

Fires



Expanding cross domain Fires

The Fires force doesn't fight from land only

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Fires

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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:

A Soldier of Field Artillery Squadron, 2nd Cavalry Regiment digs a firing position while emplacing a M777 towed 155 mm howitzer during Saber Junction 17 at the Hohenfels Training Area, Germany, May 13. (Spc. Danielle Carver/Viper Combat Camera)

Fires

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Glenn Glover, Joint Forward Observer Course manager, hands Maj. Paul Lester, British Artillery School, Joint Fires Branch senior instructor, a certificate after Lester passed the two-week course.

Interoperability is aim of US, UK armies

By Marie Barberea

One document. Two signatures. Two nations working together to fight as one artillery force. The United States Army signed a memorandum of understanding May 4 to work toward common goals with the British Army.

Maj. Gen. Brian McKiernan, Fires Center of Excellence commanding general, and Brig. Simon Humphrey, Officer of the Most Excellent Order of the British Empire, Headquarters Army, Head of Capability Combat Support, signed the document before heading into the last day of the Fires Conference at Fort Sill, Okla.

The bilateral vision statement was originally created in 2013 by the chief of staff of

the Army and signed in 2014. This was the first review of the unifying document after it was updated in June.

"There's no egos involved in this, it's just warfighting and how do we do it best together," said Col. Heyward Hutson, Field Artillery School assistant commandant.

British leaders visited the Fires Center of Excellence to discuss interoperability goals and issues within the respective armies.

"There's a lot of exciting changes in the Fires world. From structural changes, [divisional artillery] and development, to the move back to fighting in divisional fire, deep battle. We're doing exactly the same

in the U.K.," said Col. Mark Pullan, British Army Headquarters, Combat Support Capability Branch Joint Effects.

"We're all resource constrained, whether that is money, people, or time because the enemy has a vote and time isn't a luxury we have in many cases. If we can identify where our needs are common and we can exploit those commonalities, that will make us better in the future," said Lt. Col. (P) Nicholas Sargent, Army Targeting Center, Joint Integration chief.

Different areas of thought were dissected as to how the armies could take advantage of current cross-training opportunities and capabilities, fix gaps in interoperability



Brig. Simon Humphrey, Officer of the Most Excellent Order of the British Empire, Headquarters Army, Head of Capability Combat Support, and Maj. Gen. Brian McKiernan, Fires Center of Excellence commanding general, sign a memorandum of understanding May 4, that states the United Kingdom and United States will work toward greater Fires interoperability.

and ensure those gaps remain closed going forward.

"All of it will come down to training at some point, but you have to understand the aiming point of where you want to get to before you can figure out how to get there," said Pullan.

"From the U.S. perspective, the aspiration from both sides of the Atlantic is to have achieved an integrated state in the relationships with a brigade into division, division into core by 2025," said Sargent.

The British force is also trying to get away from relying on U.S. liaison officers to bridge technical and procedural gaps when the two armies are working together.

"The nirvana of NATO is we do everything together. We have standards and work to those standards," said Pullan. He added each country has industrial or fiscal restraints and therefore to equalize capabilities, one country has to take on more of the burden.

"The Americans are paying out in people just to do something that's about exchanging data. It's helpful having the liaison teams there because they're really capable individuals who do a brilliant job, but it's a hugely inefficient way to do business," said Pullan.

Currently the U.S. and the U.K. have similar rules of engagement and intelligence sharing agreements are broad and less restrictive compared to those with other NATO allies.

"In terms of classification, we are more open with the Brits than we are with many other countries. That causes less friction when you're trying to get to a specific mission, or operation all the way up to strategic objectives," said Hutson.

Hutson added that working with the British Army is the closest to "plug-and-play" as far as fighting together. He said the similarities between the two forces offer a sense of dependability.

"At least in my career, my lifetime, that reliability has never faltered with the U.K. It's never been in question. That's important when you look at what goes on globally," said Hutson. "Our strategic interests are the same. We work hand-in-hand."

Hutson said a good part of that trust begins with foundational training. For example, the U.K. has signed the joint terminal attack controller (JTAC) memorandum of agreement and therefore is mandated from a U.S. Joint Staff perspective to train to common standards.

Maj. Paul Lester, British Artillery School, Joint Fires Branch senior instructor,

completed Fort Sill's Joint Forward Observer Course May 4 to see if and how that training can be used for U.K. soldiers.

"There's clear value. The JFO course offers a more refined training model than a JTAC, which offers many advantages in time and money. A JFO can remain current using simulators whereas a JTAC has a live requirement. So there are some real attractions there," said Lester.

The JFO course is being viewed as a possible complementary capability to their current JTACs and as a progression from JTAC signalers to the higher-skilled JTACs.

Lester said before implementing any changes there are rippling effects to consider in training and doctrine to materiel support to retain the JFO skill.

Capt. James Hayes, JFO Program manager, said when coalition partners train alongside U.S. Soldiers, "It's like you're working with anyone else. It's easier to integrate them into battle."

The talks ended with the signing of the MOU, but Hutson said the cross pollination of the two forces will remain constant and consistent in the future.

"Because we are so similar, the sharing of ideas, the sharing of capabilities, capability gaps is extremely important as we move forward in a unified effort," said Hutson.

Soldiers from the 4th Battalion, 319th Field Artillery participate in a live-fire exercise called Summer Tempest. (Courtesy photo)





Preparing for an Artillery Systems Cooperation Activities exercise

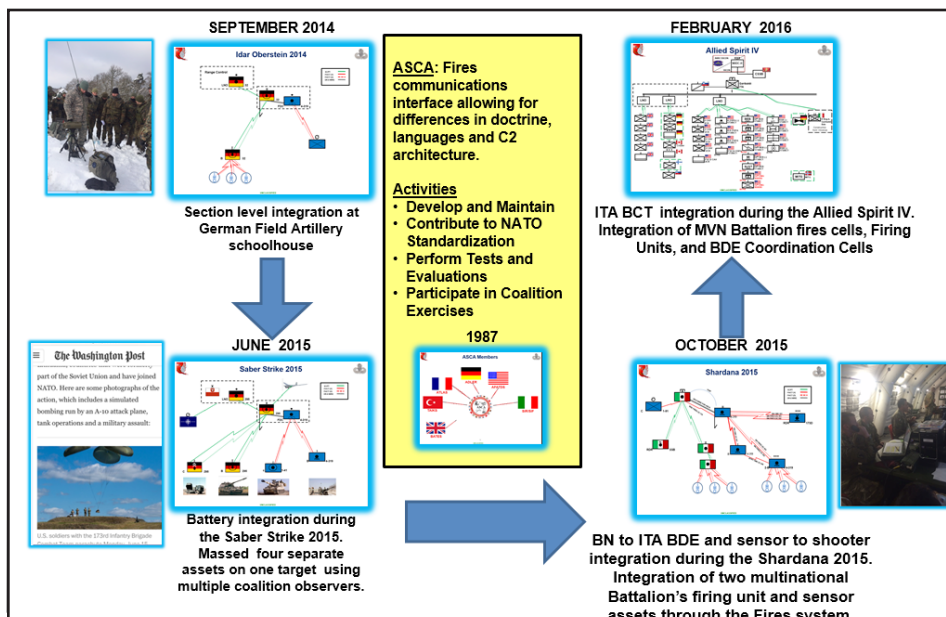
By Maj. Michael Centola and Capt. Nicholas Alexander

Fourth Battalion, 319th Airborne Field Artillery Regiment has participated in over seven NATO exercises and an additional 22 training events with countries utilizing the Artillery Systems Cooperation Activities (ASCA) system since September of 2014 (Figure 1). Garrisoned in Germany and part of the 173rd Infantry Brigade Combat

Team (Airborne), the location and mobility of 4-319th AFAR has afforded its paratroopers many opportunities to use the ASCA system. Properly preparing for and understanding ASCA prior to these exercises has allowed 4-319th AFAR and platoon fire direction centers (FDCs) to functionally integrate with U.S. allies and partners. This

article provides a planning guide to units expecting to conduct ASCA training with those allies and partners.

ASCA is a multinational fire support and artillery interface originally created by the United States, Britain and Germany. ASCA has expanded to include five nations with several more to sign on within the next



the program into their fire control systems (See Figure 1).

Understand systems

Proper preparation by battalion and platoon FDCs is critical prior to conducting an ASCA training exercise with a participating allied nation. Planners must understand the ASCA nation's artillery systems, capabilities, munitions and how their fire control system computes target effects. For example, in NATO Exercise Colibri 16, 4-319th AFAR partnered with the 11th French Parachute Brigade (Figure 2). The 4-319th AFAR FDC successfully sent and received fire for effect, at my command, and counter-fire missions. Friction occurred when attempting to have the French ATLAS fire control system send a precision fire mission since the French do not have a "like" munition in their inventory. Attempts to fix this problem involved changing the munition to Excalibur once we received the mission from the ATLAS, followed by changing the size of the target because the ATLAS always sends a 100 m X 50 m target. Yet, even after these changes and after sending the mission to the gunline, the ATLAS overrode the changes and kept the target 100 m X 50 m. The only solution was to copy down the grid from the ATLAS, deny the mission, then create a new fire mission in the AFATDS to send to the guns. Understanding the allied fire control system prior to the exercise facilitated in this quick troubleshooting by the battalion FDC.

It is important to understand that most European armies maintain their ASCA "team" at the battalion level. ASCA interoperability occurs from the communication of the battalion FDC to allies, and usually is not established below the battalion level. Foreign batteries do not maintain ASCA capability. When conducting an exercise, units need to ensure that the battalion FDC is tied into the allied tactical operation center for adjudicating targets down to the lower echelons. Additionally, be prepared to establish standard operating procedures (SOPs), particularly for counterfire. Foreign units either have a different counterfire SOP or do not train counterfire at all.

Prepare equipment

As part of the pre-combat checks and pre-combat inspections prior to deployment, ensure that each AFATDS box contains the necessary equipment to conduct a two-wire connection and a local area network (LAN) connection. The new AFATDS

	Members						Pending		
	France	Germany	Italy	Turkey	United States	Netherlands	Great Britain	Norway	Denmark
Communications									
2-Wire	X	X	X	X	X		X	X	
LAN		X		X	X	X		X	
Radio		X			X			X	
Caliber									
105mm					X		X		
120mm	X	X	X	X	X	X			
122mm				X	X				
155mm	X	X	X	X	X	X	X	X	X
MLRS	X	X	X		X		X		
Ammunition									
HE	X	X	X	X	X	X	X	X	
SMK	X	X	X	X	X	X	X		
IR-SMK		X							
ILLUM	X		X	X	X	X	X	X	
IR-ILLUM		X			X		X		
WP				X	X	X		X	
DPICM					X				
Special Munitions									
	GMLRS	GMLRS			GMLRS	Excalibur	GMLRS		
	BONUS	SMARt			Excalibur				
					PGK				

Bottom: Figure 1. The 4th Battalion, 319th Field Artillery's Artillery Systems Cooperation Activities progression. (Courtesy illustration)

Bottom: Figure 2. The Artillery Systems Cooperation Activities common operational picture. (Courtesy illustration)

few years. The purpose of the program is to provide an interface which establishes a common language amongst all member nations' fire support digital networks. Communication between multinational digital fire support networks permits maximum interoperability and expedites execution of calls for fire (CFF) between participating ASCA countries. For example, a French forward observer can place a CFF to an Italian field artillery headquarters, who can send

that fire mission to a Turkish artillery battery just as quickly as a call for fire serviced by French firing units. Current member nations and their systems include Turkey (utilizing TAIKS), France (utilizing ATLAS), Germany (utilizing ADLER), Italy (utilizing Sistema Informatico Fuoco) and the United States (utilizing Advanced Field Artillery Tactical Data System, AFATDS). The United Kingdom, the Netherlands, Norway and Denmark are currently working to adopt

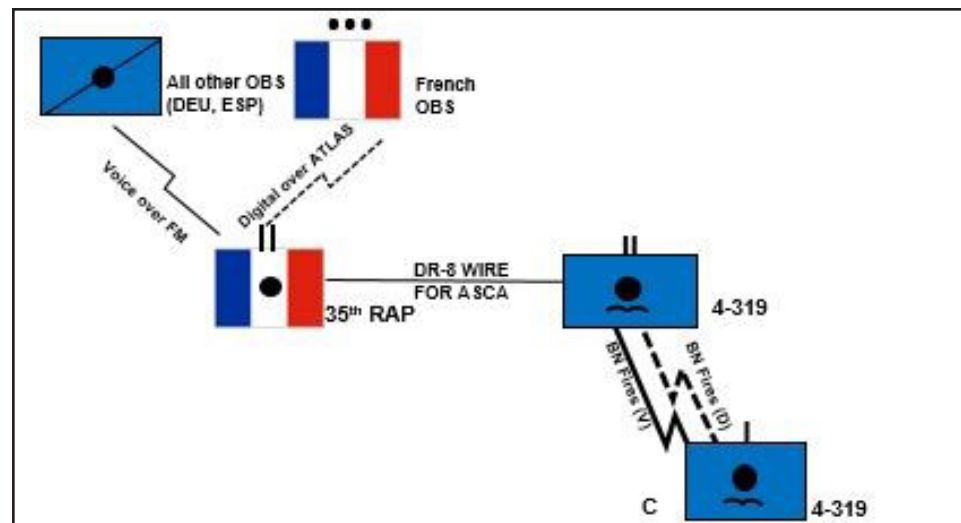
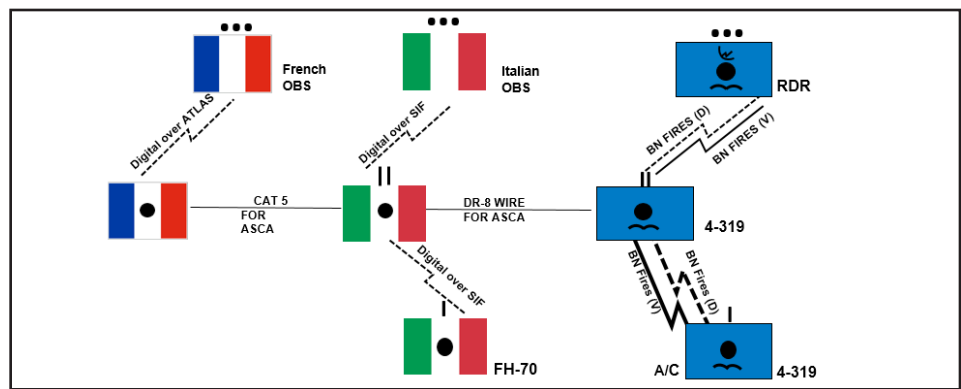
software (6.8.1.1) operates off a two-wire connection or a LAN connection. Most European armies have moved to the more reliable LAN connection. Germany and France will only operate off a LAN connection. Additionally, the newest AFATDS software is needed to communicate directly with the French over LAN. Dialogue between the AFATDS field service representatives and the ASCA representatives prior to the exercise decreases the likelihood of a software compatibility issue.

During Summer Tempest 16, a NATO exercise in Sardinia, Italy, the Italian Army provided a Force Field Artillery Headquarters for Italian, French and U.S. units. Failure to attain an AFATDS software upgrade degraded the ability of the 4-319th FDC to connect to other countries (Figure 3). As a result, the 4-319th FDC only connected to the Italian Force Field Artillery Headquarters and was unable to receive CFF directly from the French observers. The French observers had to transmit data to the Italians, which would then push the mission to the 4-319th FDC.

Soldiers in 4-319th worked to incorporate high frequency (HF) communications into its FDC communications architectures. Most European armies have retained robust beyond-line-of-sight HF capabilities. High frequency radios allow 4-319th to exchange information with a larger set of allied communications infrastructure. One method to construct an integrated HF ASCA network is to connect three HF radios via LAN to a switch and an AFATDS, enabling a HF “net” and connecting all three battery FDCs to one long-range platform. Four-319th AFAR has successfully communicated digitally using this platform, reinforcing the viability of HF.

