillery Systems Cooperation Activities program to test all of the above in a multinational environment.

In October 2017, JMRC began taking steps to improve the RTU experience with the receipt of the FA commandant's situation report. This report mentioned the 10th Mountain Warfighter Exercise 18-1 and the use of the JAGIC and airspace control and management operations. JMRC contacted the 10th Mountain Division Artillery commander to understand the lessons learned from the warfighter as well as the use of the JAGIC with respect to airspace management. The resulting dialogue evaluated how CTCs communicate airspace to a RTU as well as the sharing of the 10th MTN Airspace Appendix from the 18-1 Warfighter. Further discussion and the release of the new FM 3-0, resulted in several changes to Annex D and the Airspace Appendix for the JMRC HICON OPORD. Utilizing the 10th MTN Airspace Appendix as a base minimum risk routes and the incorporation of position areas for artillery are included in the unit airspace plan. Additionally, a dedicated portion of the appendix discusses variations in levels of acceptable risk and clear priorities for each airspace user.

Tenth MTN determined that a division is not manned or resourced to achieve positive control beyond finite points. Within the division, the Air Traffic Services (ATS) Company within the Combat Aviation Brigade (CAB) can conduct small-scale positive control, typically associated with FARPs and the immediate airspace. Tenth MTN found that divisions could not positively control the large volume of airspace associated with a division fight. Even in the JAGIC, the U.S. Air Force personnel designated as "procedural controllers" have the authority to route aircraft using procedural means, but have no capability to conduct positive control of fixed wing assets. The capability for positive control of fixed wing assets rests with the Airborne Warning and Control System or Control and Reporting Center, both forward extension of the Air Operations Center. Even if the CAB's ATS were resident in the JAGIC, the division AO is too large to manage all helicopters in a positive control stance. The 10th MTN staff assesses that, typically, an Army ATS unit can conduct positive control between five to 10 miles of an airfield and probably has the technical means to control helicopters out to approximately 20 miles. A BCT at a CTC may have a forward extension of an air traffic company capable of positively running airspace over a landing zone, but it lacks the means to cover the entire BCT AO. When NATO applies these lessons learned across an alliance that does not have a holistic positive control capability, the requirement to engrain procedural control is more evident. Though this one warfighter exercise does not warrant labeling as a trend, it is does show the evolution of thought at the division level and the positive outcome associated with linking warfighter results to CTC HICON execution.

We became over reliant on positive airspace control given the pace of COIN and CTCs see RTUs struggle to break this habitual method. Tools exist, from doctrine to training opportunities for our divisions and BCTs, to embrace procedural control. Properly communicating risk to airspace users by conducting proper analysis and planning in the deliberate and dynamic fight is critical to the success of this shift. Positive control of airspace can be achieved during decisive points when required in a DATE, however we will have to accept that the battlefield in a DATE is too complex and vast for positive control to work. We can fight and win with a joint and multinational force, harnessing the fire power of our alliances, by training our leaders in the CUOPS and FUOPS staffs to design battlefield geometry that enables airspace integration and creates a permissive environment for Fires, surface-to-surface, surface-to-air and air-to-air.

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8 *https://www.army.mil/article/197056/allied_spirit_vii_invaluable_training_for_all*
9 *https://jfcbs.nato.int/page5964943/2017/general-farina--witnessed-the-inauguration-ceremony-for-multinational-division-northeast*

Going the extra 1,000 miles

Preparing a field artillery brigade for a near-peer adversary

By Maj. Rich Farnell and Capt. Brennan Deveraux

Soldiers from 1st Battalion, 94th Field Artillery Regiment, 17th Field Artillery Brigade conduct a mock artillery raid at Orchard Combat Training Center, Idaho, Apr. 21, 2018. The artillery raid was in conjunction with 16th Combat Aviation Brigade to exercise communications between the AH-64 Apache helicopters and the M142 High Mobility Army Rocket System. (Sgt. Jacob Kohrs/U.S. Army)

The 17th Field Artillery Brigade drove over a combined 1,000 miles "total convoying" to and from the Orchard Combat Training Center, Idaho, in an attempt to go beyond their standard training regimen and build the unit's confidence in vehicles, equipment and Soldier readiness in preparation for large-scale combat operations.

The brigade participates annually with our allies and partners abroad in major training events including Yama Sakura, Ulchi Freedom Guardian and Talisman Saber. These exercises challenge the brigade staff and rely heavily on the mission execution of simulated firing battalions. From these exercises, key training objectives are formed that allow firing elements at echelon to execute missions that were identified as vital in the scenario. Taking the lessons learned from the exercises, and progressing from the battery evaluations in February, the brigade looked to conduct the battalion evaluations in an environment that would test Fires in support of large-scale combat operations.

