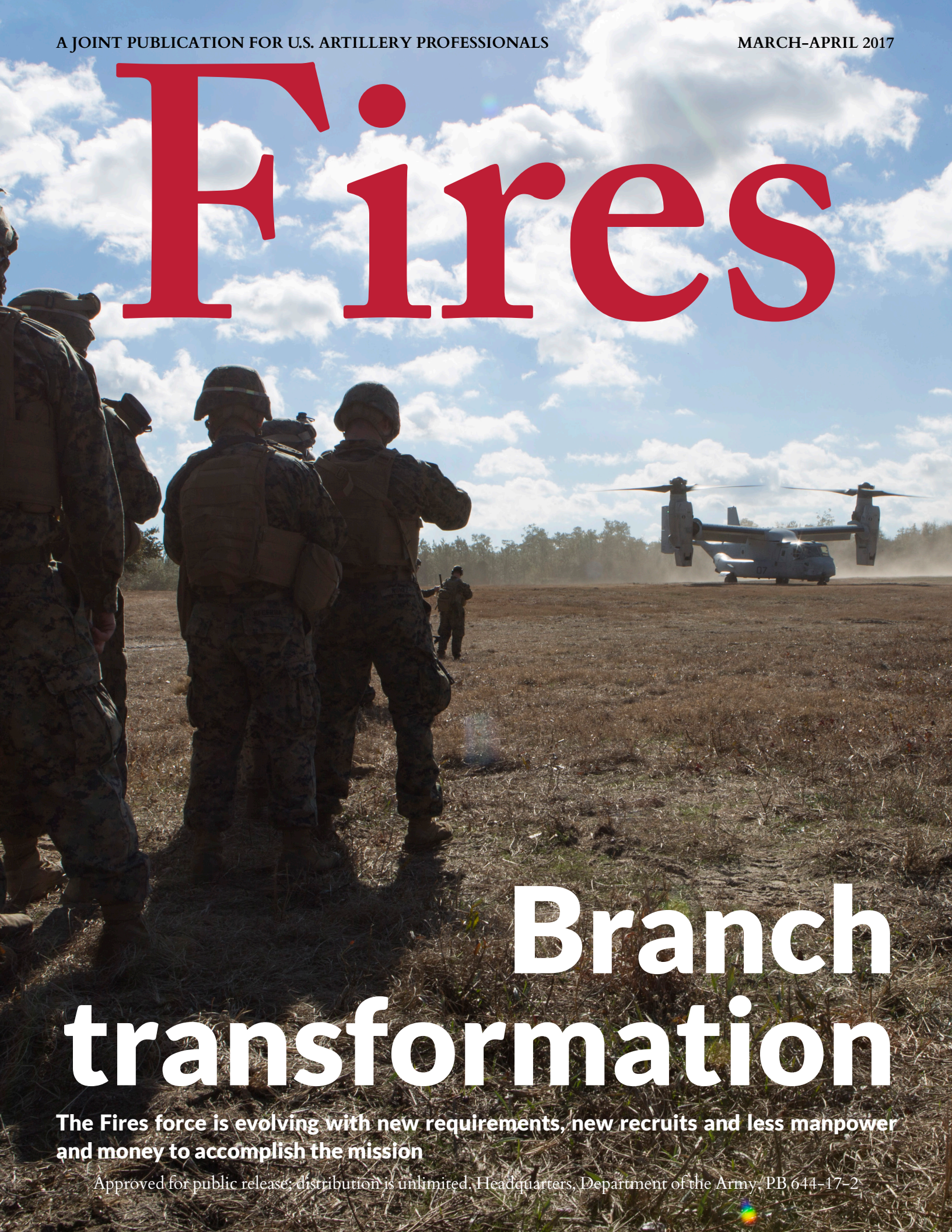
A JOINT PUBLICATION FOR U.S. ARTILLERY PROFESSIONALS MARCH–APRIL 2017

Fires



Branch transformation

The Fires force is evolving with new requirements, new recruits and less manpower and money to accomplish the mission

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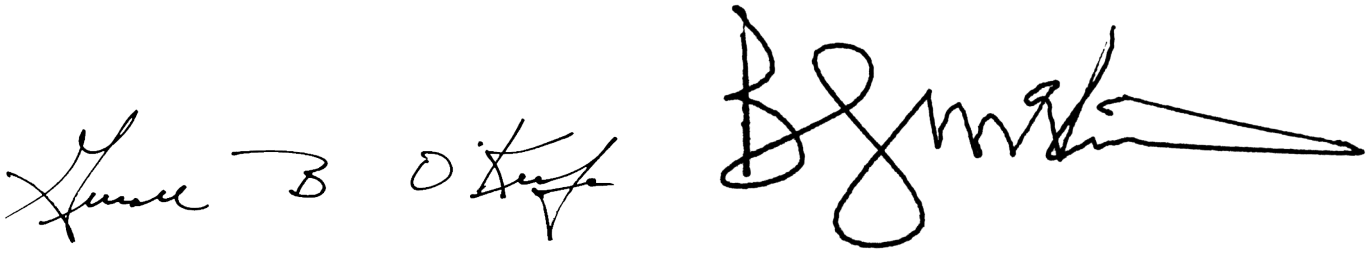

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Purpose

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

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On the cover

U.S. Marines with A Battery, 1st Battalion, 10th Marine Regiment, 2nd Marine Division (2d MARDIV), stand by to board a MV-22B Osprey during a helo raid as part of Fire Exercise 1-17 (FIREX) on Camp Lejeune, N.C., Jan. 24, 2017. FIREX 1-17 is a battalion level exercise designed to allow multiple batteries to train together in order to improve internal standard operating procedures. (Lance Cpl. Alexis C. Schneider/U.S. Marine Corps)

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Fires Conference adds professional development, panels for sergeants major

By Marie Berberea

The Fires Conference hosted at the Fires Center of Excellence at Fort Sill, Okla., shares information generally aimed at officers, but this year two breakout panels are tailored specifically to their enlisted counterparts.

"I wanted [sergeants major] to leave with something they didn't come with," said Command Sgt. Maj. Carl Fagan, FCoE and Fort Sill CSM. "I think that happens in large part on the officer side. They come here and get exposed to a new concept, or really senior discussion about a senior concept, but not so much for the sergeant major."

"We sit in the same room with [officers] and either didn't have the benefit of, or didn't take advantage of an opportunity to prepare so we could be a part of the conversation. We're not value added and we don't really get anything out of it."

Fagan said this was a chance to have a conversation unique to sergeants major.

Professional Development

New to this year's Fires Conference, Panel 3, "Nominative sergeants major process," discusses the new selection process and developmental career path of nominative senior noncommissioned officers.

The nominative sergeants major process (NSMP) aligns management of the nominative sergeants major with ADRP 6-22 and the Army Leader Development Strategy. The current process is a natural progression of the Centralized Selection List and allows for talent management along with a clear developmental model for the sergeants major population.

"For the vast majority of the brigade-level commanders, the [NSMP] is a mystery to them. And it's a fairly new program; picking and managing nominative sergeants major is only about five years old. Brigade commanders are not really versed on it so this helps with that discussion," said Fagan. "Part of that discussion is how to communicate with their commanders prior to the board and once they've been selected to be on a nominative list, then how to do their letters of recommendation."

Adding experience to planning

Panels 2 and 4 both cover "Lessons from the current fight." Panel 2 is for officers and Panel 4 provides brigade-level CSMs with an intellectual discussion on lessons learned from the combat training centers and the resources available to enhance the skills and training of the Fires warfighters.

Fagan said he wants that discussion to relate to individual crew-team sections, or platoon-level sections, on what Soldiers are getting right and what they need to work on. His goal is to bring sergeants major to the planning table with their commanders.

"For whatever reason, we haven't historically played a big part in training. It's more actions on the objective, you know when we show up for the training then we'll execute it and if it's not going right then we'll adjust on the fly.

"Oftentimes our officers, the commanders, don't get the benefit of our experience in the planning process. As [noncommissioned officers] we're not having the kind of conversations that empower other NCOs to have that type of impact on planning. That's hopefully what this will do also."

Creating the norm

Since its inception in 2009, hundreds of Fires stakeholders attend the Fires Conference in person and virtually to listen to panel discussions and take part in the conversations they create. With fiscal security driving decisions on which events leaders can attend, Fagan wanted to ensure sergeants major were receiving more bang for their command's buck.

"If the feedback from the CSMs attending the conference is what I described, 'they just sat in a room, didn't really get anything out of it,' I think eventually you're going to have a lot of people prioritizing differently. But if the feedback and a product in a publication comes out of this, then you're going to have guys excited to want to attend next year to be developed," which Fagan added is the intent of the conference.

Ultimately he said the goal of the sergeants major panels is to offer quality professional development. He wants those who attend to be able to tell their peers, "You missed it." He said if he can get that result he will have achieved his objective in influencing the right training and discussion from this year's Fires Conference for the enlisted side of the Fires force.

Marie Berberea is a former Army broadcast journalist and photojournalist. She is currently the Fires Bulletin editor.

The 2017 Fires Conference is May 2-4 at Fort Sill, Okla.

http://sill-www.army.mil/fires-conference/

Cross domain Fires: Capabilities and gaps

The discussion will identify the inhibitors, required capabilities and gaps that must be addressed as the Fires community moves forward with cross domain Fires in support of the multi-domain battle.

Lessons from the current fight

The intent is to discuss and identify lessons learned by the Fires force as a result of participation in tactical to operational level exercises to prepare for cross domain Fires. The goal is to identify training gaps and the best practices to mitigate those gaps in home station training prior to participation in major exercises.

Nominative sergeants major process

New to this year's Fires Conference is a leader development session led by the Nominative Sergeants Major Program Office chief to discuss the selection process and developmental career path of nominative senior noncommissioned officers.

Lessons from the current fight

The last panel provides brigade-level command sergeants major with an intellectual discussion on lessons learned from the combat training centers and the resources available to enhance the skills and training of the Fires warfighters.

Artist rendering of a U.S. Army commander shaping the deep fight with lethal Fires from field artillery, attack aviation, and fixed-wing aircraft. This painting is box art for Wargame: Airland Battle from Eugen Systems and published by Focus Home Interactive. (Marc Simonetti)

How enablers shape the deep fight for the brigade combat team

By Capt. Colin Marcum
Forewords by Col. Charles Masaracchia and Lt. Col. Brandon Anderson
With contributions from Capt. Jonathan Janiszewski, Capt. Brian Haley, Capt. Daniel Savini, Chief Warrant Officer 2 Gabriel Prado, Warrant Officer 1 Mathew Olodun and Tech Sgt Paul Kla

Forewords

During my time as the commander of 2nd Brigade Combat Team, 1st Armored Division at Fort Bliss, Texas, I had the opportunity to truly appreciate how effects on the battlefield can shape the execution of courses of action and conduct of both friendly forces and that of the enemy. I knew in most instances the greatest threat to mission success and force protection happens during the close and security fight. As my time went on I began to see how effectively shaping the enemy in the deep fight days before changed operational and mission variables during the close fight to create an advantage for us. As a result, I made sure the staff of my warfighting functions dedicated a portion of their planning time, and the brigade's resources, to not only fighting the close/security fight, but also to shaping the deep fight in order to set favorable conditions. I knew if this was accomplished it would arguably make future planning that much easier for us, as you see, the deep fight of today has the potential of being the close fight of tomorrow.

The following article discusses how the brigade combat team's enablers affect the deep fight to shape the enemy's decision making cycle, creates overmatch in friendly capabilities and sets conditions necessary for success in the decisive action of the close fight. Written by Capt. Colin Marcum, one of my previous fire support officers, with a collaborative effort from the other effects producing enablers of my previous staff, this article will define the deep, close and security fights and what are considered enablers; how effects compound and cascade throughout the operational environment; how to use the targeting process to set the conditions necessary for future success; then finally, how to logically incorporate these concepts into the military decision making process.

If a brigade staff thinks about the operational environment in this way and proactively executes a comprehensive targeting process to set conditions in the deep fight, then not only will the brigade's staff find shaping conditions on the battlefield much more intuitive, but it will also lead to mission success and better force protection for the organization.

Col. Charles Masaracchia, 2nd Battalion, 1st Armored Brigade Combat Team former brigade commander

Shaping the deep fight for a brigade combat team can be broken down into the balancing of ends, ways and means with risk. The enablers represent the means and it is the brigade combat team fire support

coordinators duty to ensure all the available means are feasibly employed and synchronized together in their ways. To start the discussion in the planning phase we asked three fundamental questions:

1. How can we change the enemy's course of action to that which favors ours?
2. How and where can we attrite the enemy to provide overmatch?

You will never have all the assets you would like or the time to employ them and these inevitable short-comings become the operational risk. One risk we were not willing to accept is keeping an asset on the shelf. Therefore, the third question became:

3. Is every available enabler in the fight?

This article will discuss the concepts, methods, and staff processes that will lead the reader and a brigade staff to the answers to these questions.

Lt. Col. Brandon Anderson, 4th Battalion, 27th Field Artillery, previous battalion commander/fire support coordinator

As with any shaping operation, shaping the deep fight seeks to "establish conditions for the decisive operation through effects on the enemy, other actors and the terrain." (ADRP 3-0, 1-12) In the case of a brigade combat team (BCT) that decisive operation will occur in the close fight. Therefore, when we discuss how enablers shape the deep fight we are referring to how we set the conditions necessary for the BCT to be successful in the current and subsequent close fights. This is done through planning, synchronizing and employing enablers in such a manner that has a calculated effect upon the threat which can be qualitatively and quantitatively measured at a particular time and space prior to the decisive operation. Before delving further into how this is accomplished, common terminology must be established in order to prevent a conflict in semantics.

What is the deep fight?

The "deep fight" can mean different things to different people, but for most it deals with the difference in operational reach for various organizations. For this article, the term "deep fight" will be a time and space relationship for a BCT, based on ADRP 3-0's definition of a "deep area." See Figure 1 for the doctrinal definitions for deep, close and security areas, but the deep fight is that area which "extends from the forward boundary of subordinate units to the forward boundary of the controlling echelon in contiguous operations." (ADRP 3-0, 1-11) When conducting combined arms maneuver, the deep area for the BCT would consist of the terrain beyond that of the cavalry squadron's battlespace, but still within the boundary assigned to its brigade.

	Deep	Close	Security
Contiguous	An area forward of the close area that a commander uses to shape enemy forces before they are encountered or engaged in the close area. Typically, the deep area extends from the forward boundary of subordinate units to the forward boundary of the controlling echelon in contiguous areas of operations. In this sense, the deep area relates not only in terms of geography but also in terms of purpose and time.	An area assigned to a maneuver force that extends from its subordinates' rear boundaries to its own forward boundary. Commanders plan to conduct decisive operations through maneuver and fires in the close area and position most of the maneuver force within it. Within the close area, depending on echelon, one unit may conduct the decisive operation while others conduct shaping operations.	Focus on the protected force, installation, route, or area. Protected forces range from echelon headquarters through artillery and echelon reserves to the sustaining forces. Protected installations can be part of the sustaining base or part of the area's infrastructure. Protected routes and areas involve securing a range from specific points (bridges and defiles) and terrain features (ridgelines and hills) to large population centers and their adjacent areas.
Non-Contiguous	The area between noncontiguous areas of operations or beyond contiguous areas of operations. The higher headquarters controls deep areas within its area of operations. In some instances, a deep area may focus along a single line of operations. In other instances, a deep area may focus along multiple lines of operations in various directions and distances. The mission variables of METT-TC will impact how leaders define a deep area.	The area within the subordinate commanders' areas of operations. The higher commander may redefine the boundaries of specific areas of operations as necessary to shape operations, reallocating resources to ensure subordinate headquarters can adequately cover their assigned areas of operations.	

Figure 1. ADRP 3-0's description of deep, close and security areas for contiguous and non-contiguous area of operations. (Capt. Colin Marcum/2nd ABCT, 1st AD)

During friendly offensive operations the deep area would include territory beyond the enemy's main and subsequent defensive positions and furthest point the reconnaissance squadron may establish a screen for the brigade. For defensive and retrograde operations it is simply beyond the boundary of the area of operations (AOs) for the forward-most units within a BCT's area defense. In the deep area one may find enemy mission command elements and their sustainers, long-range cannon and rocket artillery, air defense assets, operational reserves, forward arming and refueling points for rotary wing, and possibly airfields and hangars for fixed wing aircraft. Those assets in the deep area enable the enemy more freedom of maneuver throughout the AO and provide their commander the ability to weigh their main effort accordingly. Delivering effects against these assets will invariably affect the enemy's course of action (COA) as they eventually enter into the close fight with friendly forces.

The deep fight, as is the deep area, is both spatial and temporal. The deep fight of today may become the close fight of tomorrow, and our tankers and infantrymen may very well be witnessing the effects of last week's deep fight as they maneuver through the battlespace. If the decisive operation occurs during the close fight then it should be the goal of the BCT to leverage assets during deep operations that will make accomplishment of the mission in the close fight much easier. The use of these assets enables the commander to shape the course of the battle to their advantage, and it is the reason why we refer to those assets as "enablers."

What are enablers?

There is no definitive answer to this question. The term "enabler" can be found permeating through our professional discourse (such as this article) or talked about in planning tents and the floors of current operations. The problem with the term is that, even though it is so pervasive, there is no established definition as to what it means. Enablers have become one of those contextual terms where we all generally understand what it means though can't necessarily put it to words easily. It is a, "I know it when I see it" type of situation. We will attempt to appropriately define the term before we proceed any further.

The non-military definition for "enabler" most closely associated with our usage is, "a person or thing that makes something possible." References made to enablers in military articles and distributed publications emphasize that they are augmented capabilities that directly support mission accomplishment, but may not be necessarily required if other enablers and their effects can be furnished. In this case, our definition for enabler will be "an organization or capability that supports a particular COA and/or accomplishment of a particular objective." An enabler in this case is not universal, but instead situation dependent. For example, a field artillery battery can support an infantry battalion in the defense with Fires and in this case artillery would be considered an enabler as it enables

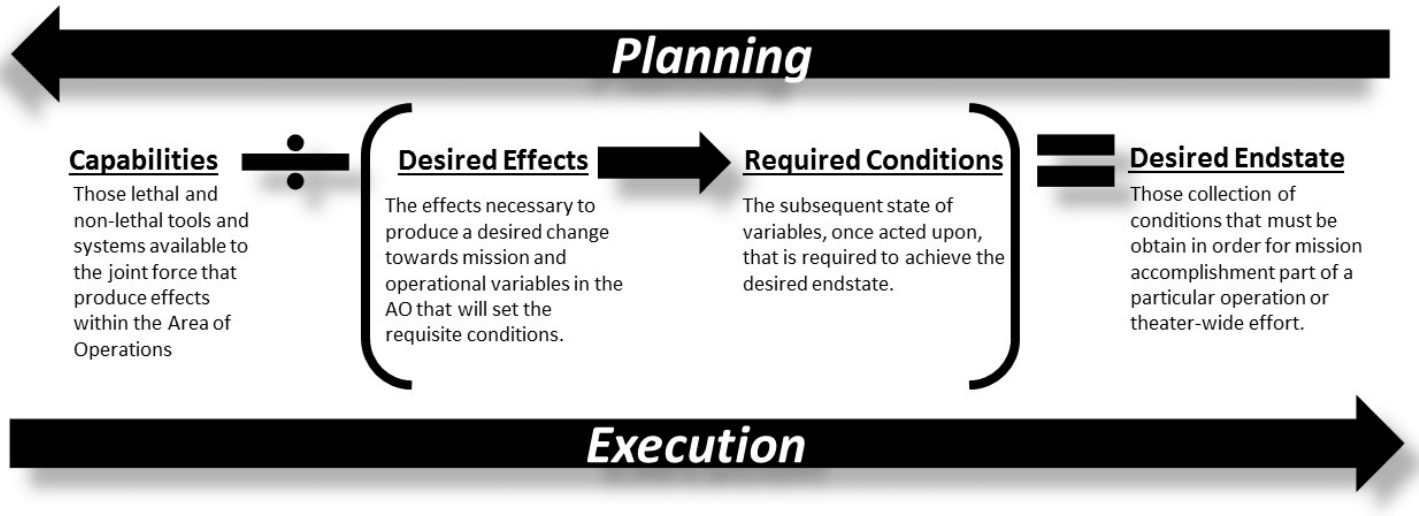


Figure 2. A flow chart depicting how desired endstates are planned and met. While a COA will naturally begin with the execution of capabilities, the staff utilize backwards planning in order to determine how to mold COAs to shape conditions required of the endstate. (Capt. Colin Marcum/2nd ABCT, 1st AD)

the infantry to accomplish its mission. Conversely, the field artillery battery could receive a platoon of infantry to help augment its battery defense, and that maneuver platoon would be considered an enabler by alleviating some of the security responsibilities for that battery.

