A joint publication for U.S. Artillery professionals

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Fires

Fires Strong

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Table of contents

Fires

Editor
Vacant
Art Director
Rick Paape, Jr.
Assistant Editor
Monica Wood

The Fires staff can be reached by email at usarmy.sill.fcoe.mbx.fires-bulletin-mailbox@mail.mil or by phone at (580) 442-5121.

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.

Brig. Gen. Brian Gibson
U.S. Army Air Defense Artillery School commandant

Ready to Fight Tonight

Air Defense Artillery is in a period of transformation and growth that is needed to effectively support U.S. military operations. The 2018 Air Defense Artillery Training Strategy laid the foundation to transform training and education to prepare air defenders to combat air and missile defense (AMD) threats. Over the last year, the ADA school focused on increasing the rigor and technical expertise in the Officer Education System (OES), Warrant Officer Education System (WOES) and Noncommissioned Officer Education System (NCOES). Additionally, the school maximized credentialing opportunities for air defenders to receive civilian certifications related to their military occupational specialty.

The ADA Captains Career Course (CCC) and Basic Officer Leaders Course (BOLC) are going through revisions to develop inspirational leaders who are analytical and logical thinkers, being both technically and tactically competent. These revisions will reinforce student knowledge of ADA core competencies: (1) Understand ADA capabilities and doctrine, (2) Synchronize AMD operations (across warfighting functions and joint/coalition AMD), (3) Conduct AMD mission command, (4) Execute AMD force operations, (5) and Execute AMD engagement operations.

The CCC and BOLC courses also continue to train with allied partners to strengthen our alliances and build partnership capacity. Highlighted by the first allied Patriot Top Gun Course graduating eight international students last October. This graduate-level program is a mirror image of the U.S. course that focuses on Ballistic Missile Defense planning and developing student expertise in air defense posture against aerial threats.

To increase the depth of knowledge of our Warrant Officer Corps, we have split the AMD Systems Tactician/Technician (140E) Military Occupation Specialty (MOS) into two separate tracks: 140K MOS AMD Systems Tactician and MOS 140L AMD Systems Technician. The last class of 140Es graduated in June 2018, and in December we graduated the first classes of 140K and 140L MOSs. The separation of the 140E MOS was necessary to develop a Warrant Officer that can provide precise technical advice to commanders.

In the 140A MOS Warrant Officer Advanced Course, the school added Information Control Officer training on joint networks. Students develop and brief a plan to integrate and employ Army weapons, sensors, and C2 systems into a joint operational network scenario. The plan development provides our Warrants an in-depth understanding of capability and limitations of those networked systems. Most importantly, this process gives our students a better knowledge of interoperability and how to connect our Army systems with the joint community.

For NCOES, the ADA school has been busy completing and incorporating technical classes back into the Senior Leader Course (SLC) and the Advanced Leaders Course (ALC), reinforcing the technical competency of our NCO Corps. Instead of having only two centralized classes for SLC and ALC the school now has 12 classes with each ADA MOS having an individual school code to attend NCOES.

To prepare our air defenders to transition from military service the ADA school recently signed a memorandum of agreement with Upper Iowa University to offer a Bachelor of Science Information Technology (IT) degree for Command and Control System Technicians (140A) Warrant Officers and Air Defense Enhanced Early Warning System Operators (14H).

A Soldier from E Battery, 2nd Battalion, 1st Air Defense Artillery, demonstrates Air and Missile Defense operations for Lt. Gen. Michael Bills, Eighth Army commander. (Cpl. Kim Jun Seo/35th ADA BDE)

The Bachelor of Science IT degree plan would award a new 14H just graduating from Advanced Individual Training (AIT) 14 semester hours towards the bachelor degree. The 14 semester hours is roughly one college semester and valued at $15,000. Similarly, a new 140A Warrant Officer Basic Course (WOBC) graduate would receive 40 semester hours.

14H AIT Soldiers from 30th Air Defense Artillery Brigade became the first class to take a civilian certification course on CompTIA IT Fundamentals at Fort Sill, Okla. The IT Fundamentals course teaches Soldiers basic concepts of computer security best practices while providing students with an understanding of the infrastructure of common operating systems and networks. In the coming months, 14G AIT students will also begin taking the CompTIA IT Fundamentals course.

140A Warrant Officers have similarly embraced credentialing opportunities including CompTIA A+, Network+ and Security+. The 140L Warrant Officers take certification classes on Basic Electronic AC/DC at Red River Technology Center, Duncan, Okla. With funding from TRADOC, the Occupational Safety and Health Administration provides Patriot Launching Station Enhanced Operator/Maintainer (14T) AIT students the opportunity to certify on Class VII Rough Terrain Forklift Trucks (over 1,075 14T AIT Soldiers certified to date).

To keep pace with evolving technology, and new learning methods, the school has introduced new training devices to increase the level of realism as well as the number of repetitions. The addition of new Stinger trainers places air defenders in a virtual and interactive three-dimensional world where they face numerous combat situations and are able to demonstrate their technical competence in a much more realistic setting.

In December 2018, the ADA school conducted a grand opening ceremony for the new Counter-Rocket Artillery Mortar (C-RAM) Classrooms and Virtual Maintenance Trainers. These trainers provide the same functionality as the actual C-RAM system without the risk of physically damaging equipment. Instructors can also program faults into the virtual systems and allow students the ability to practice preventive maintenance and troubleshooting procedures. Previously the school was limited to train on two C-RAM weapon systems, but with the new classroom and virtual technology, 36 virtual C-RAM trainers allow students to acquire experience before they conduct hands-on training on the real guns.

As threats continue to evolve we are resolute on what matters; building an Air and Missle Defense force of competent Soldiers and leaders, equipping the force with the right equipment at the right time, and strengthening our allied and coalition partnerships. With this focus, we will provide Soldiers and leaders ready to meet the challenges of the next century.

US Artillery in World War I

By Scott Cortese

Editor's note: This article is the first in a series of three articles highlighting U.S. Field Artillery operations in World War I.

As Gen. John Pershing, commander of the American Expeditionary Force (AEF), and his staff surveyed the French battlefield after arriving in June 1917 there must have been a look of disgust upon his face after what he had witnessed. What he saw were miles of trench lines that stretched from northern France, weaving in and out along the French countryside pressing southward. These very same trench lines had barely moved a hundred yards in either direction since autumn of 1914. Several attempts by the French and British to break the stalemate resulted in obscene casualty figures such as those which occurred at the Battle of the Somme. Worse still, Pershing saw first-hand the toll those years of this form of warfare had taken upon the Soldiers inside the trenches. These muddy, filthy and rat-infested holes were manned by degraded men.

It was incredible to Pershing that the French and British commanders had seemingly lacked the aggressiveness to change the situation and consigned their men to this sort of horrible deadlock. He also felt that the Allies' over-reliance on heavy weapons, particularly artillery, exacerbated the circumstances.[1] Determined to make America's participation significant and help bring about an end to the war, Pershing and his staff desperately desired to show the Allies the "American" way to fight a war.

Pershing held strongly to the battle doctrine outlined in the U.S. Army's pre-war Infantry Drill Regulations and Field Service Regulations and coined the term "open warfare" in describing the American way to fight. This doctrine was centered upon the concept that infantry needed to be self-reliant so that, "...the rifle and the bayonet remain the supreme weapons of the infantry Soldier and that the ultimate success of the Army depends upon their proper use in open warfare."[2] These regulations also stated that heavy weaponry, such as artillery, existed solely for the purpose of supporting the infantry. If brought out of the trenches and into the open, Pershing was confident that the Germans would be decisively defeated.

Previous attempts by the Allies to bring about "open war" had failed because they just simply lacked the capability to break the stalemate due in part to the ineffectiveness of its artillery against the German fortifications and also the low quality of their artillery shells which sometimes failed to detonate upon impact. Also, Pershing believed that many years of trench warfare had taken away the Allied Soldier's aggressiveness and led them to accept an artillery-centered doctrine that he considered to be futile.[3] Ironically after the AEF's initial battles, Pershing and his field commanders would eventually realize that the Allies really weren't so over-reliant on artillery at all. In fact, as the AEF tactics evolved in the use of this critical asset, artillery would become essential to victory.

At the outbreak of World War I, the U.S. Army was utterly ill-prepared to enter the war in many ways. It lacked experienced junior leadership, trained Soldiers, weapons and equipment.

Little emphasis was given to the Army during the first three years of war as the nation wrestled with debate between neutrality and getting involved in Europe's affairs. By April of 1917, the active Army's ranks had consisted of only 137,000 men with another 181,000 more Soldiers in the National Guard. [4] This was hardly the million Soldiers that Pershing felt were required to defeat the Germans.

The artillery branch of the U.S. Army represented these and other shortcomings as well. In August 1914, the outbreak of the war, the artillery ranks numbered only 266 officers and 4,992 enlisted men. By the time Pershing first walked the battlefields in northern France, the artillery had grown to 1,130 officers and 21,874 enlisted men. Toward the end of the war in November 1918, its ranks had swelled to 22,393 officers and 439,760 enlisted men. It's important to point out that this huge increase in strength occurred during the last 19 months of the war while the previous 33 months were literally squandered.[5] In short, by the time the AEF artillerymen entered combat they were primarily made up of raw recruits with inexperienced junior officers leading them. With the Allies clamoring for the AEF to get into the war, training had begun immediately during the fall of 1917.

Because time was of the essence, the training that the Americans received in the U.S. was very brief and taught them the minimum skills necessary of an

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1 *Mark E. Grotelueschen, Doctrine Under Trial: American Artillery Employment in World War I (London: Greenwood Press, 2001), 14.*

2 *As quoted in: Grotelueschen, Doctrine Under Trial, 16-17.*

3 *Grotelueschen, Doctrine Under Trial, 14.*

4 *Edward G. Lengel, To Conquer Hell: The Meuse-Argonne 1918 (New York: Henry Holt & Company, 2008), 18.*

5 *Ian V. Hogg, The Guns 1914-1918 (New York: Ballantine Books, 1971), 88-89.*

artilleryman. Addressing an incoming class of artillery officers at the School of Fire for Field Artillery at Fort Sill, Okla., Col. A. S. Fleming made it clear that, "The need of even partially educated Field Artillery officers is so urgent that the school term has been reduced to a minimum. Tactics and broad knowledge necessary for the proper emplacement and use of artillery you must learn elsewhere…And since the ultimate reason for the existence of artillery is to shoot, our primary and final object is to teach you the technique of shooting."[6] Unfortunately for the Americans, they wound up being instructed in the French manner of shooting.

Due to the lack of trained American artillery officers, the AEF relied upon the French to provide artillery instructors. There were between 70 and 80 French artillery officers in America, which included one or two at each Field Artillery camp. The French, obviously, were well-versed in artillery techniques used in trench warfare and also woefully ignorant of Pershing's concept of open warfare. Maj. Gen. William Snow, chief of Field Artillery for the U.S. Army, observed that the French instructors, "had been but a little time in the service, were not well grounded in Field Artillery, had left France at the height of stabilized warfare, and consequently knew no Field Artillery except the trench phase."[7]

To further compound these early problems, severe shortages of equipment left the AEF little to train with. Early on when the U.S. entered the war it was decided not take up precious cargo space on troop ships crossing the Atlantic with American artillery pieces. Rather, it was decided that the AEF would use French artillery guns upon arriving in Europe. The U.S. stopped producing its own artillery piece, the M1903 3-inch gun, in order to produce a gun that would chamber the French ammunition.[8]

As it turned out, this gun was not produced in significant numbers nor was it readily available for training. To make up for this equipment shortfall, a rather resourceful artilleryman, Capt. James Fort, came up with an excellent idea to train his battery. Artillery guns were available once every three days and for only an hour and a half for Fort's Soldiers to train on. Instead of waiting, Fort took the initiative and had a local college, the Georgia School of Technology, build a wooden replica. The gun was complete with a spare sighting mechanism and iron wheels. Fort had noted that this training aid worked rather well as, "The gun has inspired great enthusiasm on the part of the men and is proving to be of considerable value in their training."[9] As 1917 drew to a close and with the smallest amount of instruction conducted in the States, the AEF shipped off to France to continue their training.

Arriving in Valdahon, France, in January 1918, the first artillery units of the AEF began training on their newly assigned French artillery pieces, the 75 mm and 155 mm guns. Brig. Gen. George Irwin commanded one of the largest Field Artillery brigades, the 2nd Field Artillery Brigade of the 2nd Infantry Division. Contrary to the way in which his counterparts in the U.S. regarded the French trainers, Irwin noted that, "The French instructors were officers of experience, devoted to their profession, and eager to render every assistance to their allies." However, he also sided with those same detractors by collaborating that, "It became apparent to me, as the instruction proceeded, that the long period of stationary or trench warfare had caused a very palpable disregard of the methods necessary in a war of movement."[10] This was but a precursor to the training they were to receive over the next several months.

Adding to the difficulty, the AEF artillery lacked the number of horses required for its mobility. Horses were obviously instrumental in transporting artillery guns around the battlefield. This made it extremely complex, if not impossible, for the men to rehearse the movements required of Pershing's open warfare concept.

As a result, the artillerymen of the 2nd Field Artillery Brigade spent six to eight weeks becoming quite adept at firing pre-arranged defensive and shifting barrages. Upon completion, the brigade worked jointly with French artillery batteries in a "quiet" sector of the front south of the town of Verdun. The final phase of their training was to culminate in a month-long exercise emphasizing the concepts of open warfare. Unfortunately, a major German offensive in the Chemin des Dames area in May 1918 cut this training short to only six days. Being rushed to the battlefield, the entire AEF would soon be forced to put their abbreviated training into practice.[11]

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6 Col. A. S. Fleming, "The Mission of the School of Fire for Field Artillery," The Field Artillery Journal Volume VII, Number 4 (1917): 383-84.

7 As quoted in: Grotelueschen, Doctrine Under Trial, 13.

8 Hogg, The Guns 1914-1918, 94.

9 Capt. James L. Fort, "Improvised Methods of Instruction Employed in National Army Camps," The Field Artillery Journal Volume VII, Number 4 (1917): 459.

10 Brig. Gen. George Le R. Irwin, "Notes on the Training and Handling of Divisional Artillery in France," The Field Artillery Journal Volume IX, Number 5 (1919): 489-90.

11 Grotelueschen, Doctrine Under Trial, 21-22.

The Future of Fires

The Branches Remain Separate Specializations

By Lt. Col. (ret.) William Veitch

As a retired Air Defense Artilleryman I read the recent article by 1st Lt. Taylor Maroni entitled "The future of Field Artillery, merging with air defense," as one can imagine, with some interest. My point of view is more positive, in that I do not believe Fires, the Field Artillery or air defense branches, and the United States military as a whole face an uncertain future. What we may face are threats that are yet to be defined, threats more of a peer nature, and perhaps organizational and materiel shortfalls due to funding constraints. We must first look at the threat(s) and then structure our military forces accordingly, within the constraints imposed by Congress, against a prioritized list of missions.

With respect to air defense, I have seen the branch's history traced back to the coast artillery regiments within the Field Artillery. At the turn of the last century and through the First World War, coast artillery performed the mission of homeland defense, much as air defense has done since the 1950s. During the Second World War coast artillery became obsolete and units morphed or transformed into the anti-aircraft artillery (AAA). AAA units provided force protection to fixed assets and maneuver elements alike. It was units such as these that were the genesis of short range air defense (SHORAD) forces in the modern Army. Corps and above force and asset protection had its genesis in the NIKE Ajax and Hercules units of the 1950s. These later became our High to Medium Altitude Defense (HIMAD) forces; eventually including HAWK, Improved HAWK (IHAWK) and Patriot (before Patriot achieved an anti-missile capability just prior to Desert Storm). Today Patriot and Terminal High Altitude Area Defense (THAAD) units perform force and asset protection in the corps and above role, and C-RAM (soon to be Improved Force Protection Capability) performs protection of fixed assets.

Before there is an adjusting of Field Artillery and Air Defense Artillery job specialties, merging of missions, assigning additional missions, or creating hybrid/composite battalions one needs to have a clear

understanding of air defense concepts and control measures. In simple terms, an air defense unit detects, classifies (aircraft, cruise missile, unmanned aircraft systems, tactical ballistic missile, intercontinental ballistic missile), and identifies (friend, foe or unknown) an airborne object. However, depending on the rules of engagement for a given state or stage of alert, engagement authority does not necessarily exist at the firing platoon or battery level.

Air defense units, especially those such as Patriot and THAAD do not operate within an Army-only chain of command. More often than not, these units are under the command and control of either an Air Force or Naval commander in a multi-domain operational setting. From my days as an IHAWK firing platoon leader in NATO during the Cold War, engagement authority was held at the U.S. Air Forces Europe Sector Operating Center. Our missiles were under Centralized Command-Centralized Control. In practicing for wartime, this command and control (C2) relationship could be reduced to Centralized Command-Decentralized Control where engagement authority was pushed to a lower echelon while higher echelons still held override authority. As communications networks overloaded or failed, or threats came in massive waves, the C2 relationship could go to Decentralized Command-Decentralized Control where each battalion (or worst case if communications were entirely lost, each battery/firing platoon) held engagement authority.

With the advent of hypervelocity rounds on the battlefield, I remain unconvinced we are at a point of making any decisions going forward concerning combining the branches within the Fires community. Theoretically speaking, the advent of hypervelocity rounds may provide the potential for increasing the number of launch platforms available to counter an air and missile defense threat. However, as I have described above, engagement of such threats is seldom accomplished in a vacuum, or at the line unit level. More often, engagement is a coordinated Multi-Domain effort with decisions made at higher echelons. What I can see as a potential future outcome is hypervelocity equipped 155 mm air defense units interspersed across the battlefield with Patriot and THAAD reserved for countering missile threats.

In the very near, immediate future, after an almost 50 year estrangement of the branches, we must develop a true Fires community. I do not envision a time where a 155 mm conventional artillery battery commander rises to command a Patriot battalion. This to me is entirely two different skill sets and is not a good use of personnel, education, training and investment. My vision is more oriented on Basic Officers Leaders Course and Captain's Career Course (what I knew as the officer basic and advanced courses). In both of these courses I am certain there are many common classes. In order to build community, I would combine all incoming 13 and 14 MOS personnel into these courses and teach all the common core to everyone in this integrated environment. Only after the core material was taught would I split the13 and 14 MOS personnel out into their "specializations". I would follow the same methodology with NCO schools. And who knows? At some point that hybrid officer or NCO capable of straddling both specializations may actually develop!

The article stated the rationale for splitting the branches was "Combat in Vietnam required the officer to arrive as a proficient Field Artilleryman and not a hybrid field and Air Defense Artilleryman. Army commanders in Vietnam simply did not have the time to train an Air Defense Artilleryman to be competent in Field Artillery [...] who had had insufficient training in the basic techniques." The same can be said for any of the conflicts that have followed, and that may follow. I would maintain that specialization is a plus, not a minus in our contribution to the Army fighting where it is told to fight, and winning where it fights. The main argument for splitting the branches was trying to teach officers both kinds of artillery prevented them from attaining the proficiency necessary in order to carry out basic functions in either specialty. That argument remains valid to this day. Fire direction and control of surface-to-surface assets is entirely different (terms, tactics, rules, procedures) than fire direction and control of surface-to-air assets. The current Multi-Domain Operations literature, including TRADOC Pamphlet 525-3-1 and Multi-Domain Operations RIMPAC 2018, stresses the need for modernized and layered air and missile defense. This leads me to believe we are still two branches going forward.

In closing, Maroni stated "A core tenant of the Field Artillery has always been the ability to perform degraded operations if the situation required it. As things currently stand, it is already a challenge for new fire control Soldiers to learn manual gunnery as they do not learn it at advanced individual training (AIT), and now they will have to learn the rocket side as well." Her point is well taken and it is a shame manual gunnery is no longer taught in AIT. My final point, to the community at large, is we should learn and practice our degraded (manual) operations frequently in all branches. In a head-to-head battle with a peer, or near-peer competitor, we must expect to operate in a cyber and electromagnetic contested and degraded environment. Proficiency in manual operations is the key to winning in combat in degraded environments. An over reliance on our digital systems will prove fatal in such an environment. Innovate for the future, but remember your roots (past)!

Lt. Col. William Veitch is a retired Air Defense Artilleryman. He was commissioned with a Bachelors in Business and Operations Research from Ohio University and received his Masters in Business and Computer Science from Texas A&M University. He served with C Battery, 2nd Battalion, 57th ADA and served as the Patriot Software Branch Chief at the Directorate of Combat Developments.

Sustaining Deep Fires in Decisive Action

By Maj. Daniel J. N. Belzer

Foreword: Sustaining the artillery throughout large-scale combat operations is the deciding factor in massing Fires on the enemy. Unchanged as a tenet of decisive action for generations, recent history reminds us of the final Chinese offensive of the Korean War. Launched in July of 1953, the Chinese offensive culminated in a final battle intended to remind the United Nations forces that the Communists had achieved their objectives and had forced a UN withdrawal. Chinese artillery forces fired 705,000 rounds against the UN, and the UN artillery returned more than 4.7 million total rounds. . Achieving UN targeting objectives required a staggering volume of fire. Our history highlights how critical distribution is in artillery units; resourced incorrectly, artillery formations cannot mass on the enemy effectively.

Multiple National Training Center rotations prove that direct support light artillery battalions lack the haul capacity to transport their basic load of ammunition. We must change how we resource this fight to win in future conflicts. As it stands, artillery battalions are dependent upon heavy haul transport from brigade and divisional sustainment formations to augment their forward support companies. This arrangement degrades haul capacity for other critical classes of supply. It undermines operational reach and endurance and limits freedom of action for a brigade combat team (BCT) commander. This is especially true during defensive preparations. This shortfall forces the BCT commander to assume risk in developing obstacle belts, or in supplying artillery formations with the appropriate amount of ammunition. Maj. Daniel Belzer's article highlights the points of friction with communication systems and current Military Table of Organization and Equipment capabilities as it relates to sustaining the artillery fight. His examination and recommendations will drive the battlefield calculus conversations that must happen in the force. This article also emphasizes Maj. Gen. Wilson A. Shoffner's focus on "...mitigating identified Fires gaps to conduct large-scale combat operations against a near-peer competitor."