The OCTC mission not only certified the battalions, it offered unique challenges at all levels. The mission emphasized three areas that supported real world High Mobility Army Rocket System operations: long distance convoy operations, force-on-force operations in unfamiliar terrain, and live-fire integration with a combat aviation brigade (CAB).

The convoy

The roundtrip to OCTC allowed the brigade to train on the complexities of utilizing multiple tactical battle command systems to coordinate and synchronize movement of hundreds of vehicles and personnel while maintaining vehicle operability throughout the 1,100-mile convoy. This required an extensive analysis prior to execution. Brigade staff was required to have a common operating picture and robust communication architecture. Blue Force tracking systems were preloaded with routes and geometries that kept the convoys synched in time and space. Multiple rehearsals had to be conducted to keep the convoy on a manageable schedule while aligning key decision makers with the right tactical battle systems. These are critical actions and events the brigade must master to be confident against a near-peer adversary.

Coordination, synchronization and planning of the road march forced leaders to consider what it would be like to travel a long distance and face an opponent during a contingency operation. If the brigade had

to deploy to the Pacific theater, there may be a need to travel across hundreds of miles of terrain to be best postured to support the maneuver fight.

Maj. Sean Whelan, 1st Battalion, 94th Field Artillery Regiment executive officer, participated in the event and said, "Soldiers of the brigade would need to have confidence in their own equipment and be prepared to deploy into an immature theater with limited sustainment capabilities."

The exercise encouraged Soldiers to cross-train on equipment. Most vehicles did not have mechanics as passengers, but if a vehicle broke down the passengers would need a level of knowledge to quickly troubleshoot the problem. These moments forced Soldiers to understand typical mechanical issues. A vehicle breakdown could be the difference in the momentum of the brigade, and how well the entire formation is able to successfully execute a road march into enemy territory. When Soldiers experience these moments, it inspires them to take time during routine preventive maintenance and take personal responsibility for the care of the equipment. After 17th FAB reached their destination, the units began building combat power to transition to force-on-force operations.

The fight

Rocket artillery Soldiers at Joint Base Lewis-McChord, Wash., spend ample time at the Yakima Training Center. It is not only where section qualifications occur, but most of the field training in the brigade as well. When it comes to fighting an opposing force at YTC, the 17th FAB has a home field advantage. This was taken into account when deciding to convoy to Idaho; OCTC was unfamiliar terrain. No section chief in a firing battery could reference firing points from the last field training exercise and no leaders could look to a combat training center rotation in a previous unit. The training audience was in enemy territory.

The terrain was a challenge at the battery level. Open, desert-like terrain coupled with a few hilltops made battery commanders adjust how they fought. For example, B Battery, 1-94th FAR shifted away from traditional hide/firing point doctrine to a more Paladin-based dispersion and over watch style. Every place a launcher stopped became a firing point, and every fire mission required the launcher to displace at least 200 meters after shooting the mission. Within this strategy, the support platoon in B Battery secured key terrain on a hilltop, known as Badger Mountain, to provide security to the firing elements. The platoon had never taken on this type of mission and quickly learned a hard lesson in conventional warfare.

The platoon leader, 2nd Lt. Spencer Nietan, explained, "We didn't have a good grasp on defilade and we were exposed on the hilltop."

Their element was hit with a simulated indirect fire chemical attack. The support platoon was out of the fight for hours, spent the day in Mission Oriented Protective Postures Level 4, and had to assess casualties. It was a hard lesson that is not often emphasized in the artillery community, but one every Soldier in the platoon learned. This was apparent during the reoccupation of Badger Mountain four days later that was noted by the evaluators as a drastic improvement in defensive posture.

As the battle progressed, all the firing elements needed to advance to stay in range and remain effective. At 3 a.m. on Day Four, a "prepare to march order" came over the net requiring all elements move to a new area nearly 50 kilometers away. Covering such a distance through unknown and restricted terrain, with a required in position ready to fire (IPRTF) no later than time, provided a training opportunity for a platoon leader that cannot be simulated.

First Lt. Sean Skelly, 1st Fires Platoon leader of B Battery, was the first to execute the mission. "It was a challenge. We had to rely heavily on our map recon because of the time constraints with IPRTF. I set the priorities of work and was impressed how well my team executed," he said.

The platoon was able to emplace, set up security, establish a quartering party for the rest of the battery and receive fire missions - both voice and digitally - with 10 minutes to spare. The fight continued for six total days until force-on-force operations culminated with a field artillery raid in support of 16th Combat Aviation Brigade.