For the BCT, its COAs and objectives revolve around the decisive operation and supporting the main effort. In their case the main effort is generally a maneuver unit: cavalry squadron, infantry or armor battalion. Additionally, since enablers are augmentations to the capabilities of the BCT this would preclude the incorporation of those elements from the mission command and sustainment warfighting functions (WfF) as they are critical to the functioning of a brigade. So for this organization the enablers can be found throughout the other WfFs. The entirety of Fires and protection, as well as, certain elements within movement and maneuver and intelligence WfFs.

When talking about shaping the deep fight for the brigade, however, we limit ourselves to just those that can produce effects within the deep area. Therefore; since protection is focused on supporting the close and security fight they are precluded; however, their subject matter expertise can still be leveraged. As a result, for the remainder of this article when referencing enablers we will be discussing those particular enablers that shape the deep fight for the BCT, and that includes: field artillery, air defense artillery, information operations, electronic warfare, aviation, information collect, and the tactical air control party. For more information regarding what these enablers are and what they provide to the brigade, please reference the following "Know your enabler" section for more insight: https://www.dvidshub.net/publication/issues/32013

Shaping the deep fight

When we shape the deep fight we are setting the conditions necessary for the brigade to be successful in the close fight. As enablers, we achieve this through an effects-based approach (Figure 2). This is accomplished working backwards from the commander's desired endstate. Once we know where we need to be, we then assess the mission and operational variables of that AO to determine the conditions (ADRP 3-0, 1-6) that need to be set through the application of desired effects in order to meet that endstate. Finally, we associate available assets, or enablers, that can achieve those desired effects and plan their employment accordingly.

An important component in this process is an accurate assessment of what needs to be achieved in order to reach that desired endstate. There can be multiple options available to set a requisite condition, but it requires having a proper definition of success. A requisite condition should be a statement on the state of some variable within the AO and not directly linked with an effect. If you immediately associate a condition with an effect then that limits an organization's ability to utilize all enablers to support the operation.

An example of an improper required condition would be the destruction of the enemy's operational reserves if instead the actual intent was simply to secure and hold a key piece of terrain. The wording of the condition would limit planners to employing lethal enablers to achieve destruction. Destroying the enemy's reserve would indeed support maintaining control of that key terrain, but with a properly worded requisite condition such as, "secure and hold key terrain on objective x-ray," more options may be presented. The BCT can employ a military deception plan in order to delay their movement towards the area, electronic warfare can be employed to disrupt their ability to mission command, information operations can employ a non-lethal leaflet drop to encourage the units and members of that reserve to surrender or desert, or airpower can be employed to destroy critical ramps and bridges on avenues of approach to prevent their movement into the battlespace.

For every potential target on the battlefield there are numerous options to engage them with lethal and non-lethal effects in order to shape their behavior; both physically and psychology. As expounded by Edward A. Smith from the DoD's Command and Control Research Program:

"Physical effects alter behavior by dealing with the physical means of an observer to wage a war or to carry out a course of action. Psychological effects alter behavior by affecting the cognitive process of the observers so as to shape will. The physical effects are focused on destruction and the incapacitation of forces and capabilities, including by rendering an observer incapable of mounting a coherent action (chaos). The psychological effects span the domain of reason, the rational decision-making process, and the domain of belief, the emotional impacts on decision-making. They lap over into the physical domain where they induce choas, but focus on foreclosure,

shock, and psychological attrition." (Smith, Edward A. 256-257)

When discussing the ability of enablers to deliver different types of effects we envision the impact upon the enemy's COA through the use of compounding and cascading effects where physical effects, also produce psychological effects, and vice versa, throughout the enemy's formations and chains of command. When employing Army-attack aviation to project power into the deep area with the desired effect of destroying an enemy command post you obviously have achieved a destructive effect on its personnel and equipment, but it cascades throughout that organization. At the lower echelon, you have the physical effect of loss of communication with higher, as well as, the potential psychological effects of uncertainty and fear. When conducting information operations with the desired effect of disrupting an enemy organization through a leaflet drop suggesting desertion or surrender you may naturally produce an immediate psychological effect, but potentially also create a physical effect through the reduction of their combat power.

The art of the employment of enablers comes when one synchronizes multiple effects to produce a compounding effect which yields results more than the sum of the results of those individual efforts. In the case of the leaflet drop, friendly forces may have only been able to convince a handful enemy personnel to desert, but with the destruction of their higher's command post by aviation and the resulting behavioral change of uncertainty and fear, the effects of that leaflet drop may be enhanced resulting in more deserters. Additionally, much like a fire that feeds itself, each desertion produces an effect in and of itself, and increases the psychological effects on everyone around it. A cascade of desertions may result in the entire unit surrendering to friendly forces if not already evaporating into the countryside thanks to the employment of multiple enablers to producing compounding and cascading effects.

In the case of shaping the deep fight for the BCT, the effects-based use of enablers is required to achieve a cascading and compounding desired effect upon the enemy and their course of action before they become engaged in the close fight. Ideally, the close fight should be a relatively easy affair for our maneuver brethren due to our dedicated effort to impact the enemy in the brigade's deep area. Determining the enemy's courses of action, recognizing their centers of gravity, identifying their high value targets (HVT), and nominating high payoff targets (HPT) will allow the staff to begin planning to synchronize the effects of enablers upon the enemy. This synchronization occurs during the targeting process.

The execution of leaflet drops by psychological operations companies create non-lethal behavioral responses amongst local audiences. When associated with other lethal and non-lethal effects the additional leaflet drop can create a compounding effect that compels an adversary or neutral party to respond in such a way that's advantageous for friendly forces. (Sgt. Demetrius Munnerlyn/U.S. Army)

Targeting process

The targeting process seeks to focus the efforts of an organization in such a manner that specific effects are created against particular targets in a calculated manner so as to set the conditions necessary for the commander's desired endstate. In any particular AO there are generally more targets present than assets available to deliver effects and in the case of creating compounding effects, when more than one asset may be utilized to shape the behavior of a particular target or set of targets, there is further scarcity in means available. It is a conflict between two principles of war: mass in concentrating multiple assets to create powerful compounding and cascading effects; and economy of force, in ensuring that assets are not ineffectually wasted on targets when they could have been more efficiently used supporting another important effort. The targeting process will seek to balance these two.

To support this balance the staff is provided targeting guidance from the commander. This guidance, "describes the desired effects to be generated by Fires, physical attack, cyber electromagnetic activities, and other information related capabilities against threat operations." (ATP 3-60: Targeting, 1-2) It should delineate how enabler efforts support the friendly COA for the immediate close and security fight, as well as, provide overall direction for how targeting should employ enablers to affect the enemy's COA in the deep fight. This is an important distinction to make as shaping the deep fight will happen concurrently with the close and security fight, and determination needs to be made on where a particular asset will be employed. If all you have today is a flight of two AH-64 Apaches, you can't have them conduct a deep attack against an HVT/HPT and simultaneously have them provide close combat aviation support for troops in contact. The targeteers will have to assess where to weigh available assets to achieve the best effects, but thanks to the targeting process and an effects-based approach, they can utilize all of the BCT's enablers and weaponeer a solution to this problem.

The targeting officers involved in planning the shaping of the deep fight have to not only know how assets produce effects throughout a system, but also the nature of the targets themselves to determine whether the effects can even be achieved. For many, destruction of an enemy mission command node and killing enemy leadership would appear to cause significant dis-

ruption in their operations. For state actors with weak mission command, like North Korea and Iraq, this would be the case since they have inflexible chains of command where not much trust is placed in the capabilities of subordinate leadership to step up at critical times. Conversely, for state actors with strong mission command, like Russia and United States, the loss of a leader may be tragic, but it is within the culture to always have someone ready to step up to fill the void. For non-state actors and transnational threats whose mission command is decentralized, like ISIS and Hezbollah, their ability for long-range planning may be impacted, but at the tactical and operational level they function generally independent of one another.

Behavioral responses

Knowing the nature of the target, how it will react to a specific effect both physically and psychologically, is the most critical and complex element of targeting as it requires in-depth knowledge of that target.

"Our objective in executing effects-based operations is to somehow create a unity of effect that focuses all action and thereby masses their effects toward a particular behavioral objective. … The problem once again centers on what observers see and how they interpret what they see." (Smith, 281)

On Dec. 7, 1941 the Imperial Japanese Navy utilized airpower to employ destructive effects against the U.S. Pacific Fleet at Pearl Harbor, and were able to cripple a significant portion of the fleet's combat power. Their desired endstate was not to defeat the United States militarily, but to leverage enough influence in theater to force the United States to terms favorable to Japan, or at the very least, weaken them to the extent they would not be able to array enough combat power to halt their expansion throughout the Pacific. One requisite condition to meet their desired endstate, therefore, was the destruction of the Pacific Fleet.

Short of destroying the fleet's aircraft carriers and harbor facilities they did meet the condition they set out to accomplish, but failed to understand the behavioral nature of the United States. The current state of conditions between the United States and Japan created an unintended negative behavioral response, a psychological effect, which went against their desired endstate. While their military element of national power was setting conditions for open conflict, the Japanese diplomatic and informational elements of power was still working toward peace. Though the Japanese government sent a telegram stating their cessation of diplomatic efforts, basically stating the two nations were now in armed conflict, the timing of its delivery after the attack changed the American behavioral response. Instead of demoralization and defeatism, that attack created a sense of betrayal which required vengeance and rallied the nation to war; the opposite reaction the Japanese intended.

This example emphasizes the true intent of most military operations and that is to shape the will of the enemy to our own. We shape their will through the effort of creating calculated behavioral responses. We create those responses through the application of lethal and non-lethal effects on the battlefield in concert with the effects created from other elements of national power. So while some may say that we in the military focus on destruction of the enemy they are both right and wrong. The targeteer focuses on shaping the behavior of the target, sometimes through destruction. But when all enablers are available the targeteer will utilize whatever is necessary to create the desired effect and the resultant behavioral response.

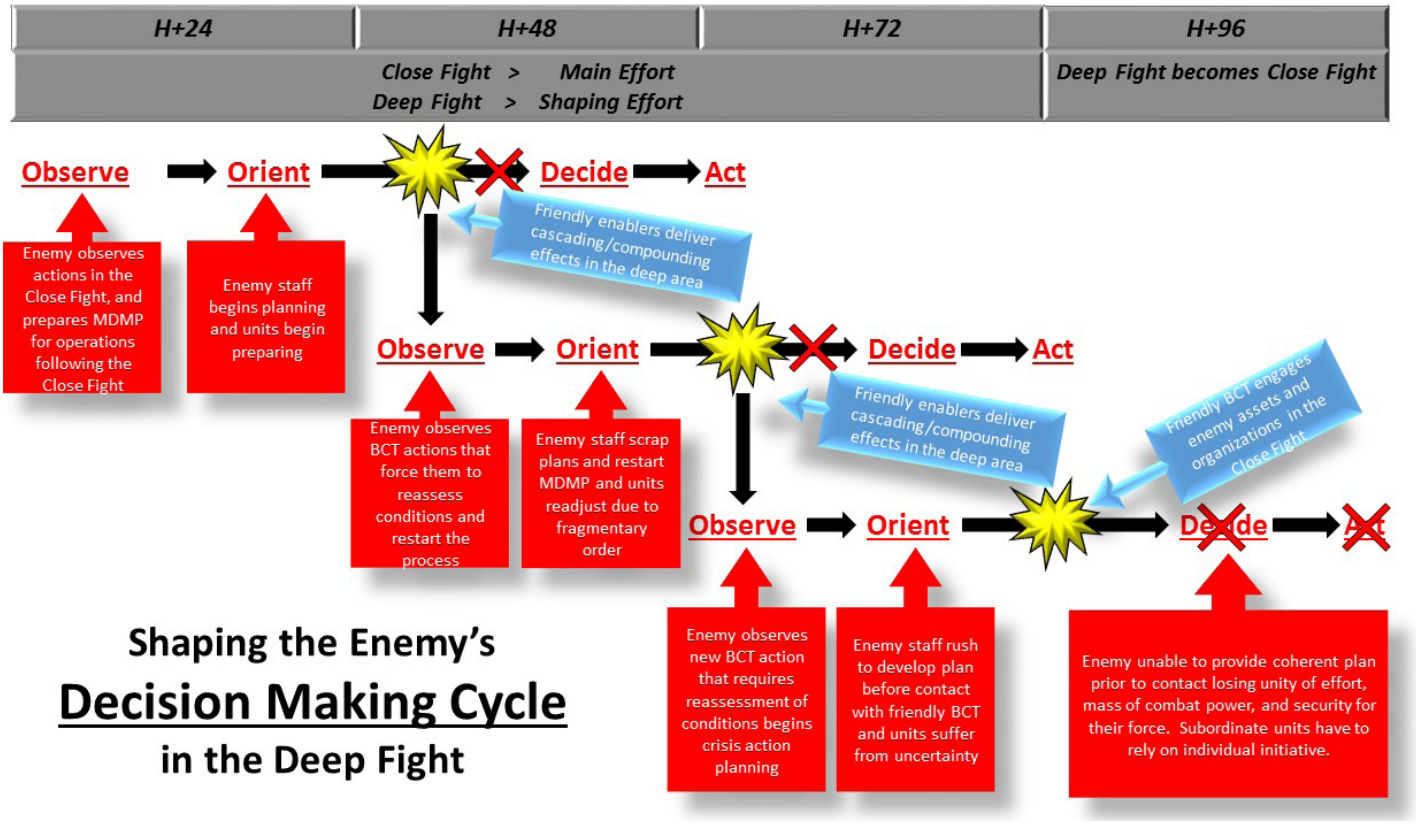
Focusing on effects to create psychological responses is all well and good, however, the questions arise, "How is that actually accomplished and how does the BCT go about shaping the deep fight in this manner?" The answers come from getting into the enemy's decision-making process and disrupting it, thereby preventing them from executing their COAs.

Enemy's decision-making cycle

Arguably, the brigade would prefer to decisively engage an enemy organization that is not only attrited but also disorganized. A disorganized force that is unable to carry out its COA, or was unable to finalize a COA by time of engagement, will not be able to put forth a unified effort at that critical place and time. Since the brigade seeks to emerge the victor from the decisive engagement in the close fight (which stated previously is the main effort) then naturally the BCT will seek to utilize its enablers to begin shaping conditions in the deep fight toward that desired endstate. The first method is to simply compel the enemy to change their COA that will allow the BCT to strike where the enemy is weak and avoid where they are strong; a basic warfighting tenet. The other method, however, is the one that keeps their leaders off-balance, frustrates and demoralizes their operation planners, and creates an air of uncertainty throughout their ranks. This second method involves getting into their decision-making cycles, and defeats their ability to produce feasible and coherent plans for their subordinates to follow.

Buy War Bonds! This poster pulled on the sentiment that many American's felt the attack on Pearl Harbor was a heinous betrayal; depicting open desire for peace while executing a surprise attack. The Japanese didn't intend to create this behavioral response desiring instead to demoralize and not rally the American population to war. It nevertheless was created due to numerous efforts creating compounding negative effects. (Courtesy image/National Archive and Records Administration)

Within the targeting/intelligence community we refer to the decision-making cycle as the OODA loop, which stands for observe, orient, decide and act. The OODA loop is inherent to all individuals, groups, and multi-tiered organizations, and simply refers to the process in which they react to stimuli in the environment. Some form of stimuli is first observed, then the individual or unit orients its efforts toward determining a response, a COA is decided upon that will achieve a desired effect and finally they action take that COA. Once that action is completed then new stimuli will be observed and the process is continued. This is always occurring, with no respite, and will not stop until the observer is no longer capable of observing stimuli i.e., destroyed.



Depiction of the enemy's decision-making cycle in the friendly force's deep area. Through the use of effects at the right time and place the enemy's observe, orient, decide and act process is continuously interrupted preventing them from developing a unified plan. This culminates when the enemy is decisively engaged in the new close fight unprepared. (Capt. Colin Marcum/2nd ABCT, 1st AD)

A comprehensive, feasible, and actionable COA for an organization requires a relatively unmolested OODA loop to have occurred. The enemy would have observed the AO under its current conditions, oriented planners and resources to develop a plan, decided upon a COA to follow, then actioned that COA. During the OODA process if new stimuli is introduced it may force the adversary to re-start their OODA process if they thought this new information was critical enough to do so. Imagine you used assets to introduce new stimuli while the opponent was in the process of either orienting their capabilities or deciding upon an action. Now if this new information was significant enough that, once observed, they would have to cancel their current process and re-orient, this would cause frustration for the organization and potentially confuse subordinates that may have been provided warning orders and have started preparing for a COA that will no longer be executed. If you were able to continue to leverage effects on the enemy that forced them to constantly re-orient and re-decide on a COA they would not be able to regain the initiative and would be forever reacting to your efforts, not able to put up a coherent and effective plan.

In the case of the deep fight, and shaping the enemy COA through disrupting their OODA process, the BCT is effectively shaping the conditions of the future close fight while the current close fight is still being waged. In Figure 3 we see this process from the perspective of the enemy as they prepare for future operations within the BCT AO. They initially observe the conduct between their forces and that of the BCT during the close fight and begin planning for their future COA 72 to 96 hours out. They will orient their planners to conduct mission analysis, develop COAs, potentially wargame them before coming to a decision on how to execute the future fight against our forces, but thanks to the timely employment of cascading and/or compounding effects throughout the deep area, the enemy commander and their planners have to drastically change their assessment of the current conditions. Because this newest assessment is so significantly different from their initial calculations, all previous planning is no longer valid, and they have to re-orient their planners to develop new COAs.

The BCT, through its employment of effects in the deep fight by its enablers, is able to keep the enemy's decision-making cycle in a state of constant reassessment up until their forces are decisively engaged in the close fight. When contact is finally made between this enemy and the brigade, the failure to develop a coherent plan means they won't be able to unify their efforts, mass combat power, and maintain a comprehensive security plan. The enemy's subordinate units will be forced to react to contact, and will have to rely on individual initiative with limited support from their higher echelon. Even if the effects upon the enemy didn't create an overmatch in capabilities for the BCT, they would still have tremendous advantage with a unified effort for the close fight against a force that has none.

Creating overmatch in the close fight

Creating overmatch, however, can be a much simpler affair than trying to shape the behavior of the enemy. Assessing whether the enemy has been behaviorally shaped requires skilled analysts and measures of effectiveness tied with well-defined identifiers to determine that success. However, even a novice can tell whether destructive effects were achieved on a tank, howitzer or combatant. Measures of performance and effectiveness are easier when it comes

to creating overmatch, at least in regards to lethal Fires.

What is overmatch, you ask? The Army's Operating Concept for 2014 defines overmatch as, "The application of capabilities or unique tactics either directly or indirectly, with the intent to prevent or mitigate opposing forces from using their current or projected equipment or tactics." (TP 525-3-1 Army Operating Concept: Win in a Complex World, 47) In layman's terms, in comparing capabilities with the enemy; like armor or artillery, you ask yourself three questions: Do we have more of them then they do? Are ours more advanced than theirs are? And do we use ours more effectively than they do? If the predominant answer is "yes," then you have overmatch.