Artillery is the king of battle. Has been since the advent of bows and arrows. But the king, in counter insurgency (COIN), is dead. Long live the king-- in decisive action. This transition may seem tantamount to killing a sacred cow. To say that anything to do with COIN is dead sounds ridiculous. It flies in the face of nearly 15 years of recent experience. It sounds like an artilleryman's mix of wishful thinking and blind hopefulness. Not so. The king of battle, the most lethal weapon platform in any brigade combat team, is critically under-resourced in decisive action, and the sustainment community should lead change toward correcting it. Years of COIN and modularity leave our army with gaps in our systems that exacerbate our challenges with planning, resourcing and executing sustained distribution to artillery formations.

This was a predictable consequence of low-order conflicts. The queen of battle has made leaps and bounds to learn, train and adapt to the measured lethality and policing functions that COIN requires. Artillery formations must regain their former relevance, and sustainment organizations must modernize to prepare for tactical logistics in decisive action. Tolerating force structures and unit systems as they are is either abrogating our duty to the Army to lead change that wins wars, or foolishly assuming that we will prosecute future wars like the last two. Together, we can build and implement systems that reliably sustain the volume of fire required to defeat a peer adversary.

I've previously written about sustainment priorities in decisive action, and those articles are the baseline to this discussion. In the spring of 2017, I wrote an editorial for the Center for Army Lessons Learned regarding the ebb and flow of commodities in decisive action in an article called "Color Codes for Reporting," which was later published in sustainment magazine. Using that work as a starting point, I wrote an article aimed at contrasting the differences between supply-focused COIN and distribution-focused decisive action titled "The 96-hour Distribution Targeting Cycle." This article builds on those

theses and focuses two operational concepts into tactical systems.

Adjusting the sustainment architecture for artillery units is not rocket science, even if we're firing rockets. Second Infantry Division DIVARTY identified these shortfalls during a recent brigade external evaluation. The broader towed artillery force, whether in a DIVARTY or brigade combat team (BCT), could immediately implement these systems, and would certainly benefit by creating a link between targeting and sustainment planning.

Before anything else, artillery organizations must integrate their forward support company (FSC) commanders into the BCT targeting process - the same way that support operations section (SPOs) integrate them in the operations planning process. "What we have here is a failure to communicate" comes specifically to mind. Sustainment and artillery organizations don't often speak the same language. Worse, existing metrics for stock objectives, commonly called "days of supply" (DoS), is an imprecise measure of performance or effectiveness. DoS does not identify the size of the unit in question - and will always create confusion in a higher headquarters by treating all units as the same. This is especially true with the ammunition - the largest distribution tonnage requirement in a decisive action concept of support. I've written about days of supply and percentage-based resupply triggers before in "Distribution and Safety Stocks," and I stand by the conclusions I reached at that time; DoS is both imprecise and inaccurate, and percentage-based triggers trade perceived precision (often citing percentages to two decimal places) for an arbitrary goal (like 3 DoS). Neither 75.01 percent, nor 3.1 DoS enables a commander to make a decision. Neither is as effective as communicating the capabilities available at his disposal.

To reach common terms of reference, artillery organizations should communicate their requirements based upon effects the brigade commander wants to retain at the BCT level. Communicating in terms of a retained capability (e.g. 45 minutes of smoke on a battalion-size breach) effectively trains logisticians to plan ammunition resupply based upon future operations. We are accountable to know the maneuver plan as it changes - not just accountable to recalling the details of a sustainment rehearsal. Table 1 below highlights a way to build a menu of retained capabilities into a unit standard operating procedure (SOP). Planning is always preferable to reacting - anticipation is the most overlooked of the sustainment tenets. Many sustainment organizations create detailed plans with adequate redundancy; very few have systems in place that enable informed initiative within the concept of support.

Using consumption data during major combat operations should always be a distant third option behind planned and targeted

Figure 1. An example layout of retained capabilities. This system assists S3s in managing flexible fire support to the BCT, and likewise helps FSC commanders visualize equipment utilization requirements in the absence of (or in advance of) more detailed maneuver plans. (Courtesy illustration)

RETAINED CAPABILITIES MATRIX													Sustainment Requirements				
Primary & Alternate Shooter	EFFECT	ECHELON	STANDING FIRE ORDER	PROJECTILE	QTY	WEIGHT	FUSE	QTY	WEIGHT	PROPELLANT	QTY	WEIGHT	FA BN Capacity @ 85% OR	MISSION SQUARE WEIGHT	Pallet Spaces	MTVs Req.	LHS Req
	NEUTRALIZE	BN	3	HE	54	5130	M739	54	420	M232	33	972	84	6522			
		BTRY	6	HE	36	3456	M739	36	280	M232	22	648	85	4384			
	DESTROY	BN	6	HE	108	10,260	M739	8	770	M232	66	1944	140	12,974			
	BREACH (SMOKE)	Btry	TIMED	M825	30	2880	M762	4	164	M231	15	240	97	3284			
				M110	30	2910	M767	4	184	M231	15	240	101	3334			
	PGM	BTRY	1	M982	6	624	Pre Fuzed			M232	6	180	85	804			
		BN	1	M982	18	1872	Pre Fuzed			M232	18	540	85	2412			
	COUNTERFIRE (ENY Radars, C2 nodes)	BTRY	3	HE	18	1836	M739	3	167	M232	11	324	119	2327			
				M825	18	1746	M762	3	150	M231	9	144	103	2040			
	400m x 400m HA MINEFIELD	BN	3	DPICM	54	5562	M762	3	150	M232	33	198	101	5910			
	BLOCKING ACTION	BN	3	HE	54	5184	M739	7	392	M231	27	108	99	5684			
	AREA/ TERRAIN DENIAL	BN	6	DPICM	108	11,124	M762	14	574	M232	63	378	95	12,076			

Per Charge			Can
M231	1	4.25lbs	18 lbs

Per Can		
M557	8	35lbs
M565	8	56lbs
M739	8	55.8lbs
M732	8	49.8lbs
M762	8	41lbs
M767	8	46.5lbs
M782	8	35lbs
X1156	3	48.6lbs

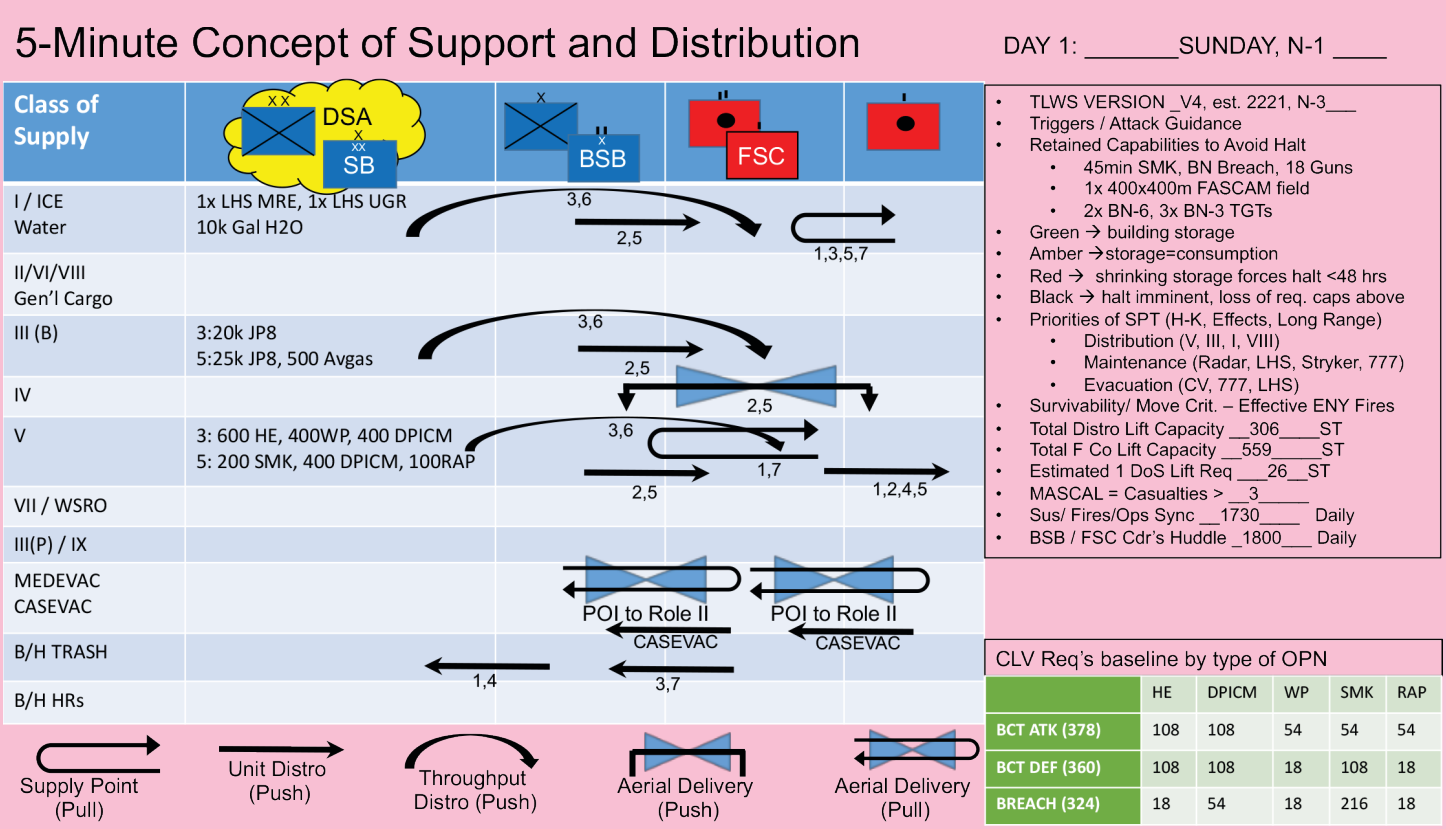

Figure 2. An example concept of support diagram. This method is specifically designed to reduce distribution methods and resupply schedules into a single format that builds shared understanding during the planning process.

stock objectives and baseline SOPs. Brigade fire support officers (FSOs) communicating requirements or resupply triggers in a number of fire missions or in a specific number of retained capabilities creates a system where ammunition requirements are consistent. This method permits a mix of shell and fuse combinations that is consistent across the spectrum of operations - precisely correcting the problem with "days of supply" as a metric.

This system reinforces a battalion commander's ability to direct and mass Fires on specific, high-value targets, for an extended period of time, with minor adjustments from standard operating procedure. Further, it creates consistency within the distribution network, increasing predictability for the Brigade Support Battalion. This will allow the BSB commander to anticipate when and how to weight the main effort.

The artillery battalion is the brigade's primary commodity customer in terms of raw tonnage. Second ID DIVARTY created a system that reduces complicated synchronization matrices into a simple concept of support and delivery schedule. It won't replace the complex tables that the BSB fights from, but it will allow the BCT SPO, FSO, FA battalion S3 and FSC commander to share a common vision of resupply operations within

Figure 3. Forward support company (FSC) commander overlap in key artillery planning functions. Leveraging the FSC commander in these processes will improve the reliability of support within the battalion, and provide predictability to the brigade support battalion support operations and the artillery battalion S3. (Rick Paape/ Courtesy information).

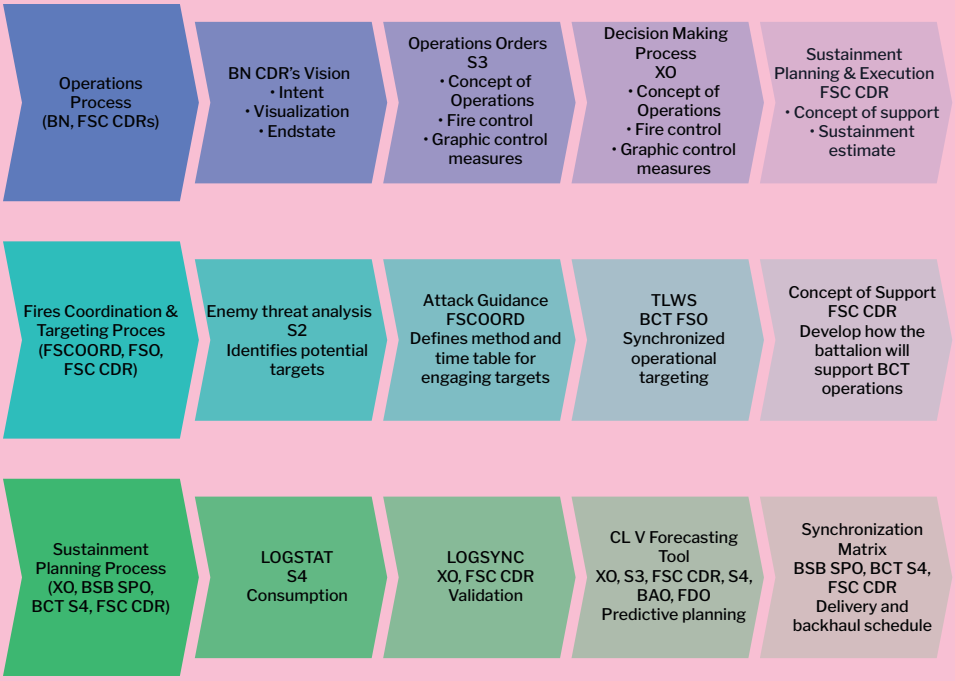

Figure 4. Field-grade ownership, integrating Forward support company commanders in roles and responsibilities shared understanding during the planning process. (Rick Paape/Courtesy information)

the maneuver fight. This system creates a simple visualization for scheduled resupply operations, and could be adapted to use a "D+" schedule, or a day of the week schedule with minimal labor. Logisticians learn and communicate in basic targeting terms, and artillerymen communicate in precise language describing methods and timelines for distribution.

Integrating FSC commanders into this fight is practical but often overlooked. Artillery battalions need to link artillery operations (S3), BCT sustainment operations (SPO), and fire support planning officers together more clarity in their roles and responsibilities. Figure 3 below highlights this link, while Figure 4 highlights a way to separate the "fights" between those critical field grade roles, and how a unit might integrate their FSC commander's responsibilities to capitalize on that overlap.

With consistency, accountability, and shared understanding, the next step for units to address is equipment utilization. Relooking the placement of palletized load system (PLS) assets cannot wait any longer. The error in matching the load handling system platform with artillery formations requires immediate revision. Armored brigade combat teams artillery FSCs can distribute a third more ammunition with the same utilization based upon their PLS density, to say nothing of their higher personnel authorizations. It's time for the Combined Arms Support Command (CASCOM) and the Fires Center of Excellence (FCoE) to solve this problem together. The current CASCOM estimation tools are consistently disproved by national training center consumption rates. CASCOM student texts rely excessively upon historical data, rather than the standard coefficient of forces and means analysis. FCoE produces articles arguing over the number of guns in each battery, rather than solving the larger problem of unit basic load estimates and how to sustain them. If units can find ways to implement systems that clearly communicate deep Fires and match them with distribution cycles, the strategic Army must find a way to match the equipment, and the doctrine, to decisive action.

The Fires and sustainment warfighting functions are unavoidably and permanently linked in decisive action. Systems and methods created or trained during COIN all suffer from the same flaws. The volume of fire required will quickly overcome a supply-focused concept of support, especially if that system relies upon consumption rates to determine stock objectives or resupply timelines. Artillery battalions need to integrate their FSC commanders into the targeting process. Done right, BCT FSOs and FSC commanders can firmly establish distribution requirements, methods and schedules. Left undone, artillery battalions will constantly fight through ammunition limitations. Those battalions will be reduced to a limited counter-fire role, unable to mass Fires on major objectives. This is a culture shift, and some will be reticent to add responsibilities to an FSC commander's plate.

On the other hand, when major combat operations begin, units will fight with the systems they have. Logistics is a great leading indicator of success. If not solved now, units cannot be surprised when they struggle to change later.

Acknowledgments and Notes: This article benefited from sustained support from Col. David S. Pierce, Majors "JT" Turner and Adam Buchanan, and Sgt. 1st Class Benjamin Tivao. Helpful comments and insights also were provided by many other members, both officer and enlisted, of the 2nd Infantry Division DIVARTY team. Any remaining errors are my own.

Maj. Daniel Belzer has a B.S. in Mechanical Engineering from the Virginia Military Institute and an Master's degree in Supply Chain Management from Virginia Commonwealth University. He has served in tactical logistics and advisory roles in the 10th Mountain and 101st Airborne Divisions during Operation Inherent Freedom and OEF, and now serves as the Executive Officer for 308th BSB, 17th Field Artillery Brigade.

What's in a Name?

The Case For Dubbing IMSHORAD and MSHORAD

By Capt. Peter Mitchell

Names are great. Nothing has more power to rescue military equipment from the ignominy of historical obscurity than a good, punchy, colloquial name. Historical examples from the Army's past are myriad. Ask someone about the 'U.S. Rifle, Caliber .30, M1' and you'll get a blank stare, but that same person will be able to recognize a Garand. Same goes for the 'Rocket Launcher, M1A1', more commonly known as a bazooka.

America's British allies realized the ease of naming when they were inundated with U.S. lend-lease equipment during the Second War World. Instead of memorizing countless different and illogical number/letter combinations (everything started with M1 be it a tank, rifle, hand grenade or entrenching tool), the British attached nomenclatures. Thus the 'Light Tank M3' became Stuart, the 'Medium Tank, M4' became Sherman, and the '105 mm Howitzer Motor Carriage M7' became Priest. Even the Roman legions called their ubiquitous light catapult an 'onager' after its kick being similar to a wild donkey.

Nowadays it is equally as important to save new air defense equipment from hideously bland and clinical acronyms, reducing complex weapons of war to a mere job description. This fate has already befallen C-RAM (Counter-Rocket, Artillery and Mortar), JLENS (Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System), IFPC (Indirect Fire Protection Capability), and THAAD (Terminal High Altitude Area Defense). Once so-called, the acronym sets in place like concrete and is practically impossible to remove.

Thus, now that new weapons systems have been approved it is important to have a vetting process in place to establish proper names for IMSHORAD (Interim Maneuver Short-Range Air Defense), and upcoming MSHORAD. Such a process must be transparent and able to lend an ear to the will of the vox populi. The Air Defense branch should hold an open poll with a list of good, strong names for both new systems within the year. Such an action would not only drive enthusiasm within the branch for the heralded return of SHORAD, but also provide excellent public exposure outside to the Army at large and the civilian world.

Some humble suggestions from the author:

The IMSHORAD recently approved for production is a Stryker variant made by Leonardo DRS equipped with both Stinger and Longbow Hellfire missiles, M230 chain gun and the 7.62 mm coaxial

An artist's conception of a Interim Maneuver Short-Range Air Defense Stryker. (Courtesy illustration)

machine gun.[1] An excellent name for this particular vehicle would be the Sergeant Stout for two reasons. First, the name honors the only Air Defender ever to receive the Medal of Honor. Secondly, the naming convention also serves to help obliterate the $1.8 billion mistake known as the M247 Sergeant York.[2] Alternatively, in the same way that the M2 Bradley Infantry Fighting Vehicle was equipped with Stingers to become the Bradley Linebacker, so too could the Army carry on its legacy by calling the new IMSHORAD vehicle the Stryker Linebacker.

As for the all-new MSHORAD, the Air and Missile Defense modernization director and former ADA commandant, Brig. Gen. Randall McIntire, has said that it will be "less about missile technology" and have "more of a directed-energy focus."[3] That means that along with missiles, the new MSHORAD (whatever its chassis) will be equipped with a 50 kw laser. The best possible name for such a machine would be Cyclops. In ancient Greek mythology, the cyclops were a race of giants with one great eye in the middle of their foreheads. The word kyklopes literally means "circle eyed," a very appropriate term for the wide reflective lens of a weaponized laser. This Greek name also carries on the convention started by the Nike Ajax, Hercules and Zeus. To make matters even better, the name Cyclops also belongs to a famous fictional and copyrighted superhero who shares an affinity for lasers.

So then, what's in a name? A rose by any other name might smell as sweet, but calling a rose a Photosynthetic Air Fragrance Integrated Delivery System (or PAFIDS) is an affront to the English language and basic human decency. If the Air Defenders of the future are to fight with these systems, let us at least give them the opportunity to tell war stories to their grandchildren without having to hear the inevitable questioning response: "But Grandpa, what do those letters stand for?"

Capt. Peter Mitchell is an air defense battery commander at Fort Sill, Okla. The views expressed in this article are those of the author and do not reflect the official policy or position of the U.S. Army, Department of Defense or the U.S. Government.

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A Stryker is equipped with a Mobile Expeditionary High Energy Laser system. (Courtesy photo)

Mastering Terrain Within Your Position Area Artillery

By Capt. Francis Porcase

As a Paladin battery commander organic to 1st Battalion, 41st Field Artillery Regiment attached to 210th Field Artillery Brigade, it became very clear very quickly that B Battery and I needed to become "masters of the terrain" if we were to train and potentially fight in the harsh, unforgiving landscape that is the Korean Peninsula. However, let me make myself clear that the lessons learned here will not just apply to the Korean Peninsula, but can be utilized during a combat training center rotation, a home station field training exercise or deployment.

In order to provide some structure to this, I will reference the characteristics of the defense. As a firing battery commander these characteristics should be equally as important to you as the five requirements for accurate fire, because once you occupy your position area artillery (PAA) you are subsequently in a defensive posture. Army Doctrine Publication 3-90 states that "the defending commander uses the characteristics of the defense: disruption, flexibility, mass and concentration, preparation and security."[1]

The following will show how the characteristics of the defense directly contributed to B Battery, 1-41st FA, 210th FA Brigade becoming "masters of the terrain."

The purpose of disruption is "to disrupt the attackers' tempo and synchronization with actions designed to prevent them from massing combat power."[2] Once your battery is in position ready to fire (IPRTF) within any PAA, you are vulnerable to attack. So you may ask "how did we mitigate this within our PAA?"

First, we had to know our enemy and the most significant threat to the battery. After eliminating counter-battery fire, the next most significant threat was a dismounted attack. In order to disrupt any potential attack, we incorporated OPs/LPs. "Observation posts and listening posts are key elements for providing early warning." [3]

We also maximized C-wire to funnel any potential attackers into our engagement areas, and placed claymores to mitigate any dead space the enemy may use to attack. Your goal with these measures is to provide early warning so that you may maximize your direct-fire weapons systems, or allow sufficient time to retrograde to your alternate PAA if the approaching force pose too great a threat. Regardless of your technique or assets available, you must get out of your cannons, carrier ammunition tracked vehicles, light medium tactical vehicles or HMMWVs and walk the terrain around your PAA to give yourself a fighting chance at disrupting the enemy before he attacks your PAA.