The live fire

While serving as the force field artil-

Soldiers from 17th Field Artillery Brigade convoy over 150 vehicles on a 550 mile trek from Joint Base Lewis-McChord, Wash., to Orchard Combat Training Center, Idaho, from April 3-9, 2018. This convoy was to test the abilities of the vehicles and to give the Soldiers confidence in their equipment. (Sgt. Jacob Kohrs/U.S. Army)

lery headquarters for I Corps, the brigade worked directly with 16th CAB. Rocket artillery has the range to conduct a suppression of enemy air defense (SEAD) in support of deep shaping operations. This is done regularly during simulation exercises; the Soldiers in 1-94th FAR had not gone through this training.

The first integration with 16th CAB was done without live munitions utilizing the Brain/Training Pod. Firing batteries conducted a raid, pushing past the forward line of troops to get in range for the operation. Rehearsals created partnerships all the way down to pilots talking directly to battery commanders. Sixteenth CAB put a liaison officer in the 1-94th FAR operations center and helped shape the scenario to meet real-world mission requirements.

The scenario focused the artillery on three things - ingress SEAD, targets of opportunity identified by aviation assets, and egress SEAD. Each battery executed the Brain/Training Pod iteration which required 32 rockets shot over the course of 45 minutes. As the scenario shifted to live fire, the SEAD missions were incorporated into the HIMARS qualification tables. The addition of the real-world mission put the qualification in perspective and brought out the best in the Soldiers.

Staff Sgt. Evan Fowler, B Battery fire direction chief, said "I have done a lot of qualifications, but this wasn't routine. Soldiers were focused, they knew the success of the overall mission depended on them and there was no way they were going to let the unit down."

The live fire focused only on the ingress and egress SEAD missions. It was shot at the battalion level. B Battery executed the ingress and A Battery executed the egress. Upon completion of the mission with 16th CAB, 16 launchers were qualified, and the brigade was able to shift focus back to the 550-mile drive home.

The exercise prepared the 17th Field Artillery Brigade to provide Fires in support of large-scale combat. In total, the OCTC mission tested Soldiers and their equipment, pushing some vehicles to the limit. The brigade convoyed over 1,000 miles, conducted a brutal six day force-on-force in unfamiliar terrain, qualified 16 HIMARS, and conducted a live-fire SEAD mission with a combat aviation brigade. Lt. Col. Joe D. Hansen, 1-94th FAR battalion commander, said, "This field problem was an investment to ensure the battalion is on the right side of ready. With the mission profiles we executed during the exercise, our Soldiers have confidence in themselves and their systems, to get the job, any job, done. This includes integrating with maneuver and aviation units that need complete confidence that our rounds are hitting targets when they are needed."

If you ask the troopers across the brigade if the training was worth it, they are quick to say that at a minimum in the last 30 days they gained confidence in their equipment, their leadership and, most importantly, themselves.

Maj. Rich Farnell is the 1st Battalion, 94th Field Artillery Regiment operations planner. He has also served as the 17th Field Artillery Brigade's fire support planner for key exercises in the Pacific such as Ulchi Freedom Guardian and Yama Sakura. Previous assignments include 2nd Infantry Division fire support planner; National Training Center observer coach/trainer, and multiple battery commands. Farnell is a graduate of the Command and General Staff College, and holds a bachelor's degree from the University of Tampa in Business Management, master's degree from the University of Oklahoma in Organizational Leadership, and is pursuing a doctoral degree in Organizational Leadership from Northeastern University.

Capt. Brennan Deveraux is the B Battery, 1st Battalion, 94th Field Artillery Regiment commander. He also previously served as the Headquarters and Headquarters Battery, 17th Field Artillery Brigade commander, where he participated in Warfighter 18-02 in Korea and as a High Mobility Artillery Rocket System liaison officer forward in Iraq in support of Operation Inherent Resolve. Deveraux is a graduate of the Marine Expeditionary Warfare School and holds a bachelor's degree from the University of Washington in Political Science.

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In the next issue of Fires

September-October 2018, Competitive convergence. The Army wants to be ready to defend against formidable enemies including Russia, North Korea and China. How is the force preparing?

This issue will also discuss the multi-domain battle and how Fires is moving to fight in this way, the Fires Battle Lab's Fires Convergence Experiment, the Army Targeting Center's expanded mission and Field artillery and air defense artillery branch transformation.

The deadline for submissions is Aug. 1, 2018. For more information call (580)442-5121 or send submissions to usarmy.sill.fcoe.mbx.fires-bulletin-mailbox@mail.mil.

A Soldier from the 256th Signal Company, 308th Brigade Support Battalion, 17th Field Artillery Brigade pulls security on a retransmission site at Orchard Combat Training Center, Idaho, April 14, 2018. A retrains site helps to boost the signal of communications over a long distance. (Sgt. Jacob Kohrs/U.S. Army)