An American-crewed M1A2 Abrams Main Battle Tank could be said to be on equal footing with a Russian-crewed T-90A Main Battle Tank. There is no numerical superiority to either side. Both tanks have similar qualities and both crews are competent in the operation of their vehicles. If you put a North Korean crew in that T-90A, however, then you have an American overmatch, because of the superior training American tank crews receive. Switch up the one T-90A with a battalion's worth of T-34-85, and you have superiority in numbers, but inferiority in technology. The enemy's guns aren't powerful enough to penetrate the Abrams' armor; their mobility and traversing speeds are not as fast as the Abrams and they lack gyro-stabilization to shoot on the move like the Abrams. In this case, the Abrams have overmatch due purely to technology.

So what does this mean for the BCT? Overmatch can be used as a tool or criteria to assess whether a particular operation will be successful. If the brigade were to have an appropriate level of overmatch in all areas, then the commander could confidently conclude that even if their most comprehensive COA fails then success can still be achieved with what is physically present on the battlefield. One option is to create this overmatch by evaluating the enemy's organization and mission and determine locations where they are weaker and engage them there with the mass of the BCT's combat power. Alternatively, the BCT can create overmatch through the use of lethal and non-lethal effects from enablers in the deep fight.

An armored BCT commander may only be concerned about overmatch in armor. The commander has on hand 16 fully operational M1A2 Abrams, but intelligence suggests there are upwards of 20 T90s operating in the deep area. It will have to be assumed when the enemy in the deep area becomes engaged in the close fight they will attempt to coordinate all their armor to engage friendly forces. The friendly commander will execute offensive operations into the deep area, but wants to achieve a 2:1 overmatch in armor if possible. That means 12 enemy tanks will need to be removed from the equation in some fashion. This is where the enablers step in.

Planning

Analysis and prediction of armor locations using named areas of interest (NAI) are associated with intelligence, surveillance and reconnaissance platforms to attempt to identify enemy T90s in the deep area. Certain NAI are then associated with lethal and non-lethal weapon systems, and are promoted to targeted areas of interest (TAI). The FSCOORD, brigade fire support officer, and targeting officers work with other staff cells in order to develop an effects-based COA to shape enemy armor in these TAIs in order to create that desired overmatch for the commander.

Execution

Lethal effects from long-range field artillery, deep-striking attack aviation and fixed-wing aircraft are delivered against positively identified armor concentrations in order to attrite them with destruction or neutralization Fires. Non-lethal effects from electronic warfare, information operations and other enablers can be used to shape the enemy's actions by preventing their combat power from being massed with the remainder of the enemy through diverting, delaying, degrading and/or interdicting them.

The commander's desire for overmatch can be met through the use of all enablers. Lethal Fires can remove enemy capabilities from the battlefield, and non-lethal Fires can prevent enemy capabilities from entering the AO at the wrong time and place. Achieving overmatch, in conjunction with shaping enemy COAs, will reduce risk and result in an easier close fight. In the case of creating effects on those 12 enemy tanks, if you destroyed six of them with a kinetic strike from fixed-wing aircraft and degraded the communications of six others using electronic jamming so they don't receive the order to move towards the BCT objectives, then you have successfully created armor overmatch. The brigade should now only expect to meet eight T90s in the close fight at best.

However, in order to achieve any success in shaping the enemy in the deep fight, the BCT needs to achieve two things. First, the friendly OODA process needs to be safeguarded. Naturally, if the enemy is able to disrupt our decision-making cycle then we will not be able to plan a COA to do the same to theirs. Second, in order to disrupt the enemy's decision cycle and create overmatch in the deep fight, it will need to be planned and resourced during the same MDMP effort that developed the COA for the current close fight. This means as the BCT conducts staff estimates and develop COAs for the objectives of the close fight, they also have to dedicate time to develop COAs for shaping the enemy in that deep fight throughout the operation. Shaping the deep fight will take place concurrently with operations in the close fight and the problem for the BCT is to determine where to dedicate its limited resources.

Supporting the close fight vs. shaping the deep fight

As previously stated in the targeting process, there are always more targets than assets to engage them with especially if one desires to create a compounding effect against a single target with multiple enablers. The brigade understands that shaping the deep fight is important for future operations and impacting the enemy's ability to influence the current close fight. The conundrum is that every asset used to shape the deep fight may interfere with the BCT's ability to support the close fight. Economy of force, a principle of war, states that a force should support the main effort with the preponderance of its capabilities available while only providing to those shaping efforts the minimal amount of resources necessary to accomplish their tasks.

In most situations the brigade will try to retain as many assets as possible to support the close fight, where Soldiers' lives and mission success most resides, but it is important to also weigh the shaping operations in the deep area heavily as well.

Why is this? Because the deep fight will become the close fight of the near future just as the close fight now was at one point the deep fight of the recent past. Imagine if 96 hours ago the brigade utilized its enablers to attrite and influence the current threat they are now facing, then this close

Using capabilities to deliver lethal and non-lethal effects in the deep area can have a profound effect on the operational environment. These Persian Gulf War Iraqi soldiers were witness to numerous effects-producing capabilities which created conditions that compelled them to surrender. As a result, what may have been a deadly confrontation that would have seen these men and their American adversary killed or wounded in the close fight, was shaped to a non-lethal resolution as a direct result of compounding and cascading effects produced during the deep fight. (Vince Crawley/Stars and Stripes)

fight would pose much less risk to the unit's mission. Brigade enablers could shift more of its assets to shaping the next deep fight because of the success of the last deep fight. It will take a very competent BCT staff in order to accurately understand the conditions of the AO, the nature of the enemy and the necessary effects to shape the enemy 72 to 96 hours out consistently and effectively. If this can be done, however, the results will be exceptional. Risk to friendly forces and mission accomplishment will be greatly reduced, thanks to a significantly weakened or shaped threat, during execution of the close fight.

Target assessment and weapon selection in the close fight are important elements when it comes to freeing up brigade-level assets for the deep fight. Proportional Fires are important in order to select the right weapon systems to achieve the desired effects. We could utilize cannon and rocket artillery or drop bombs from fixed-wing platforms, but if the target was a squad of dismount infantry then the same effect can be achieved with mortars and maneuver forces. Unless absolutely critical for mission accomplishment or force protection, brigade and division-level assets should not be used when company and battalion-level assets can do the same job; not to mention more timely and effectively as well. The allocation of lethal and non-lethal assets should be planned out during COA development and vetted during wargaming to ensure both the close and deep fight are provided the resources necessary to shape the battlefield conditions toward their desired ends.

Takeaways in shaping the deep fight

Often the brainpower of a BCT staff is absorbed in planning and resourcing the upcoming close fight. It is the main effort and there is significant risk associated with decisively engaging the enemy. But it is important to remember that the execution of this main effort, the conditions by which it will be fought, was shaped by what the BCT did in the recent past. Success or failure can therefore also be attributed to the effort the brigade put into fighting the deep fight. As the reader, if you take nothing else away from this article, remember these key points:

- Ensure every enabler is actively engaged in planning the shaping of the deep fight.
- Ensure enablers are not planning in a vacuum, and that they are constantly working in concert within one another in order to unify their efforts to shape those conditions.
- Develop a plan using cascading and/or compounding effects in order to make the most of the BCT's resources.
- Compare the nature of effects with the nature of the enemy to ensure that desired effects are achieved and negative effects are not produced.
- Look to deliver effects in order to impact the enemy's decision cycles to keep them off balance and create uncertainty.
- Utilize both lethal and non-lethal effects to create friendly overmatch.
- During MDMP, avoid directing enablers to solely support the close fight because an effectively shaped deep fight now can mean an easier close fight later.

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Attendees of the 69th Air Defense Artillery Brigade's Patriot Open House read about the different types of missiles the MIM-104 Patriot can fire, Dec. 2 in the U.S. Army Central's area of responsibility. The open house was a way for the unit to highlight the Army air defense unit and how they support the air base's mission. (Sgt. Brandon Banzhaf, 69th ADA)

Leader development

The air defense artillery transformation's biggest challenge

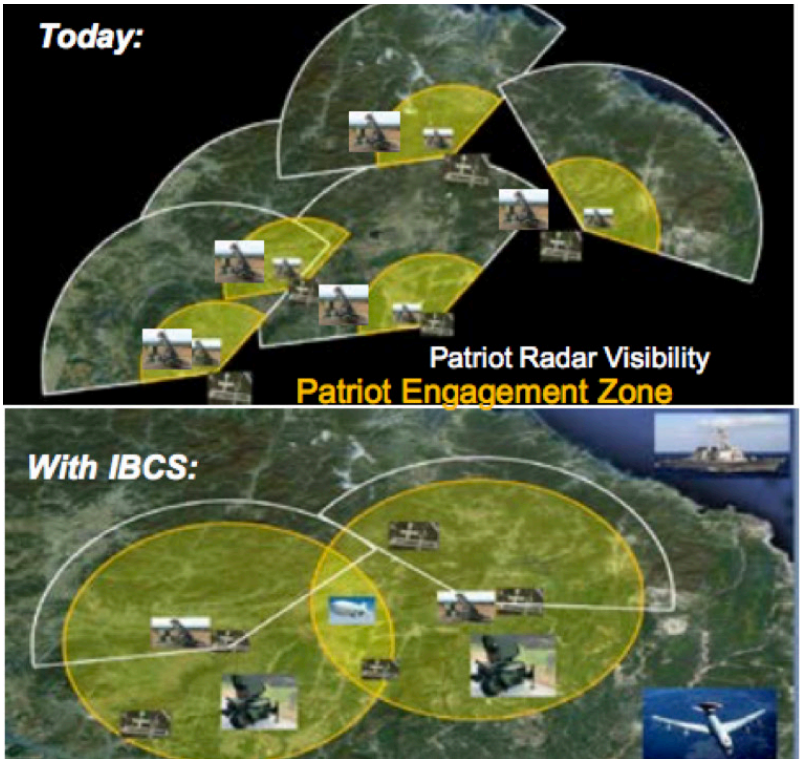
By Capt. Michael Schwartz

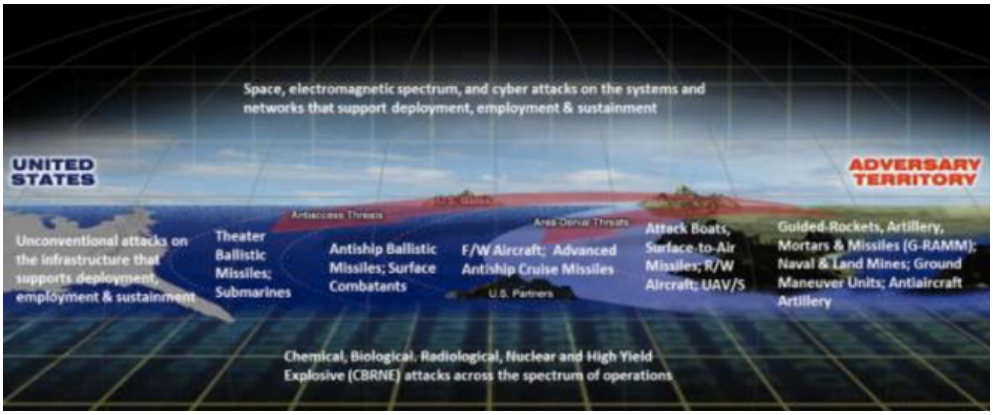
Supersonic enemy cruise missiles; swarms of unmanned aerial systems; contested airspace; area denial technology; cyber warfare: this is the future operating environment of 2025 and beyond through the lens of an Army air defender. As the joint force collectively evolves to confront the national security threats of the future, the air defense artillery branch must keep pace in their transformation efforts in doctrine, organization, training, materiel, leadership and education, and personnel and facilities (DOTMLPF) to accomplish the same mission. Amid these complex tasks, the biggest challenge will be to develop and educate ADA leaders at the company-grade level to plan and execute air missile defense (AMD) operations in a modernized branch.

Leader development and education should be the primary focus of the transformation. Educated, trained leaders will be able to meet and master the challenges of the new capabilities introduced by the Integrated Air and Missile Defense Battle Command System (IBCS), the proliferation of new technology, as well as to be able to adapt to the unpredictable and complex nature of the future operating environment.

First, equipping the force with IBCS creates numerous challenges. IBCS is the materiel solution to revolutionize AMD operations by modernizing mission command capabilities across all echelons of ADA. It enables the warfighter to mix and match radars and missile launchers by integrating the equipment onto a common network that permits a mixed detection and engagement capability from various types of equipment in the ADA arsenal. IBCS emphasizes at least two important requirements for leaders: proficiency in the AMD employment tenets and the AMD defense planning and design process. Leaders must think differently about how IBCS-equipped formations are employed and organized both at the tactical and operational levels.

Tactical lessons learned from conducting theater air and missile defense in Operation Iraqi Freedom (OIF) foreshadow several related challenges that leaders will likely face in AMD operations with IBCS. In an article published on this subject in the Air Defense Artillery Magazine in 2005 the writer states, "While Patriot can effectively engage and destroy cruise missiles, our OIF defense designs, for Patriot and short-range air de-





Above: Figure 1. An artistic representation of the Patriot radar visibility versus the engagement zone with current capabilities and with the introduction of the Integrated Air and Missile Defense Battle Command System with the additional data sources that provide the greater capabilities. (Courtesy illustration)
Left: Figure 2. A brief explanation of different chemical, biological, nuclear and high-yield explosives (CBRNE) attacks across the spectrum. (Courtesy illustration)

fense assets, were not optimized to counter this threat."[1] With varied types of radars and missile launchers at their disposal using IBCS, leaders at all levels must understand how the capabilities of each system mutually support one another and are employed together in the detection and engagement processes. In contrast, a majority of ADA commissioned and non-commissioned officers often lack the experience of operating with a wide variety of the branch's equipment and instead have been career-tracked to specialize in either short- or medium-range air defense, often familiarizing themselves with only one missile launcher and radar system.

On the operational level, the 32nd Army Air and Missile Defense Command also noted:

> [A] second challenge ... in OIF was the densely cluttered electro-magnetic spectrum. Never before have so many emitters been placed in operation in extremely close quarters. Patriot batteries, sentinel radars, field artillery radars, U.S. Navy and Air Force ground-based radars all operated simultaneously in OIF's battlespace. The number ... greatly increased the potential for electro-magnetic interference issues and calls for greater synchronization of radar coverage and positioning planning in future operations.[2]

This lesson learned serves as another indication that integrating systems will demand greater tactical and technical competency from commanders and their staffs. IBCS will improve and facilitate synchronization among AMD assets, but commanders must still be able to tailor their formations based on analysis of the mission, enemy, time, troops available, terrain, and civilian considerations. ADA operational echelons will likely assume an increased role in operations at lower levels, demanding mastery of employment tenets and defense design that creates challenges for current leader development and education models.

Furthermore, as the threat of cruise missiles and unmanned aerial systems proliferate within the operating environment, it is crucial leaders are educated in the basic science of critical thinking and decision-making skills. Specifically, educating ADA officers in System 1 and 2 thinking within the discipline of cognitive science can establish a theoretical foundation from which a leader can build a training plan that develops and maintains intuitive decision-making. Soldiers in 32nd AAMDC concluded during OIF that, "air and missile defense Soldiers and leaders must be trained to make rapid, clear-headed decisions in a compressed engagement cycle. ... Those

1 "Theater Air and Missile Defense Implications of Operation Iraqi Freedom and Enduring Freedom," ADA Magazine April-June (2005): 9.

2 Ibid.

decisions, often complicated by incomplete situational awareness, must be rapid enough to enable theater ballistic missile (TBM) intercept and prevent TBM impact or effect on coalition forces, as well as ensuring no friendly aircraft operating in the battlespace is put at risk."[1]

Airspace will only become more complicated and congested as state and non-state actors begin to operate low-cost unmanned aerial systems and advanced cruise missiles. Although computers and software are responsible for detection and engagement data that ultimately destroys air threats, engagement decisions and fire control are still executed by humans — decision-making speed remains an important attribute of engagement operations.

ADA officers will also face other types of non-traditional threats. The proliferation of technology has also resulted in emerging cyber warfare capabilities that threaten ADA's ability to conduct command and control through a networked mission command system. Turkish War College International Conference on Military and Security Studies participants determined, "… One of the most problematic challenges about the application of mission command is an acceptable balance … between technological assistance to command and control systems and creating a culture that continues to embrace trust and decentralization."[2]

ADA faces challenges in achieving the same acceptable balance, historically operating with centralized control and decentralized command within a formation no smaller than a battalion. However, IBCS may enable decentralized control of engagement operations in battalion-sized elements or below if the number of air threats exceeds a single echelon's ability to monitor engagement. If enemy cyber capabilities succeed in isolating an ADA fire unit from its higher echelon unit, the commander must still execute the commander's intent in an autonomous role. Leader development will remain the principal challenge in the branch transformation as networked mission command systems are impacted by cyber warfare and emerging technology.

Developing leaders to function with an expeditionary perspective and to understand their role within a scheme of maneuver will continue to be the biggest challenge in the branch's transformation. To fight and operate effectively within the future operating environment, ADA leaders need to understand how their force integrates into both defensive and offensive operations in an expeditionary environment. Previous branch historian John Hamilton summarized,

"In the winter of 1943, U.S. Army Antiaircraft Artillery (AAA) units experienced their baptism of fire against the German Army in the North African desert. They discovered, as Patriot battalions were to rediscover six decades later in the deserts of Iraq, weapon system expertise isn't enough to succeed on a modern battlefield — you must train with maneuver forces … a lack of experience in maneuver warfare and combined arms warfare cost the Army's AAA units dearly."[3]

Currently, the preponderance of active-duty ADA units do not attend the Army's combat training centers, except for one Avenger battery currently stationed at Fort Bragg, N.C. Thus, leaders within the branch rarely gain practical experience integrating air defense with maneuver forces and into combined arms operations. This is especially important when considering the Department of Defense's Joint Operational Access Concept states, "key area-denial capabilities include … rockets … missiles … designed to attack landing forces … [and] unmanned aircraft … [providing] intelligence collection or Fires in the objective area."[4]

Air defense will remain a key enabler to maneuver forces conducting operations in the future operating environment.

To compound the problem, within the last decade, the majority of Patriot battalion deployments to Central Command in support of Operation Enduring Freedom have not likely tested leaders' abilities to encounter a wide range of mixed air threats and complex, integrated attacks. The norm produced in this unopposed, low air threat era has not flexed ADA leaders' tactical decision-making skills and highlights the need to prepare for a paradigm shift to the future battlefield.

AMD will be fundamental in achieving joint operational access in the future operating environment. As access to the global commons of air, land, and sea is contested by emerging area-denial and anti-access (A2/AD) capabilities, freedom of navigation, facilitated by ADA units, will be vital in securing land-based lodgments immediately following forcible entry operations. A decrease in operational access will likely occur as Russia and China continue to expand their geopolitical influence in the Middle East, Europe, and Asia and challenge the United States military's strategic mobility by expanding A2/AD throughout their areas of interest.

Leader development and education is the lynchpin of DOTMLPF. Training is the solution, but the real challenge exists in developing and educating leaders who must plan, resource, and implement realistic training opportunities that build intuitive decision-making skills in their Soldiers. In order to better prepare our leaders for the branch's modernization, ADA officers should be developed and educated at the company-grade level to become proficient in employing various radars and missile launchers against a wide-range of threats, leaders should be familiar with the basic science of intuitive decision-making in order to plan realistic training; developed and educated to embrace the principles of mission command; and developed and educated to understand the role of AMD in expeditionary warfare and the future operating environment. As the Army's agent for ADA leader development and education, the ADA School at the Fires Center of Excellence, Okla. is partly accountable for implementing professional military education that includes these areas. Responsibility for leader development is not only shared by the commanders in the operating force, but also by individuals themselves through personal study of their profession. As the branch continues to transform, one theme characterizes global politics, economics, and society: uncertainty. Air defenders must be ready to deploy, fight, and win our nation's wars.