Resource specialized training

Units should resource mobile training teams (MTT) or subject matter experts in order to train FDC personnel prior to an ASCA exercise. Additionally, planning a training event for key FDC personnel from participating allies and partners facilitates interoperability development prior to the exercise. Lastly, ensure box operators are well versed in the AFATDS. This may seem obvious, but there is a great deal of troubleshooting that occurs once the training exercise begins. Fully understanding AFATDS greatly assists when finding solutions to the inevitable kinks of interoperability.



Bottom: Figure 3. Communication architecture for Colibri 16. (Courtesy illustration)

Top: Figure 4. Communication architecture during Summer Tempest 16. (Courtesy illustration)

Capture, share lessons

Once an ASCA exercise is complete, knowledge management is critical. The knowledge gained from operating with NATO ASCA nations only benefit all U.S. Army artilleryman if the participating unit captures and distributes the lessons learned. It is the training unit's responsibility to record and communicate tactics, techniques and procedures, troubleshooting techniques, and best practices upon completion of each exercise. With high personnel turnover across the Army, institutionalizing the lessons learned in an ASCA tactical standard operating procedures or a white paper is essential. Accessible information concerning ASCA helps prepare units assuming the Regionally Aligned Forces' mission to Europe, and can potentially shape training in the U.S. at the unit level and the various training centers. During the recovery phase of each NATO exercise, the 4-319th AFAR's FDC adds lessons learned from that particular rotation to the battalion's ASCA white paper. The unit then updates its MilSuite page in order

to render lessons learned accessible to other units.

With further development and training, ASCA can become the bridge that NATO requires to solidify digital firing capability across the alliance. Our fire direction operational environment is unique and challenging because all of our allies operate using different digital fire control systems, whereas our adversary's single system unifies their entire Fires enterprise. Ample training with ASCA prior to deployment and thoughtful integration with allies during exercises enhances ASCA's functionality. Finally, institutionalizing lessons learned regarding ASCA implementation facilitates the ability of any U.S. Army artillery unit to successfully participate in any contingency operation or training exercise across Europe.

Maj. Michael Centola is the 4th Battalion, 319th Airborne Field Artillery Regiment, operations officer.

Capt. Nicholas Alexander is the 4th Battalion, 319th Airborne Field Artillery Regiment, fire direction officer.



Personnel from the NATO Rapid Deployable Corps-Spain pose for a unit photo. (Courtesy photo)

Employment of NATO tactical Fires

By Lt. Col. Michael Englis

The opposing forces' Fires elements have interoperability and the capacity to provide timely and massed Fires against the NATO alliance. The NATO Fires community has limited tactical Fires interoperability, placing NATO at a disadvantage against opposing forces in the Fires arena. In order to mitigate this gap, NATO Rapid Deployable Corps-Spain hosted the first annual Field Artillery Command and Control (FA C2) Workshop at Valencia, Spain, from Jan. 23-27. NATO Command and Force Structure Headquarters and national Fires subject matter experts came together to discuss and enhance synchronization of NATO multi-echelon Fires and integration of NATO partners' FA C2 systems, Artillery Systems Cooperation Activities (ASCA) and non-ASCA signatories, into a digital lab exercise to develop and refine fire support and targeting standard operating instructions and tactics, techniques and procedures (TTPs).

The workshop consisted of a seminar and laboratory session. In the seminar, Fires experts discussed how to improve the employment of NATO tactical Fires. The main topics focused on NATO Force Structure Headquarters and Troop Contributing Nations Fires elements' FA C2 systems' digital interoperability, standardization at the corps-level Fires headquarters and the management of Fires at the Land Competent Command (LCC) level.

Regarding these topics, methods were established to continue the progress and discussion that were achieved at the workshop. Participants agreed to continue the FA C2 workshop annually, providing a forum to discuss and share lessons learned amongst the alliance. Furthermore, a requirement for a NATO Fires Center of Excellence (CoE) was identified to increase interoperability and standardization of NATO Fires. Currently, there is no single entity that retains or improves the knowledge, capabilities, and interoperability of NATO tactical Fires. A CoE will build that foundation and focus for Fires interoperability.

Additionally, to enhance integration and synchronization of Fires, a requirement for a LCC Fires headquarters was identified. Presently, there is no principal Fires advisor to the LCC commander on apportionment and allocation of fire support assets and logistical considerations. Moreover, there is no dedicated LCC headquarters that plans, integrates, coordinates and synchronizes Fires without massive augmentation. That headquarters will provide the LCC commander and LCC-level headquarters the ability to synchronize NATO Fires across the battlefield.

During the laboratory session, participants focused on database creation, fire mission processing and executing counterfire and airspace clearance operations. During the workshop, the op-

timal solution for multinational Fires interoperability is the ASCA interface (ASCA provides a common interface between different FA C2 systems).

TTPs that were identified and practiced during the laboratory were keeping dynamic targets and the Fires common operating picture in the mission-secret network. By keeping the Fires data in this network, the corps headquarters was able to provide timely Fires in support of maneuver forces and allow the corps commander to visualize the battlefield.

In order to streamline the lethal fire process and reduce intervention points for rocket/missile fire missions, it is the best practice to position the rocket/missile liaison officer team in the corps

headquarters, not at the field artillery brigade headquarters. This practice removed one intervention point, reducing the counterfire mission processing time from 15 minutes to six minutes.

At the conclusion of the workshop, the NATO Fires community was able to establish a way forward to provide the required Fires that NATO commanders demand and need to conduct successful operations. These solutions and requirements will be conveyed back to their organizations, to be continually refined, discussed and trained. All participants left Valencia looking forward to sharing lessons learned at the next FA C2 workshop next year.

Lt. Col. Michael Englis is the U.S. Army NATO Rapid Deployable Corps-Spain targeting officer.

Top: Soldiers and their multinational counterparts from the NATO Rapid Deployable Corps-Spain work during a training exercise. (Courtesy photo)
Bottom: Soldiers and their multinational counterparts from the NATO Rapid Deployable Corps-Spain attend a briefing during a training exercise. (Courtesy photo)



Implementing digital battle systems effectively

By Sgt. 1st Class Phillip Floyd

The military currently has the challenge of operating within an ever-evolving battlefield and environment. The way our military conducts battle has greatly advanced both tactically and technically over the last 12 to 15 years. The question remains: is there a point that technological advancements actually begin to inhibit your operational effectiveness? It falls to the warfighters to effectively integrate the technological advancements into the operational environment in order to ensure the most effective use of those advancements as our military force continues to evolve.

There is no doubt that we have made great strides in our digital technology and its implementation into the modern battlefield, but in this implementation we have consistently overlooked the ability to integrate these systems outside of our organic parent service. Being a fire support sergeant with the Army has allowed me to observe and be directly involved in many of these digital technological advancements. The Army has been largely successful in renewing its focus in the fire support community to establish and advance its digital operating processes over the

last four to five years and made great strides in processing fully digital fire support operations. However, I have observed a consistent oversight or failure in how we integrate these new systems and procedures with sister military branches and our coalition and partner nations.

As the battlefield environment evolves, we become more and more interdependent as operating services and nations. The challenge then arises, how do we ensure digital systems are effective at cross-operating? Also, as we advance our technology and systems, are we ensuring the implementation of these systems is not hindering operations? I observed this implementation and operation at and above the corps-level as a member of the 4th Battlefield Coordination Detachment assigned to the Combined Air and Space Operations Center in Al Udeid, Qatar.

The unit is tasked with being the Combined Forces Land Component commander's representative and liaison, working with the Combined Forces Air Component commander. In this role we are responsible for interpreting the ground commander's intent and requirements both to the U.S.



and coalition air forces within the Combined Air Operations Center. We are tasked with providing an accurate ground forces common operating picture (COP) to enable the effective allocation of air support assets. In accomplishing our daily mission we use multiple digital systems to obtain the most accurate picture of the battlefield available. The Agile Client and the Joint Automated Deep Operations Coordination System (JADOCS) are two of the main systems that display operational graphics and friendly unit locations. The significant issue that often occurs is the upgrades to these systems do not happen simultaneously across defense departments. One service will

upgrade a system while the other can go up to another year before this change is approved. This leads to the inability to share operational data across the services even when utilizing the same system. Servers on different versions prevent receiving or displaying complete data leading to an incomplete COP, which causes a failure to identify significant data.

This also occurs when we attempt to transfer digital data from Army Battle Command Systems to other service digital operating systems. As the systems are upgraded, they lose the ability to send messages in the format recognized by earlier versions of the alternate system. When this happens, operators

Staff Sgt. Michael Mitchell, an electromagnetic spectrum manager for 2nd Brigade Combat Team, 1st Armored Division, uses a Joint Spectrum Management Planning Tool to track mission progress in the field from inside the headquarters tactical operations center at Fort Bliss, Texas. (Staff Sgt. Richard Andrade/16th Mobile PAO)



will resort to manually entering information that could otherwise be digitally transferred, which can lead to inaccuracies in transferred information and unnecessary restrictive measures. Ensuring that the Army systems can directly integrate with the other services and nations' systems remains a continual challenge in maintaining current updated versions.

These new systems, through the initial implementation and training, are expected to operate jointly and integrate with the previous systems, but this is rarely the case in execution. They are tested with training procedures that do not replicate actual operational

procedures in training events and causes a new problem set ensuring their effectiveness when used in a real-world environment. The results of this inability to transfer information across systems is resorting back to older, less advanced operating procedures; poorly trained operators attempting to implement the systems; reliance on civilian contractors to manage systems due to minimal training of operators; and failure to transfer information to joint services coalition partners, causing a severe shortcoming in shared battlefield knowledge.

With technology advancing and becoming more effective, it falls to the testers, lead-

ers and operators to ensure these advancements are implemented. It is imperative to look outside our own operational footprint and examine the overall functional impact with our coalition partners. As the implementers, we must strive to provide effective feedback to the fielding teams and work to provide solutions to situations that may arise and derogate operational effectiveness. It is also necessary that operators understand the system's processes. It is not enough to know how to operate a digital common operating picture system. They must understand what the systems are doing to use it to its full potential. This falls directly

to the noncommissioned officers to ensure their elements are thoroughly trained in the event the system fails.

The advancement of digital systems will continue to produce more functional systems that expand our operational ability. Knowledge of these systems and how to integrate them continues to advance our abilities as a military, both to enhance our forces and to limit the negative impact to civilian populations in battlefield environments.

Sgt. 1st Class Phillip Floyd is the 4th Battlefield Coordination Detachment fire support sergeant.

Planning, establishing and securing a rearm, refuel and resupply point

By Capt. Chad Scott

Recently the Joint Multinational Readiness Center hosted three airborne field artillery regiment forward support companies (FSCs). They participated in decisive action training environment exercises Allied Spirit 16-02, Saber Junction 16-04 and Swift Response 16. The training provided a best practices-way to execute the resupply of supported batteries. The FSCs mission is unique in that there is a large and vitally important ammunition resupply requirement. Fury supports a light infantry Fires battalion, but these practices also come into play for heavy units as well.

The ability of the FSC to resupply ammunition to the Fires assets can have both instant and long-lasting impacts on the battlefield. Any disruption to the supply line can be devastating to the overall mission. Therefore, the FSCs requirement to secure itself and conduct resupply operations tactically and swiftly to mitigate the enemy's ability to disrupt the supply chain is vital. Over the course of the two training rotations, the FSCs chose to use the rearm, refuel and resupply point or R3P as the preferred method for resupply.

The R3P is a technique that involves the movement of logistics elements to an agreed upon location where the firing elements can pass through and take on needed Class I, Class III, and Class V. Small amounts of onsite maintenance may also be conducted when tactically feasible. The site is especially vulnerable to attack when these operations are executed during the day or in large open areas. Therefore it is critical for security to be in place prior to the execution of the logistical aspect of the R3P.

Planning the R3P

Planning the R3P mission well in advance of the execution ensures its success.



A Soldier in 54th Brigade Engineering Battalion, 173rd Airborne Brigade provides security while conducting defensive operations during Exercise Allied Spirit VI at 7th Army Training Command's Hohenfels Training Area, Germany, March 16, 2017. Exercise Allied Spirit VI includes 2,770 participants from 12 NATO and Partner for Peace nations, and exercises tactical interoperability and tests secure communications within alliance members and partner nations. (SpC. Malik Gibson/ U.S. Army)



Ultimately, the FA battalion commander must give his intent on the execution of the R3P within his plan for executing and sustaining Fires. The commander's guidance is executed with input from the battalion executive officer, S3 (operations), S4 (logistics) and the FSC commander. Within this planning process it is critical for the R3P officer in charge (OIC) and the supported battery executive officer to identify the following requirements prior to any movement so they both have a common understanding.

The first requirement is the location via 10-digit grid or a previously established named area. This can be determined with a simple map recon or preferably a site recon if the operating environment allows. Often the unit will predetermine the best sites for the linkup based on phases of the operation and artillery maneuver area locations. A good practice is to also select an alternate site that both units can move to in case the first site is compromised. The S2 (intelligence) and S3 can help determine this based on current operations and the enemy threat. When selecting the site there are a few key things to keep in mind. Specifically, determine a location that is on or near the route the firing battery is moving along, or one that is easily accessible from that route. The best R3P locations generally make use of a wood line or terrain feature

for cover and concealment while maintaining access to the route. The location also needs to provide good freedom of movement for both logistics and supported unit. Traffic considerations need to be made such as terrain, the effects of adverse weather due to mud or snow, and whether the site provides cover and concealment. The site planning factors differ greatly when resupplying a light infantry field artillery unit versus one that supports a heavy brigade. Paladins will require much more space to maneuver as opposed to the towed artillery and High Mobility Multipurpose Wheeled Vehicles.

The key to any successful R3P is speed, but the presence of cover and concealment will often help in the decision of where to emplace. However, searching for the "perfect cover and/or concealment" at the expense of speed may not be the best practice. The site OIC will have to weigh the risks when identifying the importance of speed over cover and concealment and vice versa. The larger the formation being resupplied by the R3P, the more speed matters, since an OIC can be overwhelmed if the speed and scope are too large.

The second important requirement is to establish a link-up time so neither unit is onsite longer than they have to be. Mismanaging the link-up times can lead to one or both units being exposed

1. Battery/company being supplied
2. Location (by name or 10-digit grid)
3. Link-up time
4. Radio frequency, joint capabilities release role name and call sign
5. Supplies required by class
6. Battery point of contact at site
7. Enemy situation at site
8. Special instructions (black out, avenue of approach, etc.)

Figure 1. The eight-line supply request process.

to enemy attack, which may compromise the site for future resupply efforts. Coordinating for intelligence, surveillance and reconnaissance (ISR) can mitigate some of the threat if the link-up is compromised, either in timing or location. Furthermore, if the FSC is late, there is a potential to impact future fire missions due to the supported unit being held up at the site or not receiving supplies at all. If the supported unit is late, the FSC, with its limited firepower, may be at risk of being attacked.

The third piece of information that needs to be conveyed to the FSC is what classes of supply will be replenished on site. This can be determined through daily logistics status reports (LOGSTATs) or having the S4 present to identify the needs of the firing battery and the capability of the FSC to provide those supplies. Overestimating the supply requirements can put unnecessary logistics assets on the road, not only wasting fuel, but potentially placing more Soldiers in harm's way as they are exposed to the enemy along the route. Underestimating the supply needs has catastrophic consequences to the mission when a firing battery does not have the rounds needed to execute future fire missions. Underestimation leads to the need for emergency resupply in the future. The FSC must understand and convey its lift capability and current supplies on hand to the battalion staff in order for them to adequately plan future resupply missions and request a replenishment of supplies from the brigade support battalion.