Flexibility is critical within a PAA. A flexible firing battery or platoon allows the commander, platoon leaders and section chiefs to react quickly and violently to any threat or incident.[4] In order to be flexible, the battery must understand the following. One, where is the alternate PAA and what is the route? With survivability being the number one goal for a firing battery, this should be your top priority. Second, is to create an accurate and effective defensive diagram. It is critical to your survival that following becoming IPRTF, that the creation of a defensive diagram is not overlooked. (See Figure 1). Lastly, the establishment of solid communications, casualty evacuation (CASEVAC) and maintenance/recovery plans. While not directly tied to engagement of defense, is vital to being flexible with the PAA. Batteries and platoons must have a primary and alternate communications location in the event you must conduct platoon operation center (POC) to POC or POC to battery operations center (BOC) transfers. At a minimum, search for an alternate fire direction center location capable of reaching the guns with voice communication. A flexible CASEVAC plan will inevitably benefit your PAA; upon occupation, identify platoon-level casualty collection points (CCPs), primary and alternate CASEVAC vehicles, and REHEARSE it! The first sergeant should publish the battery CCP location and have at a minimum conducted a map recon to the nearest Role 1. If this is not happening, you are failing

Soldiers from B Battery, 1st Battalion, 41st Field Artillery, emplace their Paladin at the Rooster 7 Training Area, Republic of Korea. (Courtesy photo)

1 *ADP 3-90 Paragraph 46. PG.11*

2 *ADRP 3-90 Paragraph 4-4, page 4-1*

3 *ATP 3-09.70, Paragraph 4-6, page 4-2*

4 *ATP 3-09.70 paragraph 4-10, Page 4-3*

your battery and must rectify this ASAP. Ensure the battery forward maintenance team is located in a position they can either conduct maintenance or move to effectively and operate as needed. Don't hesitate to use your M88 (if you have one) to level terrain or break some brush. In conclusion, being flexible means surviving and surviving allows your battery and platoons to continue their mission.

"The defender seeks to mass the effects of overwhelming combat power at points and times of the defender's own choosing."[5]

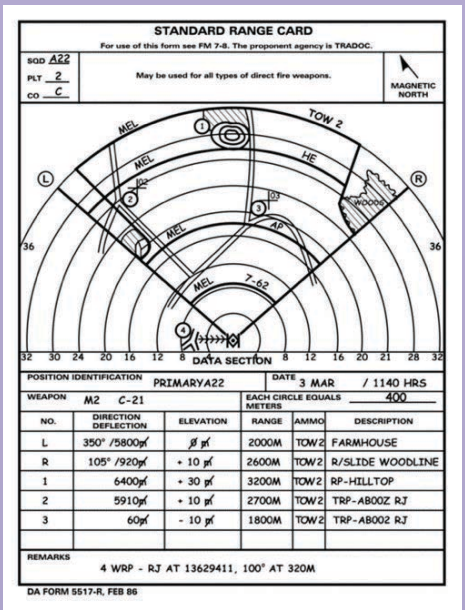
Batteries, platoons, and sections must maximize their crew served weapons capabilities. In Korea, the vegetation is so thick in the summer that it effectively negates the effective range of your .50 caliber and MK-19s. Creative thinking and some yard work will benefit the PAA greatly. Do not hesitate to dismount your crew served onto a tripod and tie them into the platoon/battery defense in that manner. Just be cautious of the distance placed from the section and how it will be manned. A battery that is flexible and able to disrupt the enemy, will subsequently be able to mass and concentrate their crew served weapons effectively. Sector sketches, interlocking fields of fire, and common target reference points (TRPs) are all necessary to accomplish this task (See Figure 2). The terrain in your PAA, dispersion of sections, and friendly units within the area of operation will also contribute to your ability to mass and concentrate.

Preparation may be the single most beneficial characteristic of

5 *ADP 3-90 Paragraph 49. PG 12*

Time	Task	Personnel
H+2	• Establish firing capability	Platoon
H+5	• Ensure GUNs take up concealed positions IAW fire mission tactics • Ensure FAASVs are positioned to maximize fields of fire, observation and concealment IAW occupation formation and to cover most likely enemy avenues of approach • Ensure BOC and Maint truck/M88 take up concealed positions	PSG/GSG
H+15	• Begin engagement area development • Reposition vehicles (if necessary) based on occupation formation • Assign sectors of fire • Establish TRPs and direct fire targets	PSG/GSG
H+15	• Record T&E mechanism settings on range cards	Track TCs
H+20	• Determine ranges to TRPs and dead space	Track TCs
H+20	• Establish platoon rearm point	PSG/GSG
H+30	• Establish LP/OPs with commo (PRC-127 or TA-312) • Manned from designated FAASV crews • Positioned approximately 150 meters away from FAASV • Positioned to maximize observation and concealment • Positioned to overwatch dismounted or mounted avenues of approach not already covered by FAASVs or GUNs • Equipped with AT-4, map, binos and NVGs • Establish LP/OP break point (when enemy crosses the break point approaching the PA, LP/OP returns to FAASV) • Establish anti-armor team positions (if different than LP/OPs) • Positioned ideally where 2 separate flank shots are possible	PSG/GSG
H+30	• Emplace M8 alarms 100 meters upwind and reposition as wind direction changes	FAASV Drivers
H+35	• Range cards are completed and ready to be inspected by PSG (two copies are made – one for the position and one for the PSG)	Track TCs
H+35	• Camouflage vehicles with vegetation from the surrounding area • Place sandbags around sensitive equipment (collimators, tires, ballistic shields, etc.)	Drivers
H+40	• Select displacement routes (primary and alternate) • Select CCP • Select EPW collection point	PSG/GSG
H+50	• Emplace claymore mines and trip flares along dismounted avenues of approach (location determined by PL/PSG) • Emplace anti-tank mines along mounted avenues of approach	Drivers
H+60	• Establish final protective line • Defensive diagram completed • Establish pre-planned illumination targets • Establish pre-planned immediate suppression/ smoke targets along approaches to the PA	PL/PSG/GSG
H+80	• Establish sleep plan • Mark sectors of fire for night operations	PSG/GSG
H+120	• Rehearse appropriate battle drills	PL/PSG
H+180	• PMCS on all vehicles	Drivers/TCs

Figure 1. The Platoon defense checklist for the 1st Battalion, 41st Field Artillery tactical standing operating procedure. Similar checklists will mitigate lapses in critical components necessary to successfully defend a unit's position area artillery. Additionally, quality checklists are located in ATP 3-90.50, Appendix B.



STANDARD RANGE CARD

For use of this form see FM 7-8. The proponent agency is TRADOC.

SQD A22 PLT 2 CO C

May be used for all types of direct fire weapons.

MAGNETIC NORTH

DATA SECTION

POSITION IDENTIFICATION	PRIMARYA22		DATE	3 MAR / 1140 HRS	
WEAPON	M2 C-21		EACH CIRCLE EQUALS METERS	400	
NO.	DIRECTION DEFLECTION	ELEVATION	RANGE	AMMO	DESCRIPTION
L	350° /5800	5	2000M	TOW2	FARMHOUSE
R	105° /920	+ 10	2600M	TOW2	R/SLIDE WOODLINE
1	6400	+ 30	3200M	TOW2	RP-HILLTOP
2	5910	+ 10	2700M	TOW2	TRP-AB00Z RJ
3	60	- 10	1800M	TOW2	TRP-AB002 RJ

REMARKS

4 WRP - RJ AT 13629411, 100° AT 320M

DA FORM 5517-R, FEB 86

Figure 2. Example range card. (Courtesy illustration)

the defense for an artillery battery. Preparation involves positioning forces, improving terrain to favor the defense, war gaming, movement and rehearsals.[6] It all begins once you receive your operations order or movement order. If your goal is to master the terrain you are operating in, you must prepare as such. Preparation includes but is not limited to, map and route reconnaissance, analyzing weather and their potential impacts, Class V distribution, and enemy situational template.

Terrain and time available will directly impact your ability to conduct recon selection occupation (RSOP), therefore the battalion S2 and a thorough map reconnaissance is crucial to successful preparation. Primary and alternate routes, checkpoints, and chokepoints must all be taken into account. If aerial imagery is available, have the S2 provide analysis prior to movement. Weather and terrain analysis are also key to preparation. Do not disregard the S2 weather report. Korea's terrain is vastly complex and at the mercy of drastic temperature and weather conditions. I was privileged to watch a river rise 50 feet in 12 hours after just a few inches of rainfall. Leaders must identify these hazards within your PAA's, you will often have little warning of a potential disaster to your combat power. Also, what your PAA looks like in spring and summer is not at all what it will look like in fall and winter. An area you once thought was suitable for a machine gun position, or a level piece of terrain for a howitzer will quickly become overgrown with brush, or possibly flooded. All in all "preparations multiply the effectiveness of the defense." [7]

Security is the final characteristic of the defense as it relates to a battery PAA. Prior to this discussion we must first understand that "the purpose of security measures is to coordinate and synchronize the defense, provide early warning and disrupt the enemy attack as early as possible."[8]

The optimal way to coordinate and synchronize the defense is through the use of platoon- and battery-level defensive diagrams. The defensive diagram must include: dominant terrain features, dead space, TRPs, range markers, LPs/OPs, howitzer direct fire sectors, crew served weapons assigned sectors of fire, and the fire direction center (See Figures 3).[9]

Other key locations on the defensive diagram are platoon and battery CCPs, combat trains, claymore, c-wire, and any primary or alternate routes. Force the use of platoon and battery tactical standard operating procedures. Once occupying a PAA simple checklists and engaged leaders will increase your survivability. There is quality checklist in Army Techniques Publication 3-09.50, Table B-13, "Unit Defense Checklist" that will effectively increase and strengthen any unit's security. Do not hesitate to maximize security through the use of terrain masking. This is a combat multiplier that should be maximized within any PAA.

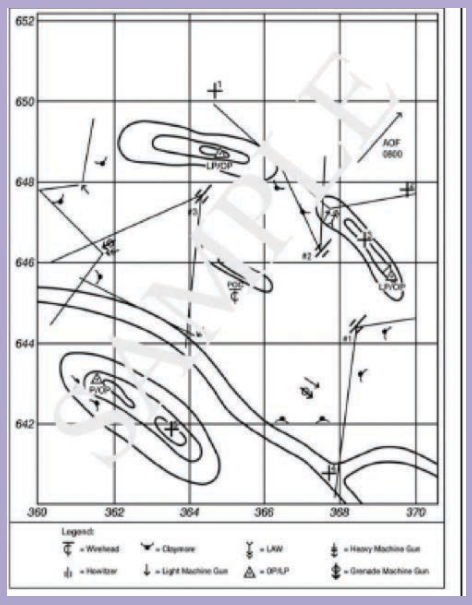


Figure 3. Example basic defensive diagram. (Courtesy illustration)

In conclusion, it is evident that the characteristics of the defense apply to an occupation and defense of a PAA and should be taken into account in any terrain and all weather. The first sergeant integrates platoon defense plans into the overall battery defense.[10] The platoon leader will command the defense in the event of an attack and the battery commander is responsible for the general planning, coordination, and execution of the battery defense. Whether light, medium, heavy, towed, airborne, air assault or self-propelled; referencing your doctrine, asking the tough questions, the right amount of tenacity and deliberate execution will allow you to "master the terrain." To all my fellow Redlegs good luck and God bless.

Thunder! Glory's Guns! Rounds on Target! Blackjack 6!

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6 *ADP 3-90 Paragraphy 51. PG. 12*

7 *ADRP 3-90 Paragraph 4-10 PG 4-2*

8 *ADRP 3-90 Paragraph 52 PG 12*

9 *ATP 3-09.70 Paragraph 4-11. PG 4-3*

10 *ATP 3-09.70 Paragraphs 4-3, 4-10. PGs 4-1 & 4-3*

Using Behavioral Science to Ready Air Defenders for the Future Fight

By Chief Warrant Officer 5 Eric Maule and Dr. Rhett Graves

Air and missile defense operations are risky, technical and mentally intensive. In war, Air Defenders serve as the first line of defense, protecting friendly forces and assets against aircraft and missile attacks. Being first, Air Defenders must make timely and high-stakes decisions in uncertain situations. A single mistake can have enduring consequences for friendly forces and assets as well as for international relations and diplomacy. Adding to this complexity is the continual evolution of new warfighting technologies. Future combatants will employ to-date unknown technologies and tactics to surprising effect. ADA clearly must continue to evolve technologically and tactically to outpace potential adversaries. No less, future Air Defenders must be ready to operate in complex and uncertain operational conditions, and making time-sensitive decisions.

One of the ways the ADA School (USAADAS) and Chief Warrant Officer of the ADA Branch (CWOB) have begun addressing these concerns is through a research partnership with the Army Research Institute for the Behavioral and Social Sciences (ARI), Fort Benning, Ga. Since 2015, this research partnership has focused on identifying the cognitive competencies Air Defenders require to operate in complex and uncertain environments and on developing tools to enhance those competencies. To date, this research has focused on Patriot Air Defenders and on the upcoming transition to the Army Integrated Air and Missile Defense System (AIAMD), particularly the Integrated Air and Missile Defense Battle Command System (IBCS). In this article, we highlight key research findings and research products that can be applied in support of our mission to ready Air Defenders for the future fight.

Research overview

Three broad topics have encompassed our research partnership with ARI. These topics include: (a) ADA Warrant Officer (WO) professional development, (b) enhancing perceptual and cognitive skills for Patriot, and (c) preparing Air Defenders to transition to emerging systems.

ADA Warrant Officer Professional Development. Our first line of research began in 2015 with an analysis of ADA WO duty requirements. It has continued to grow in scope, focusing on assessing and developing the cognitive and non-cognitive competencies of warrant officers in the 140A, 140K, and 140L Military Occupational Specialties (MOSs) (140K and 140L formerly being 140E).

Enhancing perceptual and cognitive skills for Patriot. Our second line of research has focused on identifying and developing the perceptual and cognitive competencies Patriot Air Defenders require to solve problems and make decisions in complex and uncertain operational environments. To date, this research has focused on enhancing the cognitive skills of both Patriot tactical control officer (TCO) and tactical control assistant (TCA), utilizing both individual assessment/feedback and train-the-trainer tools. Currently, it is targeting the perceptual and interpretive skills that contribute to Patriot Air Defenders' problem-solving and decision-making processes.

Preparing Air Defenders to transition to emerging systems. Our third line of research has focused on anticipating and addressing the challenges that Air Defenders and their instructors and trainers may face when learning emerging systems, such as the AIAMD's IBCS. Our early research on this topic focused on developing front-end analysis methodologies appropriate to complex, emerging AMD systems. Follow-on research has addressed challenges related to supervisory control of automated systems, and mitigating the impact of past learning on acquiring skills with the emerging system.

ADA warrant officers' professional development

In 2015, ARI analyzed ADA warrant officers' MOS duties and training. ARI examined whether the existing 140A and 140E WO MOS descriptions accurately reflected WOs' reported duty requirements and expectations. At the time, the ADA WOs' job descriptions had not been revised in a decade. Anecdotal reports from operational units suggested that WO roles and responsibilities had evolved. We wanted to identify any inaccuracies in the MOS duty descriptions as well as WOs' performance and training requirements across their professional lifecycle. ARI found that overall the duty descriptions did accu-

WO Critical Cognitive Skills		Description
Decision-Making	Routine Daily	Routine choices for daily operations. Usually involve limited resources and short-term applications.
	Management and Supporting	Choices on implementation and how to manage resources to achieve a goal. Usually have medium-term implications.
	Long Range Major	Major choices of direction or actions. Usually complex and multidimensional with wide spread or long-term impact.
Planning	Routine Daily	Routine planning that focuses on specific procedures, processes that support implementing higher level plans.
	Management and Supporting	Planning that supports a strategic plan by translating it into specific plans relevant to a distinct area of an organization.
	Long Range Major	Large scale planning of direction or actions that effect major organizations.
Predicting	Near term	Largely based on known circumstances that currently exist and have short term effects.
	Far term	Largely based on unknown circumstances that may exist in the future and have long term effects.

Figure 1. The three complex cognitive skills, decision-making, planning, and predicting, which U.S. Army warrant officers duties are concentrate. (Rick Paape/Courtesy information.)

rately reflect duty requirements and expectations. Even so, potential inaccuracies were associated with a need to better differentiate scope and unit level of responsibilities.

As for performance and training requirements, ARI found that WOs needed opportunities to attend institutional training on a timely basis to meet the requirements of each level in their professional lifecycle. WO1s and CW2s indicated they performed similar duties at varying degrees of responsibility and expertise. Moreover, responsibilities and requirements blurred between WO1 and CW2 as well as between CW3 and CW4. Where duty requirements did not align with WO expectations, the trend was for junior WOs to be performing more senior duties. Later research found that approximately 17 percent of WOs reported working above grade. WOs also reported that they performed additional duties as frequently as core duties, with many indicating that they perform at least one additional duty as part of their regular job. Finally, for senior WOs, the shift from technical responsibilities to program management was not clearly defined.

Following this initial research, ARI zeroed in on identifying and assessing WOs' cognitive skill requirements across their professional lifecycle. This first involved determining which cognitive competencies WOs develop over time to perform their duties successfully. ARI then explored how and when these cognitive competencies are being developed, refined, and assessed in order to identify gaps in how WOs are prepared for their duties. Following this needs analysis, ARI has been developing, refining and validating an assessment and feedback tool that ADA WOs can use to compare their individual cognitive competencies to those of other WOs. An additional goal is to use the Warrant Officer Cognitive Assessment Tool (WOCAT) in a leadership development role to measure the cognitive competencies required for successful WO performance at one or more critical points in the ADA WO professional lifecycle.

Based on ARI's needs analysis, WO duties concentrated around three complex cognitive skills—decision-making, planning and predicting—applied within expanding time horizons and scope of influence as WOs progress in their careers. Figure 1 describes these skills.

ARI looked at 140A and 140E MOSs individually (the data was collected prior to the split of 140E into 140K and 140L). WO1s and CW2s in the 140A MOS tended to focus on routine daily decision making and planning, likely associated with planning connectivity for current and future operations. CW3s and CW4s in the 140A MOS were engaged in planning, predicting and decision-making, requiring more diverse cognitive skills associated with anticipating long-term impacts of decisions. A similar pattern arose for 140E WOs. WO1s and CW2s were focused on routine daily decision-making and planning related to operations in current situations, whereas CW3s and CW4s focused on decision-making and planning associated with longer-term impacts.

To explore the how WOs are prepared for this expanding application of cognitive skills, ARI analyzed the lesson descriptions for six warrant officer courses: the Warrant Officer Basic Course (WOBC) for 140A and for 140E; the Warrant Officer Advanced Course (WOAC) for 140A and 140E; and the branch immaterial Warrant Officer Intermediate Level Education (WOILE), and Warrant Officer Senior Service

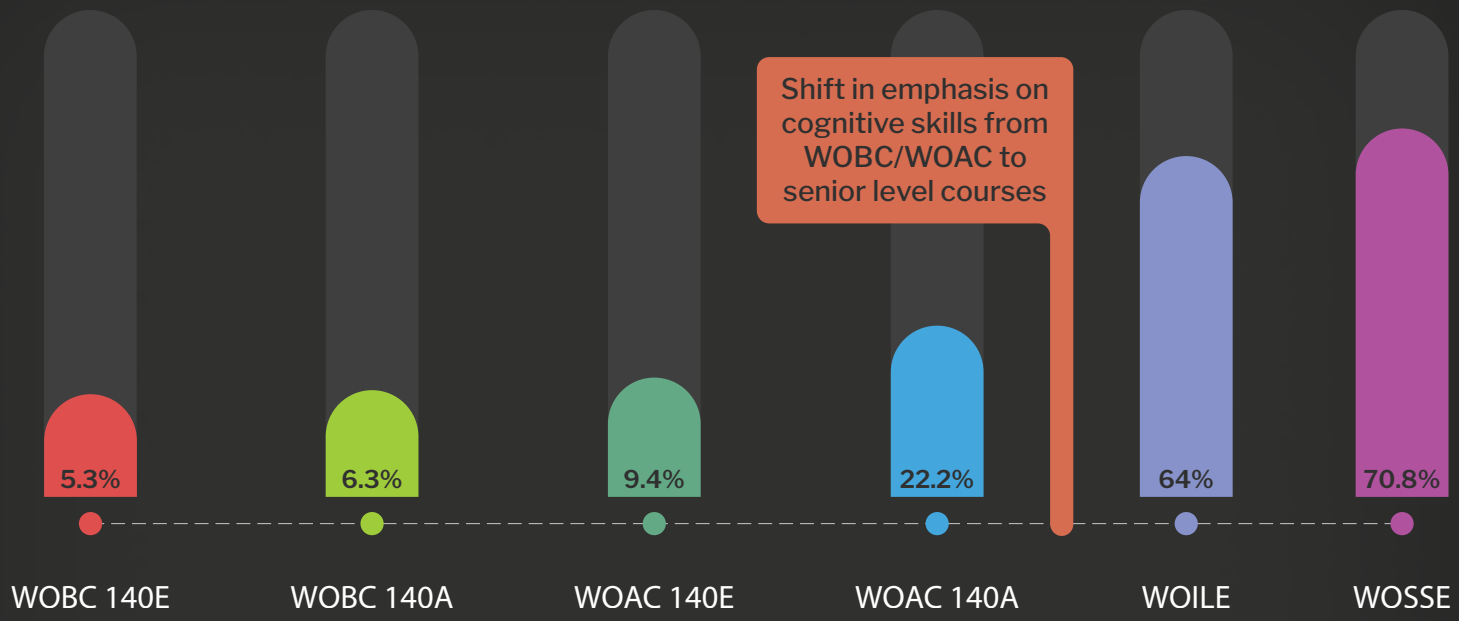


Figure 2. Percentage of time allocated to fostering cognitive skills based on lesson descriptions. (Rick Paape/Courtesy information.)

Education (WOSSE) courses. The time limitations associated with the research did not allow ARI to directly observe these courses being taught; however, they were able to analyze the content and training method descriptions for these courses in order to identify training targeting cognitive competency development (see Figure 2).