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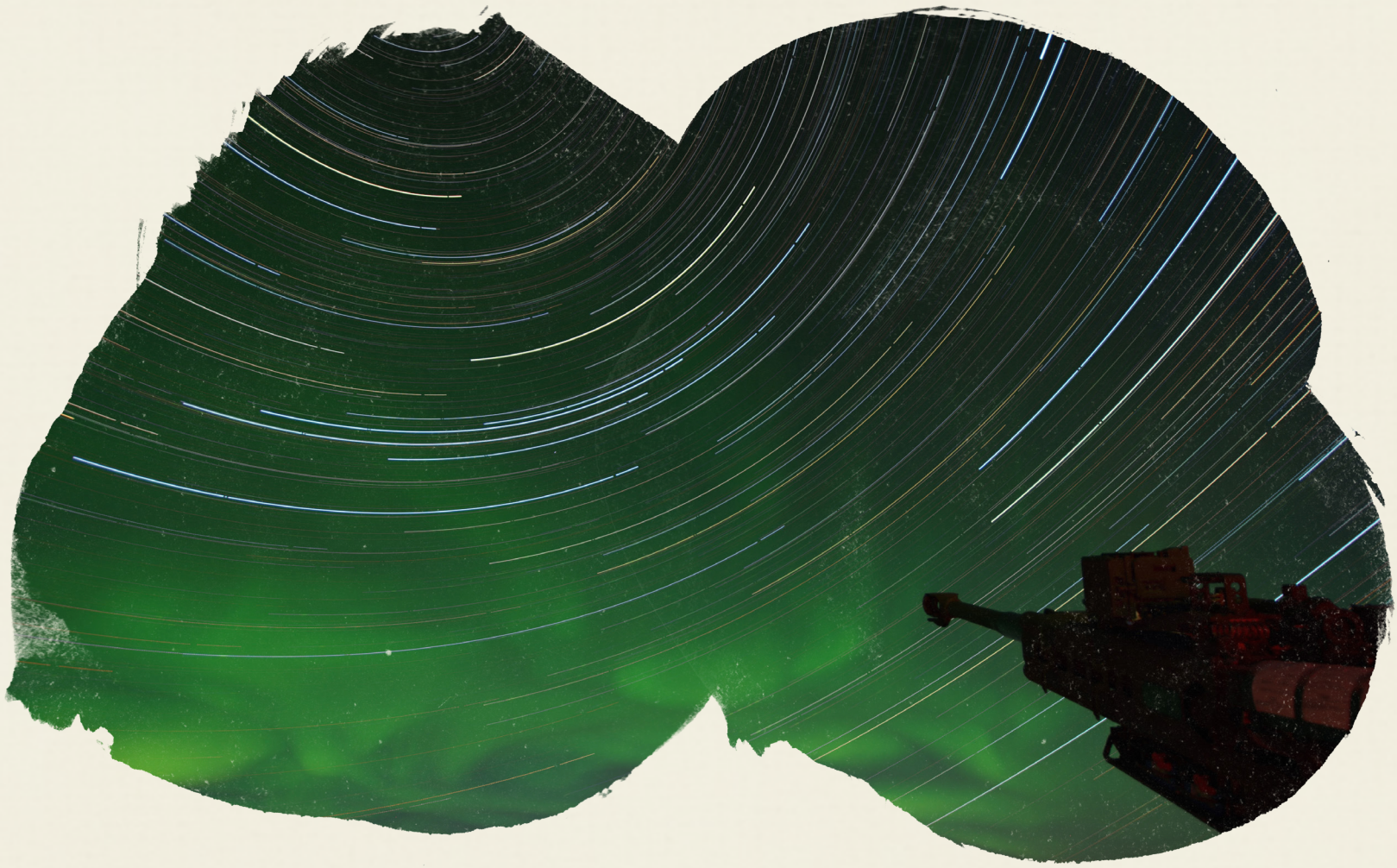
1 Ibid.

2 H. Yalcinkaya, A. Hayran, and M.S. Uygun. "Challenges for Effective Application of Leadership and Mission Command in Today's and Future Security Environment," Turkish Multinational Joint Warfare Centre Command, Turkish War Colleges, accessed January 18, 2017, http://www.harpak.edu.tr/Bilimsel_Faaliyetler/Kara_Harp_Akademisi/ICMSS_2015/4.17.pdf.

3 John Hamilton, "Kasserine Pass," ADA Magazine April-June (2005): 40.

4 U.S. Department of Defense. Joint Operational Access Concept. (Washington DC: Joint Chiefs of Staff, January 2012), 10.



An M777A2 sits at the ready under the starry sky. (Courtesy photo)

Preparing for M777A2 cold weather operations

By Capt. Steven Huckleberry

Cold weather regions present unique challenges to Army unified land operations. The harsh temperatures and terrain combine to create an unforgiving environment that can quickly bring operations to a halt.

Extreme cold weather quickly saps battery power, causes materials to become brittle, and increases dependence on logistical support in order for formations to maintain maneuver capabilities. M777A2 firing batteries that are not prepared for these conditions find themselves at the mercy of the environment and are severely challenged in being the "all weather" fire support asset that artillerymen pride themselves to be. It is important to determine the maintenance support, logistical requirements, and planning considerations for operating in cold weather environments that will lead to an increased reliability of the M777A2.

This article focuses on tactics, techniques and procedures (TTPs) for adjusting nitrogen pressure during winter and subzero temperatures; preventing the accumulation of condensation in the airlines of the prime mover; planning considerations for batteries, utilizing the trunnion pump, spade emplacement, and logistical forecasting during cold weather operations. These TTPs are based on the lessons learned from operators and maintainers employing the M777A2 howitzer in the harsh, extreme cold weather of Alaska.

The M777A2 lightweight 155 mm howitzer is a split-trail artillery weapon that functions on a hydraulically operated suspension system. It merges the digital capabilities of the M109A6 Paladin with the operational flexibility inherent in a towed system. Like all U.S. Army howitzers, it can fire "degraded" utilizing the included Optical Fire Control equipment, but primarily uses the Digital Fire Control System (DFCS) allowing the crew to quickly and accurately emplace the howitzer and lay on deflection and quadrant elevation. While its DFCS isn't yet as capable as the Paladin DFCS, its design was still a technological leap forward by providing digital capabilities on a towed artillery piece. Weighing in at 10,000 lbs, its transportable via any four-wheel drive vehicle over 2.5 tons, such

as the FMTV and Stryker, as well as air mobile - rotary or fixed-wing assets - such as the CH-47 and C-130.

The M777 training manual, TM 9-1025-215-10, states the M777A2 howitzer, with its hydraulically operated breach and hydro-pneumatic recoil mechanism, is capable of employment between the temperature ranges of minus 40 F and 125 F. Fort Wainwright and the Alaskan interior, located approximately 100 miles south of the Arctic Circle (66° 33"N latitude), exceeds these thresholds from time-to-time, but generally remain within this temperature band. Therefore, it stands to reason the weapon would function properly in this climate. However, during the winter of 2012/2013, 60 percent of the howitzers within 2nd Battalion, 8th Field Artillery were non-mission capable at one point. The operator's manual contained little information on how best to employ the weapon in the extreme cold, but referenced FM 31-70, FM 31-71 (both replaced by ATP 3-97.11 in January 2011) and FM 9-207 (replaced by TM 4-33.31 in July 2013) for cold weather operations. These manuals provided some information to identify issues and best practices during cold weather operations, but fell short of providing the technical data necessary to keep the M777s working effectively in the subzero temps. After many years of utilizing howitzers in the extreme heat of Iraq and Afghanistan, the artillerymen of Alaska needed to develop the knowledge to keep the weapon operational during the extreme cold. When the lack of technical information became evident, 2-8th FA's leadership reached out to BAE for assistance. BAE sent one of the weapon's original engineers to help develop procedures not encapsulated in the TM.

Field Artillery Soldiers emplace a howitzer during cold weather training. (Courtesy photo)

The first issue addressed was maintaining the appropriate nitrogen pressure during subzero temperatures. The howitzer maintains a hydraulically operated breach and hydro-pneumatic recoil mechanism that, in addition to the equilibrators, is charged with nitrogen. The hydraulics, in conjunction with the scavenge system, recycles the pressure created from the rearward motion of the tube following the firing of a projectile. The recycled pressure is used to open and close the breach and operate the loading tray. The TM states the nitrogen pressure in the recoil system should be maintained between 25-36 bar. However, Amonton's Law of Gas identifies that the pressure of a gas has a direct relationship with its temperature. Gas pressure reduces as the ambient temperature lowers. This means the amount of nitrogen necessary to properly pressurize the system during the summer or inside the heated motor pool bay is not the same amount necessary to keep the weapon from falling out of battery on the firing point at minus 20 F.

To combat this, weapon maintainers were forced to change their sustainment procedures since normal charging of the pneumatic systems while inside the heated maintenance bays during the winter proved insufficient for operation at the firing point. Experience revealed it was best to fill the howitzer's low-pressure cylinder while it was at the planned firing temperature. This reduced the probability of changes in temperature depleting nitrogen pressure and negatively effecting the operation of the howitzer. However, this wasn't always a viable option for maintainers. The unit developed procedures where weapons needing services were brought into the bay to warm up enough to ensure the maintainers did not receive contact burns (frostbite). The maintainers overcharged the nitrogen at room temperature and adjusted the pressure relief valves appropriately, ensuring it would work in the cold. For the howitzer to function effectively at minus 20 F or below, the system was overcharged until the low-pressure gas was 48 psi and the low-pressure oil was 130 psi. Engineers at BAE assured Soldiers it would not cause damage to the howitzer to over-pressurize the nitrogen in the system to this extent. In normal operations, the nitrogen pressure is around 75 psi when the weapon is fired, and the hydraulic fluid presses the piston in the accumulator cylinder forward. Once all services were complete, the howitzer was carefully taken back outside and put back on line. The following day, once the weapon returned to ambient temperatures, operators and maintainers checked the pressure and added any necessary nitrogen or oils. Soldiers also checked the pressure whenever the temperature began to climb significantly, such as at the end of winter, to identify when it became necessary to discharge excess nitrogen.

Battery field artillery operations during the winter months means longer periods of darkness. (Courtesy photo)

Excessive rattle from the elevation clutching system when elevating or depressing the tube was an indication the nitrogen pressure was incorrect; it was either high or low. The U6 Maintenance manual lists the appropriate pressure settings for each temperature range. The manual is located on the M777 Joint Program Executive Office website: https://picac2as2.pica.army.mil/jpmo-website/index.htm.

Accumulation of condensation in the airlines of the prime movers or the howitzer's brakes presented another concern. The M777 is equipped with an air-over oil brake power system. As noted by ATP 3-97.11, Cold Region Operations, condensation causes the brakes to engage or the brake shoes to freeze to the drums/disc. This would generally happen unobserved by the driver or truck commander because of the ease of dragging a howitzer or FMTV tire over the ice. The crew just continued driving until someone smelled the rubber burning. The FMTV TM, TM 9-2320-366-10-1, states operators should drain the air tanks if they are not operating the vehicle for 12 hours or more in temperatures of 50

degrees and below. First, operators must open the FMTV's air tank drain valves prior to sitting static for an extended period of time, the time dependent on the ambient temp. This released the air and condensation built up in the system. Once the section chief gave the march order for the howitzer, then he instructed the operator to carefully drive forward as a Soldier observed the wheels on the truck and gun to ensure the brakes were not "locked up." If they were, the section began troubleshooting the brake system on both the prime mover and the howitzer to identify the fault. Generally, a rubber mallet applied generously to the brakes and wheels could solve the issue. Lastly, it became necessary to change brake fluid at every quarterly service during the winter months.

Leaders were held accountable for enforcing proper command maintenance processes and ensuring their equipment was maintained. Additional procedures were established for equipment stored outside the motor pool bay to prevent excessive faults and deficiencies. Soldiers regularly checked howitzer batteries to ensure they were adequately charged. If fully charged, the gel batteries utilized in the howitzers reportedly will not freeze until minus 70 F. However, the cold slowly saps the charge from the batteries. Repeated discharge of the batteries below 50 percent at cold weather temperatures can lead to battery damage. At the cost of over $100 a battery, neglect during the winter months has a potential cost of thousands of dollars for battery replacement. Additionally, rubber gradually becomes brittle when exposed to subzero temperatures for an extended period of time, so a good vehicle rollout plan is necessary to prevent tires from developing flat spots and causing catastrophic failure. Lastly, sheets of plywood were placed beneath the howitzer's points of contact with the surface to prevent the gun from freezing to the ground. This was especially important during early and late winter when temperatures climbed above freezing during the day and dropped below freezing at night.

The M777 was designed so Soldiers can manually operate the trunnion pump in order to close the breach until the howitzer builds enough pressure through the scavenge system for it to function hydraulically. However, in extreme cold the viscosity of the oil is so thick that crewmembers have to continually manually operate the trunnion pump until the fluids are exercised enough that they thin out. This is especially true when located on firing points limited to firing lower charges, such as two increments of M231. This results in reduced timeliness of Fires as the crew drill takes longer depending on how much pressure has to be manually applied. The U6 (trained 13B field artillery weapons maintainer) should also routinely check scavenge systems to ensure the seals have not failed, causing the issue, and apply more gas or OHT as necessary.

Maintaining spade emplacement during fire missions in cold weather presented additional challenges. Digging into the frozen ground is tough. Howitzer crews may go through

Soldiers fire the first round from their M777A2 at a high angle to help seat the howitzer in the snow. (Courtesy photo)

Field Artillery Soldiers fire their M777A2 howitzer during cold weather operations. (Courtesy photo)

numerous pickaxes during the course of an exercise because the brittle metal will snap while trying to break the ice digging the spades to an acceptable depth. The TM maintains that spades must be at least three inches deep for indirect Fires, but that is not deep enough when the ground is frozen and the howitzer is laid on a sheet of ice. As Chapter 4 of TM 4-33.31 denotes, weapons firing from frozen surfaces have a tendency to move opposite the direction of fire. Generally, Soldiers had to double the spade depth or the guns would immediately slide out of position back towards the prime mover. TM 4-33.31 recommends Soldiers mitigate this issue by placing logs between the spades and ground. However, adequate timber is not always available on firing points to use for such a purpose. In lieu of this, Soldiers had some success in placing additional weight on top of the spades and trails, such as tire snow chains, to prevent the guns from bouncing out of the furrows. One TTP to combat the frozen earth that worked with moderate success was to fire the first fire mission at high angle with a moderate charge to provide downward and rearward force on the gun. This helped the spades dig in and better seat the gun. If the first

fire mission was low angle with a moderate or higher charge, the platoon would frequently have to re-emplace after the first few rounds.

Accurately forecasting logistical needs during winter presented another challenge to units operating in these environments. Planning for the sustainment of fuel, and its increased demand, is an essential function to maintain operations during cold weather. The TM states the howitzer's battery performance will degrade below 32 F. Use of the DFCS and the Hydraulic Power Assist Kit at these temps quickly depleted the batteries. In a place where the average temperature from November to March is minus 20 F, the weapon's allowable operating time without external power is 10 minutes. According to the TM, at these temperatures the system has little to no battery recharge capabilities. This constrains the howitzer to need a constant power source, such as a running FMTV, to maintain power to operate the weapon's DFCS. The fuel burned by this constant idling, compounded by the troop heaters installed in the rear of the truck, caused the battery to consume more than twice the amount of fuel as it did training during the summer months. During the winter, a firing battery would generally need refueling every 24 hours or less, regardless of whether or not it conducted a movement to a new positional artillery area.

One essential item that is frequently overlooked until time to emplace the howitzer is the swab. Prior to conducting operations batteries must order biodegradable antifreeze for each section during the winter. Crews put it in the swab bucket preventing the water from freezing while training at subzero temps. Additionally, it is strongly recommended to double the basic load of lithium batteries for all the optical fire control equipment. Lithium batteries perform better than any other in cold weather, but their capabilities are still significantly degraded.

Leaders must also account for how the temperatures will affect their capabilities, such as the loss of propellant efficiency. Propellants aren't as efficient in the cold weather and generally suffer a loss to the maximum achievable range. However, due to the increased risk of equipment malfunction or failure at extreme temperatures, it is ill advised to fire larger charges to achieve a desired longer range until the weapon system's Thermal Warning Device indicates it is adequately in the operating zone and all the gases and oils are exercised properly. Chapter 4 of TM 4-33.31, Operations and Maintenance of Ordnance Material in Cold Weather, maintains that gun sections must exercise weapons prior to conducting live fire in subzero temperatures to ensure the recoil mechanism and elevation parts function properly and are not sticking. This helps to thin oils that thicken as the temperature drops.

Appreciating the effects of cold weather on a firing battery and its primary weapon system is essential for any organization anticipating conducting operations in cold regions. With continued exposure and experience, the knowledge units in these environments develop while training and maintaining their equipment in support of decisive action operations will continue to grow. The development, application, and continued refinement of these TTPs will enhance readiness should it become necessary to employ and operate the M777 in the winter climates of Eastern Europe or Northern Asia, where it may determine an artillery battery's success or failure in executing its key task of providing surface-to-surface Fires.

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Developing Patriot gunnery standards for a dynamic environment

By 2nd Lt. Josef Danczuk

As the quantity, diversity, and complexity of airborne threats continue to increase, there is a renewed need to ensure that Patriot battalions are ready to conduct effective air and missile defense (AMD) operations. This must include their ability to provide AMD to the maneuver force. As such, gunnery standards for the Patriot weapons system must accurately validate the unit's readiness for realistic combat operations.

Although Patriot has not deployed in direct support of maneuver forces since Operation Iraqi Freedom in 2003, the operational need for Patriot as a mobile, rapidly deployable AMD weapons system remains. Even if there is only a small portion of the Patriot force serving in direct support of maneuver forces, the ever-decreasing cost and increasing proliferation of Tactical Ballistic Missiles (TBMs) serve as a threat not just to static assets, but also to maneuver forces which may quickly outrace Patriot and other AMD systems. Additionally, new types of unmanned aerial systems (UAS) and short-range TBMs can endure through offensive and defense counter-air efforts, presenting a sustained threat to friendly maneuver forces. This is particularly true with regards to highly mobile and concealable TBM transporter-erector-launchers (TELs) and mobile erector launchers (MELs). These factors may very well increase the operational demand for Patriot AMD for maneuver forces. To respond to the ever-shifting threat and to meet this constant need for Patriot as a relatively mobile AMD platform, gunnery standards must reflect realistic combat expectations.

Current standards

In March and April of 2016, the Fires Center of Excellence revised and published updated editions of all three of the major Patriot doctrinal documents: ATP 3-01.85, TC 3-01.86, and ATP 3-01.87. Despite these enhancements, particularly in the gunnery tables prescribed in TC 3-01.86, one key component remains unchanged from the previous version. Both the intermediate and advanced gunnery certifications, Table VIII and XII, respectively, do not include any requirement for certifying the Patriot battery's capacity to rapidly deploy from one site to another in its entirety. Instead, it requires the evaluation of individual sections of the collective process while ignoring the movement phase. For example, according to TC 3-01.86, the battery has 45 minutes to march order all equipment for a Table VIII certification. They then have 45 minutes to reach minimum engagement criteria and 60 minutes to achieve the directed alert state, with time starting when the first vehicle passes over their assigned hub stake. However, there are two major issues with these timing standards.

Potential improvements

First, these standards ignore the actual movement of the battery from one site to another and instead focus on individually timed sections, i.e. march order and then emplacement, evaluated completely separately. However, the actual movement of the battery is an essential step to evaluate. A Patriot battery may be expected to convoy a substantial distance through unfamiliar terrain in a dynamic wartime environment. They must contend with the possibility of vehicles getting lost, breaking down, or other unknown factors inherent to the fog of war. The movement validates that the reconnaissance, surveillance, and occupation of position (RSOP) team conducted a valid and thorough reconnaissance of the route and can also mimic the unexpected, dynamic nature of war. It also validates the RSOP team's capability to properly relay relevant information from the new site to the main body at the old site, outlining route information and confirming their ability to communicate across a greater distance.