The final critical requirement is the communications coordination through a primary, alternate, contingency and emergency (PACE) plan used between the FSC and supported unit. Often this involves the joint capabilities release (JCR) as the primary with FM communications as the alternate. This plan must include the radio

frequencies, JCR roll names, any challenges and passwords and determined onsite points of contact. If needed, be sure to include the "land owning unit" in this PACE plan if the site selected is in another battalion or brigade area of operation. This ensures the land owning unit knows what friendly units are in their battle space and can possibly aid in quick reaction force activities if the R3P site is attacked.

Generally, R3Ps are not considered ideal for an emergency resupply. However, if the tactical situation calls for an emergency resupply using the R3P, a common procedural checklist should be established much like a 9-line medical evacuation. This allows for the supported unit to quickly identify what the FSC needs to provide so the logistics vehicles can launch. Figure 1 is an example of the 8-line supply request. Combining this supply request with anticipatory logistics at the S4 and battalion XO level along with managing pre-configured loads, the requesting unit can be resupplied quickly with what they need to continue the fight even in emergency situations.

Occupying and securing the site

When occupying the site selected for the R3P, the first unit on ground is responsible for securing the site. Often the FSC is first on site so they were required to establish an ingress and egress point, determine the layout and then emplace security around those plans. Ideally, a logistics unit will have gun truck security integrated into their convoy and that can be easily placed at the entrance and exit of the R3P site as well as any other locations based on mission variables that are mission, enemy, terrain, troops available, time, and civilian considerations (METT-TC) dependent. Whether gun trucks are present or not, personnel that are not needed for logistics operations such as refueling, ammo transfers,

or Class I loading must aid in securing the R3P site. It is the responsibility of the site noncommissioned officer in charge (NCO-IC) to establish this security while balancing the logistics requirement by creating a perimeter with dismounts.

If a FSC does not have gun trucks and is relying on logistics platforms such as the Load Handling System (LHS) or Palletized Load System with a M240B ring mount to provide security, leaders on ground need to determine if it makes tactical sense to leave the gunner in the truck while the R3P is executed or if that Soldier should dismount and push the perimeter of security outward away from the site. Be sure to take into account the LHS provides very little ballistic protection while presenting the gunner as a large target of opportunity. Also, consider that if a Soldier in the LHS is engaged, there is a strong likelihood the truck will take damage increasing the possibility of that truck being disabled or destroyed, leading to a dangerous recovery operation.

The layout of the R3P is METT-TC dependent but there will usually be a fueler, a Class I resupply truck such as a Light Medium Tactical Vehicle, and a Class V resupply truck such as an LHS using flat racks. Those flat racks are dropped to ground level to allow the supported unit to pick up the needed rounds and drop off any residue. Sometimes the FSC establishes a maintenance point to exchange 5988-E's and possibly conduct small repairs if the tactical situation allows. Figure 1 show the standard layout for an R3P.

The CL III (B) resupply point of the R3P should be placed near the end of the site so those vehicles that are not involved in receiving Class I or Class V supplies can immediately move to the fuel point to refuel and then move off the R3P site and into a security posture.

Due to limited security capability in the FSC on the R3P site, the supported unit should integrate into the R3P security plan. This plan should be conveyed both in the initial planning phases and when the supported unit arrives on site. The FSC is in control and takes the lead on the R3P so all direction should come from the R3P OIC and NCOIC. Due to this requirement the R3P OIC/NCOIC needs to link up with the convoy commander or platoon leader at the R3P entry control point to identify security needs, explain the station order and verify the supplies required.

While the units on ground are executing the R3P it is critical that the battalion

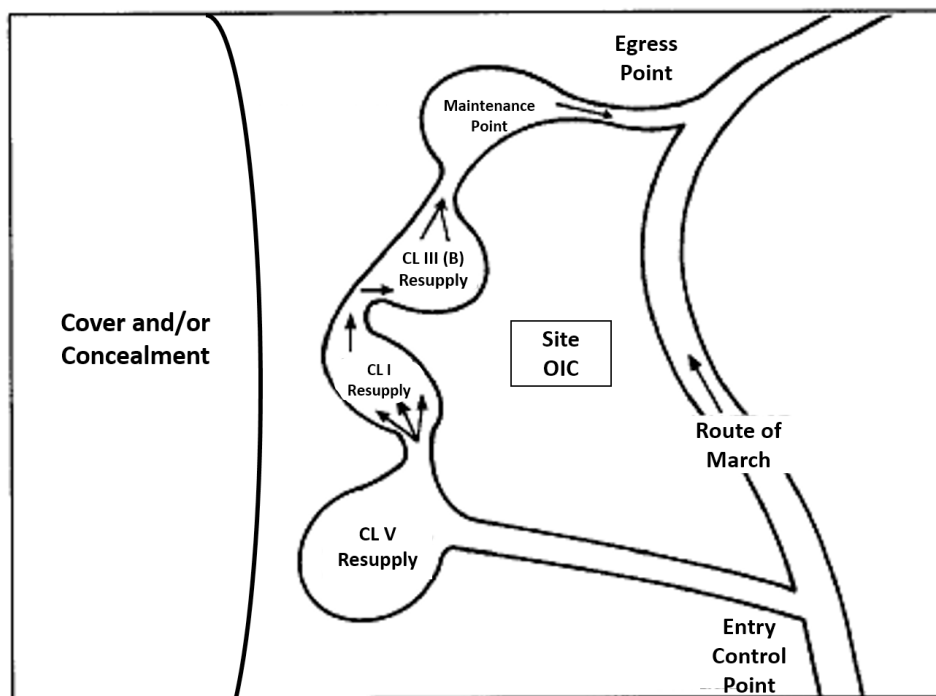


Figure 2. The rearm, refuel and resupply point. (Courtesy image)

tactical operations center is monitoring the battlespace they are occupying. This is done through the battle captain or battle NCO. Ideally, ISR should be pre-coordinated. Regardless, adequate communications via JCR and/or FM is critical. The R3P OIC should provide periodic updates on the number of trucks completed and how many remain.

Multinational integration

With enough foresight and planning, the integration of multinational logistics into the R3P becomes very easy as each resupply node of the R3P can be replaced by a multinational requirement or a multinational unit can be added to the R3P. For instance; simple coordination between multinational units can mean a German fuel truck carrying diesel fuel (grade DF2) can be integrated into the R3P allowing German vehicles to be refueled while under an umbrella of U.S. and German integrated security. The consolidation of assets onsite provides mutual benefits in security and logistics as the multinational units integrate into the R3P and bolster its capability, if only temporarily. It is key that all supported units understand that the R3P OIC is still in control of the site even in a combined R3P.

Consolidating, departing the R3P site

Upon completion of resupply operations the on-ground leadership may determine if it makes tactical sense to keep the supported unit in place, for security purposes, while the FSC loads up for movement. The current mission set for the supported unit will obviously dictate that decision. If not, the FSC needs to collapse its security perimeter as the consolidation takes place. At no point is this time for the FSC to cross level supplies or refuel its own trucks. That adds more time on site and is better served upon the unit's return to their secure company or base support area. Upon re-establishing march order, a count of personnel and sensitive items should be completed and the unit can depart the site after notifying the battalion tactical operations center of the closure of the R3P site.

The mission is not complete once they return to the control point. All trucks should be refueled and loads replenished in case of an emergency resupply. This is also the time to conduct S2 debriefs and update the LOGSTAT so higher headquarters has visibility of supplies on hand. After-action reviews and after-operations preventive maintenance checks and services of vehicles must be conducted to improve tactics and ensure readiness, respectively.

Training recommendations

In garrison, training time is scarce for logistics units who provide daily "real-world" support to maneuver units, so it is key to insert training objectives into these support missions. Seek to piggy back off of maneuver unit field exercises. When a line battery is conducting a field exercise, provide support to them through the use of a tactical R3P, even if the FSC is not in the field with the supported unit. Ensure this is not just an "administrative" resupply point. The FSC commander needs to convey to his fellow battery commanders and the battalion commander his intent to make the entire battalion better by improving the ability to resupply effectively. All units benefit from training on the R3P task consistently. Execute an R3P during FSC training events, convoy training or ammo draws by coordinating with the Ammo Handling Area. R3P training cannot be solely a sergeant's time training event. Sergeant's time is when you teach the process of the R3P. Executing an R3P in a training environment, such as a supported unit field exercise or gunnery, and taking advantage of the FSCs own training to conduct an R3P will hone the Soldiers skills.

As stated before, commanders also need to conduct in-depth after-action reviews following these R3P training events, ideally with the majority of the input coming from the Soldiers that executed the mission. This is to drive a bottom-up refinement of the processes which increases efficiency, safety and buy-in from the Soldiers. Including the supported unit so their alternate point of view can be understood is also a good practice.

With enough foresight, planning and coordinating the R3P can be a secure, expeditious, and successful method for conducting the resupply of platoon and company-level classes of supply. The emphasis must be placed on site selection, security, speed and supply requirement accuracy, also known as the four Ss of the R3P. With the four Ss accounted for, supplies can be adequately transferred with minimal impact to the maneuver unit's ability to conduct fire missions whether they are en route to a new location or returning to their firing position.

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Leveraging US Embassy support to assist joint force commands

By Lt. Col. Thomas Putnam

Joint operation areas (JOA) in Iraq and Afghanistan have long-standing working relationships between the Departments of Defense (DoD) and Department of State (DoS). Additionally, units deploying to these JOAs receive support from well-established military sustainment structures. The Joint Force Command-United Assistance deployed to Liberia as part of the U.S. government's support effort to contain the 2014 Ebola Hemorrhagic Fever Disease outbreak in West Africa. In contrast to Iraq and Afghanistan, the immature operating environment (OE) in Liberia required both the estab-

lishment of a DoD-DoS relationship between the JFC-UA and U.S. embassy and development the JFC's sustainment infrastructure.

The positive relationship between the U.S. and Liberian government, a receptive English-speaking population and coastal access, were a few of the factors that greatly contributed to Liberia being a permissive OE. However, establishing the JFC footprint and leveraging the Liberian infrastructure to contain Ebola held unique challenges. The support provided by the U.S. embassy staff helped the JFC overcome them.

Joint force operations in immature OEs

will likely continue into the foreseeable future. Unfortunately, most staff officers have not worked with an embassy and are likely unaware of all the capabilities and assistance the embassy can provide a JFC. Staff understanding of an embassy's structure and available services reduces uncertainty and unveils opportunities that will enhance planning and operations. This article focuses on basic embassy functions a JFC can leverage in future scenarios to better accomplish its mission, using examples from JFC-UA's Ebola response mission.

Overarching considerations

Regardless of the character of an operation, beginning dialogue with an embassy early allows the staff to provide better options to the JFC commander. The embassy has a wealth of tactical-level information that provides vital local insight. This insight facilitates JFC's situational understanding during design and course-of-action development. This insight is invaluable throughout the deployment for understanding political, economic and cultural events and their impact to the mission. On a practical level, the embassy can assist with force

Spc. Morgan Austin, Joint Forces Command – United Assistance communications specialist with assigned to Headquarters and Headquarters Battalion, 101st Airborne Division (Air Assault), holds up the U.S. flag during a promotion and re-enlistment ceremony Jan. 1, 2015, at Barclay Training Center, Monrovia, Liberia. United Assistance is a Department of Defense operation in Liberia to provide logistics, training and engineering support to U.S. Agency for International Development-led efforts to contain the Ebola virus outbreak in western Africa. (Spc. Rashene Mincy/55th Signal Company)

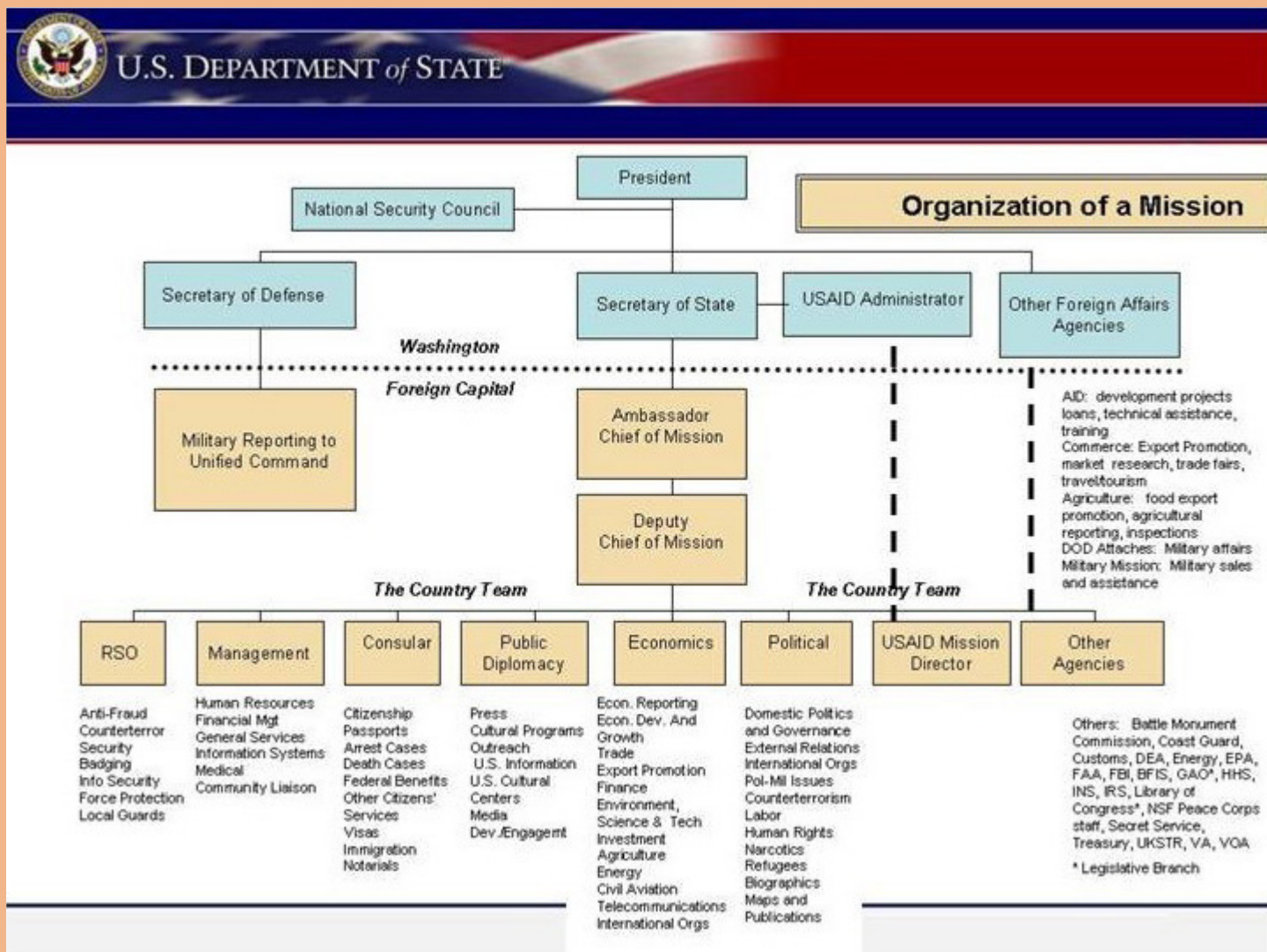


Figure 1. The organization of a mission. (U.S. State Department)

generation and enable the JFC's self-sustainment in an immature OE. The embassy can provide a detailed understanding of the capacity and capability of the country's sustainment infrastructure.

It is important to note that embassies have different compositions based on U.S. interaction with the host nation government. This composition defines the embassy's capability and will influence the extent the embassy can directly support a JFC with sustainment.

The embassy

The chief of mission (COM) is the senior DoS member of a U.S. Embassy and is typically an ambassador. As the President's representative, the ambassador leads the embas-

sy's country team. The country team is normally comprised of the core DoS functions and other federal agency representatives that vary based on the embassy's location (see Figure 1). In Liberia, the DoD United States Agency for International Development (USAID), and the Peace Corps have robust long-term representation on the country team.