While this analysis was limited, ARI found a dramatic shift in time allocated to developing cognitive competencies going from the branch-specific WOBC and WOAC to the branch-immaterial WOILE and WOSSE courses. In branch-specific courses, much more time appeared to be allocated to imparting technical information rather than developing broader cognitive competencies. Nonetheless, placing greater emphasis on developing WOs cognitive competencies earlier in their careers may support WOs in successfully taking on duties above grade and progressing to an expanding scope of responsibilities.

One way to develop WOs cognitive competencies is through exploring a broader range of instructional methods. Looking at the lessons which had a focus on cognitive skills, ARI found that the predominate methods used were discussion/reflective discussion (29.4 percent of lessons) and practical exercises (RP/HO/Written/Test) (53.8 percent) Methods designated as brainstorming (0.02 percent), problem-solving (0.05 percent), inquiry (2.3 percent), and role playing (2.3 percent) were far less frequently indicated (see Figure 3).

Based on these findings, ARI concluded that WOs are performing complex cognitive tasks—decision-making, planning and predicting—at all levels. The shift with increasing rank is associated with the time horizon and potential magnitude of impact resulting from these cognitive activities. Preparing WOs early in their careers to exercise these cognitive competencies will better prepare them for an expanding scope

Figure 3. Methods of instruction associated with lessons emphasizing cognitive skill development. (Rick Paape/Courtesy information.)

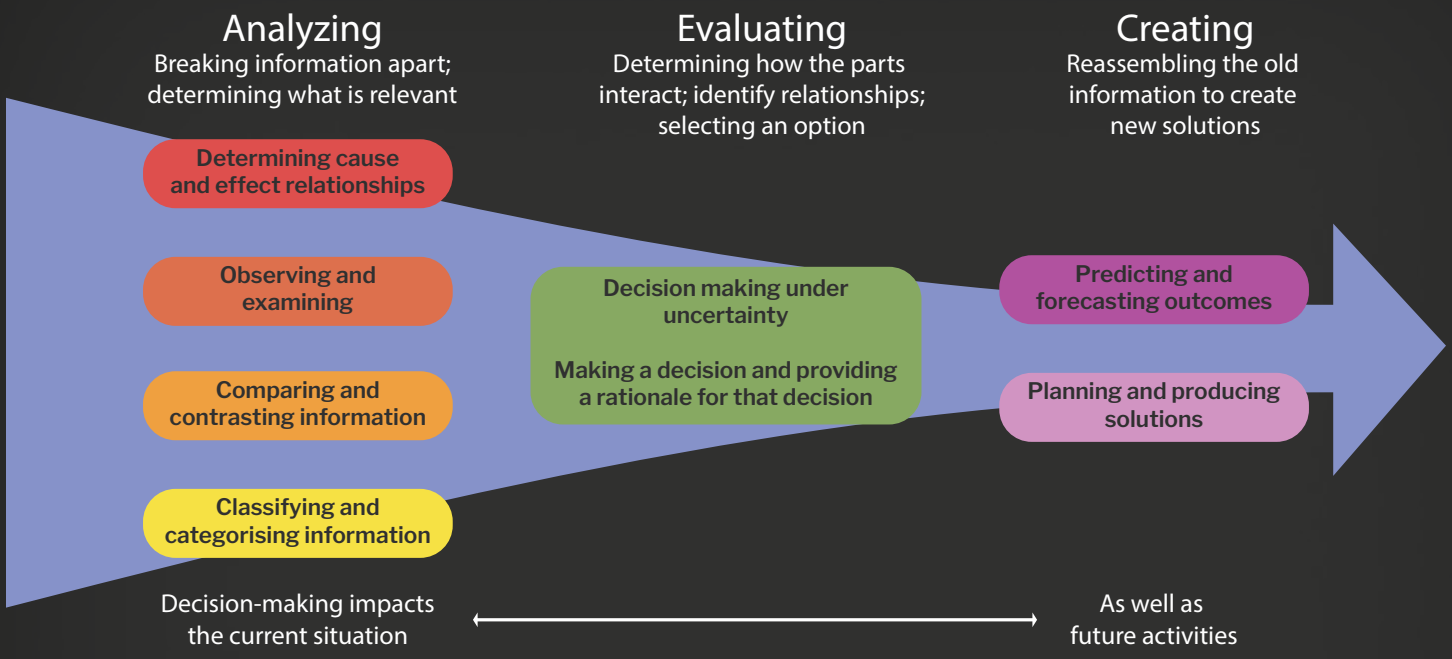


Figure 4. Applying the Higher-Order Thinking Skills Model to decision-making under uncertainty. (Rick Paape/Courtesy information.)

of responsibility and influence. Moreover, given that 17percent of WOs reported being responsible for duties above grade, developing these cognitive skills is vital. The majority of hours in branch-specific courses tend to develop cognitive skills related to remembering, understanding and applying information, and may not prepare WOs with higher-order complex cognitive competencies required by their duties.

To support WOs in assessing and enhancing their complex cognitive skills, ARI and the CWOB are developing the WOCAT. The WOCAT is a situational judgement test, specifically designed to target the types of complex problem-solving and decision-making scenarios faced by WOs in their duties. This assessment and feedback tool will provide WOs in the 140A, 140K, and 140L MOSs a means to compare their problem-solving and decision-making to that of their peers. The WOCAT is intended to enable WOs to identify areas of cognitive skill development for which they are on track with their peers and areas where they can benefit from engaging in targeted self-development to enhance their cognitive skills for the future. We anticipate that the WOCAT tool will be hosted on the Fires Knowledge Network beginning in the first quarter of 2019. Given that this tool is being normed on the existing cohort of ADA Warrant Officers, it may also be of interest to NCOs who are considering joining the WO ranks.

Enhancing perceptual and cognitive skills for Patriot

Our second line of research focused on developing new tools and strategies for assessing and enhancing Patriot crews' decision-making and problem-solving in complex, ambiguous situations. The research has resulted in materials for instructors and unit trainers to prepare them to train Air Defenders to apply higher-order thinking skills in uncertain situations, a desktop module for assessing and providing feedback on fire control decision-making and problem-solving, and a project expanding the scope of the assessment and feedback tool to incorporate perceptual and interpretive skills supporting the problem-solving and decision-making process.

ARI drew their initial theoretical framework for this research from the well-known cognitive skills taxonomy developed initially by Bloom (1950s) and updated by Anderson and Krathwohl (2001). This taxonomy allowed them to identify and define the cognitive skills targeted for assessment and development. This taxonomy divides thinking skills into those of a higher-order (more complex) and a lower-order (less complex). Lower-order thinking skills include remembering, understanding and applying information, and tend to be developed through traditional training methods focusing on factual information and procedures. Higher-order thinking skills include analyzing, evaluating, and creating new information, incorporating and building on lower-order thinking skills (see Figure 4).

A handbook of materials was developed to expand ADA instructors and unit trainers' knowledge of the methods and strategies that can be applied to develop Air Defenders' higher-order thinking skills. The information imparted was intended to complement the preparation that instructors and unit trainers already receive. The handbook is philosophically rooted in the Army Learning Model, focusing on adult learning techniques and theories. There are four main sections: an intro-

Event description	Examples
Determine the mission impact of a fault	The system capabilities are degraded but the Patriot can still engage – degraded operations; launcher problems; recommend repair priorities/ modify operations as required.
Recommending reload and maintenance priorities	Time and task management - during air battle; fault ID; launcher and system maintenance; reloading.
Reacting to an ARM launch	Saturate the environment (friendly and enemy); screening ARM carriers; alert line/screen warnings; misclassified missile track or type.
Executing the directed engagement of a track	Merge tracks for enemy and friendly aircraft (hazard); depict threat systems in a friendly air corridor at a protected altitude.
Acting to clarify a spurious or misclassified track	TBMs/ARMs/ASMs; slow ABTs or TBMs; bad track or tab data.
Executing cruise missile (air or land launched) engagement	Portray a high, fast track or a high launch and descent out of radar coverage.
Executing engagements of threatening massed ABTs	Varied aircraft in coordinated effort. Determine the highest threat; multiple ABTs emerge from single track.
Acting against swarm attacks or massed suppression of enemy defenses (SEAD)	Swarm; multiple ASM launches.
Executing engagement of varied types of TBMs and mixed multiple threats	Mix TBMs; saturate with coordinated ABT and ARM/ASM attacks

Figure 5. A description of the decision-triggering events and associated examples. (Rick Paape/Courtesy information)

duction to higher-order thinking skills, techniques to develop critical thinking in adult learners, creating critical thinking learning environments for Patriot units and execution of critical thinking training. Content also includes an outline of topics, slides, handouts, references and other digital materials.

The handbook presents a model of the decision-making process, focusing on how it arises from ongoing transactions between individuals and their environment. While an instructor or trainer cannot directly influence an individual's psychological make-up, they can manipulate the learning environment to influence the individual's psychology. The handbook presents specific strategies, techniques and methods instructors and trainers can apply, as well as the effects these approaches may have on eliciting higher-order thinking skills during problem-solving and decision-making tasks—focusing in-depth on ALM techniques such as facilitation, effective questioning, use of mistakes and effective feedback (e.g., in after-action reviews). The handbook may be particularly useful to unit trainers, as they are often selected based on their proficiency and are not formally prepared for their role as trainers. The handbook may be used to augment their knowledge of formal training techniques. Additionally, the handbook may be provided in the Schoolhouse to NCOs, WOs, and officers with likely future positions as unit trainers, thereby helping to front-load their competency development. A digital version of the materials can be obtained by contacting the second author of this article.

In addition to the instructor and trainer focused materials, ARI produced an assessment and feedback tool to develop the problem-solving and decision-making skills of Patriot Air Defenders. This tool primarily focused on the cognitive competencies of the tactical control officer and tactical control assistant, focusing on fire control decisions in ambiguous and complex tactical environments. In order to develop this tool, ARI needed to identify specific types of events that would trigger complex decision-making processes. Working with 26 ADA subject matter experts from the SPEAR (Fort Bliss, Texas) and ADA School (Fort Sill, Okla.), ARI identified nine general categories of events that serve as triggers to complex decision-making (see Figure 5).

These decision-triggering events were applied in the context of a fictional unclassified enemy air order of battle to produce problem sets of increasing difficulty. The assessment and feedback tool was designed to run on Windows-based computers. In order to keep the tool unclassified, ARI designed it to focus users at the level of decision-making, and not specific technical actions on the Patriot system. Information used to give the scenarios realism (e.g., airborne threats and friendly capabilities) was drawn from unclassified sources such as Jayne's Defense Weekly. ARI did not simulate sensitive capabilities, processing capabilities or embedded resources of the Patriot system. No movement is presented on scope. The hypothetical scenario involves defense of friendly forces against attacks from Nordland, whose capabilities were defined in terms of current global competitors. The hypothetical battlespace used a region in East Alabama-West Georgia.

The assessment and feedback tool utilizes problem sets of increasing complexity, introducing additional decision-triggering events and reduced feedback as Air Defenders progress through the tool. The problem sets were structured in a crawl-walk-run

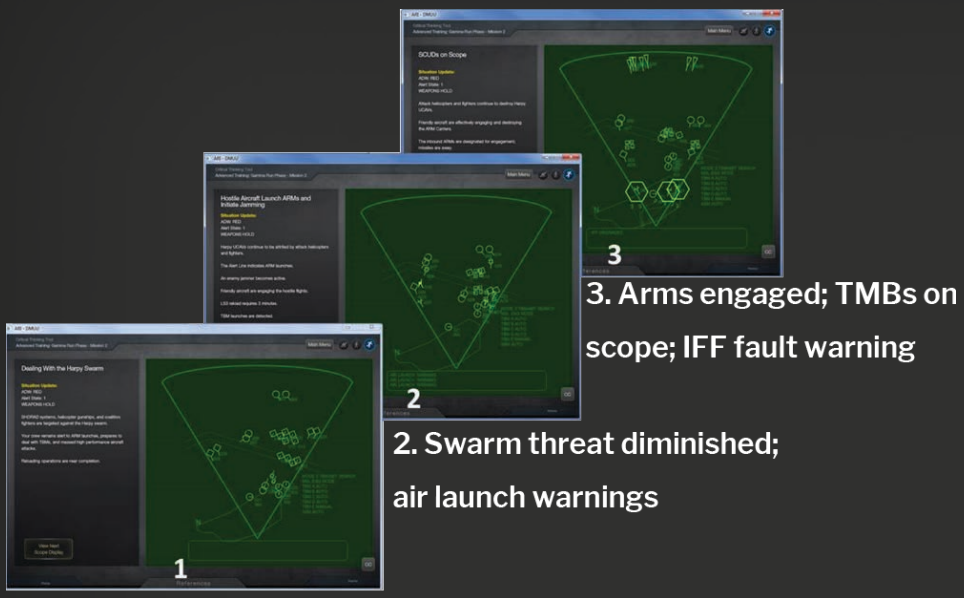


Figure 6. A progressing problem set which begins with a swarmed attack from UAV loitering munitions, followed by air launch warnings, TBMs on scope, and then an IFF fault warning. (Courtesy illustration).

format, with problems becoming more complex as the user progresses. Complexity was manipulated in terms of increasing numbers of decision-triggering events, reduced information and reduced feedback on the decisions users make. In the run phase, users work through multistep problems in which the consequences of their decisions play out, potential actions are reprioritized, and feedback is delayed. During each problem scenario, users are presented with a scope display and are briefed on the changing situation. Users are required to identify a decision, and then to rank order the assessment factors that contributed to their decision, using a truncated variation of the Army's Mission, Enemy, Terrain and Weather, Troops and Support Available, Time Available, Civil Considerations process. Figure 6 depicts a progressing problem set.

After making a decision and identifying the critical information that contributed to their decision, users compare their decision(s) to those of a group of Patriot subject matter experts (SMEs). The SME feedback was derived on the basis of consensus decisions from focus group interviews. A SME rationale is provided to assist users in better understanding how their decision compares to the experts and provides a verbal description of how the experts arrived at their decisions.

ARI pilot tested the tool with Patriot Air Defenders in the 14E and 140E MOSs. Overall, the users were positive about the impact of the tool for developing their decision-making skills, reporting perceived improvement in six out of 11 content areas evaluated. The remaining five of the 11 content areas also indicated improvement after using the tool, but were not statistically significant. The test group largely reported that the scenarios were realistic, and that they experienced greater difficulty working through the more complex problem sets, requiring tracking of multiple pieces of information and task reprioritization. The researchers concluded that by designing problem sets around context-specific decision-triggering events, training design elements manipulating feedback and complexity can be used to assess and enhance users' higher-order thinking skills contributing to their problem-solving and decision-making competencies.

Moving forward, ARI is extending the focus of the tool to develop the perceptual and interpretive skills contributing to Patriot Air Defenders' problem-solving and decision-making processes. One shortcoming of this initial research was its theoretical basis. From working with Patriot SMEs, we were able to identify context-specific triggers to decision-making and to determine how Patriot SMEs would typically respond in those situations. The training tool provides users with insight into what expert decision-making looks like in the Patriot context, and an awareness of how the users' decisions and rationales match those of a group of Patriot SMEs. What it did not do is get deeply into the psychological underpinnings of the perception-cognition-decision-action cycle itself.

ARI's follow-on research, which will expand on the assessment and feedback tool, is exploring the perceptual and interpretive processes by which Patriot experts make sense of complex operational problems prior to arriving at a decision. This follow-on research will further move us from the level of focusing only on "what right looks like" to "how right happens," exploring the more fundamental perceptual and cognitive competencies that serve as a foundation for effective Patriot problem-solving and decision-making. The updated assessment and feedback tool is planned for early 2019 to be hosted on Fires Knowledge Network.

Preparing Air Defenders to transition to emerging systems

Our third line of research has focused on the competencies Air Defenders need to develop to transition effectively to emerging, complex systems—such as the Army Integrated Air and Missile Defense (AIAMD) concept, and its materiel solution in the Integrated Battle Command System (IBCS). While Air Defenders have often transitioned between versions of existing missile systems and con-

trol interfaces, AIAMD will represent both a necessary evolution and a revolutionary change in the Graphical User Interface we have utilized in the past. The significant change introduces many immediate questions concerning future training requirements and command and control practices, as well as longer-term questions that will arise as we get to know the new system's capabilities and limitations.

ARI's earliest research on this topic was primarily methodological. They sought to develop an approach to front-end analysis that was appropriate to identifying the competency development requirements for evolving, complex systems. This research developed and compared the outcomes of two different front-end analysis methods to assess the needs of Patriot operators and then to extrapolate those findings to their current understanding of the IBCS.

Focusing on air battle management tasks, the front-end analysis for Patriot identified critical skills related to situational awareness and crew resource management and recommended their incorporation into Patriot Advanced Individual Training. Extending these Patriot-based findings to the IBCS context, the research indicated that operators must have an understanding of how individual assets fit into AIAMD and how AIAMD is used to support air and missile defense, placing an emphasis in the importance of increased system knowledge. A competency development progression was recommended: (1) understand the mission, (2) understand how AIAMD is deployed to facilitate the ADA mission, (3) understand how AIAMD works to facilitate the ADA mission, (4) understand how to operate the IBCS, and (5) how to operate the IBCS given a specific mission and context. Additional recommendations were to increase formal knowledge-based instruction, regarding tactics and threats, integration of capabilities of AIAMD radar and shooter assets and situational awareness strategies.

One critical topic concerns the automated processes being incorporated into the emerging system, emphasizing the competencies that Air Defenders must develop in order to effectively perform supervisory control. Supervisory control describes the process by which a human operator of an automated system monitors the automated processes and steps in to manipulate or stop the process when required. Supervisory control has long been a topic explored in robotics research, but little research had addressed it in the context of Air Defense missile systems. ARI's research sought to identify a key set of competencies supporting effective supervisory control and determine how these competencies may be enhanced for operators of highly automated, multisystem air defense architectures.

In the context of Air Defense, ARI determined that supervisory control describes an operator's capacity to: (a) understand the relationship between mission requirements, system parameters and operators' roles and responsibilities; (b) manipulate system settings to achieve mission requirements; (c) monitor and correctly interpret system and operational data and cues; (d) respond appropriately to these data and cues; and (e) adapt system inputs and operations to changing or novel conditions. The research recommended various areas for targeted skill development to enhance supervisory control skills, at the individual, collective and organization/unit levels. At the individual level, recommendations included improving the development of Air Defenders mental model of how automated systems work, developing an improved understanding of system limitations and the consequences of automation bias and developing an improved mental model of command and control processes. At the team/collective level, recommendations included developing a common crew resource management mental model, implementing components of situational awareness and scenario-based team training to practice critical thinking and decision-making, and cross-training skills to improve crew members' ability to assume the weapons control role when needed. Finally, at the organizational level, ARI recommended standardization of metrics for assessing supervisory control.

As a first step in addressing ARI's recommendations, the USAADAS asked them to focus their research on crew development and assessment technologies for supervisory control. ARI worked with ADA SMEs to develop guides providing strategies, techniques, activities and exercises to help crews assess and mitigate task saturation and improve their collective performance. The target audience for these materials are crews who have recently completed Table IV/ Air Battle Management Level V certification, and crews with recently replaced crew members. The current materials developed focused on Patriot Engagement Control Station crews. However, as the IBCS system comes online, the multiple crew configurations possible for different missions will require individual Air Defenders to have exceptional competency with understanding their unique roles and functions and how those roles and functions can quickly be integrated into crew processes. The materials and activities focus on three areas: developing a shared mental model of crews roles and responsibilities, rapid skill assessment of crew members and effective crew task distribution. The incorporation of Reconfigurable Table-Top Trainer equipment for skill development is recommended, but not required. ARI also developed an associated set of assessment metrics to measure the key indicators of effective performance of supervisory control. These materials can be acquired

by contacting the second author of this article.

The final research effort undertaken for this topic concerns the potential issues that Air Defenders who have developed expertise with legacy systems (such as Patriot) may encounter when acquiring skills on the IBCS. Specifically, this research has looked at how psychological processes, such as proactive interference and negative transfer, may impact how experienced Air Defenders develop competency on the IBCS. Psychologists typically assume that past learning confers a benefit to future learning. This is usually the case, but sometimes it is not.

In the first phases of this research, ARI collected questionnaire data and conducted focus groups with Patriot, and a smaller sample of Terminal High-Altitude Air Defense, Air Defenders to identify learning and skill retention challenges, training methods used to gain and sustain proficiency, individual knowledge and skills presenting a challenge, knowledge and skill mastery and beliefs and attitudes concerning current and future missile systems. In addition, ARI conducted observations of the training sessions for Soldiers supporting four Soldier check-out events (SCOEs) for the IBCS.

In summary, ARI found that most specific challenges Soldiers face in transitioning to the new system will fall into three categories: (a) looking for information in the wrong place, (b) reaching for or manipulating the wrong button or control and (c) mixing up the steps in complex procedures or processes. Additionally, ARI identified nine factors contributing to Soldiers' susceptibility to these learning challenges: (a) ability to handle stress, (b) degree of experience with the legacy system, (c) diversity of duties and assignments, (d) experience with training procedures focused on principles versus procedures, (e) legacy system certifications and recent duties, (f) recency and intensity of training on a legacy system, (g) experiences with supervisors in dealing with mistakes and errors, (h) experience as a participant setting and achieving learning goals and (i) attitude toward gaining new knowledge and skills.

Using this data, ARI developed a tool that instructors and trainers can use to anticipate, identify and diagnose learning challenges Soldiers may encounter when learning the IBCS. The tool provides background information psychological phenomena such as proactive and retroactive learning interference, the serial position effect and negative transfer. Then it describes key differences between legacy Patriot and emerging IBCS. Instructors and trainers are then introduced to techniques to diagnose and mitigate challenges that learners of the new system may face. Included is an optional section that covers various essential learning self-directed learning strategies to serve as a refresher for instructors and trainers. The final section explores how to apply learning and assessment techniques to address each of the three general types of learning challenges Soldiers may encounter. The tool is currently in development and is planned to be hosted on the Fires Knowledge Network in early in 2019.

Conclusion

The research efforts and research products described above result from a partnership between ARI, USAADAS, and ADA CWOB. They are intended to provide tools to Air Defenders and their instructors and trainers to support our mission to prepare ADA Soldiers for a future fight in which new technologies and tactics will dominate a complex and uncertain operational environment. While the research presented focuses on the cognitive development of the warrant officer, there is applicability across the ADA cohorts. The next steps should include introduction into Basic Officer Leadership Course (BOLC), Captain's Career Course (CCC), Advanced and Senior Leadership Course (ALC/SLC), etc., as well as introduction into Forces Command unit readiness evaluations and training. The research products described in this article are owned by the Army and may be used freely, in whole or part, to support Air Defenders in their professional development, training, and other duties.