Second, the requirement to begin timing emplacement when the first vehicle passes over the hub stake is arbitrary and irrelevant in the context of a wartime environment. This requirement results in battery personnel worrying unnecessarily about the timing of their vehicles stopping at their hub stakes, thus distorting the actual training value of the emplacement portion of the certification. In a realistic environment, once the main body reaches the new site, equipment should begin emplacing as quickly as possible to facilitate a rapid assumption of minimum engagement criteria and of the directed alert state, regardless of which vehicle passes over their hub stake first.

Recommendations

To remedy these two topics, doctrine should prescribe one collective time for the battery to complete all aspects of mobility and jumping sites. The battalion evaluators would determine this unique time based on approximate travel time from the old site to the new one. In addition to the time expected for march order, movement, and emplacement, the overall evaluation time window would have to include time for previously untimed events. According to TC 3-01.86, this includes tasks such as the convoy brief, retrieving the corner reflectors, and, if emplacing manually at the new site, determining manual data for launchers and the radar. Put simply, the battalion will include a no-later-than time by which the battery must assume the directed alert state, distributed in the Movement Warning Order (MWO) and/or the Movement Execution Order (MEO). The evaluation would be continuous, instead of stopping the time after each section. Based on the ordered time, the battery commander can properly plan for and execute the battery march order, movement, and emplacement to meet all the criteria to assume the alert state within the directed time. This thereby mirrors potential real world operations of having to deploy in support of rapidly moving maneuver forces.

Despite these recommendations, this is not an argument to eliminate timing individual crews on the march order and emplacement drills for their assigned equipment. Each crew must be able to complete their drills in a timely manner, thereby ensuring the battery's efficiency as a whole. However, rather than the current

method of starting every crew's time at once when the first vehicle passes over the hub stake, the evaluator can start the crew's time once they reach the designated location for their individual equipment. This retains the useful evaluation of individual crews without the unnecessary step of having all individual evaluations start at the same time. It validates the crew's proficiency as an individual task, but still falls within the greater umbrella of the battery's collective time for the entire evaluation.

Additionally, while it may seem arbitrary to evaluate the movement phase as opposed to all of the other basic Soldier tasks necessary for a Patriot unit to provide and maintain effective AMD, this sort of convoy operation is absolutely essential. A Patriot battery or battalion cannot provide AMD if it cannot even effectively reach their new location in a timely and safe manner. Although a revised standard might encourage unsafe practices, such as speeding during the convoy to the new site, or racing across the site to reach the position hub stakes as quickly as possible, revised doctrine must include additional safety stipulations for which to evaluate units on. Not only does this help protect Soldiers during training and certifications, it also stresses the importance of safety during real operations, as keeping Soldiers and equipment safe from accidents helps preserve the force for sustained operations. Therefore, if a change is initiated, new doctrine must include appropriate safety benchmarks, similar to those already in place for other evaluated drills.

Conclusion

With the implementation of one singular evaluation time slot, gunnery certifications will better mirror actual combat operations and provide a more realistic evaluation and validation of a unit's mission readiness. Of course, there are many forms that this sort of time standard might take. Figure 1 displays a potential evaluation guide using these recommendations. Regardless of its precise form, ensuring that the battery is deploying from one site to a significantly different one, ideally contending with unfamiliar terrain and a relatively long distance, and that it does so in a timely manner, will help ensure that Patriot units train consistently to meet the operational requirements of supporting maneuver forces. As the battle lines of modern, mechanized conflict shift rapidly, such renewed evaluation methods will increase all Patriot battalions' capacities to provide effective AMD of forward assets and maneuver forces.

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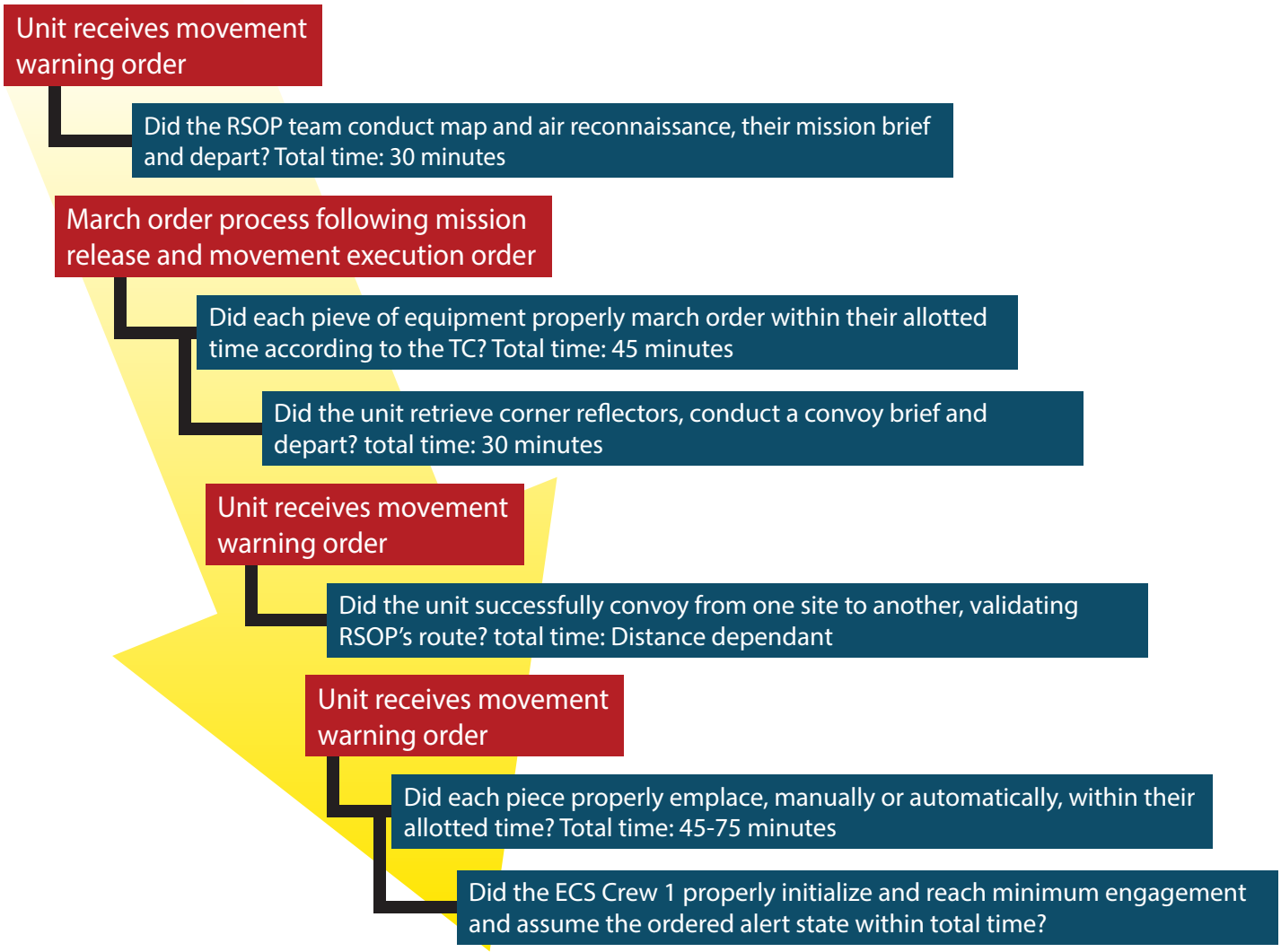
Figure 1. An example evaluation timing breakdown process. (Rick Paape)



The integration of intelligence with operations during Danger Express

By Chief Warrant Officer 3 Michael Rider with contributions from Dr. William Rierson

The field artillery intelligence officer (FAIO) played a key role in the effective employment of Fires in the 1st Infantry Division's Warfighter exercise (WFX), April 5-14. With a new commanding general and staff, and facing a WFX against a near-peer adversary, 1st ID focused on building mastery through multiple repetitions, conducting three command post exercises (CPXs) during an eight-month train up. Over the course of the train-up and through the execution of the Warfighter, the techniques, tactics, and procedures used by the FAIO continued to evolve, with the enduring objective being the timely nomination of relevant, targetable intelligence for action by the Joint Air Ground Integration Center. This article highlights the lessons learned and best practices of the FAIO during the 1st Infantry Division Warfighter, which enabled the team to "win with Fires."

First Infantry Division utilized the decide, detect, deliver and assess methodology as outlined in Figure 1. Throughout this process, the FAIO's roles and responsibilities were essential to the successful link between intelligence and targeting.

Division commander's intent for Fires

"Maneuver to emplace Fires forward and leverage information collection to detect and destroy division high payoff targets," said Maj. Gen. Wayne Grigsby Jr., 1st ID commander.

Decide function

During the decide function of the targeting process one of the responsibilities of the FAIO is to provide target criteria to the analysis and control element (ACE), ensure the ACE understands and follows the high payoff target list (HPTL), target selection standards (TSS), and attack guidance matrix (AGM) demonstrated in Table 2. The ACE targeting analysts along with supervision from the FAIO are responsible for the accurate and timely data base entry into the Distributed Common Ground System-Army incorporating the attack guidance matrix and target selection standards. The FAIO works with the G2/J2 in the development of the high value target list (HVTL) throughout military decision making process.

As stated in Joint Publication 3-60 Joint Targeting, "a high-value target is a target the enemy commander requires for the successful completion of the mission. The loss of a high-value target would be expected to seriously degrade important enemy func-

Key Input	Targeting Function	Key Output
• Commander's Intent • Completed Intelligence preparation of the battlefield products • Targeting Requirements	**Decide**	• High-payoff target list • Target selection standards • Attack guidance matrix • Input to information collection plan
• Information collection tasks	**Detect**	• Intelligence operations to identify and track key targets for delivery of Fires
• Decision to attack target (with lethal or non-lethal weapons) • Attack guidance matrix	**Deliver**	• Intelligence operations to continue to identify and track targets
• Delivery of fire (lethal or non-lethal) • Information collection tasks	**Assess**	• Intelligence operations to determine the effects of fires for combat assessent

Figure 1. The targeting process and intelligence operations. (Information from FM 2-0, Intelligence, April 15, 2014, pages 1-13)

tions throughout the friendly commander's area of interest."

The HVTL is then analyzed by the targeting officers and developed into the recommended HPTL in order to be briefed and approved by the commander. The approved HPTL is then used to focus information collection efforts, and when required, for the execution of a dynamic target, see Figure 3.

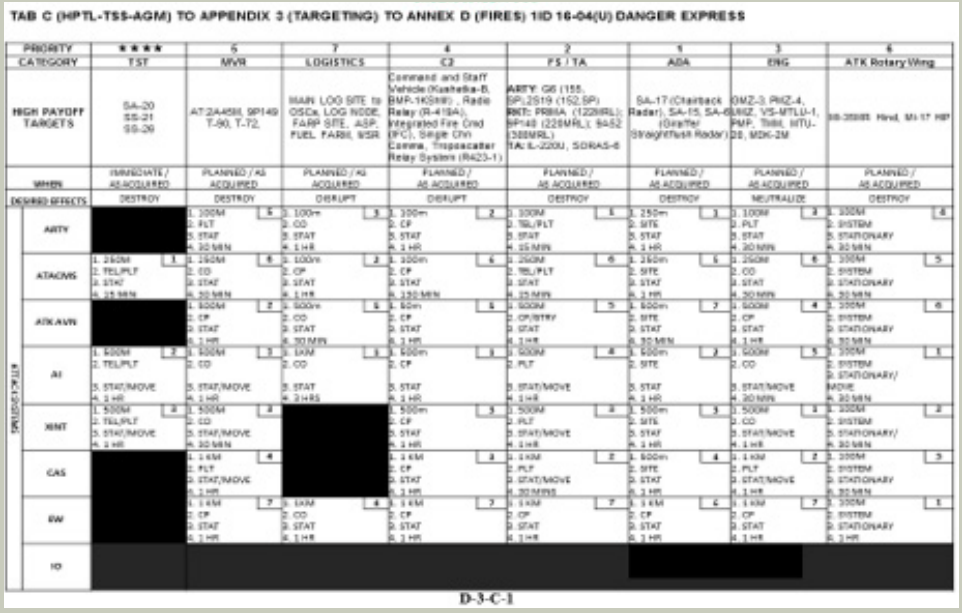
During intelligence preparation of the battlefield the FAIO needs to work with the All Source Intelligence technician in the development of the enemy situational template. The FAIO also assists the division artillery S2/targeting officer in the terrain analysis to template the location of the fire support/target acquisition targets on the HPTL. The FAIO works with the collection manager to develop the specific information requirements (SIRs) for the areas that will be a focus of collection and makes recommendations to the commander on the priorities for collection during the targeting working group as well as requesting and synchronizing the resources available to conduct target refinement. These SIRs become the information on the collection deck for the assets that are requested and later resourced. The sensor operators use these requirements during the detect phase; conducting the information collecting and the passing of that specific information that pertains to the HPTL to the FAIO utilizing the processing, exploitation, and dissemination (PED) section.

The FAIO, fire support officers (planners) along with the DIVARTY targeting officer or Fires planner need to conduct offensive fire planning for all of the objectives and develop a target list worksheet (TLWS) for each. This will aid in receiving collection priorities, and targeting guidance from the commander during the targeting process. This integrated planning aids the DIVARTY in the development of the Field Artillery Support Plan and those triggers associated with the employment of the firing units and target acquisition assets required to service planned targets on the TLWS. The target synchronization matrix is one of the outputs during this phase and is the primary tool (if used properly) in executing current operations or the detect, deliver, and assess phases of targeting.

Detect function

Once Warfighter 16-04 (Danger Express) commenced, 1st Infantry Division was executing the detect function of the targeting process. One of the key intelligence collection sections in the ACE is the Geospatial Intelligence. This section provided the intelligence targeting officer (ITO), collection manager, and FAIO situational awareness of ground moving target indicators in the area of operations. If multiple intelligence disciplines had additional information pertaining to the moving target indicators the ACE chief then requested the chief of operations (CHOPS) to dynamically retask other collection/target acquisition assets to confirm or deny activity in that area. If the request was approved the collection manager would re-allocate assets based on the decision of the CHOPS. Once the assets confirmed the activity and positively identified HPTs, the PED section (as discussed during the decide function above) passed all targetable information to the FAIO for vetting and validation of that target. Once all HPTL criteria was met for the FAIO validated and passed the dynamic target to the JAGIC for execution (deliver phase of targeting process). The Army Techniques Publication 3-60 Targeting states that a key point to remember is that "not all of the information reported would benefit the targeting effort, but it may be valuable to the development of the overall situation. Targets that we cannot or choose not to attack in accordance with the

Figure 2. The 1st Infantry Division's high payoff target list target selection standards attack guidance matrix. (Courtesy image)



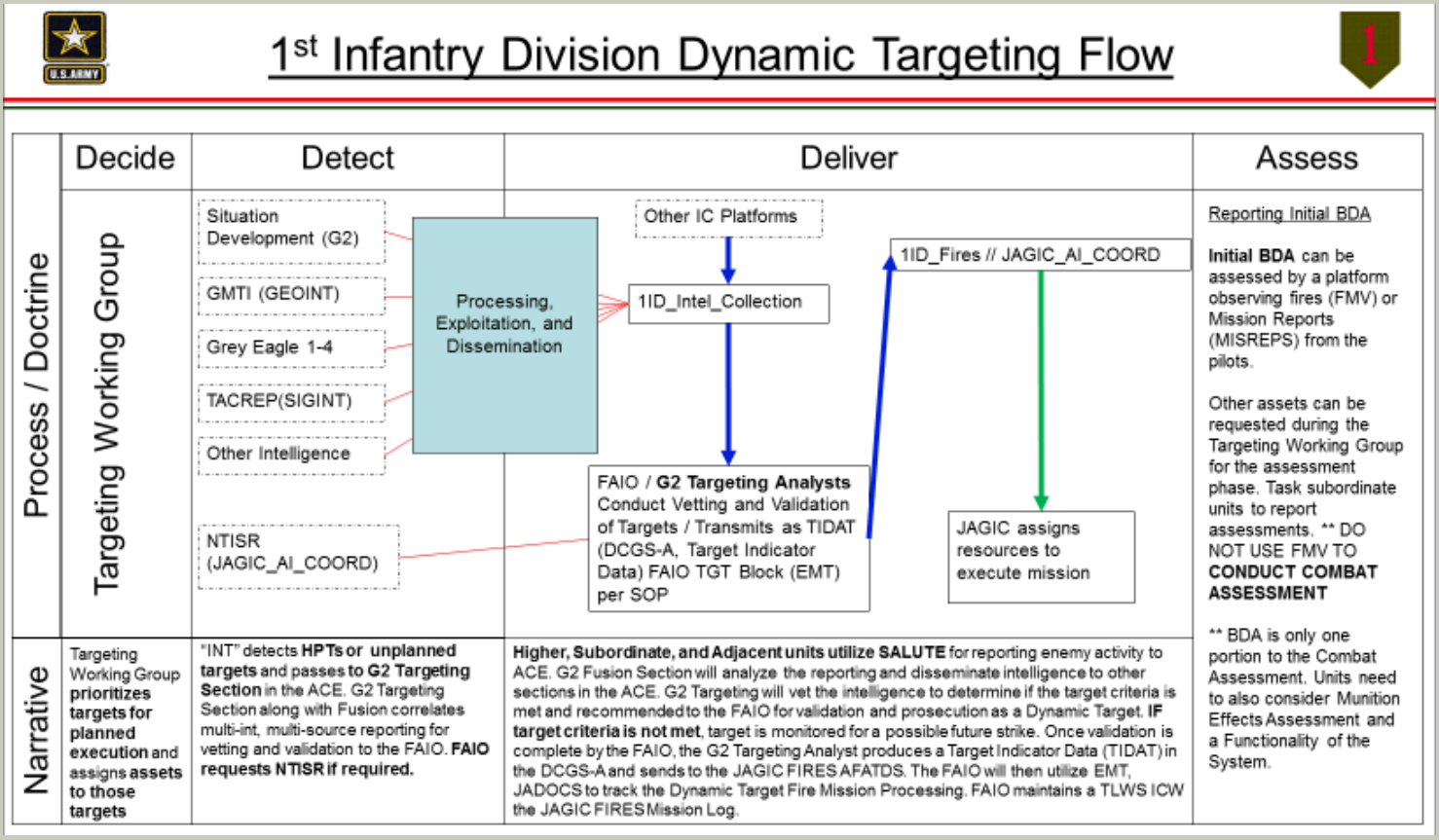


Figure 3. The 1st Infantry Division Dynamic Targeting Flow during Warfighting Exercise 16-04 . (Courtesy image)

attack guidance should be tracked to ensure they are not lost. Tracking suspected targets expedites execution of the attack guidance as well as keeps them in view while the targets are validated. Planners and executers must keep in mind that assets used for target tracking may be unavailable for target acquisition."

The process above was utilized for the full suite of intelligence collection/target acquisition assets which provided targetable data within the published targeting standards and assisted the FAIO in providing recommendations to ACE chief on changes to high value targets. The JAGIC received and executed over 400 calls for fire/fire mission requests from the FAIO and the targeting cell in the ACE during Warfighter 16-04. The results were seen at the final after action review with the destruction of 90 percent of all air defense artillery systems, 85 percent of the Operational Strategic Command-2 (OSC-2) fire support assets destroyed, and 70 percent of the remaining OSC-2 Target Types destroyed.

The DIVARTY counter-fire cell's target acquisition radars located and identified the enemy's indirect fire weapons locations. The DIVARTY counter-fire officer passed those locations to the FAIO and the ACE. The FAIO relayed the targetable information to the JAGIC and the air interdiction coordinator (AI COORD) using the process that will be discussed in the next paragraph.