During the 2014 Ebola response, the Liberia country team was augmented by two other U.S. government entities. The first was a Disaster Assistance Response Team (DART) from the Office of Foreign Disaster Assistance (OFDA), a subset of USAID. The DART was the lead federal agency (LFA) for the U.S. Ebola response. The second entity was a

team from the Center of Disease Control and Prevention (CDC) that was designated as the lead technical agency for the U.S. Ebola response. Both of these teams were on a temporary duty status in Liberia, and similar to the JFC, utilized embassy assets to establish and maintain a footprint in Liberia.

A country team is arranged by specialty area similar to a military staff alignment by war-fighting function. As COM, the ambassador leads the country team and uses the deputy chief of mission, similar to a deputy commander and chief of staff. Country team reporting functions and staff processes are also similar to a military staff.

To ensure a synchronized response, the JFC-UA staff interacted continuously with

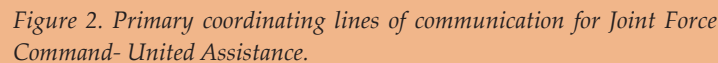
the embassy's country team. The most frequent interaction was between the DART, CDC, Defense Attaché and Management Section. This interaction was focused on achievement of shared understanding and sustainment support for the Ebola response. Figure 2 represents the primary coordination lines of communication between the two staffs. In future operations the JFC staff may operate more frequently with different embassy departments, such as the J5 coordinating long-term plans with the Economic Section. The interaction will be weighted by assignment of the LFA, scope and duration of the mission.

Embassy sections

For brevity, only four sections of the country team will

Whether a DoD element is a small team or a JFC, the SDO/DATT is responsible for facilitating the arrival of all DoD TDY personnel into the host country. This includes coordination with the embassy on the purpose of the visit, coordination with host nation officials for the conduct of the visit, and all logistical requirements in support of the visit. During the initial integration of JFC-UA into the 2014 Ebola Response, the JFC utilized the DAO. The

The embassy Management Section is a sustainment umbrella for the embassy and functions similar to the Admin



The GSO can provide the JFC access to housing, customs

expediter, limited embassy motor pool assets and Information technology (IT) services. During JFC-UA's tenure in Liberia, the GSO facilitated temporary housing in a complex known as Phoenix Apartments. Phoenix was used by the JFC to augment the scarce bed space available during initial force generation. The GSO also assisted with finding suitable

housing solutions for the JFC-UA transitional force that was significantly smaller. With local expertise and contacts in the community the GSO facilitated quick identification of housing and assisted with contracting. In some environments the GSO will assist contracting and budget management teams understand local customs for negotiations and pricing.

Access to international shipping was a critical requirement for the JFC's aviation sustainment. The GSO has detailed knowledge of host nation customs processes and the operations of international shipment agencies, such as FedEx and DHL. The GSO can use their existing relationships and expeditor services to ensure shipments are cleared through customs in a timely manner, which can be critical in some countries due to potential bureaucratic issues. For Operation United Assistance, the GSO customs expeditors facilitated clearance of duty-free Ebola response shipments, such as helicopter repair parts, through Liberian customs to keep the small helicopter fleet operational. Direct communications with the GSO shipping supervisor enabled the JFC J4 to understand local processes in order to estimate realistic expected delivery dates on mission critical items. GSO expeditor support was also essential to customs clearance of some critical ETU components because of the Liberian government's "duty free" agreement covered these items.

The GSO may be able to provide non-tactical vehicle (NTV) support from the embassy motor pool. Prior to a JFC establishing NTV contracts, access to the embassy motor pool can facilitate the mobility of an initial support team to establish the JFC footprint. To support the JFC acquisition of NTV

contracts, the GSO can provide expertise and contacts with embassy approved local vendors and car services.

As JFC-UA established its footprint, the initial DoD response units were heavily reliant on the IT services provided by the embassy's Information Resource Management. IT services such as secure and non-secure video teleconference, computer and e-mail access were provided by the embassy. In future operations the Management Section can also assist with the procurement of cell phone contracts to expand the communications architecture of the JFC with a low-cost solution.

Services provided by the embassy are not entirely free. The embassy charges fees based on an International Cooperative Administrative Support Services (ICASS) schedule. Non-state department employees assigned to the embassy under National Security Decision Directive-38, such as the Defense Attaché, pay for a range of ICASS services that span from office space to mailroom services. For a JFC these funds can be negotiated with the Management Officer to determine the ICASS cost for JFC personnel using embassy services. For example, the JFC's embassy liaison officer paid a higher ICASS charge than JFC staff members that used embassy services infrequently.

The Regional Security Office (RSO) is staffed by the Bureau of Diplomatic Security and led by the regional security officer. The RSO is the security and law enforcement element of the embassy with duties that range from investigations to providing security to embassy personnel. RSO duties a JFC will likely encounter are providing security to non-JFC personnel, monitoring the country's security

environment and management of the embassy force protection and access. JFC members will obtain access to the embassy compound through the RSO. The RSO can also provide a unique tactical-level security understanding derived from local contacts to enhance the J2's intelligence picture. This tactical-level security understanding can also facilitate the JFC Protection Cell local security assessments.

Consular Affairs interfaces directly with the local population. Though its primary mission is providing support to U.S. citizens in foreign countries, Consular Affairs assists local nationals primarily with U.S. visa applications, passports and immigration requests. A JFC's interaction with Consular Affairs will likely be limited to local national claims about damage caused by the JFC. Consular Affairs will provide the JFC Staff Judge Advocate with local expertise and advice about local customs and practices in regards to claims made by local nationals. In addition to the DAO, Consular Affairs can maintain historic JFC claims documentation in the event a claim is submitted for an unresolved incident after the JFC departs the JOA.

Recommendations

1. Contact the SDO at the receipt of mission. As the DoD representative to the embassy, the SDO is the JFC's advocate and will assist with contact, follow-up and support from the embassy. The SDO's contact information can be obtained from the GCC J5 or the embassy's website.
2. Ensure the entire JFC staff understands their embassy counterpart's capabilities. Though staff relationships will depend on the size and scope of the JFC's mission,

knowledge of embassy capabilities and structure will facilitate collaboration at the lowest level. Classes and information for embassy functions can be obtained through the main DoS website. One example is the "Diplomacy 101" website at <https://diplomacy.state.gov/discoverdiplomacy/diplomacy101/>.

3. Use the Management Section for sustainment support. The Management Section has unique capabilities and local contacts that can assist the JFC throughout its mission.
4. Use the embassy staff to obtain detailed tactical-level knowledge about the OE. The unique insight and expertise from daily interactions with the local population provide embassy sections with context that will benefit the entire JFC staff.
5. Review Joint Publication 3-08, Interorganizational Cooperation, or a general framework on interaction with the U.S. Embassy and other elements within the OE.

The highly successful JFC-UA deployment into an immature OE reinforces the benefit of quickly establishing a working relationship with the U.S. Embassy. The 2014 Ebola Response in Liberia is likely one of many joint force missions in the near future. This article is only a short synopsis of embassy capabilities and provides an initial starting point for planning DoD-DoS interaction. Through further study, staffs will obtain greater understanding of embassy capabilities that can facilitate mission accomplishment.

Lt. Col. Thomas Putnam is the U.S. Southern Command Special Operations Command South Operations chief.

Synchronizing air, ground operations through unit airspace plan

By Capt. Justin Lock, Capt. James Severin, and Chief Warrant Officer 2 Travon Graves

Army brigade combat teams (BCTs) continue to face significant challenges synchronizing air and ground operations through the execution of a unit airspace plan (UAP). A well-developed UAP increases combat effectiveness by promoting safe, efficient, and flexible use of airspace with minimum restraint upon airspace users.¹ During Joint Readiness Training Center 17-04 rotation, the air defense air management/brigade aviation element (ADAM/BAE) successfully cleared airspace for over 50 fire missions. Lessons learned from the rotation focus on UAP development, integration of small and tactical unmanned aerial systems (UAS), and management of a synchronized UAP.

Initial airspace management

Soldiers in 2nd Brigade Combat Team, 25th Infantry Division ADAM/BAE struggled during the initial stages of the military decision-making process in identifying roles and responsibilities for UAP development due to the lack of airspace management standard operating procedures (SOP) and the inability to build habitual relationships with all airspace users prior to the rotation. Procedures that are continually updated with lessons learned provide continuity and streamline the development process specific to the BCT's mission. Additionally, an initial working group, specific to airspace management, synchronizes enablers when habitual relationships are not established prior to an operation. This session should create a shared understanding that's nested within the commander's intent and take into account the brigade's priorities. It's an opportunity for the fire support officer, fire support coordinator, the aviation task force commander, and the ADAM/BAE to build a foundation for a UAP that promotes a safe, efficient and flexible use of airspace with minimum restraint on airspace users.

Repetition and practice

The skills required to successfully manage the airspace only come with repetition and practice over time. An emphasis must be made by all parties involved to

train their craft as frequently as possible. During home station training, command post exercises and field training exercises, coordination should be made to ensure the ADAM/BAE receives an air picture to facilitate UAP development. Waiting for major combined arms field exercises to train and develop UAPs will not provide the repetition required for success.

Integration of sister services, multinational partners

Throughout the operations process, staffs must integrate and synchronize forces and warfighting functions within an area of operations. The integration of air operations into the ground commander's scheme of maneuver may also require the integration of other services or multinational partners. Integration fundamentals include: understanding the capabilities and limitations of each force, building habitual relationships and training. BCTs are typically augmented with support from the Air Force Tactical Air Control Party, Air Naval Gunfire Liaison Company, an aviation liaison officer and multinational liaisons as mission variables of mission, enemy, terrain, troops available, time, and civilian considerations dictate². It's important to manage these additional personnel during UAP development and tailor the product to meet the requirements of all users. Processing time for both pre-planned and counter-fire missions is a strong measure of performance that signifies a well synchronized UAP. When all airspace users are integrated, the BCT can expedite air clearance to enable effective fire support to the Soldier on the ground.

Management, control of UAP

Following an initial development, a UAP becomes a living document that requires meticulous management. In order to be effective, the ADAM/BAE must develop a plan to disseminate updates and enforce compliance. The ADAM/BAE must also establish buy-in from all airspace users. The more each user can incorporate controls to provide the greatest amount of flexibility to accomplish their mission, the more likely

they are to comply. Soldiers in 2-25th IBCT found battle rhythm events, such as an airspace control working group (ACWG), extremely valuable for management throughout the operation. An ACWG is a great conduit to synchronize all airspace users. During home station training, respective to 2-25th IBCT's lessons learned, it was determined the ACWG be held in conjunction with the targeting working group to decongest a high operational tempo. Like many battle rhythm events during a combat training center (CTC) rotation, not all parties are able to attend. This creates a possibility for subordinate units to desynchronize. The ADAM/BAE cell identified UAP product distribution as an area for improvement during our CTC rotation. During the rotation, the cell published only one UAP with the initial operations order. If changes were made, they were informally disseminated to all airspace users through unit liaison officers. Moving forward, it's best to designate a representative to the brigade plans section to produce Annex C, Appendix 10 fragmentary orders (FRAGORDs) for distribution. This official means of making changes to the UAP will ensure all airspace users remain synchronized throughout the duration of the rotation.

Integration of tactical unmanned aerial systems

The command relationship to the BCT's organic tactical unmanned aerial systems (TUAS) unit can have a significant impact on UAP development. During the recent JRTC rotation, 2-25th IBCT deployed four RQ-7B Shadow UASs, organic to the military intelligence company (MICO), assigned to the brigade engineer battalion. Because Shadow UAS provides BCTs the capability to conduct continuous reconnaissance to gain and maintain contact with the enemy, it's essential for a brigade to maintain reliable communication with the asset to ensure timely and accurate employment. The MICO's limited communications structure made it difficult for the TUAS platoon to integrate directly with the brigade staff and receive their reconnaissance guidance.

1 JP 3-52 Joint Airspace Control, 13 November 2014 I-2

2 FM 3-96 Brigade Combat Team 08 October 2015 3-30, 31



Capt. James Severin, 2nd Brigade Combat Team, 25th Infantry Division air defense officer, and Capt. Charles Murphy, 5th Air Naval Gunfire Liaison Company liaison officer, develop the initial unit airspace plan during the course of action development-phase of the military decision making process. (Courtesy photo)

During the course of the rotation, there were many instances when Shadow operations were delayed, or on the verge of cancelation. This can be attributed to inconsistent voice and data communications with the brigade. Assigning a co-located staff and upper tactical Internet capabilities could drastically increase integration and better synchronize TUAS operations.

Defined relationship with aviation task force

The TUAS platoon did find some relief with the aviation task force, which was co-located with them for a portion of the rotation. Because this relationship was not formally defined, the support was inconsistent and created an uneasy dependence. In the future, a well-defined command relationship with the aviation task force, as opposed to remaining with their organic battalion could alleviate some of the challenges experienced during our rotation. It is likely that the integration of organic RQ-7B platoons into the 25th Combat Aviation Brigade's Heavy Attack Reconnaissance Squadron will demonstrate a more

efficient support relationship for future operations. Shadow UAS are not the only assets creating challenges in BCT airspace management. If not given proper attention, the small unmanned aerial systems (SUAS) also have the potential to create UAP challenges.

Small unmanned aerial systems training

Brigades should make it a priority to replicate SUAS operations in a dense air traffic environment during their CTC train-up. Subordinate units across the brigade struggled to properly submit SUAS requests for inclusion into the UAP. Battalions/squadrons within the BCT are assigned RQ-11 Raven UAS for use at the company level. Many operators were unfamiliar with the importance of submitting an accurate Raven UAS request and operating within its restraints. Without a replicated home station training experience, ADAM/BAE labored throughout the exercise, repeatedly training users on the proper procedures for a Raven UAS launch. It's imperative that all Raven operators understand the submittal

process, along with the second and third order effects of an inaccurate request. The more units incorporate Raven operations into their planning process, the better prepared the ADAM/BAE can be to ensure all necessary steps have been accomplished to enable a safe and successful launch. Individual efforts are important to UAP development, but a clear understanding of how each individual fits into the process is the key to success.

Smooth operations

The BCT must have the ability to manage airspace to facilitate efficient employment of its combined arms assets. UAS operations will remain an integral part of the BCT's ability to fight and win tonight. The proper training and integration of both SUAS and TUAS can have a dramatic impact on airspace management at the brigade level. Additionally, clearly defining the roles and responsibilities will help alleviate many of the uncertainties in UAP development, ultimately saving the team's greatest commodity: time. Once the airspace team publishes a UAP, it's equally important to manage it throughout the operation to maintain synchronization. This can be accomplished through battle rhythm events such as the ACWG and with the use of published FRAGORDs to the airspace annex. BCTs must share their experiences across the force in an effort to refine techniques, tactics and procedures for synchronizing air and ground operations through the execution of a UAP.

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Chief Warrant Officer 2 Travon Graves is the 2nd Infantry Brigade Combat team, 25th Infantry Division command and control systems integrator serving as the brigade systems integrator at Schofield Barracks, Hawaii. He is an air defender by trade with multiple deployments in support of Operation Enduring Freedom and operations on the peninsula of Korea.



Infantrymen with B Company, 1st Battalion, 21st Infantry, 2nd Brigade Combat Team, 25th Infantry Division, prepare to return fire on roleplaying enemies during training exercise Lightning Forge. (Sgt. Ian Ives/2nd BCT PAO)

"We must bring the Army – and the rest of the joint force – together with their sensors and their fires as domains converge in the battlespace. By taking advantage of these technological advances we can help overcome the operational challenges we face in our resource constrained environment."