Chief Warrant Officer 5 Eric Maule has served as the only Table XII certified Warrant Officer TCO in all Air Defense, Operation Iraqi Freedom, First place at FORSCOM for the Army Award for Maintenance Excellence, Rear Detachment Battery Commander, Course manager for the prestigious ADAFCO and Top Gun courses, Life-Cycle Management Officer in the TRADOC Capability Manager office, first Command Chief Warrant Officer to the 94th Army Air and Missile Defense Command, and the fifth Chief Warrant Officer of the Air Defense Artillery Branch. Maule recieved a Master of Business Administration in Technology from the University of Pheonix and has graduated from the Warrant Officer Senior Staff Course and the Navy Maritime BMD.

Dr. Rhett Graves is a lead research psychologist with the U.S. Army Research Institute for the Behavioral and Social Sciences at Fort Benning, Ga., focusing on cognitive performance in complex conditions, identifying ways to assess and enhance Soldiers' knowledge acquisition, problem-solving and decision-making performance in Air Defense, Cyber, Infantry, and Armor domains. He holds a Ph.D. from the University of Tennessee, Knoxville, in Experimental Psychology (Cognition and Consciousness), and an M.A. from University of Chicago in Social Science (Cultural Psychology/Psychological Anthropology). Graves is a former Secretary of the Society for Military Psychology (Division 19 of the American Psychological Association).

Artillery Tag

By Capt. Derek F. Bartlett

The United States Army's Field Artillery training doctrine does not cultivate confidence at the platoon and battery level of leadership. The Training Circular 3-09.8 (Dot Eight) is confined to routine, mechanical drill, using a numbered checklist to assess the proficiency of sections, platoons and batteries. Psychology proves that this method of assessing does not cultivate confidence by taking away a sense of control, destroying motivation, and not helping Soldiers learn from mistakes. The artillery community needs to assess our platoon and battery level leadership with Mission Command in mind, combine centralized intent with decentralized execution. There are three separate audiences for this article, even though my English teacher always told me you should only ever have one: section chief, officer and tech savvy civilian.

Section chiefs, I understand that the Dot Eight makes you execute the same tasks no matter if you are on Table V,

CH-47 Chinook helicopters of the Combat Aviation Brigade, 3rd Infantry Division transport M777 howitzers of the Georgia Army National Guard's 1st Battalion, 118th Field Artillery Regiment during training at Fort Stewart, Ga. (U.S. Army)

"No general can accustom an army to war. Peacetime maneuvers are a feeble substitute for the real thing; but even they can give an army an advantage over others whose training is confined to routine, mechanical drill."

– Carl Von Clausewitz, "On War."

VI, XII, XV and XVIII. We, as an artillery community, have failed at an effective method of how to assess you. Our actions show that we are not confident in your abilities to train your section. The "table methodology" comes from tank gunnery, when at each table they add a level of complexity for the individual section. The Army decided it might as well work for everyone, hence why we use the "table methodology" now. Psychology shows the need for control is a biological imperative. Columbia University's Department of Psychology stated in a paper: Trend in Cognitive Sciences (2010), that when people are in control, they tend to work harder and push themselves more. On average these people with a sense of control are more confident and overcome setbacks faster. The artillery community needs to utilize Mission Command and give control to the section chief, and then assess accordingly. The purpose of this article is to convince the officers of your plight with the Dot Eight and get the tech savvy civilians to come up with a better method on how to establish confidence at the lowest level.

Artillery officers, I understand we fell in on the Dot Eight and we make it work the best way we can. Our goal is to connect the technical experts (section chiefs) to our commander's vision. We, as officers, have been taught that the Dot Eight is the bridge to make that happen. Train the confident section chiefs so all the technical experts look alike, and any commander's vision can be accomplished. Psychology proves this is wrong. It all falls in the difference between extrinsic motivation versus social motivation. Extrinsic motivation is using punishments or rewards to get a subordinate to complete a task. Fail a section chief for not following the correct procedure in the Dot Eight and the officer is using extrinsic motivation, by using punishment for the failed task. The opposite is also in play, certify a section chief and the officer will use a reward – both extrinsic motivations. Punishments and rewards have a negative correlation with confidence and only elicit temporary compliance in many cases, and in turn create a cyclical need for more punishments and rewards to complete the same task . Social motivation is defined as a drive for a particular goal based on social influence. Social motivation, specifically competition, is seen as a means to improve effort-based learning and attention. Most officers in the Army use competition as a way of motivation and establishing confidence, but have not figured out the method on using it as an assessment for artillery. This is where our tech savvy civilians are needed.

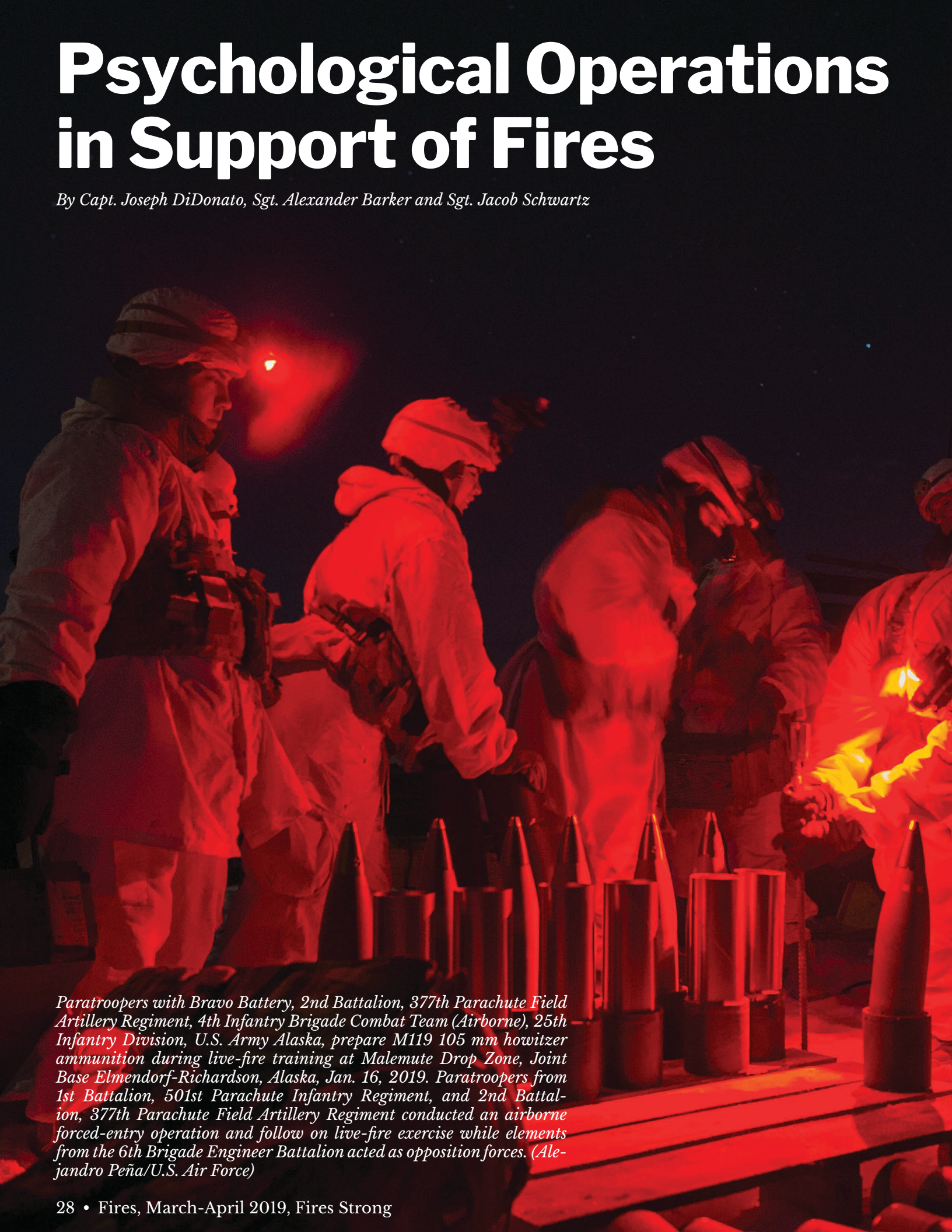
Tech savvy civilians, section chiefs need a sense of control and competition to motivate them for assessments. As officers we are told to use Mission Command, but at the same time are given a checklist to assess our units. We need a new method. We need artillery tag. Artillery tag is an interface that utilizes our Advanced Field Artillery Tactical Data System (AFATDS), to play a form of laser tag over long distances. The artillery community can put platoon versus platoon, battery versus battery or battalion versus battalion. AFATDS tracks each individual artillery location, what type of round that's fired, and the effects the round will produce. All this data is available, we just need a way of organizing it and projecting it to build a competition for assessment.

The goal of the artillery is to shoot, move and communicate. Place an accurate round down range as fast as possible and kill the enemy. The thought process up until now is that to prepare us for combat we need to become more prescriptive in our doctrine. Our sections, platoons and batteries don't look the same, therefore they are failing. Our doctrine tells our Soldiers exactly how to operate, so we can synchronize and mass Fires. The idea that Battery Artillery Readiness Tests, Division Artillery Readiness Tests, National Training Center and Joint Readiness Training Center need to test on a prescriptive numbered checklist will solve our problems is an old and outdated way of thinking. We need leaders that give a sense of control to the lowest level leadership, inspire purpose in each and every action through competition, and let Soldiers become confident and learn from their mistakes through assessments.

Capt. Derek F. Bartlett spent his lieutenant time in the 101st Airborne Division, deploying to a small combat outpost on the Pakistan border. He called for fire from a M777 Battery 20 km away, which gave him the idea of training through Artillery Tag. Once in command, he began to explore and experiment with different ideas and found that the best way to motivate Soldiers is building intrinsic motivation through unit competitions.

Psychological Operations in Support of Fires

By Capt. Joseph DiDonato, Sgt. Alexander Barker and Sgt. Jacob Schwartz



Paratroopers with Bravo Battery, 2nd Battalion, 377th Parachute Field Artillery Regiment, 4th Infantry Brigade Combat Team (Airborne), 25th Infantry Division, U.S. Army Alaska, prepare M119 105 mm howitzer ammunition during live-fire training at Malemute Drop Zone, Joint Base Elmendorf-Richardson, Alaska, Jan. 16, 2019. Paratroopers from 1st Battalion, 501st Parachute Infantry Regiment, and 2nd Battalion, 377th Parachute Field Artillery Regiment conducted an airborne forced-entry operation and follow on live-fire exercise while elements from the 6th Brigade Engineer Battalion acted as opposition forces. (Alejandro Peña/U.S. Air Force)

The operational challenge

The Fires community leads the Army in destroying, neutralizing and suppressing the enemy by cannon, rocket and missile fire as well as helping to integrate all lethal and nonlethal fire support assets into combined arms operations. Both the Field Artillery and Air Defense Artillery are critical capabilities as we transition from focusing on the counter-terrorism threat to fighting near-peer and peer threats. The 2018 National Defense Strategy articulated the threat posed by revisionist powers that seek to undermine long-term U.S. security and prosperity and the international order. As Psychological Operation's (PSYOP) trained Soldiers it is our job to leverage the cognitive domain to amplify Fires' ability to Decide, Detect, Deliver and Assess (D3A) and to Find, Fix, Finish, Exploit, Analyze and Disseminate (F3AD) to the enemy. By working together, we can increase lethality, capitalize on successful missions and frustrate the enemy's plans/affect their decision-making process. This is all done in order to support the commander and ensure that end-states are met at any level of war.

For the past 17 years, following the attack on Sept. 11, the focus of the majority of the Armed Services has been toward counter terrorism and counter insurgency. However, given the revision of FM 5-0 Operations focusing toward conventional warfare, and the contents of the 2018 NSS, the Department of Defense has shifted focus from counter insurgency to engaging and winning in peer-to-peer conflict. This change of focus makes the kinetic capabilities of Fires and the effects cell all the more relevant in today's conflicts. As such, psychological operations, provides planners to Fires who are a critical portion in the planning and targeting cell. The main goal of these planners are to augment the capabilities of these elements by offering cultural expertise, countering enemy propaganda and messaging in order to achieve psychological effects in support of commander's objectives. Successfully integrated PSYOP can augment any Fires campaign, to accomplish the mission, exploit opportunities and achieve the commander's desired end-state.

One of the issues we see when it comes to successfully integrating PSYOP into Fires is lack of involvement in the planning or targeting process. Psychological operations must be involved in the early planning stages at all levels of war to support Fires at the tactical, operational and strategic level. Without proper inclusion into the targeting process, PSYOP cannot be properly executed in order to achieve to greatest effects to further the objectives of Fires' commanders. To quote Lt. Col. Clint Tracy's article in the previous issue of Fires, "We'll figure it [the mentality] out when it happens…Unfortunately your odds of figuring something out, on the fly, is practically zero."

Given the fact that targeting is a complex and multidiscipline effort that requires coordinated interaction among many command and staff elements, it is an implied task to include PSYOP, as well as other information-related capabilities, in the targeting process.

PSYOP in today's conflicts

Targeting is a critical component of the Fires warfighting function, which uses the D3A and F3DA process. In terms of where psychological operations gives added value to the process of D3A; first, in the decision process, PSYOP can offer commanders and staff input of cultural effects that could be created due to the operation. PSYOP can have stand-by operations exploiting the success of the operation and demoralizing the enemy. Second, on the topic of how PSYOP can augment the detection process, PSYOP can establish tip lines in order to report enemy activity. PSYOP is also capable of mapping civilian activity and cultural events to ensure civilian involvement in the ultimate area of oper-

An Avenger crewmember from 2nd Battalion, 263rd Air Defense Artillery Regiment, South Carolina National Guard, views the lane of fire during an exercise at White Sands Missile Range, N.M. (Courtesy Photo/2-263rd ADA)

ation, AO, is kept to a minimum. Third, when talking about how PSYOP can assist in the delivery cycle, PSYOP is capable of utilizing tactical deception in support of operations. This encompasses using a calculated act of deception in order to disrupt, deceive and degrade enemy operations. Some examples include, spreading misinformation in order to protect firing positions or possibly masking unit movements to and from the AO (OPSEC). PSYOP is also capable advising the supported unit on how to develop decoy fighting platforms, in order to distract enemy attention, keeping Fires forces in the fight longer. Finally in the assessment phase, PSYOP is capable of conduction their own job-related assessment and evaluation in order to determine effectiveness. When viewing assessment through the lens of targeting, more specifically for fires, PSYOP can help staff to provide accurate assessments that the commander's guidance has been met.

In addition to being able to be incorporated into Fires Planning/targeting process, Psychological Operations can upset an enemy's formation or tempo, interrupt the enemy's timetable, or cause enemy forces to commit prematurely or attack in an organized fashion. A tactical PSYOP team (TPT) is a three man tactical-level PSYOP team that is capable of implementing several methods to deny the enemy the use of space, personnel, supplies or facilities to confuse enemy combatants into believing that U.S. forces are located in a certain position, therefore drawing the attention and forces of an enemy from the point of the principal operation; an attack, alarm or feint that diverts attention.

In addition, a TPT can target a village with a loudspeaker in order to divert civilians away from a targeted area, or influence a high-value target to commit to actions that benefit United States interests and actions. After Fires has engaged with a target, PSYOP Soldiers can recognize, collect, process, preserve and analyze information, personnel and/or materiel found during the conduct of operations by utilizing their sensitive-site exploitation skillset, the ability to scan and process an area for items of interest after any sort of direct action, or using tactical questioning when speaking with an enemy prisoner of war. In addition, PSYOP forces are trained and specialize in conducting key leader engagement (KLE) and can serve as a key tool in understanding the operational environment and working toward solutions within multinational forums. When properly done, KLEs can support the commander's end-state and have strategic impact towards reaching overarching lines of effort.

The way forward and conclusion

In conclusion PSYOP, when correctly integrated with Fires, can make lasting contributions toward mission attainment. Currently, the challenge is incorporating these effects early on to synchronize these effects to support the commander's end-state. PSYOP can support Fires on a range of missions from understanding the cultural terrain to influencing the cultural terrain in order to support organizational objectives. This can be done by PSYOP forces in all different shapes and sizes, from the planners in the targeting cell to the physical tactical PSYOP teams that circulate the battlefield messaging various targeted audiences.

Capt. Joseph DiDonato, psychological operations officer and former Short Range Air Defense Officer, C-RAM and Avenger Platoon leader, is assigned to 6th Psychological Operations Battalion, 4th Psychological Operations Group.

Sgt. Alexander Barker, Psychological Operations Team leader, is assigned to 6th Psychological Operations Battalion, 4th Psychological Operations Group.

Sgt. Jacob Schwartz, psychological operations non-commissioned officer, is assigned to 6th Psychological Operations Battalion, 4th Psychological Operations Group.

Gender Integration into Combat Arms

A History of Unpopular Change

By Master Sgt. Jesus Robles

Fire direction officers from 1st Battalion, 503rd Field Artillery, verify safety data in support of a combined arms live fire exercise. (Courtesy photo)

"The integration of our services is important. We are a country that believes that every individual deserves the same opportunities if you're capable and can do the job."

–Secretary of Defense Chuck Hagel

On July 26, 1948, President Harry S. Truman signed Executive order 9981 integrating the military and mandating equality of treatment and opportunity. Sixty-two years later, under orders to integrate women into new positions and into units no later than Jan. 1, 2016, the Department of Defense conducted assessments to develop, review and validate gender-neutral individ-

A Soldier conducts a break-the-ice drill as part of winter warfare training. (Courtesy photo)

ual occupational specialty standards. During the Revolutionary War, women served the U.S. Army in traditional roles as nurses, seamstresses and cooks for troops in camp. Some courageous women served in combat either alongside their husbands or disguised as men, while others operated as spies. More than 400 women disguised themselves as men and fought in the Union and Confederate armies during the Civil War.

Some inside of and outside of the military oppose opening up combat roles to women due to concerns they will not measure up and it will challenge or harm unit cohesion – historically, the go to battle cry of "change's" opposition. Ultimately, both our standards and unit cohesion survived desegregation in 1948, the Don't Ask/Don't Tell policy in 1993, and later its repeal in 2011, allowing the lesbian, gay and bisexual population to serve openly. One year after repeal of the Don't Ask/Don't Tell policy, a study published by the Palm Center (a think tank at the University of California, Santa Barbara, that produces scholarships designed to improve the quality of public dialogue about critical and controversial public policy issues) found that openly gay service had not resulted in a negative net impact to the U.S. military. There is no reason to believe that gender integration into combat arms would produce any different results. There is no more open-minded system than the Department of Defense and specifically the United States Army. The U.S. Army has led the charge on every one of the previously mentioned challenges.

What has produced the best results? Unflinching equality backed by a sincere, mature team of leaders. Expectations and the commander's intent are just that, regardless of sex. From the time of any service member's reception, the unit's standards and what is expected of them as member of the unit is clear and no different than any other paratrooper. The unit's hardships and burdens are shouldered by both sexes equally, not unlike its victories and failures. No matter if its living conditions, accommodations or access to facilities, if it's available to one Soldier, it's available to all. Standards will not be changed or relaxed. Warfare will not be taking a break any time soon, neither should the ruler by which we measure our service men or women's performance.

One would be hard pressed to find a more aggressive test bed than the world's only "always" forward deployed airborne Field Artillery battalion, 173rd Infantry Brigade Combat Team (Airborne). The 4th Battalion, 319th Airborne Field Artillery Regiment, the "King of the Herd." Having been assigned three of the Field Artillery Branch's first female Field Artillery officers in the summer of 2015, the 4-319th AFAR is at an advantage in the gender integration arena. Immediately assigned to separate firing batteries as fire direction officers (FDOs), our female FDOs found themselves out in front of their sections and platoons. Within 12 months of arrival, the battalion's three female FDOs participated in 18 airborne operations, led their sections through two section certifications, attended the United States Army's Jump Master School, and participated in numerous named operations and live-fire exercises through five countries. Responsible for the safe, accurate, and timely firing of over 4,800 artillery rounds. Like their male counterparts, the battalion's newest FDOs proved to be combat multipliers.

When dealing with living arrangements (undoubtedly one of the loudest arguments against gender integration), we found that it was detrimental and even disruptive to the planning and execution of operations when we did polarize one sex or the other in the rare instances we coordinated for separate living quarters for our male/female personnel. On numerous occasions and as a direct result of the living arrangements one or the other was not present for those extremely vital epiphanies that occur without warning in team quarters. The situation is further exasperated when the individual missing is a leader. Understanding and breakthroughs of our Army culture and norms happen every day. Gone are the days where we segregate our female populace to "protect them." What, or better yet, who are we protecting them from? Who are we then labeling the possible offender that our female or male paratroopers need protecting from? Who are we villainizing or victimizing? To the contrary, we as a battalion leadership team feel that our paratroopers regardless of sex are

Soldiers perform pre-jump training prior to airborne operations. (Courtesy photo)

more vulnerable when they are isolated away from those that care about them the most, their teammates.

It is not going to be an easy process, and it will not come naturally to many of us. As recently as my last exercise with the battalion, Summer Tempest '16 in Sardinia, Italy, during our after-action review I was asked why I had separated our female paratroopers from their male counterparts and teammates. A question posed by three of our female combat medical specialists and a female radar operator. I didn't have an answer for them, not a good one anyway. My response — I did it because the four-man tent math lent itself to what I felt was an easy answer. In hindsight and more likely the truth — I did it because that's how I had seen it done and grew up doing it for the past 17 plus years of my career. I did it without thinking about it twice because it's what felt right to me … at the time. I had inadvertently reverted to the "old way of doing business." Four months leading up to this incident I felt I had done everything right in regards to promoting a healthy approach and pace towards fostering a positive gender integration. I should have taken an extra moment to consider the second and third order effects that my decision to separate these troopers would have on their teams and ultimately the battalion. I cheated my subordinate leaders of an opportunity to grow and mature via the need to negotiate a new "problem set," further hindering our progress toward the pursuit of gender integration. This process will not be without relapse. A conscious, selfless effort must be made to mitigate these setbacks.