The FAIO established a link with the AI COORD within the JAGIC after the initial 48-72 hours of the exercise. In order to open the line of communication the FAIOs created a Transverse Chat window with the AI COORD and the controlling joint terminal air controller in the JAGIC. This chat window allowed the FAIO to request non-tasked intelligence collection from the JAGIC. This process reported target information and situational awareness to available aircraft that were transiting in or through the battle space, were mission complete on their assigned task or had remaining time on station the ability to be sent over a historic sites of enemy fire support assets or air defense radar locations. In addition to the 400 calls for fire/fire mission requests sent from the FAIO with the dynamic targeting process; the FAIO additionally passed 100 targets to the JAGIC and AI COORD using this technique. The battle damage associated with this process was the most effective for the 1st Infantry Division Warfighter.

Throughout 1st Infantry Division Warfighter 16-04 the FAIO's workstation was located in the ACE next to the entrance. The FAIO's location granted easy access to the JAGIC and the current operations cell. The FAIO was then able to conduct face-to-face engagements with the fire support coordinator (FSCOORD), deputy FSCOORD, fire support officer, JAGIC chief, and the targeting officers throughout the day and more importantly when the FAIO had specific information from the ACE that could affect the current operations. The FAIO's primary tools for mission success were the Distributed Common Ground System-Army, the Effects Management Tool and the Joint Automated Deep Operations Coordination System (JADOCS) in conjunction with the Advanced Field Artillery Tactical Data System located on the current operations floor in the joint air ground integration cell. This network of systems proved to be a vital for the integration of multi-intelligence resources into the operations process. This combination of knowledge management systems and physical position within the ACE enabled the FAIO to efficiently communicate and share information horizontally across the staff war fighting functions.

A key lesson learned during the Division Main Command Post jump to the secondary position was the FAIO's physical location. The FAIO along with the JAGIC chief along with multiple JAGIC Air Force personnel, the ACE targeting section, the PED section, and

other intelligence sections moved to the DIVARTY Tactical Operations Center (TOC) and assumed the dynamic targeting process. The positioning of these key positions allowed the establishment of the direct sensor to shooter link. There was no loss of efficiency in the dynamic targeting process, however staff enablers such as public affairs, cyber electro-magnetic activities and civil affairs were not included in the move to the DIVARTY TOC. Although we did not see a significant result from this shortfall the lesson learned will be to include all staff sections for the transition of command posts.

During the detect phase of the targeting process the FAIO's primary responsibility was the vetting and validation of those HPTs that were identified using those tools specified above. Keeping in mind that all of the targets identified were not HPTs but would still be reported for situational awareness for the collective targeting effort.

Deliver function

The deliver function of the targeting process begins with and without the FAIO. During Warfighter 16-04 there were numerous instances when the ACE targeting analysts began the vetting and validation process without the FAIO or ITO present. The targeting analysts were developed and mentored by the FAIO and ITO to conduct operations in their absence and executed superbly during the exercise. This allowed the FAIO the flexibility to walk around and engage multiple different staffs during current operations. The FAIO makes target execution recommendations to the JAGIC chief based from the target type, and the activity associated with the target based from the approved and published attack guidance matrix (Table 2) when passing the dynamic targets (Table 3) to the JAGIC. During this time the FAIO is also the fire supporter responsible for advising the ACE on the fire support capabilities available for execution in current operations. The overall selection of assets used to execute the dynamic target relies on the JAGIC Chief based on available assets and the most efficient time to execute the target. Once the target was approved and resourced to be executed the FAIO maintained situational awareness and provided predicted battle damage assessment to the ACE Chief on the results from the target execution.

The FAIO had to set time aside during the deliver phase for the refinements of those targets nominated, approved, and tasked on the air tasking order (ATO) for close air support and air interdiction at the 48 hours and 24 hours prior to ATO day as well as those priority targets eight hours and four hours prior to mission time. The FAIO's ability to use JADOCS to track and face-to-face discussions to coordinate updates with the air liaison officer on targets submitted to the battlefield coordination detachment worked efficiently during Warfighter 16-04.

The FAIO continued to nominate dynamic targets during the detect and deliver phase of the targeting process and remains heavily involved with the intelligence collection efforts in the ACE ensuring that those "shiny objects" do not interrupt and divert the collection priorities set forth by the commander.

Assess function

The FAIO's responsibility during the assess function of the targeting process is to assist in the conduct of battle damage assessment that is orchestrated by a tactical and operational BDA collection team. Initial BDA is conducted utilizing the collection asset over the target area. At times those assets may have been reallocated to higher priority missions and the mission report (MISREP) from the pilot of a fixed-wing or rotary-wing aircraft is used to determine of the desired effects were achieved. An alternate method to determine predicted BDA is the utilization of the joint weaponeering system along with the fire mission information containing the munition type and number of munitions expended in executing the target. If the desired effects were not achieved the FAIO in conjunction with the JAGIC can make recommendations to the commander for a reattack of the target.

"The assessment process is continuous and directly tied to the commander's decision points throughout planning, preparation, and execution of operations." (Army Techniques Publication 3-60 Targeting, 2015)

Planning for the assess phase begins well before the targeting working group which identifies key aspects of the operation that the commander is interested in closely monitoring and also when the commander makes a decision during the targeting decision board.

"Commanders adjust operations based from this initial assessment to ensure objectives are met and the military end state is achieved." (Army Techniques Publication 3-60 Targeting, 2015)

If future combat assessments reveal that the commander's guidance or conditions of operational success have not been met, the detect and deliver functions of the targeting process must continue until the desired effects are met.

The FAIO battle rhythm

The FAIO and the intelligence targeting officer ensured that one or the other was present in the ACE targeting cell at all times to maintain oversight of target vetting, validation, and authority. The FAIO's duty day was broken up into two 12 hour shifts (extended longer during peak times and key meetings) associated with the two targeting analysts on shift with the FAIO. The ITO typically attended the targeting decision board every morning which allowed the FAIO to remain in the ACE for the passing of dynamic targets. The night shift FAIO had the responsibility to attend the targeting working Group and pass all information included in the targeting FRAGORD to the FAIO in the morning during the battle hand over. Always considering that the battle rhythm needs to be nested with the higher headquarters' to allow the right information to be shared and understood at the right time.

The FAIO played a key role in the successful employment of Fires during WFX 16-04. The FAIO's fusion of multiple means of collection to develop targets through shared understanding of the HPTL and focus of Fires, along with the seamless handoff of targets to the JAGIC ensured success of Fires in the division fight.

Chief Warrant Officer 3 Michael Rider is currently assigned to the Headquarters and Support Company, 1st Infantry Division, Fort Riley, Kans. As a Chief Warrant Officer he has served as a radar section leader, target acquisition platoon leader, battalion and brigade targeting officer, and is currently serving as the division field artillery intelligence officer.

Dr. William Rierson, Ed.D., is a retired Field Artillery Officer with over 23 years of active-duty enlisted and commissioned service. He holds an earned Doctorate of Education from the University of West Florida. Rierson is currently a contractor with CGI Federal, assigned to the TRADOC G27, ISR Integration Training Team. He served as a Mission Command Training Program Fires observer/coach/trainer during Warfighter 16-4.


AIRBORNE

First female fire support specialists graduate at Fort Sill

By Jeff Crawley

Three female Soldiers completed 13F Advanced Individual Training Feb. 2, to become the first women fire support specialists to graduate at Fort Sill, Okla. Spc. Holly Morrison and Pvts. Emily Buffington and Bailey Hendrix will next serve at Fort Hood, Texas.

"I'm pretty excited, I definitely wanted a combat MOS," said Morrison, who was formerly an Iowa Army National Guard logistician. "When I found out they were opening to females a year ago, I began striving for it."

Buffington said she felt a sense of accomplishment and relief by completing AIT, but downplayed her gender.

"I don't think it's that important," said Buffington, from Montrose, Mich. "All my battle buddies here, male and female, did the same things, accomplished the same things and went through the same training as I did. We were all treated equal."

How did her family react when she told them she was going into a combat job?

"My mom and dad were a little concerned, but ultimately they are proud of me and excited to see what I can do," Buffington said.

Abbott and Pvt. Yesenia Gutierrez, who are in the 13F class which graduates today, both said they wanted to go into the infantry, but that it was not yet available to them.

"I wanted to go infantry, but the barracks won't be ready until summer of this year, and I didn't want to wait that long," said Abbott. "So this is the closest to infantry I could get."

It's the second field artillery MOS that has opened to enlisted women after 13B cannon crewmembers began graduating AIT here in March 2016. Capt. Steve DeGracia, B Battery, 1st Battalion, 78th Field Artillery commander, said women are joining the combat arms MOSs as they open.

"It's a tiered system. We started with the gunline -- the 13-Bravos last year, and now we're kind of the last line here with our observers," he said. "Then the infantry and armor will also be intermingled with females, as well."

DeGracia said he was excited about the way the Army is going.

"I believe regardless of your sex that you should have the opportunity to serve in any MOS in the Army," DeGracia said. He noted that there are 16 other women Soldiers currently attending 13F AIT or scheduled for the training.

Stimmell said he is completely OK with women fire support specialists.

"I don't mind anyone coming into my career field as long as they can do the job," he said. "All I want is productive Soldiers."

At the graduation ceremony for Fire Support Specialist Class No. 05/02-17, guest speaker Capt. Kelly Turner, FA Basic Officer Leader Course gunnery instructor, told all the Army's newest fire support specialists: "You bring the most lethal weapons in the Army to the fight when you are proficient in your skills. You are the artillery's ambassador to the infantry, and being a professional will ensure that we continue to bring the guns to the fight."

Jeff Crawley is an award-winning photojournalist with the Fort Sill Tribune. He is also a retired veteran of the Coast Guard and Air National Guard.

Opposite page: Col. Joe Bookard (left), 428th Field Artillery Brigade commander, congratulates the graduates. He presented each one with his coin of excellence. (Jeff Crawley/Fort Sill Tribune)
Right: Pvt. Bailey Hendrix, Spc. Holly Morrison and Pvt. Emily Buffington are the first women to graduate in the 13F advanced individual training program. Fire support specialist are known as forward observers, and part of the field artillery team to put steel-on-target. (Jeff Crawley/Fort Sill Tribune)

Two Patriot Launching Systems from 3rd Battalion, 43rd Air Defense Artillery Regiment, 11th Air Defense Artillery Brigade, stand at the ready with a full moon lighting the Patriot site at Marine Corps Air Station Yuma Oct. 15, 2016. (Courtesy Photo)

Legion puts the 'T' back in Patriot

By Lt. Col. Scott Mclellan

More than 200 3rd Battalion, 43rd Air Defense Artillery Regiment, *Legion*, 11th Air Defense Artillery Brigade, Soldiers began a 566-mile-tactical road march in nine series of vehicles from Fort Bliss, Texas, to the Barry Goldwater Range Complex, Yuma, Ariz., Sept. 17, 2016.

The six *Legion* batteries tactically moved by ground using organic equipment and weapons systems to support the Weapons Tactics Instruction (WTI). Two days later the rest of the unit arrived and began establishing life support areas and Patriot sites. When all was said and done, 378 Soldiers from the *Legion* Battalion were on ground to support a robust test mission and the Marines as they trained their students on air and ground command and control.

Patriot battalions have supported the WTI course at Marine Corp Air Station Yuma for decades. It was an opportunity to fight with some of the most advanced aircraft and pilots the Department of Defense can employ. What makes the *Legion*'s operation in September and October 2016 different from others is the scope, magnitude and implication it has for the future of the air defense community.

The design for the operation was for 3-43rd ADA, to take the newest Post Deployment Build software and hardware and test it against an aggressive air breathing threat. The outcome – the air defenders learned a significant amount about the new equipment, but more importantly it proved that a Patriot battalion can deploy, operate and sustain itself in any environment and conditions as an autonomous "T"actical unit for 40 days with success. This is the key to the story – the hard takeaway. Doubters will suggest that this type of operation is easy and "it's been done before multiple times." However, the highlight is the approach and outcome of this mission when external support otherwise inherent to any deployment is not readily available and an expeditionary approach to training is necessary. E *Legion* Battalion accomplished this through deliberate problem solving utilizing the operations process, implementing disciplined initiative, executing multi-echelon training and good old fashion field craft.

It started with a comment to the battalion staff in March 2016.

"We're all going to Yuma … and we're taking everything."

It was a great commander's intent and although it didn't meet any doctrinal intent requirements, it generated the ideas, and triggered the process.

In the decades past, units usually only deployed key pieces of equipment totaling two batteries and some headquarters elements and used temporary duty to stay in hotels to accomplish the WTI mission. That was not *Legion*'s plan. The staff assembled and began to dissect the complexity of supporting a 30-40 day, battalion-sized operation in an austere environment, with joint forces, no higher headquarters on ground, no support units within reach and not enough organic assets or equipment to sustain operations.

Tackling variables like parts distribution, Internet support, water, food, fuel and even hygiene started to overwhelm the staff. So the Soldiers tackled them – they used the military decision making process and methodically applied the problem solving collaboration and addressed the variables. One by one, they started to fall off the issue chart. They quickly found out that without an external combat service support battalion, classes of supply would be the biggest challenges. The signal officer submitted a request for a command post node platoon to support the Internet resource gap (180 day lead time) and the executive officer and logistics section addressed supply challenges. As the process evolved, they concluded the only option to execute the mission while continuously sustaining units was to utilize the "push" method.

They couldn't ask the 40-50 Soldier batteries to pull all supplies because it would stress their daily test requirements and drain subordinate unit Soldier power. Therefore, they built a distribution platoon out of the maintenance company. Saddled with equipment borrowed from the sustainment brigade on Fort Bliss, they built a platoon to distribute water, fuel and parts to outlying Patriot sites.

Utilizing a "hippo" water tanker and a consolidation of the battery petroleum supply specalists, the distribution platoon pushed more than 80,000 gallons of water and 60,000 gallons of fuel over the course of the mission. A lieutenant led the platoon using strict tactical vehicle guidelines for convoy operations. They operated over six hours a day covering close to 3,000 miles during the mission – accident free. This concept was only accomplished through months of coordination and analysis, a clear example of deliberate planning and junior level leadership at the point of execution.

Variables continued to plague the planning process. Some were expected, and others were not. Therefore, the Soldier had to employ a disciplined initiative to solve the issues and continue the mission. One of the biggest variables was parts distribution and receiving. With 24-hour, seven-days-a-week operations in the Yuma heat, between 90- and 105-degree temperatures, not to mention continuous tactical movement, parts were critical. Additionally, the supply support activity (SSA) could not run the accounts through the Marine units due to the duration of the mission and cross service issues. Through planning they saw this coming, and applied disciplined initiative to be successful. They split the SSA and established a mobile supply point half way between Fort Bliss and Yuma. They deployed 75 percent of the field SSA and left 25 percent at Fort Bliss to receive and process parts. Every third day, Soldiers from each location would meet and exchange parts and personnel to maintain operations at the supply point. It was the safest and fastest way for the unit to maintain and sustain operations. It was clearly unconventional, but an acceptable and efficient initiative to keep the operations of the battalion moving.

Multi-echelon training of the unit was planned for the air defense operations, but the Soldiers quickly learned that out of necessity several other echelons of the battalion needed to be employed to accomplish the mission. The span of control at the battalion headquarters was stressed by the tyranny of distance and the complexity of dealing with logistics and technical challenges. This forced some key training to satisfy three specific multi-echelon training efforts. First, the battalion had to tackle "conduct expeditionary deployment operations" which, as identified earlier, was a significant hurdle with the distance, span of control and environmental conditions. Second, at the next echelon, the fire units had to occupy new sites and conduct force projection operations. The third echelon at the fire platoon, the unit trained to continue air battle management on an aggressive cycle, comparable to theater deployment.

As planning progressed they found associated training for expeditionary operations at subordinate echelons were not regularly practiced. For example, Headquarters and Headquarters Battery mission essential supporting task was "establish a field kitchen." They found quickly that a ration cycle of hot meal- Meal Ready-to Eat- hot meal for 35 days would require significant resources to sustain and maintain in an expeditionary environment. That drove them to train several other supporting tasks such as field sanitation and fighter management.

Pfc. Nicholas Huffman, left, and Spc. Ceidee Gulzenski, right, both from D Battery, 3rd Battalion, 43rd Air Defense Artillery Regiment, 11th Air Defense Artillery Brigade, load a Patriot Launching System while in military operational protective posture level 4 at Marine Corps Air Station Yuma Oct. 8, 2016. It is necessary for air defenders to practice with the Patriot system in all operating environments in case of real-world missions. (Courtesy photo)

They learned multi-echelon training cannot exclusively be air defense operations in an expeditionary environment. As a tactical battalion, battery and battalion retransmission operations and field maintenance also tested their capabilities and level of training. These are only a few example of how they trained and employed each team, section and platoon within the battalion.

When the operations process, disciplined initiative and the multi-echelon training could not address the multitude of variables challenging the air defenders at Yuma, they had to result to more field craft. That is not to say we omitted challenges in our planning process, but some adjustments to plan once on ground demanded we implement some. The first successful field craft initiatives were the implementation of field showers and hygiene stations. The distance between the Patriot sites and reliable hygiene facilities proved too extensive to conquer on a daily basis with operational requirements. Therefore, with some ingenuity at the staff- and battery-level, the battalion established its own shower facility at the main logistics supply area (LSA). The Marine engineer vertical construction platoon built a fully functional, piped and stalled shower facility for the Patriot unit. The facility was operated and supported by the chemical, biological, radiological, and nuclear (CBRN) section with the use of the unit's M26 decontaminating apparatus (senator and blivet). The facilities operated off of water delivered by the distribution platoon and serviced all Soldiers in and around the LSA for the duration of the operation. Through some quick thinking, design and problem solving, the CBRN team operated the facility with organic equipment safely and within environmental compliance for the entire operation.

After they retrograded to Fort Bliss and had time to reflect on the mission and conduct the after action review, the Soldiers realized they accomplished the unit and test objectives, but more importantly, and unforeseen to all of them, they developed leaders.

They used the operations process, disciplined initiative, multi-echelon training and field craft to prepare and solve issues on ground as much as they could. However, as they wrote the awards, handed out the coins and passed out the high fives, the leadership realized it was junior noncommissioned officers, young lieutenants and first-term Soldiers who learned the most. For each problem, issue or real life struggle facing the Soldiers while at Yuma, one of those individuals stood up and fixed it. Some will say this is something Patriot battalions have always been able to do – others would argue this was an eye-opening experience for 70 percent of the battalion across all grades and experiences and it is my recommendation to continue these type of missions. Leaders were developed through field circumstances, extremes stresses and tactical challenges. The 378 personnel executed this mission across a 50 square kilometer area of operations continuously for 32 days and we proved this battalion can deploy, fight and win in any environment if necessary.

Lt. Col. Scott Mclellan is the 3rd Battalion, 43rd Air Defense Artillery Regiment commander.

Sgt. Rodger D. Vu, top, petroleum supply specialist, 3rd Battalion, 43rd Air Defense Artillery Regiment, "Legion," 11th Air Defense Artillery Brigade, gauges the fuel tanker and Spc. Malcolm Alfred, center, Patriot launching station enhanced operator and maintainer, Legion Battalion, ensures the connections are not experiencing any leaks while refueling at Marine Corps Air Station Yuma Oct. 27, 2016. The mission to Yuma was to support the Weapons Tactics Instruction and to test the newest post deployment build against an air-breathing threat. (Courtesy photo)

How to develop advanced targeting and minimize Army target development gaps

By Col. David Pierce, Chief Warrant Officer 3 Sean Schmitt, Chief Warrant Officer 2 Michael Carney, Chief Warrant Officer 2 Rafael Fernandez and Chief Warrant Officer 2 Chad McFall

> "Talent hits a target no one else can hit; Genius hits a target no one else can see."
>
> -Arthur Schopenhauer

As the U.S. military reduces its numbers, so too does its capabilities by service. The Chairman of the Joint Chiefs of Staff provides specific directives on how to conduct basic, intermediate, and advanced target development. The U.S. Navy and U.S. Air Force have pioneered these three levels of development, but the U.S. Army has not. The outcome of a reduced force is that the Army would need to add this capability in order to support joint targeting efforts as the lead in unified land operations (ULO).