—Adm. Harry Harris, Jr.
Commander, U.S. Pacific Command

Cross domain Fires executed in Lightning Forge 2017

By Capt. Joseph Schmid

During the Land Power in the Pacific Symposium May 25, 2016, one of the topics highlighted the importance of the Army's ability to successfully project combat power over water from shore to aid in the anti-access/area-denial (A2/AD) conflict. The commander of U.S. Pacific Command Adm. Harry Harris, said "I believe that the

Army should look at ways to use the Paladin and HIMARS systems to keep at risk the enemy's Navy ... we should be able to deny the enemy the sea – from land."¹

Soldiers in 25th Division Artillery, 25th Infantry Division sought to capitalize on Harris' suggestion during Operation Lightning Forge 17.01 (OLF17)

by successfully simulating a shore strike on a sea-based target. This simulation had three main outputs. First, it provided validation of existing systems required for accurate land-to-sea cross domain Fires; second, it verified DIVARTY's ability to competently control land-to-sea Fires as an operational headquarters element using the joint

dynamic targeting steps²; and third, it showed that employment of these Fires requires a clearly delineated approving process/authority. These outputs furthered the understanding of how land-to-sea Fires can exploit small windows of opportunity in increasingly contested domains.

¹ Adm. Harry B. Harris, Jr., "Role of Land Forces in Ensuring Access to Shared Domains" (paper presented at the annual LANPAC Symposium, Waikiki, Hawaii, May 25, 2016).

² U.S. Joint Chiefs of Staff, Joint Targeting, Joint Publication 3-60. Washington, DC: U.S. Joint Chiefs of Staff, April 13, 2007.

Land to sea cross domain Fires potentially involves an air-based sensor acquiring a sea-based threat which then provides targeting data over a cyber-based LINK-16 to an Army division artillery command post which transmits firing commands via high frequency radio to a land-based High Mobility Artillery Rocket Systems unit.

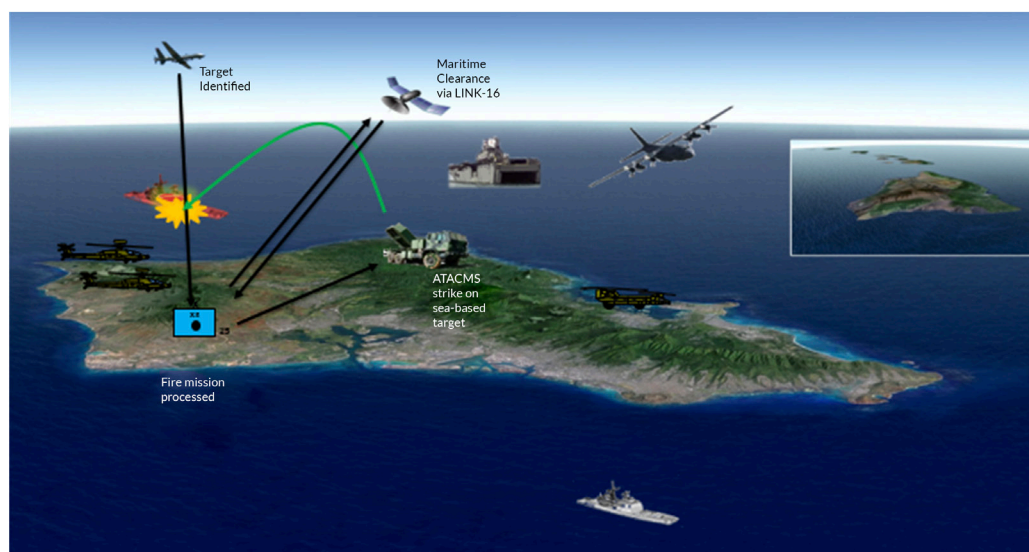


Figure 1. The 25th Division Artillery tests a mission command/command and control solution to facilitate cross domain clearance of Fires within the constructs of the Lightning Forge 17-01 scenario. The objective is to identify any doctrinal shortfalls while validating the ability to conduct domain of clearance of Fires out of the DIVARTY's tactical command post on Leader's Field. (Courtesy image)

OLF17 is 25th ID's home station training exercise geared toward unit readiness for an impending combat training center rotation. The entire division performed either a supporting or direct role in the execution of the nine-day exercise. Three units, to include 2nd Brigade Combat Team, 25th ID, 25th Sustainment Brigade and 25th DIVARTY, had a decisive role in the initial entry operation. These three units were placed under a joint command who sought to restore the sovereignty of a simulated nation (termed the Ari Republic) who

had recently been invaded by a hybrid threat. The threat contained regular units from Rogue Poema Armed Forces, radical insurgent groups of the Islamic Liberation Front, and gang-related elements loyal to a narcotics network known as the Black Wolves (BW).

In order to defeat the hybrid threat, four key tasks were developed. Soldiers in 25th ID first sought to assist the Government of the Ari Republic (GoAR) in restoring the sovereignty of their borders. Second, they promoted the GoAR's legitimacy by working with

their government, police and military. Third, they needed to isolate criminal networks from their sources of support and the Ari population. And finally, they sought to ensure the GoAR police, military and other necessary agencies had both the capabilities and capacity needed to maintain civil security and deter external future threats.

Soldiers in 25th DIVARTY fulfilled the third key task while simultaneously using the joint dynamic targeting steps (find, fix, track, target, engage and assess) to facilitate rapid land-to-sea cross domain Fires. They

used an MQ-1C Grey Eagle unmanned aerial system to find a notional ship belonging to the BW off the coast of Ari. The Grey Eagle streamed a live feed of the BW ship directly into the DIVARTY command post S2 cell. The feed allowed the S2 section to initially find, fix, track and eventually generate an initial targeting grid for the BW ship. The 25th DIVARTY Air Defense Airspace Management/Brigade Aviation Element (ADAM/BAE) co-located with the S2 section, received the BW targeting grid and verified its authenticity with a notion-



A crew from 535th Airlift Squadron, 15th Wing, flies a C-17 Globemaster III from Wheeler Army Airfield, Hawaii. Inside the plane were equipment and Soldiers from the 3rd Brigade Combat Team, 25th Infantry Division. The Soldiers went to the Pohakuloa Training Area to participate in Lightning Forge 17. (Staff Sgt. Armando R. Limon/3rd BCT, 25th ID)

al collection platform using a network known as LINK-16. LINK-16 is a tactical voice and data exchange network commonly used for transmitting targeting data in between individual military services, NATO forces and U.S. allies. The DIVARTY ADAM/BAE accessed this multi-service communication network via its organic Air Defense System Integration platform. Critical to this specific scenario, LINK-16 provided the ability for the 25th DIVARTY command post (CP) to view most U.S. naval ship positions, while simultaneously commu-

nicating the Soldiers' intention to target a maritime threat. In essence, LINK-16 grants cross domain synergy as a secondary check on the initial targeting data provided to the S2 by the Grey Eagle.

After the targeting data was verified by the ADAM/BAE, it was announced in the tactical operations center as a fire mission. The fire control element generated fire commands with the Advanced Field Artillery Tactical Data System and successfully engaged the maritime target with a simulated MGM-140 Army Tactical

Missile System (ATACMS) fired from a simulated M142 High Mobility Artillery Rocket System (HIMARS).

OLF17 serves as an example to the joint community that weapon systems and communication networks required for land-to-sea cross domain Fires already exist. New modes of thought are effectively employing old tools in innovative ways. Think of the possibilities of replacing the Grey Eagle UAS with an Air Force RC-153 Rivet Joint or a Navy EA-18 Prowler, all of which have sophisticated electronic intelli-

gence sensors geared toward real-time, on-scene collection analysis and dissemination capabilities. While conducting strike coordination and reconnaissance missions, these air platforms would provide valuable maritime awareness to a DIVARTY CP. The CP can then tap into that wealth of maritime data these platforms provide via LINK-16 to decisively project combat power in the form of



Soldiers from 3rd Battalion, 7th Field Artillery Regiment, 3rd Brigade Combat Team, 25th Infantry Division adjust their M119A3 howitzer during Exercise Lightning Forge. High-angle, high-charge firing showed the recoil system on the earlier iteration of the howitzer to be its Achilles' heel. (Sgt. Brian C. Erickson/3rd BCT PAO)

land-to-sea cross domain Fires. Leveraging its beyond-line-of-sight network, known as the Joint Range Extension Application Protocol (JREAP), a DI-VARTY CP can solve the range communication problem which will undoubtedly be associated with a Navy or Air Force long ranging aircraft. A LINK-16 message would be transmitted over JREAP allowing communication between the sensor and

CP. If land-to-sea cross domain Fires were incorporated into the A2/AD fight, PACOM field artillery assets would be achieving Harris' end state of denying the enemy the sea from land.

However, the regional capability cross domain Fires can potentially provide a joint community embroiled in an A2/AD fight, must be clarified. This notion has largely been answered by Maj. David Henderson in his monograph, "Land Based Anti-Ship Missiles: A Complementary Capability for Maintaining Access in an Anti-Access/Area-Denial Environment."

His monograph highlights the advantages of developing

and then building upon a land based anti-ship missile presence to deter possible naval adversaries from attempting of-fensive maneuvers in domestic and international waters.

When an aggressive near-peer threat believes it no longer can operate in certain regions without unwanted consequences, it is effectively deterred. The concept of deployable coastal field artillery provides new capabilities even as it draws on an old theory of coastal defense. For example, current potential coastal field artillery batteries will not resemble the gargantuan concrete fortifications reminiscent of the World War II gen-

eration. Instead, highly mobile systems such as the HIMARS platform will apply timely Fires to small windows of opportunity from unknown positions as it defends its coastline. When U.S. policy dictates that an area no longer requires an integrated coastal defense, the Army simply transports its HIMARS systems to an area that does. This scalability allows the Army to appropriately allocate coastal defense systems to the most current perceived threat. With these capabilities in mind one can perceive the deterrence value land-to-sea cross domain Fires brings to regions such as the South China Sea.



Cross Domain Fires is the employment of Joint and combined mutually supporting lethal and non-lethal Fires across all domains to achieve effects designed to create multiple dilemmas for the adversary, achieve overmatch, and enable Joint Combined Army Maneuver
—Joint Force Freedom Action

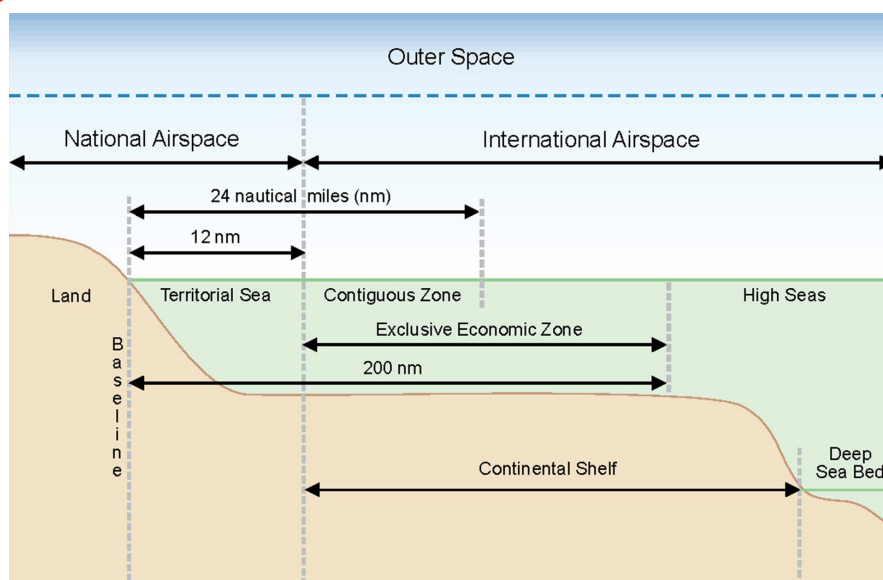


Figure 2. The legal boundaries of the oceans and airspace. (Joint Publication 3-32, Command and Control for Joint Maritime Operations, Aug. 7, 2013)

Now to solve two intertwined complex problems. How does an Army-marked target in the maritime domain get routed to the appropriate clearance authority? And who is approved to actually clear land-to-sea cross domain Fires?

To recap, this process potentially involves an air-based sensor acquiring a sea-based threat which then provides targeting data over LINK-16 to an Army division artillery command post who would then transmit firing commands via high frequency radio to a land-based-HIMARS unit. Due to its complexity, potential problems exist in maintaining the most current coast/maritime oriented

operational picture. On a macro level, if the joint task force commander of a certain theater assumed the sole mantle of clearance authority for cross domain Fires the potential exists for fire missions to stove pipe as they queue awaiting his or her approval. On the other hand, from a relatively micro perspective, it would be increasingly difficult for a single brigade combat team who has historically focused on land-based operations to either gain or sustain the complete operational picture required to competently clear land-to-sea cross domain Fires.

Existing joint publication doctrine can help identify structural concepts, current short-

falls and required additions. Joint Publication 3-33 "Joint Task Force Headquarters" offers an excellent starting point, explaining the basic construct of a joint task force (JTF). A JTF headquarters is an attractive command structure due to its ability to provide the forum needed for Navy, Air Force and Army liaison officers to conduct the coordination needed to make cross domain Fires a reality. JP 3-33 states, "The appropriate authority may establish a JTF on a geographic or functional basis or a combination of the two."³ The geographic area pertaining to land-to-sea cross domain Fires is limited to the coastline of an island and just

inside the exclusive economic sea zone (200 nm) surrounding that island. The primary function relating to this JTF will be the facilitation of planning for and executing land-to-sea cross domain Fires.

JP 3-33 continues to outline a staff containing the personnel (J1), intelligence (J2), operations (J3), logistics (J4), plans (J5) and communications (J6) sections needed to drive this potential operation. For example the J6 could serve as the main proponent for JREAP/LINK-16 architecture. Or, the J3, among its numerous other duties, could be responsible for maintaining the complete coast/maritime operational picture needed

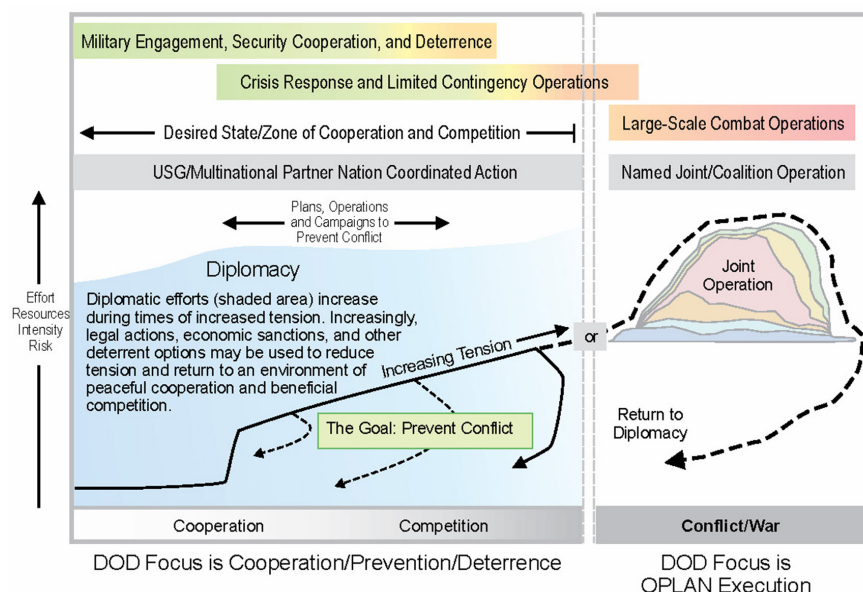


Figure 3. The conflict continuum. (Joint Publication 3-0, Joint Operations, Jan. 17, 2017)

when clearing these types of Fires.

Is this sprawling organization needed for the one purpose of executing land-to-sea cross domain Fires? Yes, at first it does seem like the perfect forum for bringing different service components together, but does the Army really need to invest exorbitant amounts of time, money and personnel into an entirely new JTF? The answer is once again in JP 3-33.

JP 3-33 introduces the idea of a cell which is "a subordinate organization formed around a specific process, capability or activity within a designated

larger organization of a JFC's HQ."⁴ A cell can be thought of as an augmentation to a certain capability closely linked to the one the cell itself provides. A cell would receive the same operational, logistical, intelligence and communications support from the J-shops amplifying its ability to perform a certain task without having to create an entirely new organization. With this basic JTF structure in mind, Joint Publication 3-60 "Joint Targeting" depicts how current joint, largely air-to-ground operations are conducted.