Our FDOs have since become platoon leaders and fire support officers in our sister infantry battalions and cavalry squadrons. It's only a matter of time before we see our first female section chiefs and they graduate to platoon sergeants. It is imperative that we as leaders build the systems now that will facilitate familiarity and trust in both the policy and the leadership. Like so many challenges the armed forces has overcome in the past, gender integration is going to take time to phase into the Army. In the end we will be a stronger more adaptive fighting force for it. It's not going to happen overnight and there are going to be setbacks. A conscious effort must be made in order to change the culture and it starts with us — the leadership. The effort must be sincere and above all else, professional. We are ready.

Master Sgt. Jesus Robles was recently asked to write a paper for 4th Battalion, 319th Airborne Field Artillery Regiment, which he was assigned to from 2014-2017. He is now a senior military science instructor with the Army ROTC at City University of New York.

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Establishing Effective Junior Air Defense Officers

An Institutional Approach

By 1st Lt. Bradley T. Hodgkins

Status quo Army officer institutional development courses are designed to ensure that officers arrive to their units with the baseline competencies required to be successful in their next assignment. TRADOC Regulation 350-36 notes in Chapter 4-9 that graduates of any Basic Officer Leader Course (BOLC) B branch specific training should "possess attributes and competencies to assess, train and lead in their first unit of assignment" and that they will need to "[adapt] troop leading procedures and problem-solving skills to branch specific mission support requirements." For second lieutenants graduating the BOLC, company grade commanders demand that their new second lieutenants are prepared to serve as platoon leaders and accomplish tasks with minimal guidance or training required. This expectation requires different levels of training for lieutenants of various branches; the duties and responsibilities of an infantry platoon leader and a transportation platoon leader may share similarities, but still require different levels and lengths of branch specific training.

Infantry lieutenants, for example, spend a significant amount of time developing platoon-level leadership and tactical skills during their BOLC, and conduct follow-on training by attending Ranger School, Weapon System Leader Courses (Bradley, Stryker, etc.), and troop schools before reporting to their first assignment. By providing several opportunities for new infantry lieutenants to develop their skills as a platoon leader, new arriving infantry lieutenants are often considered reasonably prepared to step into their role and immediately begin executing within the organization. The progression in the maneuver community is direct: BOLC B provides students with a basic tactical understanding of the core competencies, Ranger School turns basic understanding into mastery by putting tactical concepts into practice under extreme stress, and special schools (i.e. Bradley/Stryker Leader Course) provide exposure to the breadth of knowledge that their Soldiers are required to know on their systems. This direct institutional progression is not leveraged by the Air Defense Artillery.

The ADA community stresses a unique level of expertise from their new lieutenants. New arrivals are not simply placed in a position of leadership over a platoon of Soldiers that learn similar skills. Serving as tactical control officers (TCOs) in Patriot, for example, involves a depth of understanding of a complex weapon system that necessitates a set of skills that have nothing to do with platoon leadership. The dilemma is simple, when young maneuver officers broaden their understanding of their tactical responsibilities they, in turn, develop as platoon leaders. As new air defense officers are immersed in the nuances of Patriot tactics during BOLC B they are not learning skills that translate to being a platoon leader. Even if a brand new BOLC B graduate is placed in a fire control platoon leader position in a Patriot battalion, the skills they learn while training to certify as a TCO do not generate second lieutenants that can effectively oversee a prepare for movement and emplacement (PM&E) crew drill, comprehend and interpret a defense design, or understand Patriot's role in a broad air defense plan.

Additionally, the Table IVc written exam, used by unit standardizations teams to validate a baseline level of understanding for Patriot competency, poses a significant challenge to newly arriving lieutenants. Although the current BOLC B curriculum allocates a significant amount of time to Patriot Engagement Control Station (ECS) tactics, incoming TCOs are not retaining the information and the tactics, techniques and procedures (TTPs) vary significantly. In June of 2018, 3rd Battalion, 43rd Air Defense Artillery Regiment, conducted a review of all Table IVc scores by second lieutenants and found that students graduating BOLC B scored an average of 30-40 percent. After an in-depth one week immersion course new officers showed a significant increase on their average scores (~80 percent), but were still missing the 90 percent mark required to certify baseline competency.

The trend operational units are currently seeing from second lieutenants arriving from BOLC is as follows: Second lieutenants are eager to learn Patriot, they understand that the NATO tactics they have been instructed on during their course must be unlearned and replaced with new TTPs and brevity, and they lack an understanding of air defense concepts beyond rudimentary Patriot tactics. This is particularly troubling when considering the role that officers play in the air defense community—the 14A designation does not tie officers to a particular weapon system, which requires officers to adapt to the circumstances they are placed in. This may be remedied by shaping BOLC B to serve as a course that introduces and drills the fundamentals of air defense, while

providing opportunities to deepen exposure to a weapon system in a follow-on course. This is not a novel concept in the ADA community, all second lieutenants assigned to Terminal High Altitude Area Defense (THAAD) units are required to attend the THAAD follow-on course. Upon completion of this course, ADA Soldiers receive an identifier on their record brief that demonstrates their understanding of the weapon system.

Third-43rd Air Defense Artillery Battalion recently sent a new arrival, 2nd Lt. Reed E. Simmons, to the German Air Force Air Defense course. As the first U.S. Army graduate of the course, it was immediately apparent that he graduated with a much more nuanced and broad understanding of both Patriot and air defense concepts. He now communicates with a fluency and understanding that places him well beyond the level of his peers that have been forced to learn in an operational environment. A critical aspect of the training plan during the course required students to translate 'real world events' during air battles into concepts that are applied in the ECS. This forced operators to remain vigilant and understand their role in the ground and air fight occurring outside their fire unit. Training dynamic thinkers creates more adaptable ADA officers in the long term. Students in the course spend a significant amount of time drilling autonomous and decentralized methods of operation, which forces them to understand the role of their higher echelon unit and consider the actions of friendly units around them. The German course also taught graduates to understand all aspects of the platform, including PM&E and reconnaissance, selection and occupation of position, which enables graduates to serve more effectively in a supervisory role as Soldiers train for certifications. Finally, this knowledge was provided in a distraction-free institutional environment which allowed Simmons to become a more expert ADA officer without being drawn away by the demands of platoon leadership.

In BOLC B, rather than providing new lieutenants' exposure on the purpose and principles of radars, defense designs and surface-to-air platforms, second lieutenants are introduced to NATO doctrine and brevity by German exchange instructors that focus primarily on tabular and Patriot-specific tactical knowledge. This results in a botched attempt at achieving two separate goals simultaneously: Second lieutenants do not graduate with a tactical knowledge that is practical in FORSCOM/PACOM units and they do not graduate with a breadth of understanding that enables them to be plucked from a Patriot unit and be immediately successful as a Short Range Air Defense (SHORAD) platoon leader. The German Air Force acknowledges this deficit and sends their BOLC B exchange student graduates to the course that Simmons attended to supplement their tactical expertise.

The Aviation Branch demands technical expertise from their second lieutenants similar to ADA, but Aviation BOLC B functions as their exposure to platoon leader-level training and the fundamentals of flight operations as defined by TRADOC, then all officers are sent to follow-on flight school to master their assigned aircraft. ADA officers are not currently developed to be successful in any possible ADA position or understand the scope of ADA tactics. This problem is going to be magnified as the branch looks to implement the Integrated Battle Command System (IBCS). The 'plug-and-play' capability of the IBCS expects ADA officers to understand ADA concepts and not simply the capabilities of a specific platform. Anticipating this evolution in ADA operations ensures that future leaders are more equipped to function in a multi-domain environment.

This ultimately begs the question 'what does the branch expect from junior officers in the Air Defense branch'? In the past, ADA separated the institutional model into a SHORAD versus High to Medium Altitude Air Defense (HIMAD) dichotomy. This fostered a culture that discouraged exploring the transitivity that exists between short-range and high-altitude air defense planning and procedures. It is understandable that FORSCOM is required to remain dynamic, and adapting to real world events, a luxury that takes much longer in a TRADOC environment, but divisions between SHORAD and HIMAD will exacerbate the current institutional mold as the Army seeks to adopt the IBCS. As ADA approaches this critical moment of innovation and transition it is imperative that officers are developed into air defenders and not simply Patriot, THAAD, or SHORAD officers.

The multi-domain environment requires air defense units at all echelons to not only understand the capability of every sensor and shooter in the Joint Operations Area but to have the knowledge to properly emplace and integrate them. We can no longer accept the stove piped approach to professional military education and career development, and the institutional community must get ahead of this problem now to ensure our branch is in the optimal position to address emerging threats. The institution should not wait for units to receive the IBCS to implement a dynamic and tailored BOLC B curriculum. Adopting an institutional model that more closely mirrors the developmental model that the Aviation and Infantry branches currently use would serve the ADA branch well today, while concurrently ensuring that the force is prepared once IBCS or any similar system is fielded.

1st Lt. Bradley Hodgkins is an Air Defense Artillery officer serving as an assistant operations officer in 3rd Battalion, 43rd ADA. He has also served as battery trainer and battalion master evaluator.

Lessons Learned From Korea

By 1st Lt. Hannah Jones

Introduction

The future of warfare is ambiguous, and although the United States strives for decisive victory, the Army has a tendency to lose its first battles due to incomplete preparation. It is imperative for leaders to constantly re-evaluate global threats and preemptively create strategies for sustaining the fighting force in order to win the nation's wars. Second Battalion, 20th Field Artillery, a Multiple Launch Rocket System (MLRS) battalion, deployed to the Republic of Korea (ROK) from February to November of 2018 as part of 210th Fires Brigade. The brigade is one of the northernmost units to the Demilitarized Zone (DMZ) and are pivotal in deterring North Korean aggression. The theatre of Korea poses challenges to the U.S. Army unseen in decades, and alludes to a future of near-peer, conventional warfare with high casualty rates. The leaders within 2-20th FAR and 210th Fires Brigade employed innovative medical training and techniques, such as whole blood transfusions in battalion aid stations and casualty evacuation with non-standard ground platforms, to mitigate the predicted treatment and evacuation shortfalls unseen by the U.S. Army since the Vietnam War.

Planning without air MEDEVAC

It is predicted there will be no air medical evacuation (MEDEVAC) for at least the first two weeks of hostilities due to the anticipated volume of artillery fire and the threat of North Korean air defense systems. There are approximately 50 ROK artillery battalions within 210th Fires Brigade's area of operation (AO), spanning a 60 mile distance from Seoul to the Demilitarized Zone, and dozens of North Korean artillery battalions targeting weapons towards the AO. The predicted volume of fire is too massive for air controllers to de-conflict air space for air MEDEVAC. Additionally, the 210th Fires Brigade AO is close enough to the DMZ where air MEDEVAC is in range of North Korean Air Defense Artillery systems, both shoulder-fired weapons from special operations infiltrators and heavier ADA systems across the border. Until the North Korean air defense systems are destroyed and the artillery rates of fire decrease, ground vehicles will be the only means of medical evacuation.

Non-standard casualty evacuation

There are not enough ground ambulances or licensed drivers to accommodate the extremely high casualty predictions, so commanders must designate vehicles, such as light medium tactical vehicles and humvees, and practice loading and evacuating casualties from these non-standard platforms to augment the ground ambulances' capabilities. All leaders should know where the closest aid stations are on the battlefield, at least two different routes to arrive there, and how long each route will take. This knowledge is essential in Korea because not only can a route potentially be obstructed by the destruction of artillery and chemical contamination, multiple roads will be off-limits to the U.S. Army due to civilian evacuation. Leaders will also have to make hard judgement calls when triaging casualties due to limited space. Soldiers with minimal or delayed injuries like simple fractures may have to stay forward to keep fighting, and only the most serious injuries with a chance of survival will be evacuated. A unit's training reflects the priorities of a unit, and medical treatment and evacuation are imperative to 'fighting tonight and keep fighting until we win.'

No golden hour

The golden hour is the first hour after a traumatic hemorrhage injury most critical for success in emergency treatment, so casualties have the highest likelihood of survival if evacuated to a treatment facility within one hour of injury. War in Korea means no more golden hour. Since casualties will only be evacuated by ground platforms, the rate of evacuation will be slow and cumbersome compared to recent U.S. combat zones with air MEDEVAC capabilities. The urban and natural terrain of the Republic of Korea canalize and highly restrict movement due to the dense populations and the mountainous terrain, further slowing the anticipated rate of travel during combat. Because there is no more golden hour, battalion aid stations will need creative solutions for holding and maintaining the lives of casualties in lieu of evacuation to higher roles of care.

Walking blood bank

The key to the golden hour is blood replacement, so 210th Fires Brigade adopted the Walking Blood Bank (WBB), an initiative to bring the blood to the Soldiers if the Soldiers cannot evacuate to the blood. Whole blood transfusions in pre-hospital settings are not new to war, but rather a diminished skill first used as early as World War II and deemed

unnecessary over the years due to advances in patient evacuation. In previous wars, helicopters air-dropped medical supplies and units of blood to the forward lines, but this luxury will not exist in Korea. Also, the Role 2 of 210th Fires Brigade only has the storage capacity for 50 units of blood, and will be located too far for most units to travel in wartime conditions. Although the transfer of whole blood is generally a Role 2 and higher capability, the WBB allows battalions to give whole blood transfusions in their aid stations.

The whole blood transfusion process is more complicated than matching blood types on dog tags and quickly sticking someone with an IV. Units proactively consolidate blood types via titer tests of every Soldier in the unit. Titer tests give physicians a more exact description of a Soldier's blood type, beyond the general A, B, or O reading, and are imperative for a safe blood transfusion. Critics of the WBB believe a whole blood transfusion on the front lines will just take a healthy Soldier out of the fight, but a Soldier who donates blood will be physically capable of all activities within an hour. Although the Walking Blood Bank program will help 210th Fires Brigade units 'Fight Tonight," leaders are constantly researching better methods for blood replacement, such as using freeze-dried plasma.

Battalion aid station (+)

An MLRS battalion aid station has the capacity to only treat around 40 trauma casualties with their Modification Table of Organization and Equipment (MTOE) CLVIII allotment. All units stationed in Korea or units training to fight near-peer enemies must realize casualty evacuation might not be possible, so creating innovative methods during peacetime to enhance pre-hospital medical capabilities will save lives during combat. Outside of the WBB program, 2-20th FAR's medical section also increased their aid station's capabilities by ordering additional antibiotics outside of their MTOE amount, and planned to use factory buildings in predicted combat positions as patient holding areas. Units cannot let their MTOEs define their potential and leaders are urged to evaluate their different missions and environment to see how much medical supplies they actually need.

Korean alliance

210th Fires Brigade does not operate in a vacuum, so creating an alliance and understanding the surrounding ROK capabilities is essential for maximizing casualty treatment and evacuation. The medical rules of engagement for treating Korean nationals is only life, limb and eyesight. Additionally, because no formal rule of engagement prohibits it, U.S. Soldiers should evacuate their casualties to Korean hospitals in dire situations. There are a few reasons why evacuating through Korean channels should not be the primary method, even if a Korean facility is closer. In wartime conditions, Korean hospitals will most likely be overwhelmed with civilian casualties and unable to treat U.S. Soldiers. Also, there is no formal method of patient tracking or communication between Korean hospitals and U.S. units in 210th Fires Brigade's area of operation, so it could be days before units find out the status of their Soldiers. Fortunately, each battalion within 210th Fires Brigade has around 40 to 50 Korean Augment to the United States Army Soldiers attached to their ranks to act as a liaison between the U.S. Army and the Korean populace, and they can be sent with casualties to help relay information back to the battalions. Even with these difficulties, evacuating to a Korean hospital is a better solution than nothing.

Challenges and recommendations

The future of combat medicine is in pre-hospital medical care: hospitals are just static targets. This alludes to more permanent medical MTOE changes. MLRS battalions in Korea are more frontline, wide-spread and mobile than traditional MLRS engagements. Their battalion aid stations need the manning and CLVIII to handle the predicted high level of casualty rates, especially if they are also receiving Korean civilian casualties. MLRS battalions' MTOE should double the number of their medics (68W's) and also assign both a physician's assistant and a physician to the battalion. This will allow the aid station to handle more casualties and split into a forward and main aid station like other mobile units do in order to spread medical treatment capabilities over a larger area. MLRS battalions should also purchase more medical equipment sets geared towards treating an excessive number of trauma wounds and chemically contaminated casualties.

Conclusion

Leaders must remain proactive and not reactive, predicting the future friction points in warfare to remain the most lethal and sustaining fighting force. With air medical evacuation unlikely in a future war with North Korea, units must prepare for evacuation by non-standard ground platforms in order to augment the capabilities of the limited number of ground ambulances. Casualty evacuation will be extremely slow or even impossible during combat due to the heavily populated and highly restrictive mountainous terrain. Units must enhance their pre-hospital medical capabilities beyond their MTOE, like 210th Fires Brigade's Walking Blood Bank program, in order to posture for injuries and destruction never seen in modern war.

1st Lt. Hannah Jones is a graduate of the United States Military Academy. She currently serves as the medical officer for 2nd Battalion, 20th Field Artillery Regiment stationed out of Fort Sill, Okla. She served a nine-month rotational tour in Korea with 2-20th FAR where she earned her Expert Field Medical Badge.

Korean Counterfire

Rotational Field Artillery Battalion Operations in Korea

By Chief Warrant Officer 2 Matthew Pfannerstill and Sgt. 1st Class Gary Weathersbee, Jr.

Abstract

This is an effort to describe the transformative process of adapting from a maneuver-centric Field Artillery battalion to meeting the demands of the static, high volume nature of the Korean Theater of Operations (KTO). There are many significant differences in how we operate and train for decisive action compared to the role of rotational Field Artillery in the KTO.

The train-up for the Korean Regionally Aligned Forces (RAF) mission was dynamic and intense but did not entirely prepare us for the nuances of the peninsula. It is vital to assess the train-up for a KTO rotation and ensure lessons learned from previous units are implemented before a rotational unit's arrival.

We will begin this discussion by describing a centralized counterfire cell's decisive action national training center rotation and pre-deployment train-up. We will then go on to catalog an organizational transformation process to successfully train and implement Korean Fires through Army Battle Command Systems, Permanent LAN, and FM digital over distance. We will conclude with several lessons learned throughout the deployment.

Introduction

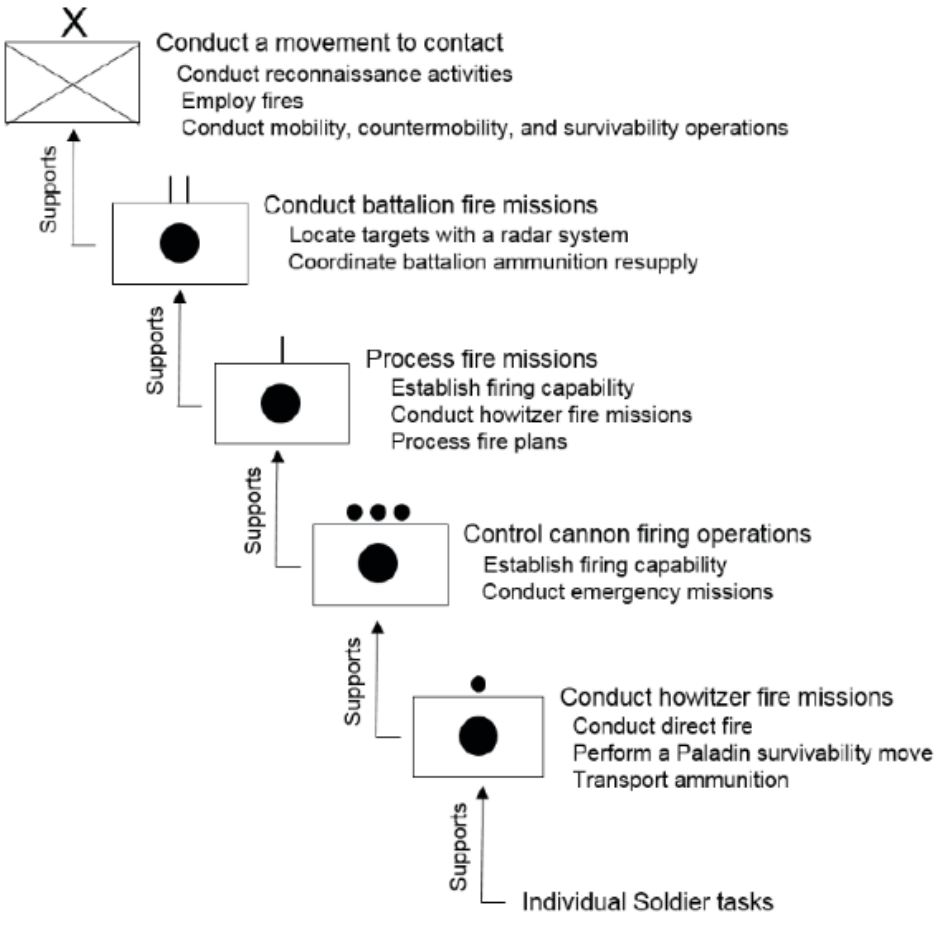
"The Army trains to win in a complex world (United States Army, FM 7-0, 2014, p. 1l)." The unit training cycle leading up to a nine-month rotational deployment to Korea included a combination of Artillery Table (AT) progressions and a decisive action rotation to the National Training Center. The unit laid groundwork for the rotation to ensure proficiency on our standardized mission essential tasks (MET). Additionally, 1st Battalion, 41st Field Artillery conducted numerous multi-echelon training events to ensure we could employ Fires in support of the brigade combat team (BCT). The Army Field Artillery standards prepare units to fight our nation's wars; however, the essential question remains. Does the current training model offer the preparation needed to fight in Korea? See Figure 1.

Korea can be an enigma to the traditional Army warfighter. What makes Korea so unique? The profound directive that maneuver supports Fires in the KTO. In Korea, maneuver assumes two missions: non-combatant evacuation operations and defense of the Field Artillery. This concept can be problematic for movement and maneuver professionals to reconcile. It can also be a difficult notion for Fires operators as well.

The Army has encountered non-standard mission sets for the better part of two decades, and our ability to adapt has been dictated by our unique operating environments across the globe. Whether through battalion-centric counter-insurgency rotations to Joint Readiness Training Center or the contemporary large-scale combat operations of the NTC, the Army has adjusted pre-deployment training to meet the threat.

Considering the unique en-

Figure 1. Multi-echelon training task crosswalk. (U.S. Army FM 7-0)



vironment of Korea, how did we adapt our pre-deployment training? Looking back at the unit training plan, additional Korea-specific training was warranted to provide the necessary readiness.