Target development is an all-source analysis, assessment, and documentation process used to examine potential target systems and identify and characterize entities that, when engaged, support the achievement of the commander's objectives. In a resourced constrained environment of limited growth, how do we educate, equip, and organize our force to be able to meet the CJCS requirements while also attaining joint and interagency accreditations, qualifications, and certifications? Which warfighting function should be the proponent for each level of development? What echelons, grades, and military occupational specialties need this as part of their formal and unit-level training?

The year 2011 saw change in Army doctrine detailing how we as an organization fix and shape the battlefield to defeat an ever-evolving enemy deep into the 21st Century. Army Doctrine Publication 3-0, "Unified Land Operations," provides a common operational concept for a future in which Army forces must be prepared to operate across the range of military operations, integrating their actions with joint, interagency, and multinational partners as part of a larger effort.

When it comes to the Army targeting process, the Army Techniques Publication 3-60 addresses how decide, detect, deliver and assess (D3A) methodology enhances targeting and helps support the overall concept of ULO via the Army's two core competencies – combined arms maneuver and wide-area security. D3A is a methodology, which optimizes the integration and synchronization of maneuver, fire support, intelligence, mission command, and information related capabilities from task force to corps-level operations. D3A also interfaces with the joint targeting cycle, military decision-making process, and operations process. While the D3A methodology makes sense and works well with conventional Army forces worldwide, it still at times struggles to answer the mail when it comes to nesting with joint doctrine and standards at the brigade combat team (BCT) and above echelons.

The Army's decentralized approach to targeting has created training and equipment standardization gaps that affects the planning, synchronization, and execution within the D3A methodology, resulting in a lack of clearly defined doctrinal procedures to effectively develop and engage targets within the area of operations. Within the realm of targeting in the Army, some analysis will yield significant gaps on how the Army conducts targeting to support the joint environment versus how our sister services in the form of the Air Force and Navy conduct targeting.

Major gaps within the Army targeting process display that:

- There is not clear Army doctrine detailing the list of supported and supporting personnel involved in the targeting process.
- Target material production (TMP) is not defined in Army doctrine.
- No Army standard for databasing targets (Modernized Integrated Database is the joint standard).
- No Army standard for electronic target folders (ETF).

Targeting is a commander's process, which makes the commander the supported entity, and all other staff personnel the supporters. Regardless of who is responsible for the targeting process, this individual must have support of all coordinating, special, and personal staff members, even without tasking authority. In order to participate in specific aspects of the joint targeting cycle, individuals must be trained, qualified, and certified (e.g. weaponeering, target coordinate mensuration, collateral damage estimation).

Target development standards

Normally, basic target development begins after diligent intelligence research and target system analysis (TSA). Basic target development can begin the process of identifying, locating, describing, functionally characterizing, and subsequently data basing entity-level target details. Basic target development analysis is required for all target development nominations (TDNs). When complete, basic target development will provide sufficient justification to assign the entity a unique entity identification (EID) if one does not already exist. An

EID is a unique alphanumeric character set assigned to an entity for the purposes of unique identification. All entity-level target development data correlates to an EID. Once an EID is assigned, the joint force tracks further development of these TDNs (i.e., via a target development nomination list.[1]

Intermediate target development completes characterization requirements for Phase Two (target development and prioritization) of the joint targeting cycle and ensures the entity qualifies as a candidate target and can be vetted. (Note: Intermediate target development and intelligence community vetting are NOT required for military units, personnel, and equipment that by their nature and purpose clearly perform a military function and are governed under general military intelligence production rules).[2]

Advanced target development completes the target characterization process and defines the minimum intelligence necessary to plan for effective target engagement. It normally occurs after a target has been validated to the Joint Target List/ Restricted Target List for planning by a target validation authority.[3]

Electronic targeting folders

Target development standards are the foundation base of ETFs, and are standardized under CJCSI 3370.01B. Unified commands, sub-unified commands, joint task forces (JTF), or subordinate joint force battlespace owners have the responsibility (inherent or delegated) to produce TSA, ETF, and target lists.

Universal Joint Task List TA 2.1 outlines the process of how to produce and maintain ETFs containing textual/ graphical target information within the outlines of manuals Joint Publication (JP) 3-60, Joint Targeting, Chairman of the Joint Chief of Staff Instructions (CJCSI) 3160.01B, No-Strike and the Collateral Damage Estimation Methodology, CJCSI 3370.01B, Target Development Standards, Chairman of the Joint Chief of Staff Manual 3314.01A, Intelligence Planning, and Defense Intelligence Agency (DIA) Instruction 3000.002, Critical Elements Handbook. ETFs facilitate the targeting process. ETFs contain target intelligence and related materials prepared for planning and executing action against specific target. Target developers create an ETF via a web-based ETF application for each target on the Joint Targeting List (JTL), to include vetting/ validation data and any identified potential collateral damage concerns or collateral effects associated with the target. The ETF web service is both a production interface for local and community intelligence databases, and a means for users to query for ETFs.

ETF standards provide a common basis for documenting the target development process. ETF standards improve efficient and expedient communication and the sharing of basic target data such as identity, location, and functional characterization across the broader targeting and analytic communities. ETFs are standardized to facilitate both federated production and seamless use by forces operating across domains and geographic theaters of operation. ETFs should constantly evolve to meet current and future planning, training, and operational targeting requirements.

Standardizing target folders in the Army will increase efficiencies and greatly reduce duplication of effort across Department of Defense. Each ETF has eight general context categories: heading, target summary, supporting materials, capabilities analysis support, assessment, associated/ collocated, objectives and guidance, and folder notes/ other related information. A complete ETF combines target data and target materials in a collaborative, non-duplicative environment whenever possible, and is fully accessible to authorized organizations. The Army does not have a standard for creating, updating, or managing targets. Several systems exist that may be able to provide this collaborative function. Standard ETFs include:

- Description (BE number/significance statement)
- Expectation statement
- Collateral damage estimation
- Imagery
- Weaponeering recommendation
- Target coordinate mensuration
- Remarks

As stated prior, TMP is the conduct of target coordinate mensuration (TCM) to produce target materials in support of deliberate and dynamic targeting. Target materials are graphic, textual, tabular, digital, video, or other presentations of target intelligence primarily designed to support operations against designated targets by one or more weapon(s) systems. Target materials include target coordinate data for electronic target folders in databases like the Modernized Integrated Database (MIDB). The mensuration process for MIDB producers ends when the derived coordinate is entered into MIDB.[4] While target material is defined in JP 3-60, TMP is only defined in CJCSI 3505.01B and National Geospatial-Intelligence Agency concept of operations (CONOPS). TMP is also defined in Army Target Coordinate Mensuration CONOPS, yet it is not conducted within the Army; therefore making the process of producing joint standard ETFs much more difficult. Target mensuration only (TMO) is the other subset of TCM used for dynamic targeting, therefore not officially accepted within the joint channels when it comes to providing mensurated coordinates for target graphics.

Target development is an all-source analysis, assessment, and documentation process used to examine potential target systems and identify and characterize entities that, when engaged, support the achievement of the commander's objectives.[5] In a resourced constrained environment of limited growth, how do we educate, equip, and organize our force to be able to meet these CJCS requirements while also attaining joint and interagency accreditations, qualifications, and certifications? Which warfighting function should be the proponent for each level of development? What echelons, grades, and military occupational specialties need this as part of their formal and unit-level training?

Currently, the Army Targeting Center (in coordination with the Army Targeting Enterprise and the Military Targeting Committee) is conducting analysis to bridge this operational level gap as the proponent to the joint community. However, the existing void limits providing commanders the best means of meeting joint intelligence requirements and recommending the best means of lethal and non-lethal effects against targets. This article's analysis intends to educate Army senior leadership on target development standards, existing resources to close development gaps, current targeting initiatives by two divisions, and recommendations for the Army's way forward.

1 CJCSI 3370.01B, Target Development Standards, May 6, 2016, page D-B-1

2 CJCSI 3370.01B, Target Development Standards, May 6, 2016, page D-B-3.

3 CJCSI 3370.01B, Target Development Standards, May 6, 2016, page D-B-8.

4 CJCSI 3505.01B, Target Coordinate Mesureation Certification and Program Accreditation, Jan. 10, 2013, page 3.

5 CJCSI 3370.01B, Target Development Standards, May 6, 2016, page B-5.

Way ahead for 2nd Infantry Division Artillery

Second Infantry Division Artillery became certified as a Force Fires Headquarters (FFH) on Oct. 8, 2015 following completion of Warfighter 16-01 conducted in the Republic of Korea under external evaluation by Operations Group A, Mission Command Training Program. Analysis of the training path to certification yielded key decisions which are discussed below. The effects of these decisions directly enabled this DIVARTY to be the first in the Army to reach certification.

DIVARTY analyzed the associated operations plans and time phase force deployment data that justified its mission forward with the 2nd Infantry Division (currently realigned as the 2nd Republic of Korea-U.S. Combined Division, or 2nd ID/RUCD). Following completion of three Department of the Army-directed Mission Command Systems Integration Exercises, the DIVARTY commander focused concerted staff functional training on the initial 35 personnel

Top: Figure 1. An example of a target development nomination list. Middle: Figure 2. Another example target development nomination list. Bottom: Figure 3. A

	Target Type				
Target Development Element	**Facility**	**Individual**	**Virtual**	**Equipment**	**Organization**
Identification	BE & O-Suffix	EID	EID	EID	Unit ID/EID
Location	GEOCOORDS	GEOCOORDS, Last known location	IP Address, GEOCOORDS, Last known location	GEOCOORDS, Last known location	
Function	Category Code	Function Code			
Significance	Facility Significance Remark	Target Significance Remark			
Facility Description	Facility Description Remark	Not applicable to these target types			

	Target Type				
Target Development Element	**Facility**	**Individual**	**Virtual**	**Equipment**	**Organization**
Significance (cont.)	Target Significance: Addresses the target's effect to the target system	Completed during basic target development			
Target Description	Describes recognizable attributes of the target entity				
Characterization	Elaborates on assigned category/function code(s)				
Expectation	Describes why engaging the target entity should affect the target system				
Target Elements	Those elements necessary for the target to perform its primary function				
Source Documentation	List of source data, to include serial numbers of associated reports				
Collateral Damage Considerations	Describes collateral concerns, environmental or population density concerns in the area surrounding the target entity, and second and third order effects on infrastructure and other non-physical entities				
Intelligence Gain and Loss	Describes potential gains or losses resulting from affecting a target				

	Target Type				
Target Development Element	**Facility**	**Individual**	**Virtual**	**Equipment**	**Organization**
Weaponeering Solutions	Determines the quality of lethal or nonlethal weapons required to achieve an effect on the target				
Aimpoint Selection	The appropriate JDPI to engage		The appropriate non-lethal reference point to engage	The appropriate JDPI to engage	N/A
Collateral Damage Estimation	Collateral Damage Estimate		Collateral Effects	Collateral Damage Estimate	N/A

identified to serve as early entry deployers and FFH capability. Staff training focused on building competency and understanding in the FFH core essential tasks and drilled these tasks from March through October in 2015. As proficiency in teammates grew, the DIVARTY leadership built functional depth into this trained core group to manage individual operational tempo and balance battalion training-readiness oversight. Concurrent with this home station training came overseas deployments in support of exercises Key Resolve 15 (KR15), Ulchi Freedom Guardian (UFG15) and culminated with WFX 16-01. Each exercise had focused training objectives that built out the functional proficiency with the variety of mission sets assigned to 2nd ID/RUCD.

DIVARTY utilizes the CENTRIX-K link in its headquarters to remain mission focused with 2nd ID/RUCD. Weekly, DIVARTY Fires effects coordination cell, operations and intelligence conducted via video-teleconferencing and Command Post of the Future updates with 2nd ID/RUCD Fires, G3, G2 and G7 personnel. Akin to the Joint Special Operations Command model, the DIVARTY never "unplugged" from the forward division. This enables concurrent planning, constant communication with division, 8th Army and the 3rd Battlefield Coordination Detachment, daily management of named ETFs, and a continued oversight of the division Fires targeting elements (lethal and non-lethal effects) which contributed to constant refinement and improvement to the division targeting process when the DIVARTY is not physically co-located on the peninsula.

When KR15 occurred during March 2015, 2ID/RUCD established the DIVARTY as the FFH for the division. The unit learned how to organize field artillery (direct support/ground support) to support the division's operational mission. At endstate, the DIVARTY established and validated the division's targeting process along its three lines of targeting; integrated the weapons of mass destruction (WMD) fusion cell and interagency partners into the targeting process; and validated the joint FIRES linkage from division to battlefield coordination detachment from planning through execution of the air tasking order. Upon completion, the division commander assessed the unit as validated.

DIVARTY assumed lead in the Fires warfighting function (WfF) for the division during UFG15 in August 2015. At endstate, the DIVARTY provided mission command of over nine direct support field artillery battalions, one FA brigade and associated sensors supporting the BCT and division while ensuring constant support to the ground combatant commander; improved the peninsular targeting process by adopting CJCS joint targeting standards; and refined the counterfire tactics, techniques and procedures to enable rapid clearance of Fires (air/ground) by, with, and through the RoK landowning corps and division. Upon completion, the new division commander reaffirmed the unit's validation.

Second ID/RUCD Warfighter 16 (WFX 16-01) occurred September to October 2015. This was the DIVARTY certification exercise directed by the Department of the Army and Forces Command. DIVARTY validated the division counterfire process, validated division and revamped 8th Army targeting process using CJCS joint targeting standards (1st Divisional unit in the Army to convert); validated the targeting process for deliberate and dynamic actions including WMD Master Site List (WMSL) specific, high value individual, and North Korean People's Army targeting. Successful validation of the division and 8th Army targeting process enabled division operations throughout deep-shaping, close, and rear support areas.

DIVARTY's integration into the division enabled the execution of the D3A methodology, and eventually mission success-

Figure 4. A summarization of the DIVARTY's training and certifications leading to its validation as 2nd IDRUCD FFH.

	Training	Certification	Validation
S2 Intel	• IPB products • DCGS-A training • Geospatial Work Station (GWS)	• Intel support to situation development. • Processes for all-source intel ops. • DCGS-A GWS training.	• 2D DIVARTY participated in KR15 with Combined 2D Infantry Division at the Republic of Korea on MAR 15. • Implemented Precision Fires workstation. • Qualified operators in Weaponeering, TMO, and CDE. • Enhanced quality of production and utilization of TMFs alongside 2ID G2. • Joint standard Target Graphics introduced and utilized for the first time in 2ID history. Maintained target graphics IAW CJCSI 3370.01B. • Decentralized sensor control of all 2ID sensors. • Established LNO team focused on liaison between 2ID DIVARTY's deliberate target nominations and pushing ASRs to USAF assets.
S2 TGT	• Target Mensuration Only (TMO) • Electronic Targeting Folders (ETFs). • Target Material Folders (TMF) development.	• Certified in TMO via I Corps TMO Cert Course. • One week course taught by TMO certified instructors via United States Army Field Artillery School (USAFAS).	
S3/FSE	• Weaponeering • Collateral Damage Estimation (CDE) • ETFs • Air Support Requests (ASRs) via AFATDS • Target Sync Matrix • Target List Worksheet • TMF development • MCTE • TOCEX • JADOC/AFATDS certifications	• Certified in Weaponeering and CDE by certified instructors via USAFAS. • Proficiency training conducted at Red Leg Park at 2D DIVARTY. • Proficiency training for Target Graphics and ASRs with counterparts from Special Operations forces and 5th ASOS units on Joint Base Lewis-McChord.	
COUNTERFIRE	• De-centralized sensor management. • Cueing and maintenance schedules • Pattern Analysis • Radar coverage • TMF development.	• Counterfire operations • Monthly cross-training with CFOs from organic BCTs and higher HQs.	

es through targeting working groups and boards. In addition, the implementation of the unit-configured Advanced Target Development Workstation provided the 2nd ID/RUCD commander with the best course of action in terms of providing the most capable means of Fires on various objectives, thus achieving the commander's guidance and desired effects on the battlefield. Through the division's targeting process, DIVARTY integrated WMSL fusion cell and interagency elements to conduct holistic targeting on a complex threat while simultaneously validating the JFIRES linkage from division to BCD thus ensuring the desired effects were prosecuted against targets.

The Figure 4 summarizes the DIVARTY's training and certifications leading to its validation as 2nd ID/RUCD FFH.

Training gaps within Army target development

Target material production training in the Army does not exist. Without a program of instruction (POI) in place, this trend unfortunately will continue. It is imperative that a POI for TMP be developed. We must gain an understanding and collect training material to produce Army TMP training and certification that meets joint standards.

Other centers of excellence (CoE) should identify personnel within their warfighting function (if any) that need this capability. Target material, including CDE, is dependent on an imagery analyst's ability to recognize the function and structure type of various targets and collateral concerns. Therefore, it is imperative that imagery analysts be part of the targeting process. Most CoEs agree that the training will benefit personnel, but we must see where the training is required.

The Collateral Damage Methodology (CDM) encompasses the joint standards, methods, techniques, and processes for a commander to conduct CDE and mitigate unintended or incidental damage or injury to civilian or noncombatant persons or property or the environment. It assists commanders in weighing risk against military necessity and in evaluating proportionality within the framework of the joint operations planning process. In short, the CDM is a means for a commander to adhere to the law of war (LOW).

Due to the nature of operations and the potential strategic risk posed to the U.S. Government, due diligence is critical to ensure personnel are trained in the CDM. At the appropriate echelon of command, services will ensure service organizations/formations that deploy in support of combatant commanders have an organic CDE capability. Service roles and responsibilities include to ensure that personnel assigned to a service component position or billet that may require them to conduct CDE are qualified and certified as CDE analysts.

The Joint CDE Methodology is a team process that requires imagery analysts, CDE analysts, and a commander to conduct the process. Currently, the Fires Center of Excellence trains CDE analysts, but there is no Army or joint course that informs decision makers of proper procedures. This training is designed for leadership and not technicians or analysts, as the U.S. Army's Digital Training Management System identifies tasks to be completed. Rules of engagement will dictate many of the specifics for the analysts and the commander, so this training will focus on the outputs and standard decisions recommended within each product.

These identified training gaps also lead into leadership and education gaps which are critical to target development. For instance, a few years back Joint Operational Fires and Effects Course (JOFEC) was terminated. It was the only joint Fires/targeting training available in the Army outside of 131A professional military education (PME). Currently the Army Targeting Center is in the process of standing up the JOFEC and is receiving feedback from FORSCOM units as to what degree of subjects and topics should make up the POI of the course. The Joint CDE Methodology is a team process that requires imagery analysts, CDE analysts, and a decision maker to conduct the process. Commanders must have an understanding of TMP and the CDE process to make an informed decision.

Additionally, there is no approved software application for conducting targeting. The Army has not adopted a software application that facilitates the communication and sharing of target material with other services, government agencies, and MIDB. Combatant commands (CCMDs) use various mensuration and database tools that are not interoperable, nor do the certifications/qualifications transfer between each other.

Existing resources

The resources available, to close the gap of basic and intermediate target development, are references (Army, joint, CJCS, DIA, DoD, etc.), functional training (Joint Intermediate Target Development Course), and personnel (All-Source Intelligence analysts/technicians and Geospatial Intelligence analysts/technicians). The resources available to close the gap of advanced target development are these same references, functional training (NGA Accredited Target Material Production Course, Joint Staff Accredited CDE Course, Joint Staff Applications Course or Army Weaponeering Course), and personnel (field artillery targeting technicians/fire support specialists for weaponeering solutions/CDE and Geospatial Intelligence Analysts/technicians for aimpoint selection).