JP 3-60 states "the joint force commander (JFC) is re-

sponsible for conducting all planning, coordinating, and de-conflicting associated with joint targeting."⁵ In order to accomplish this broad task, the JFC will normally create a joint targeting coordination board (JTCB) which supports the JFC in three areas. A JTCB, maintains a macro-level view of the operational environment, it creates an operational-level assessment to guide the JFC's decision making and most importantly, it generates a joint integrated prioritized target list (JIPTL). A JIPTL is the driving product of joint targeting and represents

targets based on component and JFC target priorities.

In relation to the JIPTL, JP 3-60 further states "members consider the estimated available air capabilities and their ability to effect the targets on the list."⁶ There is a tendency in the joint world to lean toward the previous generation's dominant air land battle concept. This tendency manifests itself in joint operational processes wholly concerned with the de-confliction and use of air power to effect targets in the naval and land domains. This mindset was effective during the first Gulf War, but is extremely vul-

4 U.S. Joint Chiefs of Staff, Joint Task Force Headquarters, Joint Publication JP 3-33, Washington, DC: U.S. Joint Chiefs of Staff, July 30, 2012.

5 U.S. Joint Chiefs of Staff, Joint Targeting, Joint Publication 3-60, Washington, DC: U.S. Joint Chiefs of Staff, April 13, 2007.

6 U.S. Joint Chiefs of Staff, Joint Targeting, Joint Publication 3-60, Washington, DC: U.S. Joint Chiefs of Staff, April 13, 2007.



A crew readies a forklift to load a container aboard a C-17 Globemaster III assigned to the 535th Airlift Squadron, 15th Wing, at Wheeler Army Airfield. More than 200 Soldiers and equipment from the 3rd Brigade Combat Team, 25th Infantry Division participated in Lightning Forge 17 at Pohakuloa Training Area on the island of Hawaii. (Staff Sgt. Armando R. Limon/3rd BCT, 25th ID)

“United States Army Pacific will take the operational lead for Multi-Domain Battle... in accordance with United States Army Training and Doctrine Command, AMC, and Joint Components”
—Sgt. Maj. of the Army Daniel Dailey

nerable in today’s cross domain battlefield where the air domain will likely be contested by near-peer threats such as China and Russia. That said, the JTCB is not a conducive body for land-to-sea cross domain Fires.

Delving into JP 3-60, it shows the joint Fires element (JFE) acts as “a staff element that synchronizes and coordinates Fires planning and coordination on behalf of the JFC.”⁷ Historically, this organization does not de-conflict land-based shooters with maritime compo-

nents. However, it does have vast amounts of experience de-conflicting air and land assets. Along similar lines, the JFE doesn’t track naval dictated fire support coordination measures (FSCMs), but it has extensive experience in “coordinating, disseminating and managing theater FSCMs submitted by [mostly air and land] components.”⁸ Since the JFE has been de-conflicting Fires with the air domain, if pointed in the right direction, it can do the same for land-to-sea cross domain Fires.

If a specific cell was created to augment the JFE it could track naval FSCM’s instead of purely air and land. This extension would help the JFE sustain the land/maritime picture so they could competently suggest to a clearing authority an ATACMS flight path that would not hinder coast/maritime forces.

Joint Publication 3-32 “Command and Control for Joint Maritime Operations” offers a succinct glance at naval structure within the JTF. JP 3-32 introduces the concept of a

joint force maritime component commander (JFMCC) assigned under a joint force commander whose responsibilities include making “coordination and de-confliction recommendations to the JFC, to include air-space management, land-space management and water-space management.”⁹ Since a JFMCC

7 U.S. Joint Chiefs of Staff. Joint Targeting. Joint Publication 3-60. Washington, DC: U.S. Joint Chiefs of Staff, April 13, 2007.

8 U.S. Joint Chiefs of Staff. Joint Targeting. Joint Publication 3-60. Washington, DC: U.S. Joint Chiefs of Staff, April 13, 2007.

9 U.S. Joint Chiefs of Staff. Command and Control for Joint Maritime Operations. Joint Publication 3-32. Washington, DC: U.S. Joint Chiefs of Staff, April 13, 2007.



SCAR is a mission flown for the purpose of detecting targets and coordinating or performing interdiction or reconnaissance on those targets

Soldiers assigned to the 3rd Brigade Combat Team, 25th Infantry Division sit aboard a C-17 Globemaster III at Wheeler Army Airfield, Hawaii. The Soldiers participated in Lightning Forge 17. (Staff Sgt. Armando R. Limon, 3rd BCT, 25th ID)

normally retains operational control of naval forces, his/her supporting staff will coordinate with subordinate maritime sea owners. This ability is crucial to the clearance of land-based targeting requests because clearance authority should ultimately be rooted in ownership of sea-based area of operations. The maritime supporting staff section the JFC will most likely be in constant communication

with will be the time sensitive strike branch embedded within the JFMCC staff. The time sensitive strike branch exists to expeditiously prosecute and de-conflict naval surface Fires within the assigned maritime area of operations.

A possible solution for the two questions previously introduced deals with land-to-sea Fires clearance. Upon fixing a maritime target, a DIVARTY command post must push the targeting data to a cross domain Fires cell (CDFC) embedded within the JFE located in the Joint Force Command. The CDFC has an Army liaison officer in the JFMCC staff who

deals with ship positioning and projectile flight clearance; most likely the time sensitive strike branch.

The Army liaison would feed current naval fire support coordination measures to the CDFC in order to increase coast/maritime operational awareness. The Army liaison would also receive the vetted targeting data from the JFE and hand it to the time sensitive strike branch for clearance procedures. These procedures include contacting naval fleet commanders who will be affected by the proposed ATACMS flight path along the gun target line. The time sensitive strike

branch will get a handshake from each commander enabling them to suggest target clearance to the JFMCC who ultimately clears land-to-sea cross domain Fires for the maritime domain. The Army liaison informs the CDFC, who informs the JFE, who currently clears land and air through normal channels. Once all naval, land and air domains give the nod of approval, the JFE relays to the DIVARTY element that land-to-sea cross domain Fires have been cleared and the HIMARS Soldiers will execute their fire mission as normal.

Potential problems may arise in the initial employment



of this process. Even though the CDFC is within the JFE to streamline land-to-sea Fires it still resides in the JTF which ultimately relies on centralization to achieve its goals. The centralization a JTF offers arguably sets conditions for the essential coast/sea common operational picture necessary for land-to-sea cross domain Fires. This is its strength. However, that same centralization predictably produces a slower response time as the firing unit waits to receive clearance from an inherently large bureaucratic process.

During a high intensity conflict (involving one or more large-scale combat operations spanning multiple domains with a near-peer threat), the JTF centralized routing/clearance method should be modified for a more streamlined approach. However, in the competition phase of the con-

flict continuum, the addition of a CDFC embedded within the JTF will most certainly serve as an initial focal point for a land-to-sea cross domain Fires deterrent capability. While the CDFC operates in the competition phase, its centralization will build a land-to-sea deterrence capability where needed. The ability to simply generate a land-to-sea cross domain fire mission and a demonstration of the proper organizations for clearance is itself a deterrent to near-peer threats. Once the U.S. transitions from the competition phase to a high-intensity conflict, clearance authority should be delegated down to lower levels to allow HIMARS shooters to be more responsive to small windows of opportunity. How far the JTFC delegate's clearance authority goes will be unique to the amount of risk the JTFC is willing to accept, the level of trust they have in

subordinate commanders, the region they operate in and the threat they face.


The Army's ability to project power across the sea by leveraging land-to-sea missile capability is extremely relevant to the multi-domain battle concept. Twenty-fifth DIVARTY has demonstrated the systems and networks exist to make land-to-sea missile projection a combat multiplier for the current anti-access/area-denial fight by using air-based live feeds to acquire targeting data for a sea-based threat in order to initiate a land-based ATACMS strike. The Army should first consolidate land-to-sea cross domain Fires at the JTF level to build a deterrent capability in the regions that U.S. foreign policy requires. Upon entry into large-scale conflict the JTFC must delegate clearance authority to the lowest level it deems appropriate to exploit small windows

of opportunity as quickly as possible. Ultimately, the simulation performed during OLF17 and the offered joint clearance guidance produces a glide path on how the Army can, to use a phrase coined by Adm. Harris, "get back into the coastal defense game."

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A U.S. Marine with Black Sea Rotational Force 17.1 sets up the fire direction center during Exercise Saber Strike 17 aboard Camp Adazi Military Base, Latvia, June 7, 2017. The Marines fired during the combined-arms live-fire exercise, a multinational training evolution involving NATO allies and partner nations to build relationships formed by shared views. (Pfc. Sarah N. Petrock/U.S. Marine Corps)



Fast fire

Achieving and maintaining tactical, technical situational awareness at platoon, battery level

By Keith A. Nemeth

Battery and platoon-level fire direction centers (FDCs) lack the situational understanding of the battlefield to effectively conduct tactical fire direction during unified land operations. This is a problem of education, as new leaders are trained to think technically, but not tactically in Field Artillery Basic Officer Leader Course (FA BOLC). This results in firing batteries not being able to track tactical and technical data which ultimately diminishes effective fire for maneuver units. The following analysis proposes a series of tactics, techniques and procedures which will allow firing platoons to better monitor and track the battlefield, while attaining a mastery of the five requirements for accurate fire that will better serve the purpose of unified land operations (ULO).

Disconnect between firing battery and maneuver brigade

The U.S. Army intends for its forces to operate effectively under the auspice of ULO. ULO is described as how “the Army seizes, retains and exploits the initiative to gain and maintain a position of relative advantage in sustained land operations in order to prevent or deter conflict, prevail in war and create conditions for favorable conflict resolution” (Army Doctrine Publications 3-0).

The Army is able to achieve this advantage by creating unified action among maneuver and fire elements on the battlefield through unified actions, which is “the synchronization, coordination and/or integration of the activities of governmental entities with military operations to achieve unity of effort.”

Field artillery batteries are not reaching their true potential in this arrangement. Doctrinally assigned a core task, firing units need to, “[i]ntegrat[e] Fires into unified land operations [which] requires the development and full understanding of, and strict adherence to, common maneuver coordination measures, airspace coordinating measures and fire support coordination measures, rules of engagement and other constraints/restraints” (ADP 3-09). Two disconnects exist between the firing batteries and their supported maneuver units and both of them are predicated upon education.

The first disconnect between maneuver units and the firing batteries, is ultimately created and inadvertently fostered in firing batteries, through a lieutenant’s initial education during FA BOLC. While in the schoolhouse, lieutenants are trained to think only about the technical data and not its tactical application. The training places too much focus on learning the duties of enlisted FDC members, while ignoring how to train fire direction officers (FDOs) in tactical fire direction.

BOC responsibilities

The battery operation center (BOC) can be either conducted by one or both fire direction centers in split operations or total control. The BOC needs to track the following, and constantly feed this information to the FDC so both units can have situational awareness in case one of the FDCs is destroyed.

Track at a minimum

- Battalion mission, intent, EFATs, CCIR
- Firing unit locations and command posts
- Perimeter defense sketch
- Obstacles
- Clear routes
- ADA Status AXP, BAS and BSA locations
- MOPP level and downwind messages
- DECON sites
- Ammo status
- Class I & III status
- Personnel status
- Maintenance status
- Send required unit reports to tactical operations center (TOC) on battalion command net and ALOC
- Coordinate logistical support as required
- Ensure communications are operational with TOC on battalion command Net and ALOC on battalion A/L Net
- Udate status boards
- Update situation map (friendly graphics, unit locations, enemy situation, FSCMs)
- Monitor battalion command net at all times
- Monitor battery internal net when moving
- Monitor battalion A/L when in position
- BPT assumes duties of back-up FDC
- Maintain firing capability-chart (with updated GFT setting applied) & AF-ATDS or CENTAUR (updated)
- Keep guns/FDC informed of tactical situation
- Post defensive diagrams
- Maintain current battle roster list

Figure 1. The BOC tracking requirements.

Tactical fire direction is more than plotting safely and giving a fire order. It requires an in-depth operational understanding of the battlefield. Some FDOs and platoon leaders get overwhelmed with the mass amounts of information they need to manage. This may result in them disregarding the totality of the circumstances of the battlefield and focusing only on one small segment, which is technical data.

Though this is a large problem, it may not need a big solution. A way to allow for more time for tactical analysis of the battlefield, and to avoid being lost at the 25 m target, is to build systems to manage the data. Once the five requirements are tracked in an efficient manner, the FDC can focus on technical aspects and the FDO can focus on tactical concerns. The majority of this article will premise itself upon attempting to help alleviate this problem.

The second disconnect is the firing battery lacks situational awareness of the brigade scheme of maneuver, which is ineffectual and/or dangerous. This lack of situational awareness occurs due to a breakdown in communication across the brigade. The Fires battalion has a clear picture of the battlefield using command post of the future (CPOF), a digital picture of the battlefield that may be updated in real time. An analogue backup is also put in place to increase safety.

The battery FDC, however, does not have CPOF. Instead it relies solely on information that is pushed through the Advanced Field Artillery Tactical Data System (AFATDS) and whatever information they can glean through radio traffic. If the battery FDC must transition into the battalion FDC, there will be a breakdown of fire mission capabilities for an unforeseeable amount of time. A

long delay in the processing of fire missions will occur as there are numerous levels of safety checks prior to firing.

A proposed solution for this is increased training of AFATDS by the forward observers assigned to maneuver units and the stressed use of AFATDS. CPOF would be the best tool for a firing battery, but it is not likely to be granted due to its cost. The field artillery branch must make do with what it is given — AFATDS. The forward observers working in the tactical operations center (TOC) for each maneuver unit must scrub and update all fire support coordinating measures (FSCMs) and other relevant information and push it to the firing batteries. Without this information, the firing batteries are essentially shooting blind and are unaware of the greater battle occurring outside of their FDC.

Fire direction center vs. battery operation center

The FDC serves two primary purposes within the field artillery battery: it will either give firing data to the gunline, or it will serve as the battery operation center (BOC). A great deal of time is spent on the technical nature of the FDC during FA BOLC, but the necessity of the BOC is virtually ignored. The duties of the BOC can be either conducted by one or both FDCs in split operations or total control. The BOC and FDC need to be in constant communication with one another and feed information so that a common operational picture exists in the event one of the FDCs is destroyed. The BOC must track, at the very least, the information covered in Figure 1.

Target location, size

The first requirement of accurate fire is accurate target location and size. This requirement will be subdivided into three smaller

elements that the FDO must continuously track and update to increase safe firing procedures. These requirements are: the situation map, fire support coordination measures and target list worksheet.

The situation map provides an up-to-date analog representation of the battlefield. This map needs to be placed in an easily accessible location where not only the FDO, but other battery leadership may look at it to assess the battlefield with a critical eye. Next to the map should be the battalion's mission, intent, essential field artillery tasks and the commander's critical information requirements. This information will provide the "why" of the operation and its assessment may be used to do "bottom-up refinement" of the plan.

The most critical information that needs to be drawn to scale on the map are all firing unit locations, their number of firing pieces, and azimuths of fire, which allow a FDO to assist with de-confliction needs, or to easily transition into the battalion FDC if necessary. Also friendly maneuver graphics, obstacles and clear routes and the location of air defense artillery and close combat attack (CCA)/close air support (CAS) initial points. CCA/CAS frequencies, call signs, and station time should be posted within the FDC, which may be pushed to units in need of such information, or to de-conflict airspace if necessary. The final two measures that must be drawn upon the map are fire support coordination measures, and targets, which will be followed with their own sections.

Fire support coordination measures

It is imperative that fire support coordination measures (FSCMs) be pushed digitally from battalion to battery in centralized operations through the AFATDS. This will provide an accurate assessment of the location of friendly units that are linked digitally with the artillery battalion. The artillery battalions should mentor and educate the forward observers of the maneuver units to cancel their FSCMs if they are not in use, as it will free up more of the battlespace where Fires can be quickly employed.