Pre-deployment training

The battalion training cycle leading up to the KTO deployment was vigorous. Within a year, the unit conducted two NTC rotations, two Artillery Table XVIIIs, and multiple other ATs to ensure an exceptional level of combat readiness. The operational tempo leading up to the deployment consisted of particularly high-intensity training, which produced a level of readiness that increased the proficiency of the overall unit.

Throughout the execution of the artillery training progressions, the battalion leadership modified the Field Artillery employment method to ensure success at each gate. As a product of decisive action training models, the unit exercised centralized control; this resulted in most of the Fires functions being consolidated and directed at a BCT level rather than the battalion. This lead to the brigade's "S-2, S-3, counterfire, target processing, and fire support elements" contributing and supervising the employment of weapons locating radars (United States Army, FM 7-0, 2014, p. 60). While this approach was successful at NTC, it proved problematic while operating in the KTO.

There are two collective modes of thought when employing counterfire elements into brigade combat team operations. One approach has the counterfire cell located in the brigade tactical operations centers (TOC), the other method places the cell in the battalion TOC; both come with inherent strengths and weaknesses. When positioned in the brigade TOC, the centralized model allows for expeditious clearance of air and ground.

Additionally, being located in the brigade TOC provides greater access to a robust communications suite. The disadvantages of this method includes being disconnected from the battalion's maintenance team and assumes risk by placing all mission command fire support elements in the same place. See Figure 2.

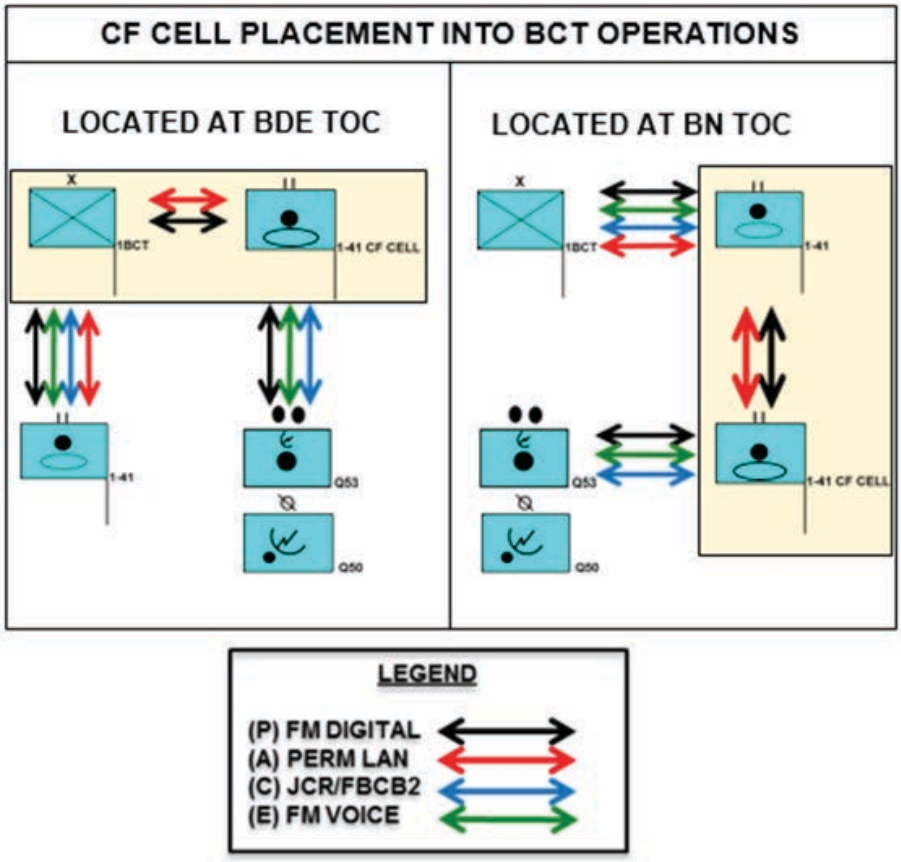


Figure 2. CF cell placement into the brigade combat team operations. (Courtesy illustration)

The placement of the counterfire cell at the battalion level allows for faster technical processing of fire missions and a greater awareness regarding battalion operations. This enhanced awareness permits the timely deployment of maintenance assets and ensures the distribution of all classes of supply to the radars. However, this movement fundamentally increases clearance times for fire missions, as the counterfire cell is no longer collocated with the land and air owners. Additionally, when separated from brigade, there is a greater risk of failing to establish upper Tactical Internet (TI) communications, which could have a detrimental effect on the counterfire mission.

The placement of the counterfire cell is driven by mission variables dictated by the operating environment. Tasks trained at NTC were very different from the mission we would receive in the KTO.

Transformation

Shortly after redeploying to Fort Stewart from the National Training Center the 1-41st FA Battalion began conceptually restructuring operations to meet the complex operating environment Korea. The reorganization subsequently produced the follow-on effects on multiple facets of the battalion's standard operating procedures. For example, the battalion TOC/Tactical Command Posts (TAC) configuration changed to accommodate the influx of personnel, the battalion level communications architecture changed to permanent local area network (LAN) due to the proximity of the battalion fire direction center (FDC) and the counterfire cell, and the power demand increased due to

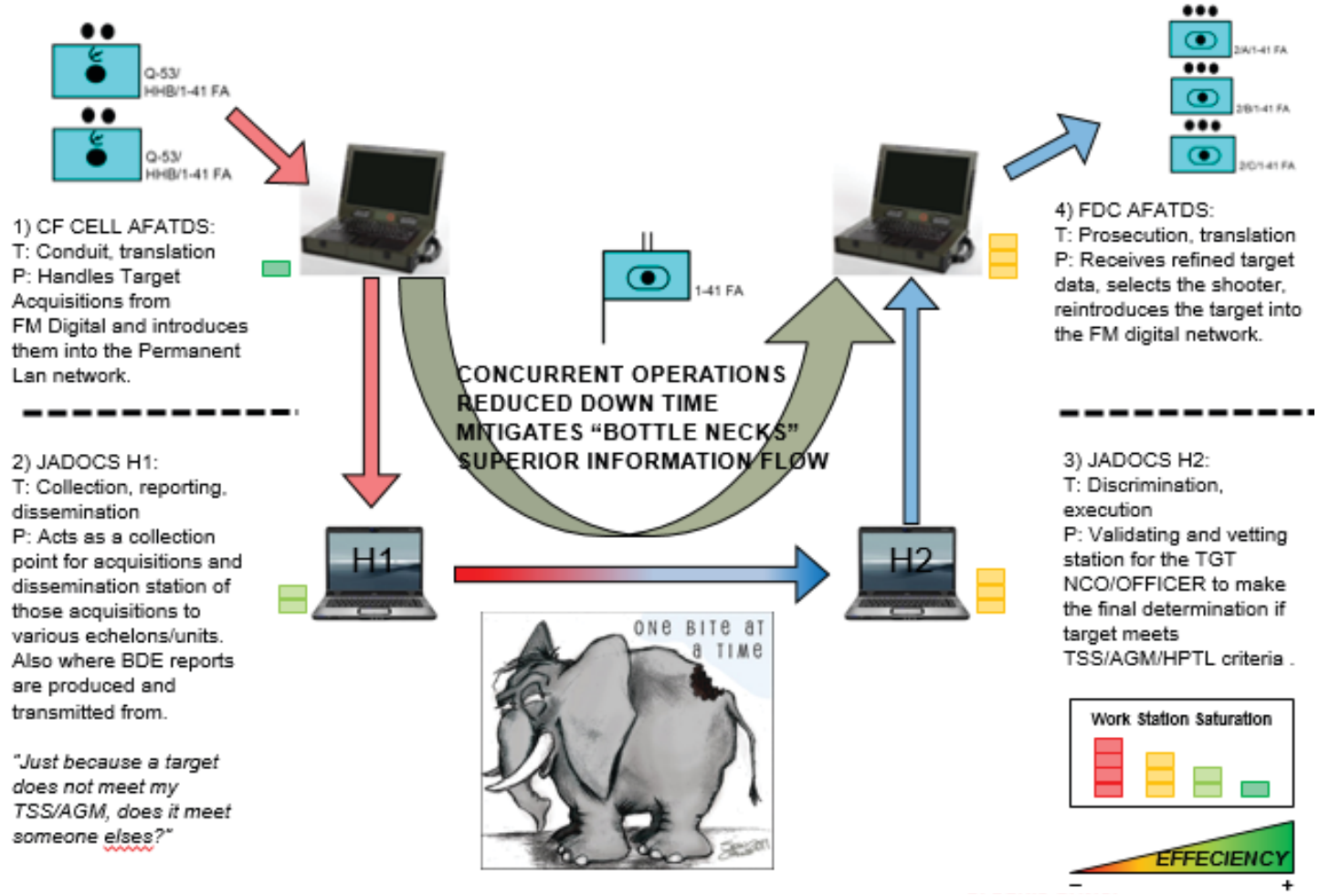


Figure 3. Cellular manufacturing and KTO counterfire. (Courtesy illustration)

the greater number of dismounted radios.

Functionally, this altered our battalion TAC standard operating procedure (SOP) in multiple dimensions. The 1-41st FA had revised its SOP throughout multiple training events and rotations and now had the added challenge to change it again immediately before deployment, which was not ideal.

The changes were not well received by the senior NCOs throughout the formation and they inquired about the necessity of the seemingly last-minute changes. Nevertheless, the battalion leadership recognized that the organization needed to adjust to meet the needs of the operating environment. The Korean Peninsula places a strain on multiple aspects of rotational battalions operations including the successful operation of digital communications over increased distance and heavy terrain, substantial reliance on upper TI, and the potential for an incredible volume of enemy artillery fire. The manner in which the rotational battalion adapts to change and conducts their pre-deployment training will ultimately determine its success or failure. This begets the question: Can a battalion concurrently train for decisive action and Korea? See Figure 3.

The KTO has many Field Artillery nuances that are unique to the peninsula. From the significant integration of Joint Automated Deep Operations Coordination System (JADOCS) into fire mission processing, to the freedom related to Field Artillery delivery mechanisms; units must learn how to exploit both opportunities in order to find success in Korea.

JADOCS increases the ability of a counterfire cell to manage an enormous amount of acquisitions while simultaneously broadcasting that data to multiple echelons for intelligence and action. JADOCS essentially takes an over-saturated two system job and breaks into four cellular components. This cellular break out of sensor-to-shooter mission processing provides a distinct advantage in information flow. In essence, the digital elephant is consumed one bite at a time by increasing the number of hands that can service the targets. Another significant characteristic of JADOCS is that all of the components of the Department of the Defense employ the system, which facilitates real-time cross organizational coordination between all component commands on the peninsula. Finally, JADOCS serves as the digital communication bridge between Re-

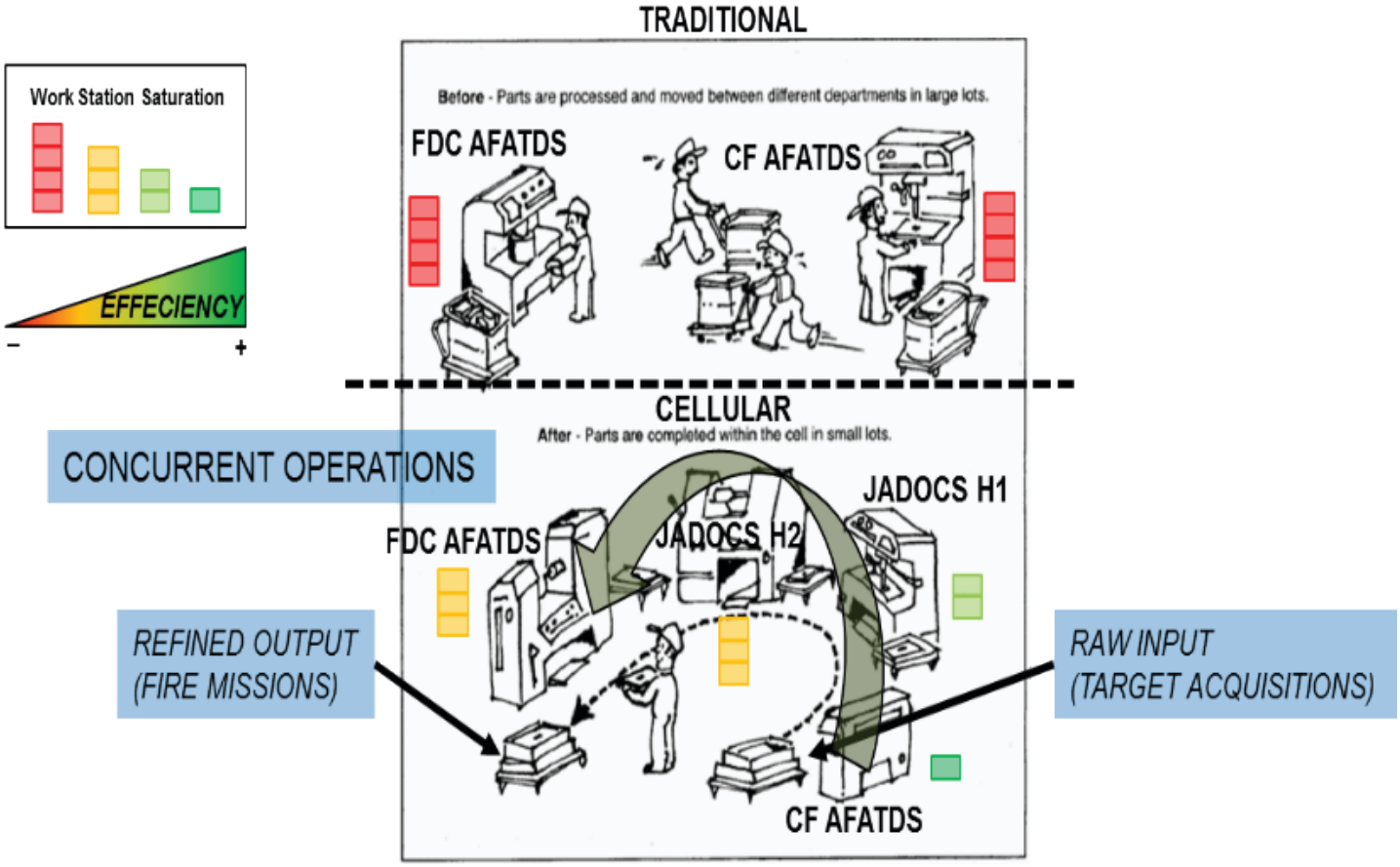


Figure 4. Cellular manufacturing provides a distinct advantage in that material flow is significantly improved. (Courtesy illustration)

public of Korea forces and United States Army; this bridge grants us the capability to leverage all available coalition resources to deter any threats that may arise. See Figure 4.

The 1-41st FA Battalion incorporated the effects management tool (EMT) and Advance Field Artillery Tactical Data System (AFATDS) to analyze and employ Fires. However, in Korea, JADOCS is mandatory and the battalion absorbed the shock of implementing a new instrument into the counterfire process. We operated with four JADOCS in total: one for the analysis of acquisitions (H1), the second for the initiation of fire missions (H2), the third to distribute the common operating picture to brigade (FA), and the fourth for the battalion S-2 to conduct real-time counterfire analysis (S2). This process proved incredibly efficient and increased the counterfire mission capacity of the battalion.

Conclusion

In retrospect, integrating JADOCS was a step 1-41st FA should have incorporated before the NTC rotation. However, JADOCS support stateside is not a priority and the battalion did not have a field service representative (FSR) in garrison to support such a transition. Training for a deployment to the KTO requires an increased level of train-up criteria that is codified at a level higher than that of a brigade and a program of instruction implemented before deployment to guarantee that units are capable of transitioning seamlessly into various unique operational requirements.

Rotational Field Artillery units should consider modifying pre-deployment training to capture the distinct nuances of the peninsula. Decisive action training relies heavily on Field Artillery movement and Fires in support of maneuver; however, that model does not holistically prepare you for the static, high-volume nature of Korea. Battalions must stress systems to the magnitude of 4,500 acquisitions and 750 fire missions over a 72 hour period, which will likely illustrate the rapid shift of operational priorities. Carrying out a focused, deliberate train-up will safeguard the 2nd Infantry Division's "Fight Tonight" mission and reduce the culture shock of counterfire in the KTO.

Chief Warrant Officer 2 Matthew Pfannerstill served as a battalion targeting officer for the 6th Battalion, 37th Field Artillery Regiment, 210th Field Artillery Brigade. Additionally, he serve a part of a regionally aligned forces deployment with 1st Battalion, 41st Field Artillery Regiment.

Sgt. 1st Class Gary Weathersbee, Jr. has served as a target acquisition platoon sergeant for 333rd Field Artillery Target Acquisition Battery, 210th Fires Brigade and as a senior Field Artillery targeting NCO for 1st Battalion, 41st Field Artillery.

(4-5th ADA/Courtesy photo)

Patriot Training For Large-Scale Combat Operations

By Lt. Col. Tom M. Noble, Capt. Samantha K. Griesinger and Capt. John M. Moriarity

The 4th Battalion, 5th Air Defense Artillery Regiment persistently works to sharpen both its tactical and technical proficiency as it prepares for Force Readiness Unit (FRU) assumption. Since 4-5th ADA's return from U.S. Central Command area of responsibility in 2017, the unit executed a full Patriot System reset and upgrade to Combined Cryptographic Modernization Phase 1 and Post Deployment Build 8, a complete change in leadership at both the battalion and battery levels, and the completion of Table VIII certifications on October 2018. The 4-5th ADA leaders were looking for a training solution to develop the skills necessary to compete on the modern battlefield. Standardized Patriot Engagement Assessment of Readiness (SPEAR) was that solution. SPEAR was formerly a validation of a unit's gunnery program and incorporates a variety of dynamically scripted scenario injects including air breathing threats, tactical ballistic missiles and faults to provide the operators the most challenging scenarios possible. This paper discusses ADA challenges in large-scale combat operations (LSCO) based on the National Intelligence Council's anticipated changes in warfare. Then the paper shows how skills necessary to compete in those operational environments are trainable using SPEAR exercises. Finally, the paper explains how 4-5th ADA executed the SPEAR exercise and discusses some of the key elements that made the training successful.

The emerging threat and training gaps

The National Intelligence |Council predicted in their 2017 Global Trends report that a key change to warfare is "increasing capabilities for stand-off and remote attacks." They expect precision-guided weapons, long-range strike assets and "unmanned-armed" aerial vehicles will "shift warfare from direct

clashes of opposing armies to more standoff and remote operations, especially in the initial phases of conflict." These threats are not new to air defense. During the initial phases of Operation Desert Storm and Operation Iraqi Freedom (OIF), Patriot batteries performed critical protection roles for critical command and control and logistics nodes. Furthermore, in OIF, Patriot batteries supported offensive operations during the invasion of Iraq, protecting the 3rd Infantry Division and filling an essential role in combined arms maneuver on a non-contiguous battlefield. The key difference between these historical operations and the predicted "shift in war" is the number and quality of these systems available to adversaries. Adversaries can cheaply build massive arsenals of these types of weapons that challenge the limits of current air defense technology.

Furthermore, adversaries can adapt more rapidly than ever before, including mid-conflict. Examples of this flexibility and adversary agility are observable in both the Ukrainian and Syrian conflicts. Finally, the challenges of fighting aerial threats on a non-contiguous battlefield remain today, presenting the risk of attacks from multiple directions with little warning.

The only way to defeat these threats is with air defense capabilities. Fourth-5th ADA already updated each of its Patriot systems to the most advanced post deployment build available. Still, customary training programs lack the dynamic and highly fluid nature of the anticipated modern and future battlefield. Therefore, training gaps existed in the ability to develop agile and flexible Patriot system operators, capable of performing at high levels in that environment.

Finding a solution: Reemergence of SPEAR

The leaders of 4-5th ADA knew they needed to challenge training paradigms to find a solution. Key elements of the threat described above include flexibility, agility, creativity and innovation. These elements exist across multiple threat systems and weapon types. These types of threats are challenging to script in normal air battle sequences and training. However, the dynamic scripting capabilities available through the use of SPEAR equipment do offer opportunities to replicate those elements. Fourth-5th ADA determined that, if it was to prepare its Soldiers to encounter these types of threats, the optimal mechanism to deliver the training was with the equipment in a SPEAR environment.

Air defense training normally focuses on the gunnery tables, and the development of tactics techniques and procedures (TTPs) conducted mostly at the battery level with some battalion classes. The demanding CENTCOM air defense missions have left little time to train for the dynamic threat previously discussed, instead focusing on TTPs for the region. Tactical seminars (TACSEMs) are a chance to teach and discuss TTPs and capabilities against dynamic threats. One of the key elements desired of the SPEAR training was to include battalion-level TACSEMs discussing the threats and results of their TTPs in action to improve the knowledge across the entire battalion. The SPEAR training provides a forum to teach a new generation of tacticians the lessons learned from past LSCO (i.e., Operation Iraqi Freedom). The Renegades recognized the potential they could reach through the SPEAR training.

SPEAR execution

SPEAR gave 4-5th ADA the avenue to assess the battalion's ability to conduct air battle management in a complex environment and validate gunnery certifications conducted the month prior. The battalion's subject matter experts, consisting of the Battalion Standardization Team, Patriot Top Guns and Patriot Master Gunners, led the charge to build crew competency, adaptability and critical thinking in high stress environments. In combat, not all situations call for a set of pre-planned responses; operators must be aware of the capabilities and inherent limitations of the weapons system they are charged to employ. With this in mind, SPEAR scenarios were scripted to create potential over-engagements, failed engagements, impacts and fratricides to test the operators' ability to make quick, complex decisions. After each scenario, evaluators and participants conducted after-action reviews (AAR). Then exercise participants discussed and developed tactics, techniques and procedures for use in subsequent scenarios. The collective AARs identified trends in operator actions and allowed open discussion of potential battlefield dilemmas. During the evaluations, crews not actively participating in an air battle management scenario attended Tactical Seminars. TACSEMs built on training conducted over the previous year and focused on topics such as anti-radiation missile procedures, communications loss procedures and equipment fault reporting procedures. These scenarios were encountered in the last LSCO ADA units participated in and were the initial reason for the creation of the SPEAR training program.

During the SPEAR, each crew fought at least three Air Battle Management Level 11s, the standard for mission assumption. Some crews were able to attempt the advanced Air Battle Management Level 16. Throughout the air battles, crews were able to experience numerous communication losses that forced operators to execute their primary, alternate, contingency, emergency (PACE) communications plans at all levels. Crews overcame communications problems by alternating between voice, free form text, and runners throughout air battle scenarios.