The inherent problem with these resources is that cost benefit analysis and the DOTMLPF-P (Doctrine, Organization, Training, Material, Leadership and Education, Personnel, Facilities and Policy) systems the Army have in place are not efficient enough to support our maneuver commanders in streamlining this process without relying on external service or agency assistance. Requirements exist, but do not progress when they impact each separate budget (HQDA, TRADOC, individual CoEs, etc.). If the capability is developed and sustained in the Army, it would reduce costs in other places for the DoD. There are precedents in the past 15 years to support the requirement for engaging the correct targets with the appropriate effects while mitigating fratricide and harm to non-combatants and collateral concerns. The largest U.S. service and the land component commanders should not be lacking these capabilities.

Current initiatives

Second ID/RUCD has been able to retrieve basic and intermediate products from DIA's Cornerstone website which links to the National Production Workstation, but sometimes those electronic target folders are incomplete which makes conducting advanced target development challenging but not impossible. What it creates are requests for information that the Division G2 is untrained to formally request for further vetting. The gap for the G2 Staff is a professional military education foundation to qualify their analysts/technicians in target development requirements.

To support 2nd ID/RUCD's mission, DIVARTY created an advanced target development (ATD) cell that reviews DIA ETFs (based on division's objectives against enemy facilities and equipment) and creates target graphic folders to the CJCS/CCMD standards for lethal effects. Individuals

within the ATD cell are qualified in each facet of ATD, less joint desired point of impact (JDPI)/target graphic creation. To mitigate this shortcoming, the targeteers are all qualified in the Army's TMO course that certifies individuals in generating accurate target locations. Because ATD does not fall under the intelligence WfF in the U.S. Army, as it does in the Navy and Air Force, this creates a gap between intelligence and Fires.

To sustain this capability and begin educating the force, 7th Infantry Division approved DIVARTY's plan to provide ATD proficiency training to targeteers across Joint Base Lewis-McChord, Wash., that meet the requisite qualifications (with one exception of using TMO in lieu of TMP). In May 2016, the DIVARTY ATD cell piloted a course to personnel from DIVARTY, 17th Field Artillery Brigade, and I Corps. The feedback at the end of the course was very positive and provided a path for future sustainment training. The following are some notes from the end of course critiques:

- "This program or class needs to be accredited and pushed Army-wide. I would recommend this to every fire supporter."
- "First time a course pulled CDE, TMO, and weaponeering to train the 'so what' of each system. Many of the personnel had received formal training on one or more functional area but had not utilized the tools to produce target graphics."

Recommendations

Training the fundamentals of advanced target development should initially begin at the BCT. The BCT is the first combined arms echelon fully resourced and responsible to conduct target development. That does not mean that a BCT has to be a responsible producer (RESPROD) to the MIDB. Intelligence and Fires personnel should know how to format the ground truth information to higher headquarters for intelligence gathering and submit target nominations all in the correct format. Having grown the foundation among the BCT targeteers, the complete ATD certification should occur at the division and corps so that these JTF-capable, expeditionary headquarters are better able to integrate into existing theater targeting procedures. The overall responsibility for target development always rests with the targeteer developing the target; however, responsibility for electronic target record population in MIDB is divided between RESPRODs and targeteers.[1]

We recommend that ATD certification be shared across intelligence and Fires WfFs. To mitigate shortcomings fire supporters and targeteers currently have with respect to JDPI/ target graphic creation, recommend that 35G/350G PME seek NGA accreditation to qualify those personnel in target material production which then authorizes these military occupational specialty to generate JDPIs and JDPI graphics (this accreditation can later be derived from the Army Targeting Center once they have the capability). With respect to MOS 131A/ 13F PME, recommend that FCoE consider combining weaponeering and CDE qualification to ensure all operations (Fires) personnel are capable of calculating weapons and collateral effects for surface, rotary and fixed-wing Fires.

With respect to basic and intermediate target development, recommend that this capability should be trained in PME for 35Fs, 35Gs, 350Fs, and 350Gs due to their inherent responsibilities for all-source and Geospatial Intelligence. Additionally, that this PME receive DIA accreditation for that portion of their formal education and sustained through unit-level proficiency training.

Finally, we recommend that the Army Targeting Center work with the Joint Staff to transition the CDE Course into an automated version with the purpose of qualifying CDE analysts in the methodology, conducting the CDE automations process, and creating CDE graphics in accordance with CJCS/ joint standards.

Joint efforts

We are inherently a joint force and with that comes the shared growth and reduction as necessary. As we scale capabilities, we must look toward the future of each component command's existing capabilities and limitations. With having one of the most talented generations of Soldiers, we may need to modify existing targeting programs throughout our Army to prepare for the next major conflict. Out of necessity to provide the 2nd ID/RUCD an advanced targeting capability to meet its mission set, the DIVARTY, in concert with the G2, 2nd ID/ RUCD, found what may become an Army efficiency in the formal creation, training and certification of an advanced target development cell within its organic force structure.

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1 CJCSI 3370.01B, Target Development Standards, May 6, 2016, page D-2.

An Israeli M60 lays destroyed by anti-tank weapons. (Courtesy photo)

The end of immediate suppression

By Capt. S. Grant Sepp

It is time for the field artillery to call "end of mission" on immediate suppression. The original reason for the suppression mission — to defeat incoming anti-tank missiles — is no longer relevant. The definition of suppression is vague, its purpose is indistinct and the assessment of its effects is subjective. This is not the case for any other fire mission, such as adjusting fire onto a target to destroy it, laying smoke to screen an enemy's view, or illuminating the battlefield.[1]

An observer reporting "target suppressed" as a battle damage assessment is only noting that the target was shot at and nothing more. Artillery observers are currently trained to call for suppression Fires on everything from dismounted infantry in defilade to tanks in the open.[2] For the maneuver commander counting on indirect Fires to destroy enemy targets, suppression provides an uncertain effect. A report of "target suppressed" is more wishful than precise, and neither the maneuver nor Fires commander learn anything to inform their follow-on orders.

Doctrinal manuals do not helpfully define suppression. The glossary of FM 3-90-1, "Offense and Defense," explains suppression as "a tactical mission task that results in the temporary degradation of the performance of a force or weapon system below the level needed to accomplish its mission."[3] This eclectic view allows either friendly or enemy units to be the suppressed entity. The 1991 FM 6-20-20, "Fire Support at Battalion Task Force and Below," suggested suppression "limits the ability of the enemy personnel in the target area to perform their jobs."[4] ATP 3-09.23, "Field Artillery Cannon Battalion," says suppression is meant to "cause the enemy to

1 U.S. Army, FM 3-09, Field Artillery Operations and Fire Support (Washington, D.C.: HQDA, April 4, 2014), para 1-200, "Fire Mission." Note: Suppression of Enemy Air Defenses (SEAD) is not related to the Immediate Suppression mission; see U.S. Department of Defense, JP 3-01, Countering Air and Missile Threats (Washington, D.C.: Joint Staff, Feb. 5, 2007).

2 U.S. Army, ATP 3-09.30, Techniques for Observed Fire (Washington, D.C.: HQDA, Aug. 2,2013), chapters 3 to 7.

3 U.S. Army, FM 3-90-1, Offense and Defense, chg. 2 (Washington, D.C.: HQDA, April 13, 2015), para. B-66.

4 U.S. Army, FM 6-20-20, Tactics, Techniques and Procedures for Fire Support at Battalion Task Force and Below(Washington, D.C.: HQDA, Dec. 27, 1991), para. 1-2c.

A Russian AT-3 Sagger 9K11 Malyutka anti-tank missile. (Courtesy photo)

seek shelter."[1] These ambiguous definitions invite confusion and criticism.

As for effects, FM 3-09, "Field Artillery Operations and Fire Support," states "Suppression, in the context of the computed effects of field artillery Fires, renders a target ineffective for a short period of time producing at least three percent casualties or material damage."[2]

How an artillery observer variously measures "a short period," enemy job performance or degree of sheltering, or single-digit percentages of enemy losses during combat is not explained. There is no uniformity or common understanding in reporting.

This lack of clarity regarding the purpose of suppression raises several questions. What are observers seeking to achieve when they call for "immediate suppression?" What do they mean when they render a battle damage assessment of "target suppressed"? How is a suppression mission better than an adjust fire or fire for effect mission? Students of the history of American artillery will note there was no such mission as "suppression" in World War II, the Korean Conflict, or the Vietnam War. A review of the origin of the suppression mission will explain what it was once meant to do on the battlefield.

The immediate suppression mission originated during the 1973 Yom Kippur War between the Egyptian-Syrian alliance and Israel. The Egyptians began the war with a surprise multi-corps attack across the Suez Canal. After quickly breaching the Israeli Bar-Lev Line all along the canal, the Egyptians — instead of continuing across the Sinai Peninsula — advanced only four kilometers, stopped and dug in. The Israelis responded with the tactic they employed in the 1967 Six-Day War by sending tank-pure formations across the desert, racing ahead of their infantry and artillery, with air force fighter-bombers providing fire support. These bold armored thrusts had brought them spectacular success in 1967.[3]

The Egyptians, however, had learned from their mistakes in the 1967 war. They carefully planned and rehearsed the rapid emplacement of Soviet-style defensive belts, saturated with a full array of anti-tank and anti-aircraft missiles. The galloping Israeli tank columns rushed into "fire sacks," and in a single day of combat, lost almost 500 of their U.S.-made M60 Patton tanks, without denting the Egyptian lines.[4] The Egyptian success was largely due to their canny and lavish use of the portable version of the powerful Soviet AT-3 Sagger anti-tank guided missile. In the Sinai desert, the tank-busting Saggers and their highly-trained gunners numbered in the thousands.[5]

The stunned Israelis, back on their heels, had to immediately develop a counter-measure to the Sagger. While the desert battle continued, they analyzed the AT-3. Like the French/U.S. SS-10, it is a first-generation guided anti-tank missile, meaning the operator must visually track both his missile and his target through a periscope while flying the missile with a control joystick. The system is very sensitive and difficult to master. The Egyptians had taken pains to carefully select and train their Sagger gunners, who each made hundreds of practice launches on simulators.

As the Israelis studied the Sagger, they discovered it had several weaknesses. The missile launches upward with a plume of white smoke, and then trails black smoke as it flies, enabling a tank commander in an open hatch to acquire it visually. The missile flies at a relatively slow speed of 110 meters per second, meaning that a tank commander out at the missile's maximum range of 3,000 meters has almost 27 seconds to react. Another weakness is the Sagger gunner himself, who is exposed to fire while flying the missile. If the gunner is distracted and turns his head away from his periscope eyepiece for even a moment, he will lose sight of either his target or his missile, causing it to miss.[6]

Considering these vulnerabilities, the Israelis devised what would become known as the "immediate suppression" mission. Operationally, as their reserves moved to the front, the Israelis belatedly, but swiftly, built combined-arms teams of armor, infantry, artillery and engineers. Tactically, a single tank-company team in the attack received a full "dedicated battery" of 155 mm howitzers in support. The battery emplaced near the line of departure to shorten time-of-flight of their rounds, with direct communications to the team's forward observer (FO). The FO planned targets on likely Sagger launch positions on and around the team's objective, with simplified single-letter/single-number identifications. Each two-gun platoon laid on a target with an open sheaf, with these priority targets updated by the FO as the team advanced. Each howitzer was loaded and primed with high-explosive projectiles fuzed with variable time for a twenty-meter height-of-burst, firing maximum charge at low angle to further cut time-of-flight. These shortcuts were implemented to get rounds onto the Sagger gunner, before the Sagger missile reached its target.

During the movement to contact, when the team's FO

1 U.S. Army, ATP 3-09.23, Field Artillery Cannon Battalion (Washington, D.C.: HQDA, Sept. 24, 2015), paras. 6-1 to 6-6.

2 U.S. Army, FM 3-09, Field Artillery Operations and Fire Support (Washington, D.C.: HQDA, April 4, 2014), para. 1-19.

3 David Eshel, The Yom Kippur War (Hod Hasharon: Israel, 1982), p. 43, and Abraham Rabinovich,The Yom Kippur War: The Epic Encounter That Transformed the Middle East (New York: Schocken Books, 2004). For the Egyptian view, see Saad El Shazly,The Crossing of the Suez, rev. ed. (San Francisco, Calif.: American Mideast Research, 2003).

4 The loss of five hundred Israeli tanks was revealed in a Oc. 9, 1973 conversation in the White House among Israeli Ambassador to the United States Simcha Dinitz, his military attaché Gen. Mordechai Gur, U.S. Secretary of State Henry Kissinger, Deputy National Security Advisor Brent Scowcroft, and staff member Peter Rodman (Washington, D.C.: Declassified Transcript, George Washington University National Security Archive).

5 Michael J. Bradley, "Field Artillery Doctrine: Does it Support Maneuver Warfare?" (Ft. Leavenworth, Kans.: USACGSC, SAMS Monograph, Nov. 28, 1988), pp.11-14. The Egyptians deployed an average of 55 AT-3 Saggers per kilometer of defensive line, triple the number prescribed by Soviet doctrine.

6 U.S. Marine Corps, Soviet/Russian Armor And Artillery Design Practices: 1945-1995 (Quantico, Va.: Marine Corps Intelligence Activity, 1995).

saw a Sagger launch, he chose the closest priority target, and radioed only the words "Suppress (letter-number)." The battery fire direction center ordered "left (or center or right), fire." As the Sagger was still scorching its way toward a tank in the advancing team, the two 155 mm rounds would air-burst, hopefully within 200 meters of the Sagger gunner. If not hit outright, the gunner would duck from the thunder-crack of the two blasts, and lose his missile. A variation on this, depending on weather conditions, was firing white phosphorous with a point-detonating fuze set to "quick" on a closed sheaf, to blind the Sagger gunner.

As the tank-company team moved forward, the FO updated his active targets. The howitzer platoons laid on the new suppression targets with lanyards taut, waiting only for the command to fire. The FO didn't report if his target was suppressed or not, because of the speed of attack through the kill zone and the continuous Sagger launches. In any regard, the battery remained "dedicated" to the team, suppressing Sagger gunners, until the team took its objective. This enabled the Israelis to break through the Egyptian anti-tank defenses.[1]

The Israeli "immediate suppression" tactic was a success. After bringing up all their artillery into the fight, Israelis also re-learned to mass Fires on breakthrough points to breach the Egyptian defensive belts. In combination with other innovations and adaptations, the Israelis were able to return to the offensive at the canal. Heavy losses, immense ammunition expenditures, and physical exhaustion soon forced both sides to accept a truce, ending the war.[2]

The U.S. Army leadership, alarmed at the enormous Israeli tank losses, issued TRADOC Bulletin 1u in 1975, on countering anti-tank missiles.[3] Several divisional field artillery units also adopted the suppression mission in live-fire training in 1976, with the specific intent of replicating the Israeli tactic for defeating Sagger missiles by suppressing their gunners. Yet within a few years of the introduction of the suppression mission, improvements in systems and technologies rendered that mission obsolete.

Anti-tank missile technology has progressed in the 40-plus years since the Yom Kippur War, but the suppression mission has not. Weapons designers improved the survivability of missile gunners by moving them out of foxholes and into armored vehicles, while also building better simulators. The Soviets soon replaced the first-generation AT-3 Sagger missile with the 200-meters-per-second AT-5 Spandrel. Like the U.S. TOW, the gunner of this second-generation anti-tank missile only has to track the target and the missile guides itself to impact. Now, third-generation missiles allow the gunner to simply aim at a target, then "fire and forget." The Russian AT-15 Springer is shot from the unmanned turret of a tank destroyer, and rides a laser or radar beam to its maximum range of 6,000 meters at over 400 meters per second — faster than the speed of sound.[4] Electronic jamming is a better defense against such missiles.

An AT-3 Sagger anti-tank missile is fired during and exercise in 1973. (Courtesy photo)

Oddly, while suppression remains in field artillery doctrine, the dedicated battery which was essential to delivering immediate suppressive Fires is gone. The 1979 version of FM 6-20-1, "Field Artillery Cannon Battalion," described when and how batteries are dedicated to be "totally responsive to a maneuver company team" with their own "dedicated Fires net."[5] But by 2001, according to FM 3-09.21, "Tactics, Techniques and Procedures for the Field Artillery Battalion," a dedicated battery was expected to support a battalion task force, not just a company. Suppression was not listed in its task matrix.[6] In the current 2015 versions of ATP 3-09.23, "Field Artillery Cannon Battalion," and ATP 3-09.50, "Field Artillery Cannon Battery," there is no mention of the dedicated battery at all.[7] The key enabler of immediate suppression has long been discarded from doctrine.

In the past two-and-a-half centuries, the American Field Artillery has successfully evolved time and again to meet and overcome battlefield challenges. It will continue to change, incorporating new technologies, materials and ideas, to constantly improve delivery of Fires. By necessity and good sense, outdated tactics and obsolete equipment have been left behind. The original reason for suppression no longer exists, and the attempts at applying suppression to other targets since the Yom Kippur War have found no clear utility. It is time to retire immediate suppression from the fire mission list of the field artillery.

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1 Michael J. Bradley, Field Artillery Doctrine: Does it Support Maneuver Warfare? (Ft. Leavenworth, Kans.: USACGSC, SAMS Monograph, Nov. 28, 1988), p. 30; also, Dr. K. I. Sepp, interviewed by S. G. Sepp, June 1, 2016, U.S. Naval Postgraduate School, Monterey, Cal.

2 Jonathan House, Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organization (Ft. Leavenworth, Kans.: USACGSC, 1984), pp. 176-180.

3 trine, and Organization (Ft. Leavenworth, Kans.: USACGSC, 1984), pp. 176-180.

13. U.S. Army, TRADOC Bulletin 1u: Range and Lethality of US and Soviet Anti-Armor Weapons (Ft. Monroe, Va.: TRADOC, Sept. 30, 1975), at http://www.dtic.mil/dtic/tr/fulltext/u2/a392784.pdf

4 U.S. Marine Corps, Soviet/Russian Armor And Artillery Design Practices: 1945-1995 (Quantico, Va.: Marine Corps Intelligence Activity, 1995); and Zaal Tchkuaseli, "Khrizantema (AT-15 Springer)," athttp://www.military-today.com/missiles/khrizantema.htm; and U.S. Army, "TOW" at https://history.redstone.army.mil/miss-tow.html

5 U.S. Army, FM 6-20-1, Field Artillery Cannon Battalion(Washington, D.C.: HQDA, July 5, 1979), pp. 2-20 to 2-23.

6 U.S. Army, FM 3-09.21, Tactics, Techniques and Procedures for the Field Artillery Battalion (Washington, D.C.: HQDA, March 22, 2001), p.1-6.

7 U.S. Army, ATP 3-09.23, Field Artillery Cannon Battalion (Washington, D.C.: HQDA, Sept. 24, 2015), paras. 6-1 to 6-6; and U.S. Army, ATP 3-09.50, Field Artillery Cannon Battery (Washington, D.C.: HQDA, July 7, 2015). "Decentralized control" and "quickfire channels" are described, but not "dedication" of batteries to maneuver units.

In the next issue of Fires

May-June 2017, Cross Domain Fires: Now and in the Future. This issue will highlight the events and speakers of the 2017 Fires Conference. Topics include: winners of this year's Knox, Hamilton and Shipton awards; dedication of the 95th Reception Headquarters in honor of retired Gen. John Vessey; lessons learned from the Fires force (Combat Training Center through Warfighter).

The deadline for submissions is April 1, 2017. Send your submissions to usarmy.sill.fcoe.mbx.fires-bulletin-mailbox@mail.mil or call (580)442-5121 for more information.

1st Lt. Sarah Renforth, an Alexandria, Ala., native and battle captain for the Headquarters and Headquarters Battery, 1st Battalion, 43rd Air Defense Artillery Regiment, 69th Air Defense Artillery "Top Notch" Brigade, reads a wall of monitors in the battalion's tactical operations center during an operational readiness exercise, Jan. 23 in the U.S. Army Central Command's area of responsibility. Renforth and her crew must continue to communicate, type and battle track while wearing mission oriented protective posture gear. (Sgt. Brandon Banzhaf/69th ADA BDE)