The use of the digital system, however, does not stop the need for an analog backup. Digital communications always run the risk of proving unreliable, due to the nature of the terrain where they are being employed. With that in mind, the Army must always continue to teach and train its Soldiers on the use and necessity of analog backups. A manual backup of all FSCM locations should be posted in the FDC in case something goes wrong with digital operations. In addition, all of these FSCMs need to be drawn to scale of the map so that the FDO can quickly assess the tactical situation, when plotting the target.

Target list worksheet

Target list worksheet should be pushed from battalion to battery during centralized operations. If decentralized, the battery must get this from the maneuver unit they are directly supporting. All targets should be plotted on the firing chart. The target list worksheet should be hung in the FDC so the FDO knows how many rounds are currently allocated toward certain targets.

Accurate firing unit location and size

The second requirement is accurate firing unit location and size which is met by creating and issuing a battery parameter card prior to the field mission, updating the howitzer tracking chart and defense diagram at every new firing position.

Battery parameter card

Each battery should have a parameter card that matches with their battalion's digital standard operating procedures (SOPs). This will ensure that missions can be sent down digitally to the guns, even when massed under battalion Fires. Maintaining digital communications is one of the greatest challenges of field artillery. It is suggested that an ample amount of training time is spent on howitzer cannon operators linking their howitzers to the FDC and firing practice fire missions. Prior to this training, either the battalion or battery FDC must create a parameter card with all of the correct communication data which will be used for operations. Battery AFATDS need to be checked by the battalion AFATDS operator to ensure the proper data is entered and battalion-wide dry missions should be held monthly to maintain force readiness and prove its ability to fire a battalion mass.

Howitzer tracking chart

A howitzer tracking chart provides the FDO with a quick reference diagram that shows each howitzer grid location, if it is currently up digitally (this is intended for M119 A3 weapon systems), and the azimuth of fire the cannons are laid. This diagram should be given to the gunnery sergeant, while performing advance party operations who will attain this information prior to occupation. This will also assist the FDC chart operators who are traveling with him to plot the location of the base piece, and will then deliver the chart to the FDO during occupation.

The howitzer tracking chart should be adopted as it will give the FDO a snapshot of where all the howitzers are located on the firing point. This will allow the FDO to quickly delegate fire missions to certain howitzers as they will be able to fire with less de-confliction methods. Not all firing points are created equally. In a 6400 mil world not every cannon will be able to fire in all directions, due to possible immediate crest problems.

Defense diagram

The final requirement is the defense diagram. The drawing of the defense diagram should be started by the gunnery sergeant during occupation and finished by the platoon sergeant during occupation. In the 82nd Airborne Division, a SOP was to dedicate the use of the platoon operations jump chart for the defense diagram. The jump chart's size allows it to be easily displayed near the FDC/BOC, and can be quickly packed up and stowed during a blitz.

At the very least, the defense diagram should include the following: the drawing of the azimuth of fire to orient the diagram, position of the howitzers, target reference points, FDC, crew-served weapons, tank-killer positions, and killer junior targets. Also, there should be drawn sectors of fire for howitzers and crew-served weapons, which will graphically depict the corresponding range card data to include target reference points, avenues of approach and other terrain features such as dead space.

The defense diagram is incredibly important as it will be the visual representation of how the battery will prepare for an assault. By drawing out the defense and then briefing those responsible for their positions, the battery ensures that it has 360-degree protection.

Weapon and ammunition information

The FDO must account for the “Big 3 of No. 3,” the third requirement for accurate fire, which are square weight, propellant temperature, and muzzle velocity variations data. These three concepts are core necessities for the production of technical firing data. This paper will not focus on acquiring and using this information properly, as Field Manual 6-40 provides ample illustration. What will be discussed is the necessity of an ammunition tracking device.

Ammunition tracking and fire orders

One of the most important duties of the FDO is to ensure the battery has the proper ammunition for the necessary field artillery tasks and in the correct quantities. A FDO cannot be passive when it comes to this duty, and simply just receive the ammunition and list it on the tracker. To be effective at his job, the FDO must send timely requests for resupplies, and make sure the howitzers have the correct number of shells and fuzes. If the FDO fails in this aspect, the FDC will not be able to deliver timely and accurate fire, which is the essential field artillery task.

As the battalion FDC enters the planning process, the FDO should first send a current ammunition count to the battalion FDC. Next the battery FDO needs to request a planned target list, and determine the fire orders for each target utilizing the attack guidance matrix that is distributed from the battalion FDC.

The ammunition requests need to be sent to battalion, while both the executive officer and platoon sergeant need to be aware of when the ammunition will be delivered to the battery. In addition, the FDO needs to establish resupply triggers on the gunline so they know when to retrieve more rounds.

The FDO must also coordinate with the battery executive officer and platoon sergeant to determine if the battery needs to shut down all the howitzers to download new ammunition. This would obviously be the least welcomed choice as it will severely limit firing capabilities. The better choice would be to keep at least 50 percent of its howitzers active, while other howitzer crew sections distribute ammunition across the firing point.

The FDO should track not only the number of rounds that are on his firing point by shell and fuze per howitzer, he should also track rounds battalion-wide. Though he may not know how many rounds each of his sister batteries have on each specific howitzer, he should know how many rounds are on their firing points. This knowledge will speed a seamless transition in case the battery FDC needs to become the battalion FDC. This transfer of authority will occur during a chaotic period of time, so it is essential that a great deal of preparation occurs prior to this outcome. If the battery FDC has appropriate knowledge of the other firing batteries, they will be able to receive fire missions from maneuver units and delegate their firing to subordinate batteries, without much disruption in fire mission processing.

Meteorological data

The fourth requirement for accurate fire is accurate meteorological (MET) data. If the battery does not have its own profile to pull MET data, it will need to request it from battalion if it is not automatically sent. The MET data must be entered at the following times: midnight, 4 a.m., 6 a.m., 8 a.m., noon, 4 p.m., 6 p.m. and 8 p.m.

Computational procedures

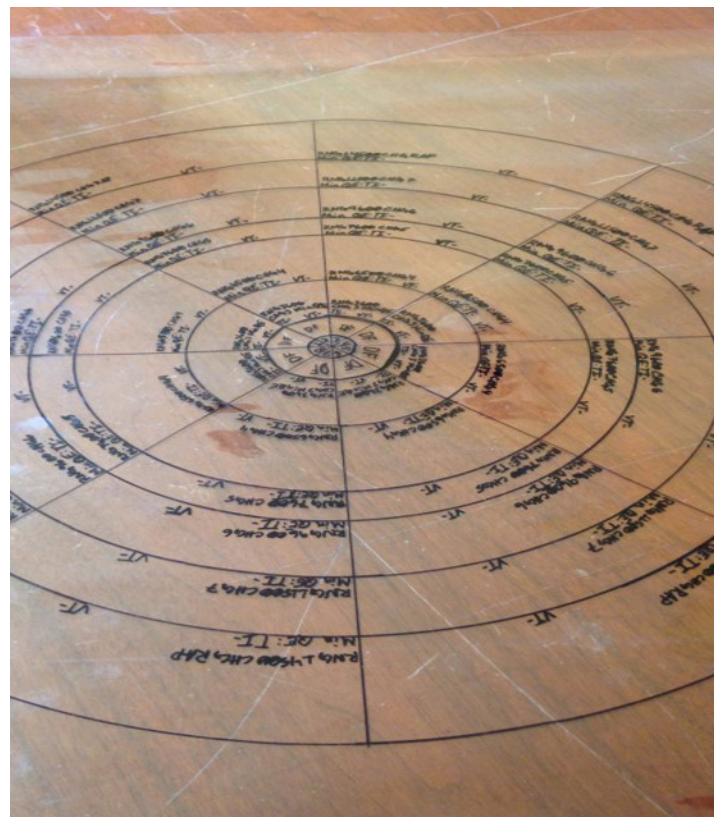
One tactical way to calculate the safe delivery of Fires not taught in FA BOLC is charge band safety. The construction of

charge bands gives the FDO a visual representation of the most optimum powder charge to fire at a given range to target with respect to the executive officer's minimum quadrant. Charge bands are designed for use in a combat situation or combat training when the FDO does not need to create a safety diagram. FDOs do not fire rounds blind because they are not calculating safety in the normal fashion.

The construction of charge bands begins with the executive officer's minimum quadrant (XOs Min QE), as determined by the FDO, based on the worst case site-to-crest. Once the XOs Min QE is established in respect to the minimum safeline, the FDO must determine the optimum charge to fire with respect to the XOs Min QE. To do this, the FDO enters the tabular firing table (TFT) and determines the optimum charge to fire at the range to the minimum safeline. The FDO then enters the section in the TFT corresponding to the selected charge and determines if the QE at the range to the min safe line is in violation of the XOs Min QE. If there is no violation, then the selected charge will be the charge to fire at that range (and will be marked as the first charge band).

If a violation exists and the selected charge cannot be fired at the given range because the QE is below the XOs Min QE, then the FDO must continue the selection process by moving to the next lower charge. If that charge is also unsafe, the FDO moves to the next lower charge and so forth until a safe charge is found. The first acceptable charge will be the charge to fire at the min safeline and will be marked as the first charge band. Construction of more charge bands is based on the same principle of using the most optimum charge possible whenever possible, without violating the XOs Min QE. When possible, the optimum charge should be fired. If the optimum charge could not be fired because the QE to the min safeline was in violation of the XOs Min QE, the FDO must ensure

A 6400 mil executive officer's minimum quadrant wheel. (Courtesy photo)



that the range where the QE no longer violates the XO's Min QE is marked.

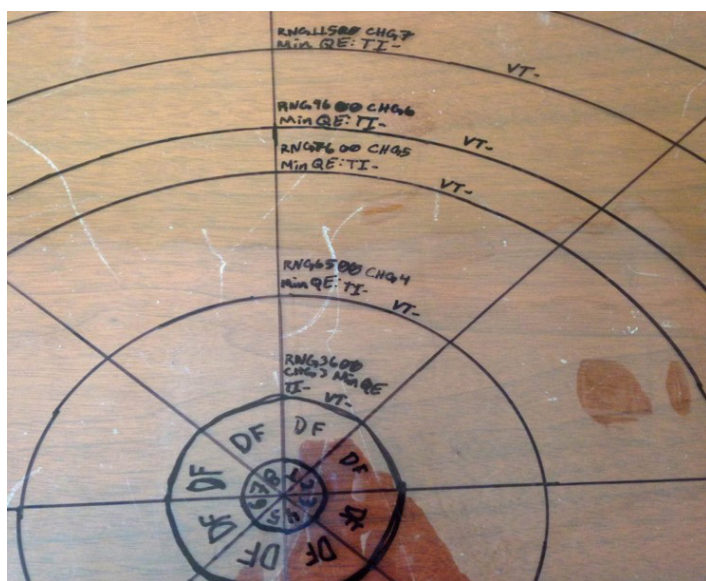
To incorporate charge band safety, and to grant the FDO the maximum amount of time during fire missions, the FDO should adopt the use of the 6400 Mil XO Min QE Wheel. The use of this wheel will allow the FDO to rapidly determine: if the target plots safe, it shows the minimum quadrant able to be fired, it allows the FDO to send an action azimuth to the gunline in advance of the fire command and it gives the preferred charge to the computer operator to speed up AFATDS use.

The 6400 Mil XO Min QE Wheel is a large device the FDO can pick up and place over a new center of battery on his firing map at every firing point which is occupied. It is essentially a visualization of charge band safety with a few additions. In a world that needs 6400 mil capabilities, the wheel helps the FDO quickly determine all the minimum quadrants, charges and octants. It works in the following way: When a fire mission is called over the radio, the FDO will plot the target grid. From there, he can visually assess the best charge to reach the target, the minimum quadrant necessary to clear any immediate or intermediate crests, tell the AFATDS operator which charge to use, and have the gunline spin their tubes to the action azimuth. This is a time-saving technique which will minimize the waiting time for the guns to be set and the FDC to calculate the correct firing data. It is recommended that this device be created beforehand as the mathematical calculations for the best probable error in range for each charge will not change, neither will the distance due to it being a circle.

This device can be created by cutting a piece of the acetate long enough to fit your farthest range to all sides from a center location. Then tape down the wiz wheel to your acetate. Using the map marker, create eight lines stretching from the center of the circle to the farthest range, which would be for rocket assisted projectiles. Once the outside circle is created, draw the eight octants using the pizza cutter for angle reference. Make a line from the center to the outside circle every 800 mils. Using the ranges given, create smaller circles at each range.

Now that the octants and range lines have been created, label each range in each octant using this format- "CHG () RNG () MIN QE- TI- VT-." Remove the wiz wheel from the acetate and finish the lines for the octants. Make another circle from 0-600 meters for a no-fire area. This is where you will label the octants 1-8. Then label the area between 600-min charge 3 in meters as DF for direct fire. Using the lamination paper, carefully cover the acetate so that the lines and information will not be erased during use. Smooth out the lamination using a debit card or other flexible straight edge and then remove the excess on the edges.

It is critical that leaders within the field artillery community are trained tactically as well as technically during their time at Fort Sill. There is too little time in an officer's career progression to learn how to think tactically solely on the job as a fire direction officer. As officers are quickly moved about, most lieutenants will only have six months to a year in this position. That is not enough time to build a foundational base for what is essentially the most important job in a firing battery—choosing correct attack guidance, and determining technical data.



The various steps for making a 6400 mil executive officer's minimum quadrant wheel. (Courtesy photos)



(Spc. Lloyd Villanueva/U.S. Army)

BURSTING THE RUSSIAN INTEGRATED AIR DEFENSE SYSTEM BUBBLE

By Col. Rick Ullian

40 • Fires, July–August 2017, Expanding cross domain Fires



(Justin Connahee/U.S. Air Force)



(Sgt. Michael Giles/U.S. Army)

Conventional wisdom suggests if Russia were to attack NATO, it would likely do so in the Baltics. While NATO considers the probability of such an attack to be low, if it's wrong the alliance will have to solve an early combined and joint Fires problem. If Putin were to send little green men into his Baltic neighbor's backyard, they would fight inside a Russian integrated air defense system (IADS) bubble that is one of the most formidable in the world. Russian fourth generation, double-digit surface-to-air missile systems (e.g., SA-21 Growler) and long-range rocket artillery (e.g., SS-26 Stone) enable Russia, with the flip of a switch, to isolate NATO's Baltic allies and deny the alliance access to assembly areas and debarkation points from which an allied operation to remove Russian forces would optimally begin. Consequently, the success of any such allied operation is entirely predicated on first bursting this IADS bubble.



NATO's essential fire support task

Rolling back the SA-21 and SS-26 range rings that stretch this bubble across not only Estonia, Latvia and Lithuania, but also the Baltic Sea and deep into Poland, would require allied air and ground forces to work closely together to deliver combined and joint suppression of enemy air defense (C/JSEAD) Fires in a well synchronized

exhibition of speed, timing and firepower. An essential fire support task NATO has spent very little time training on since the collapse of the Soviet Union. With no peer competitor on the European continent to contend with, NATO's C/JSEAD skills have atrophied in places like Afghanistan and Libya where allied air and ground forces encountered little or no integrated air de-

fenses and easily established air dominance over its third-world enemy. In the Baltics however, NATO will not enjoy this luxury.

NATO's numbers problem

According to the RAND Corporation, the Russian advantage over NATO in cannon artillery is 4:1, in long-range rocket artillery 16:1, in long-range air defense ar-

(Sgt. Juan F. Jimenez/U.S. Army)



tillery 17:1 and in short-range air defense artillery the Russians outnumber NATO an astounding 24:1. For NATO, these grossly uneven numbers render thoughts of establishing air dominance over the Russians across the Baltic region unrealistic. Instead, the alliance will likely find itself fighting hard just to establish temporary air superiority over the Russians in a single Baltic

state. That said, if NATO hopes to set even these limited conditions on a battlefield in Estonia, Latvia or Lithuania in the future, it needs to start conducting routine C/JSEAD live-fire training today.