Through any method possible, crews communicated vital information between the information

coordination central and Air Defense Artillery fire control officers to ensure air defense coverage of all defended assets. The Renegade Battalion demonstrated that its operators understand critical decision timelines, they can execute PACE plans, and operate autonomously if necessary.

The aggressive training strategy supplemented by SPEAR allowed for officers, NCOs, and Soldiers to teach the complexities of the Patriot system and concluded with a defense design brief, tabular entry packet and unit TTPs based off a given scenario set in a non-permissive environment a radical change to what the Soldiers had previously trained on with the CENTCOM focus. The design represented a real-world scenario in which the battalion deployed to a new location and immediately provided air and missile defense against an imminent threat. As validation of the hard work and tenacity of the Renegade Battalion, they once again stepped up to the challenge and demonstrated their ability to fight in any Patriot system, anywhere, and be successful. The Renegade Battalion's ability to move operators from various engagement control stations (control shelters for the Patriot weapon system) demonstrated the core competency of crews across the battalion as they adjusted to different assets, locations, shelter faults and flawlessly continued to execute mission despite conditions to which they were unaccustomed to and had never trained.

The training event was also an excellent opportunity to hone the skills of leaders to execute training. Training Patriot skills and competencies, especially focused on a dynamic threat, are highly technical and require intensive preparation and management. Chief Warrant Officer 3 William "Andy" Adamek, the battalion standardization officer, served as the execution officer and orchestrated the SPEAR by developing a training plan that allowed crews to conduct air battles at the ABML 5 (beginner), ABML 11 (intermediate) and ABML 16 levels.

"This is my first SPEAR as an OIC of the unit going through the event. In the past, I have evaluated four battalions and participated as an operator in over 10 SPEARs. My experience helped me in developing the SPEAR and balancing the Air Battles, TACSEMs and AARs throughout the exercise," said Adamek. "I knew that the daily flow of unit operations could determine if a SPEAR is successful or not. Using this knowledge, we were able to plan the event well in advance and remove any distractors that could prevent the participants from maximizing this training opportunity. My standardizations team enforced SPEAR and gunnery doctrine, which made my job relatively easy; I managed the schedule and flow of the training exercise. I allowed my standardization team to manage our master gunners, who served as evaluators, and gave operators participating in the exercise the most feedback for improvement possible."

Assessment

The TACSEMs and training scenarios were efficient in achieving the results desired. SPEAR provided the ideal environment to test TTPs in the closest simulation to dynamic combat scenarios achievable at home station. Gaps in training were discovered in the AAR and became the focus of training moving forward to mission assumption.

The dynamic nature of SPEAR scenarios successfully replicated challenges anticipated in a modern and future LSCO, facing peer/near-peer adversaries. The ability to create adaptable scenarios and the forum to discuss and develop TTPs is highly recommended by 4-5th ADA to all air defense units to include in their training strategies.

The SPEAR also provides an invaluable opportunity for leader development in the sense that it allows junior officers and their subordinates the training environment with which to think and see themselves through a critical lens. This enhanced perspective was especially bolstered by the candid after-action review process that SPEAR equipment supports. Cultivating critical thinking through exercises such as this encourages leaders to look beyond the horizon and see just how important not only training readiness is, but also how their performance and preparedness narrows the gap in an already complex environment. The Renegade Battalion will continue pushing its training to the limits to ensure that the unit is not only willing but able to deploy at a moment's notice; against any threat, in any location, at any time.

Lt. Col. Tom M. Noble is the battalion commander of the 4th Battalion, 5th Air Defense Artillery Regiment. Noble has over 20 years of SHORAD/Patriot operations including serving as a SHORAD battery commander during Operation Iraqi Freedom I, battalion executive officer and brigade deputy commander.

Capt. Samantha K. Griesinger is the battery commander of Alpha Battery, 4th Battalion, 5th Air Defense Artillery Regiment. Griesinger is a Patriot Top Gun graduate with two deployments serving as tactical control officer, tactical director and brigade assistant plans officer.

Capt. John M. Moriarity is the battery commander of Charlie Battery, 4th Battalion, 5th Air Defense Artillery Regiment. Moriarity is a Patriot Top Gun, ADAFCO, MAJIC and Ranger school graduate and has completed two deployments as tactical control officer, battalion and brigade tactical director.

Simulated Training Real Learning

The CFFT and West Point Cadets

By Capt. Ryan Scott

The use of simulators in training is nothing new. Commanders have had the option of using the Engagement Skills Trainer (EST) and Virtual Battle Space (VBS) trainers have been available for many years. As an artillery officer I spent many hours during Basic Officer Leadership Course (BOLC) in the Call for Fire Trainer (CFFT) (née Guardfist) honing my target location skills. While at my first unit, however, my use of the installation's simulators was scant and typically an afterthought to "real" training. Typically, I saw simulators such as these as a backup to when I could not execute live-fire training on a range. I have since corrected this misunderstanding on simulators and their efficacy. If you have similar doubts, please consider the following.

The existing research on computer simulations and their effect on learning is extensive. Beyond merely providing the opportunity for task repetition, simulators have a positive impact on learning goals, and touch cognitive, behavioral and affective outcomes (Vlachopolus and Makri). Research shows how simulators effectively provide the opportunity for participants to develop and implement skills such as communication, working as a team, decision-making, managing stress and prioritization of training tasks (Flanagan, Brenden, Nestel, Debra and Joseph, Michele). Even more specifically, when widely accepted and implemented within a curriculum as a pre-lab application event, simulators can increase the efficacy of lab activities (Rutten, Nico, van Joolingen, Wouter R., and van der Veen, Jan). Positive cognitive affectations occur as well. An individual's motivation to learn is positively related to effective simulations (Fu, Kun, Hainey, Thomas and Baxter, Gavin). Most significantly for military training, the use of simulators when compared to lecture led to an increase in student knowledge and confidence in the material (Warren, Jessie, Luctkar-Flude, Marian, Godfrey, Christina and Lukewich, Julia). Instructor integration and efficacy in applying simulations is key to successful implementation. Success is predicated on instructor use, motivation and efficacy in implementing the simulation (Vlachopolus and Makri). What I want to share now are the quantifiable, immediate results that can occur when simulation training is used in conjunction with live execution. Specifically, how the use of a simulator affects live-fire execution training when both are integrated into the same training event.

West Point cadets attend Cadet Field Training (CFT) between their freshman and sophomore years. During this training, cadets execute 31 days of individual and collective task training and assessment. The purpose is to "develop, train, test and validate specific tasks" (Department of Military Instruction, 2018, p. 41). For the summers of 2017 and 2018, my area of responsibility during CFT planning, resourcing and executing call for fire (CFF) lane. The

Cadets train on the Call for Fire Trainer. (Courtesy photo)

West Point Cadets participate in call for fire training. (Courtesy photo)

goal was to train and test cadets on determining a target's location, the three line call for fire format, and their ability to call for and adjust indirect fire rounds onto a target. This event was graded and the results factor in their overall military grade point average. For this event, cadets lose points for the following deficiencies; if their target location error exceeds 250 meters (generous, I know, but they are untrained observers), if they fail to formulate their call for fire in under three minutes, if they fail to correctly determine the observer target factor, if they fail to transmit their first correction within 45 seconds of the first round's impact, if they require more than five rounds in adjustment, and if their fire for effect rounds are greater than 50 meters from the target. In both 2017 and 2018, close to 1,200 cadets participated in the training and assessment. A fire support team and mortar section from the 2nd Battalion, 502nd Infantry Regiment and firing battery from the 1st Battalion, 320th Artillery Regiment, all from the 2nd Brigade, 101st Airborne Division, were on hand to help facilitate this training in the 2018 iteration of training.

In CFT 2017, the cadets received a block of instruction on the call for fire using a PowerPoint lecture and check-on-learning before moving on the live portion of the training the following day. The training was updated in the 2018 iteration. Last summer, the block of instruction was conducted using the Call for Fire Trainer facility integrated into the field environment, and time was allotted for each cadet to also have the opportunity to individually call for fire in the trainer before live-fire execution the following day. In 2017 the average cadet grade for the Call for Fire lane was 97.51. In 2018 the average cadet grade was 99.21. (While the grade average for CFF lane is admittedly high compared to other CFT graded events, the spread of grades among the population of cadets for the CFF lane is similar to the other CFT graded events). At first glance, this comparison may solicit a shrug and a "so what" – they only went from an A plus to a higher A plus. However, statistically speaking, the number of cadets that would have to have scored higher in 2018 than 2017 among a sample size of over 1,000 cadets to affect such a change when the average grade was already high is significant. This is also evidenced by the decrease in the standard deviation of overall cadet CFF grades of 5.28 in 2017 to 3.53 in 2018 indicating that more cadets scored higher and closer to the mean average than the year prior.

There is another determinant of the success of the simulator/live fire iteration over lecture/live fire in this year's CFT. On an average day in CFT 2017 (when weather did not play a factor in our ability to fire live) we required on average 8.5 hours a day of live firing to enable the cadet companies to complete their live CFF iterations. That year, each cadet averaged 15 to 17 minutes in the observation post (OP) to complete their graded portion. In 2018 under similar conditions (same number of OPs, FDCs and firing sections) the average live-firing day was 7.5 hours a day with each cadet averaging 10 to 12 minutes in the OP to complete the graded portion indicating an increase in efficacy of the time required for each cadet to execute their individual iteration of the training. Simply stated, the use of simulations followed by immediate live iterations improved the quality and efficacy of live-fire training throughput without sacrificing rigor or realism of the live-firing experience.

While simulations are standard practice in many tasks and across many platforms, I believe the increase in cadet performance in 2018's Cadet Field Training was the immediacy of live training following simulations and the individual time cadets had in the simulators. In some cases, only hours passed between when a cadet practiced in the CFFT and when they fired live the next morning. The combination of using hands-on equipment in the simulators (real maps, protractors, binocu-

lars and Advanced System Improvement Program radios) along with the computer simulated artillery rounds provided a tactile and cognitive learning experience that was quickly validated in the live fire the next day.

The qualitative, anecdotal evidence I gleaned on the use of the CFFT is mixed. Many FSOs I spoke to while researching this article told me of the value of the CFFT to their training, and the how frequency of use and proximity to live training employed mirrors results similar to mine. A few FSOs spoke of minimal access to the CFFT for various reasons; from lack of time to lack of desire to implement simulations. It is my hope that my own results can buttress the arguments of FSOs who are currently using simulators, and to encourage those who are not placing time in the simulators in their training schedules to do so. The results we experienced at West Point among untrained observers should provide encouragement to trained observers as to the efficacy of time in the simulators that is immediately followed up by live-fire implementation.

Whether your unit readily depends on the CFFT or not, I posit that simulators must not become the white noise of Call for Fire training. Leaders must not utilize simulators only as an alternative to live training due to limiting factors such as adverse weather or lack of range availability. This is a misuse of simulators. Leaders who send their soldiers to the CFFT, the Engagement Skills Trainer or the Virtual Battle Space facilities without specific task, purpose or guidance are not only wasting time, but potentially degrading the very skills they seek to improve. Similarly, for the training garnered in the trainers to be useful live-fire iterations must follow as soon as possible to the simulation. Based on results with our cadet untrained observers I recommend that leaders look at the CFFT not as their backup plan, but as the crawl and walk phases of training followed immediately by the run phase of live execution. As evidenced by CFT 2018, doing so increases Soldier efficacy in the tasks being trained, increases live-fire training throughput and decreases the resources required to achieve proficiency.

Cadets train on the Call for Fire Trainer. (Courtesy photo)

Capt. Ryan Scott is an instructor with the Department of Military Instruction at the United States Military Academy at West Point. He is a Field Artillery officer with experience with the 1st Battalion, 504th Parachute Infantry Regiment and 3rd Battalion, 319th Airborne Field Artillery Regiment, 1st Brigade, 82nd Airborne and as a FA Basic Officer Leader Course gunnery instructor with 1st Battalion, 30th Field Artillery Regiment, 428th FA Brigade, and HHB commander with the 428th FA Brigade.

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Successful Field Artillery Battalion Intelligence Support to Brigade Targeting

By Capt. (P) Tim Wilson and Sgt. 1st Class Kurt Legnon

There are multiple ways an S-2 can be successful in supporting the targeting efforts of the field artillery battalion. During exercise Combined Resolve X (CBR X) at the Hohenfels Training Area, the field artillery S-2 was extremely successful in focusing on the deep fight and destroying enemy artillery assets in a timely and effective manner. Daily, the FA S-2 worked closely with the target acquisition platoon leader (TAPL) to analyze enemy artillery assets and actions. They continually assessed when and where the enemy would fire from next. In doing so, the FA battalion, in close and constant work with the brigade at the daily targeting working group (TWG), were ultimately able to influence the enemy commander's decision cycle.

The S-2, along with the TAPL, collected and analyzed all point of origin (POO) and point of impact (POI) data from enemy Fires collected by the counter-fire (CF) cell and plotted all the data on a map overlay. The map overlay also displayed the type of round shot from each location, as well as the date time group of each shot. In order to differentiate the date-fired of each round, the S-2 plotted the POO/POIs, including the direction of travel, using different colors. Utilizing this overlay, the S-2 enhanced mission command by creating a shared understanding of the operational environment. Every day of the exercise, the battalion S-2 took the map and overlays to the brigade TWG and briefed the brigade staff on his assessment of the location of the enemy's position artillery areas (PAAs). This allowed the entire staff to visualize the next 24 hours of the targeting cycle and better assess what assets to target.

Secondly, by assessing the location of possible enemy PAAs, the S-2, with advice from the TAPL, identified and nominated new call for fire zones (CFFZs). This provides the second most responsive priority for the call for fire generated by radar. In doing this, the FA battalion has the ability to conduct counter-fire faster when a radar acquisition is within that CFFZ. The S-2 was also able to template potential enemy artillery targets with these PAAs, therefore generating terrain denial missions and predictive analysis. These target nominations, used at the brigade TWG, led to destruction/neutralization of enemy equipment. Along with the CFFZs, the S-2 section developed a Time Analysis Wheel that displayed the times the enemy was firing artillery and the types of round shot at any particular time. The Time Analysis Wheel is a more concise tracker of when the enemy fires artillery. By utilizing the wheel, the S-2 was able to identify the primary times that the enemy conducted Fires, as well as the potential resupply times for enemy artillery. The S-2 section passed this information to brigade and to the subordinate units which led to the batteries being in position ready to fire at the assessed times in order to provide timely and accurate counter-fire.

Another technique the S-2 used to support targeting was to assess what echelon the enemy would be moving into the area of operations in each phase of the operation. Through detailed staff analysis, the S-2 could assess what pieces of equipment would be in each echelon, and therefore provide adequate threat assessments to the battalion. Additionally, the S-2 shared these assessments with the fire direction officer (FDO) and the battalion S4. The FDO and S4 were then able to work together in requesting the best type of ammunition to destroy enemy equipment.

The aforementioned techniques applied by the S-2, albeit extensive and effective, were ultimately not the fundamental characteristic to the overall success achieved throughout the rotation. The fundamental characteristic is the application of all analytical techniques in conjunction with one another, and the timely dissemination of intelligence and information. S-2 assessments, within the Intelligence Summary, on why the information was important, drove the determining factor for the decision makers. Finally, the constant and effective communication between the S-2 section and the brigade targeting cell, battalion FDC/FDO, and the subordinate units solidified the success during the rotation. All of these successful techniques led to the destruction of 19 2S19s and 5 BM 21s, ultimately giving the training unit the upper hand in the artillery fight.

The unit S-2 plotted the points of origin and impacts for each mission. (Courtesy photo)

Capt. Timothy Wilson is the field artillery battalion intelligence observer/coach-trainer, Joint Multinational Readiness Center, Hohenfels, Germany. His military education includes the Military Intelligence Captains Career Course, Joint Firepower Course, and the NATO Joint Targeting Staff Course.

Sgt. 1st Class Kurt Legnon is the field artillery battalion intelligence noncommissioned officer observer/coach-trainer at Joint Multinational Readiness Center, Hohenfels, Germany. His military education includes the Human Intelligence Basic Course, Source Operations Course and the Military Intelligence Senior Leader Course.

Capt. William Carraway/Georgia Army National Guard

The Importance of a Mentor

By Capt. Jean Tomte

Mentoring is a concept that goes back to the mid-18th Century. Being a mentor implies being a role model who enlightens someone's path with advice and counseling coupled with practical lessons for one's professional or academic path.

The word "mentor" comes from Mentor, friend of Ulysses who became the preceptor of Telemachus, the son of Ulysses.

As Socrates the philosopher laid the ground for "maieutic" (the art of giving birth to spirits) while mentoring Plato, a mentor should reach that standard. Put another way, a mentor must exemplify excellence, expertise and nurture high self-esteem while equipping the mentee with tools needed for professional or academic growth.

A mentor is primarily an accompanist; who is a master in their field. They help the mentee gain experience without asking anything in return. They know the pitfalls the mentee is likely to face.

Confidence is also essential for the mentee. In this respect, the mentor should foster approaches that will make the mentee see him/herself as a valuable asset of an organization.

The Army also adopted the

mentor concept. The Army's use of the term mentoring in Field Manual 6-22 (FM 22-100) refers to effective leadership. Teaching, counseling, coaching and caring for people are tools used by a mentor. In other words, they are important aspects of the Mentorship Program, but cannot account for mentoring in its full extent.

Given that most people misunderstand the word "mentor," it is imperative to draw the attention of people on its misuse. People think that teaching someone a skill is mentorship, thereby referring to that person as a mentor.

In an Army Times interview, Gen. John Keane, former Vice Chief of Staff of the Army, said "Quality of leadership —as reflected in the mentoring process — has fallen off. We're just not taking the time that we need to spend with our youngsters and their personal growth and development. We need to do more of that."

As a former operation officer, and now commander of a basic training unit – I face a sustainable development challenge while adapting to new processes and finding new ways for professional growth. At the heart of this quest for professional productivity is the future and success of the trainees considered as the next generation of our military.

Four Thirty Fourth Field Artillery Brigade leadership values hard work and discipline and demands trainees exemplify that despite the stressful environment and challenges they face. This creates a sense of pride and admiration for those fortunate to witness it.

My credo as a mentor would be: hang in there and do not let go! A military journey is often marked with lessons learned from one's failures. My technical advice would be to learn all you can about your target and have a plan. You should also have an alternative strategy, as things do not always go according to plan.

Jim Flanagan, former captain in the U.S. Army, said that his experience with mentorship in the Army took place in Officer Professional Development. According to Flanagan, mentorship is more of a personal relationship. He said "As I got to know the various field grade officers, I honestly realized that I did not want to have my life turn out like theirs which is why I left the military. However, the only time I saw some emotional vulnerability from them was when they were stressed."

"When I was a second lieutenant, my battalion commander [5th Battalion, 7th Air Defense Artillery] at the time Lt. Col. Kevin Ciocca in Rhine Ordnance Barracks Kaiserslautern, Germany, sat down with me at breakfast and just asked how I was doing. He talked about the ups and downs of a military career. I wish more leaders did that," said Flanagan.

One does not need to look for the perfect mentor. What matters is finding the right person to help you fill in your gaps while moving where your strengths lie.

Why mentor?

Besides this altruistic aspect, your relationship is not of a deep connection, it is rather a rite of passage for them. After gaining a certain level of success and recognition, it is natural for most of them to want to help others. But not to anyone.

How to be worthy?

There are two essential attitudes. As a mentee, do your part of the job when the mentor gives you tasks to do. It can be impressive to interact with a mentor, especially considering that he or she is offering their resources and time. Do not think you are insignificant. An enlightened mentor knows the mentee will also teach important things and help them reflect on their own practices. Do not believe that a relationship with a mentor is a one-way relationship. It is a partnership with each person having values to share.

What motivates a mentor?

When witnessing the mentee's growth, the mentor can decide when to withdraw or lend a hand. This dynamic walks the fine line between teaching and mentoring. In this perspective, mentorship is evolutionary whereas teaching is static in that specific skills must be sharpened regardless of the abilities of the trainee. The mentor and mentee rapport evolves as the mentee's journey progresses.

Optimizing learning

Take notes during verbal exchanges. Every communication is precious and worth note taking, and you can't expect to hold everything in your head. You will want to know certain things, and you will have to ask yourself this question: Do I have to search by myself, or can I ask my mentor? Your mentor will not answer everything, but you still must dare to ask for resources. You must seek it when you feel it is appropriate. If you do everything yourself, you may find answers to your questions, but your mentor will shed light on things you weren't aware of due to lack of experience.

Lastly, a mentor is a support person. They have their own experience, and it's not yours. So, do not expect that by applying each of their tips you will succeed. Your work must be done by you.

The Army should consider redefining the concept of mentor in order to avoid poor mentorship. There should be a fine line drawn between mentorship and leadership development. Being a leader does not imply mentoring subordinates. One way to avoid this confusion would be to reevaluate Field Manual 6-22 (FM 22-100) and redefine the word "mentor." By doing so, subordinates and leaders as well as mentors and mentees will have a clear understanding and realistic expectations from one another.

The Officer Education System should be innovated to focus on facilitating leader development and clearly outlining key aspects of what mentorship is and how it must be done.

Capt. Jean Tomte is currently the D Battery, 1st Battalion, 79th Field Artillery commander.

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May-June 2019, Globally Integrated Fires. This issue will discuss topics related to the annual Fires Conference. In an expanded competitive space, Fires needs overmatch across the competition continuum. To do so, means globally integrating in joint and partnered operations across all domains. What steps are being taken to gain a common defense and a complementary capability with allies and partners? What technical and tactical gaps are present?

The deadline for submissions is Apr. 1, 2019. Send your submissions to usarmy.sill.fcoe.mbx.fires-bulletin-mailbox@mail.mil or call (580) 442-5121 for more information.

Following in his big sister's footsteps, Pvt. Francis J. Cunningham V takes the oath of enlistment into the Virginia Army National Guard March 11, 2019, at the Military Entry Processing Station at Fort Lee, Virginia. Cunningham will serve as a 13B Cannon Crewmember alongside his sister, Sgt. Taylor Cunningham, who works full-time with 1st Battalion, 111th Field Artillery Regiment, 116th Infantry Brigade Combat Team. (Sgt. 1st Class Terra C. Gatti/ U.S. Army National Guard)