Putting the cart before the horse?

Currently, C/JSEAD is not an essential fire support task the alliance's combined

and joint Fires warfighting team routinely trains on. While the alliance conducts hundreds of important combined and joint exercises annually, the preponderance of these exercises tend to be maneuver-centric training focused on high visibility missions like joint forcible entry (JFE). JFEs are important, but if the alliance's combined and joint Fires warfighting team can't set conditions early there won't be a JFE later. The suggestion here isn't that NATO should focus less on JFEs and more on C/JSEAD, but that one is dependent on the other and therefore it would be prudent for NATO to start training on both equally.

Moving beyond the theoretical

To be fair, there are a handful of headquarters in the alliance investing mostly staff effort and some live-fire training on C/JSEAD. Exercises like the United States Air Forces Europe's Iron Hand, the United States Army Europe's anti-access/area denial (A2/AD) rehearsal of concept drill and Poland's Anaconda 16 Fire Control Exercise (AN 16 FCX) are all examples of operational level commanders and their staffs thinking their way through the tactics, techniques and procedures (TTPs) for suppressing Russian artillery and the air defense systems they protect. Unfortunately, these exercises aren't always combined or even joint, and are often simulated and have yet to result in standardize C/JSEAD live-fire training across the alliance.

If NATO seeks to set conditions early, then C/JSEAD needs to move from being infrequent theoretical discussions and simulations among only Army or only Air Force senior leaders in air conditioned buildings, and into routine combined and joint practical training between young pilots, joint terminal air controllers, field artillerymen and air defenders on cold and wet live-fire ranges in places like the Suwalki Gap.

What right looks like

Of the exercises mentioned above, Poland's AN 16 FCX is arguably the best approximation of what C/JSEAD live-fire training should look like in practice and an early model NATO might consider establishing as its standard going forward. FCX leaders set for themselves the limited goal of learning how to suppress a single SA-21, the centerpiece of Russia's A2/AD capability. The thought process was to start small and through trial and error develop an initial C/JSEAD TTP the combined and joint Fires warfighting team could then improve

on to tackle larger and more sophisticated IADS problems in the future.

For nearly a week, a small coalition of the willing (Poles, Americans and Romanians) planned, coordinated and supervised the delivery of combined and joint operational level cross domain Fires using fixed- and rotary-wing fire support systems, intelligence, surveillance and reconnaissance, and cannon and rocket artillery on a range purposely built to replicate the SA-21's footprint. The exercise's realistic design, large number of dissimilar fire support systems and multi-national contribution offered its participants a sobering glimpse at the many challenges, both enemy and friendly, the alliance will likely encounter if ever called on to suppress a fourth generation, double-digit surface-to-air missile system. Among these challenges, the FCX identified several NATO should consider attending to immediately.

Combined, joint Fires challenges

Tactics, techniques and procedures - The most glaring challenge FCX leaders confronted was figuring out how to mitigate Russia's field and air defense artillery advantages so the full weight of NATO's firepower could be brought to bear against the SA-21. This was a particularly tough Fires nut to crack given Russia's advantages are not only quantitative, but also qualitative. Its most advanced cannon, rocket and ballistic missile systems can all outrange their equivalents in NATO, thus requiring allied artillery forces to maneuver inside of Russian range rings in order to deliver C/JSEAD Fires. Even if allied artillery forces managed to do so unscathed and maneuvered to within Army Tactical Missile System range of the SA-21, the Growler is capable of intercepting up to 36 targets

simultaneously which makes suppressing or destroying it problematic.

To survive inside of Russia's artillery range rings, FCX leaders concluded NATO will in many ways have to go back to the basics. Meaning the alliance will have to re-learn many of the traditional shoot, move and communicate TTPs it employed during the Cold War e.g., selecting firing positions that provide natural concealment; using camouflage nets; shooting predominantly low angle Fires at higher charges versus shooting higher angle Fires that can be easily tracked by enemy counter-fire radar; establishing survivability move criteria that require higher angle shooters to displace after every fire mission; moving at night; enforcing light discipline and reducing tactical operation center and fire direction center electromagnetic emissions.

To suppress the SA-21, FCX leaders concluded allied C/JSEAD Fires need to

(Staff Sgt. Angelita M. Lawrence/U.S. Air Force)



be high volume to include miniature air-launched decoys and electronic jamming, approach from multiple directions, at different elevations and arrive near simultaneously. When shot as part of a larger cross domain C/JSEAD mission, the cumulative effect is to confuse and overwhelm the SA-21 making it vulnerable to suppression or even destruction. While this TTP maximizes the lethality of NATO's limited cannon, rocket and missile capabilities, if NATO hopes to achieve surface-to-surface Fires overmatch it will need to invest in an arsenal that includes longer range, hyper velocity munitions that can fly nap-of-the-earth profiles, engage moving targets and avoid return fire en route to its destination.

Mission command - Synchronizing a cross domain C/JSEAD mission will require an operational level headquarters (think

general support field artillery brigade or corps artillery headquarters) capable of providing technical and operational fire direction across several multinational divisions and beyond the coalition fire support coordination line. Currently, no such organization exists within the alliance's European artillery formations. As part of its Readiness Action Plan, NATO should consider adding this capability to its list of "adaptation measures" currently being implemented to deter further Russian aggression. While the United States does possess this capability, the 45th Field Artillery Brigade out of the Oklahoma Army National Guard performed this function during the AN 16 FCX, NATO would be wise to seek a European-based solution to this critical mission command challenge.

Digital communications - Both the Poles and Romanians communicated exclusively by voice during the FCX and on a modern battlefield, where success is measured in milliseconds, voice is simply too slow and highly susceptible to being intercepted or jammed. The Pole's and Romanian's reluctance to embrace digital Fires communication is not unique to NATO's Eastern European allies, but is in fact the norm across most of the alliance. Until NATO publishes standardized C/JSEAD live-fire training guidance that includes the mandatory use of digital Fires communication, the alliance is making what is already going to be an uphill fight an even more difficult task.

Interoperable communications - If the letter "C" is the operative letter in C/JSEAD, then the alliance's digital Fires communication has to be interoperable. Currently, only five of 28 allies are equipped with the software, Artillery Systems Cooperation Activities (ASCA), which enables artillery command and control systems from different countries to communicate with one another. Neither the Poles nor the Romanians have invested in ASCA. Consequently the coalition had to exchange liaison officers during the FCX to clear Fires by voice and manually update coalition reports, all of which slowed down the process of delivering Fires.

Known knowns, known unknowns and unknown unknowns

Obviously, not every challenge the coalition faced at the Drawsko Pomorskie Training Area last June would come as a revelation to NATO's senior leaders. Russia's numerical superiority and its technological Fires edge are "known knowns" and a handful of allies are already researching and developing a broad range of lethal and non-lethal capabilities to offset the Russian advantage. The purpose of the FCX was to validate a TTP and identify for NATO's senior leaders those "known unknowns and unknown unknowns" they may not have been aware of, but need to account for if ever designated the allied joint force commander. In the event Article 5 is invoked, the allied joint force commander would be responsible for the deep fight to include establishing air superiority, an operational level task Gen. Frank Gorenc once suggested would take "weeks, not days" to accomplish. Given the former NATO Air Command commander's estimate assumed a level of C/JSEAD proficiency at the time of incident which does not currently exist in the alliance, establishing air superiority over the Russians in the Baltics could in fact take months, not weeks and cost the alliance dearly in additional lives.

Forestalling this grim scenario starts with NATO investing heavily in capabilities that address Russia's quantitative and qualitative advantages described earlier. While there is little expectation NATO's member countries will increase defense spending to do so, there are things NATO can do with what they have to at least reduce the risk to the force. First among them is for Supreme Headquarters Allied Powers Europe to establish C/JSEAD as a training priority. It then needs to publish guidance that directs its components to routinely train together on this essential fire support task, standardize what C/JSEAD live-fire training should look like, evaluate the training and encourage its armies to build ranges that can support it. Only then can NATO, and not a small coalition of the willing, increase its C/JSEAD proficiency and aspire to burst the Russian IADS bubble.

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Members of the heavy weapons squad occupy a support-by-fire position as smoke comes in beyond the wire obstacle during the 2nd Brigade Combat Team, 101st Airborne Division, walk and shoot exercise. (Courtesy photo)

Brigade combat team walk and shoot

Setting conditions to achieve combined arms maneuver

By Maj. Daniel Ciccarelli, Lt. Col. Charles Kean and Col. Brett Sylvia

In 1997, then Col. David Petraeus and Maj. Robert Brennan published an article titled, “Walk and Shoot Training.” It described focused training for company commanders, platoon leaders and their respective fire supporters on how to plan and execute a movement to contact (approach march) and employ indirect Fires. The authors stated that all too often tactical leaders fail to integrate Fires into their plans to set advantageous conditions prior to closing with and destroying the enemy.

The same lessons that led the leaders of 1st Brigade, 82nd Airborne Division to develop a walk and shoot tactical exercise without troops (TEWT) in 1997 not only continue to be seen, but are compounded by the host of enablers available to leaders in today’s operating environment. Tactical leaders often transition directly from platoon live-fire exercises into company live-fire exercises without getting valuable repetitions on the integration of all available assets – a leader-intensive task.

In February 2016, 2nd Brigade Combat Team, 101st Airborne Division (Air Assault) executed a re-designed walk and shoot TEWT with the objective of training company and platoon lead-

ership in the art and science of employing both indirect and direct Fires, multiple enablers and maneuver elements to achieve synchronized combined arms maneuver. Such training is invaluable to company leadership as they prepare formations for combined arms live-fire exercises and it should be built into the standard training progressions for maneuver leaders and units.

Rather than develop a training exercise that focused strictly on the employment of Fires, 2nd BCT’s re-designed walk and shoot used arguably one of the toughest tactical scenarios: the combined arms breach. They used it to train company-level leaders on setting advantageous conditions in terms of the enemy situation, friendly situation, terrain and timing. Furthermore, the scenario provided context on how each echelon’s actions contribute to the platoon, company and battalion’s accomplishment of mission. This problem-set forced Soldiers to visualize their mission and how it fits into the larger scenario. They had to plan for and employ all assets to include organic elements and numerous enablers. Additionally, the scenario helped leaders understand the use of space and time to synchronize effects to set conditions and inevitably overwhelm

Performance Measures: Maneuver	Go	No-go
1. Unit leaders gained or maintained situational understanding		
2. Unit leaders adjusted the plan		
3. Unit executed the attack		
4. Unit conducted consolidation and reorganization		
5. Unit reported status to higher headquarters		
6. Directed unit reaction to the obstacles		
7. Obtained pertinent obstacle intelligence from unit recon and reports from other units		
8. Developed the breach plan		
9. Directed actions of the support force to support by fire		
10. Ensured the mounted/dismounted elements secure the near side of the obstacle		
11. Directed the breach force to reduce the obstacle using the method designated in the order		
12. Established far side security for breaching operation		
13. Directed actions on the objective		
14. Reported completion of the breach to the higher unit commander		

Figure 1. An example of an evaluation checklist used by observer controllers during the 2nd Brigade Combat Team, 101st Airborne Division, walk and shoot exercise. Observers and participants were provided a training evaluation and outline (T&EO) that outlined collective training objectives, related individual training objectives and applicable performance measures.

the enemy at the decisive point in battle. It gave squad leaders and above, repetitions on the tasks they must master to achieve synchronized combined arms maneuver.

The lessons learned in 2nd BCT's walk and shoot will undoubtedly increase each participant's proficiencies as they train and lead Soldiers into combat.

Exercise design

In general, the exercise centered on a company's mission to breach a linear mine/wire obstacle and set the conditions to allow another company to execute a forward passage of lines through the obstacle and assault a follow-on objective. The company team executing the lane was designated as a shaping operation focused on setting conditions for a subsequent unit to assume the decisive operation. The team consisted of two rifle platoons, one mounted anti-tank platoon and an engineer squad. The training audience for each element included company leadership, platoon leadership, a heavy-weapons squad, company mortars and the habitually aligned fire support teams. In addition to the elements task organized under the company, the order also outlined enablers that would be utilized in the operation. These enablers included battalion mortars, 105 mm and 155 mm howitzers, air weapons teams (AWTs) and the BCT's organic Shadow. To add realism to the scenario, external enablers served in a direct support role to the battalion and BCT and were allocated based on the higher level unit's priorities. Furthermore, in order to employ these assets, company teams were required to use battalion and brigade mission command nodes as opposed to establishing quick fire nets. This also provided a training opportunity for battalion and brigade fire support elements and tactical operations centers.

Each team executed the lane in three phases. For each of these phases, the BCT resourced both maneuver and fire support observ-

er controllers for the company command team, each of the platoons and subject matter experts to observe each of the supporting enablers. The observer controllers followed training and evaluation outlines to rate individual and collective tasks associated with each event (see Figure 1). During the first phase, Soldiers had to execute the lane using Virtual Battlespace-3 (VBS3). The virtual environment replicated the terrain and enemy units they would see on the range. Additionally, the unit replicated the communications architecture and included supporting teams that replicated the enablers (see Figure 2). The second phase consisted of a blank iteration on Observation Point 13 in the Fort Campbell, Ky., training area. Prior to the blank iterations, companies conducted a combined-arms rehearsal. All direct fire weapon systems were fired using blank ammunition and the indirect fire weapons systems used either tracer practice target rounds or a single high explosive (HE) round. The signature from the indirect fire weapons systems provided the training audience feedback on the effectiveness of their Fires, while conserving ammunition. Upon completion of the virtual and blank fire phases, the unit advanced to the live-fire portion of the exercise.

Observation Point 13 is an area approximately 1,000 meters in length and 400 meters in width that extends into the northern impact zone. There are approximately 10 clearly identifiable vehicular targets that are located just beyond the observation point in the impact area. Additionally, the range has five wooden structures and pop-up direct fire targets positioned within the cleared area of the range. There are three sets of berms from east to west in the cleared area of the range. Indirect fire weapons systems from 60 mm mortars up to 155 mm artillery can effectively engage the targets in the impact area from firing positions to the northeast and south of the range. Units are allowed to employ individual weapons, crew-

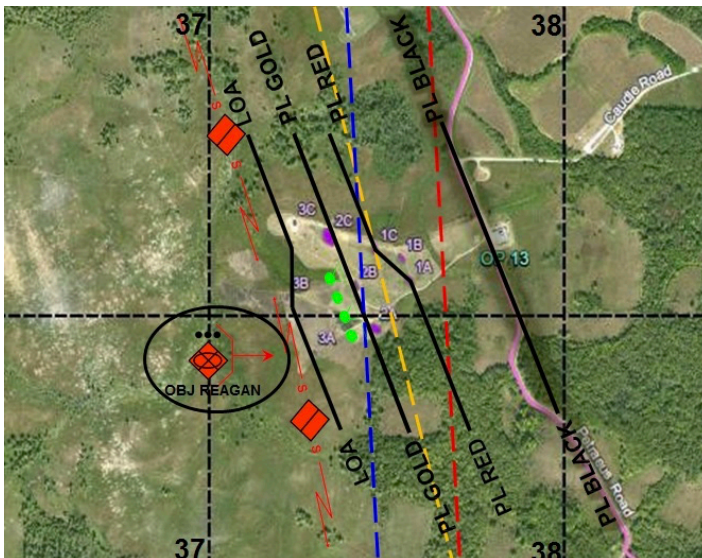


Figure 4. This diagram outlines the higher level graphical control measures and basic enemy situation. (Courtesy illustration)

allowed leaders to achieve true synchronization and overwhelm an enemy at the decisive point in the battle.

The heart of the walk and shoot is shaping the decisive point. How the leadership estimates, employs and tracks assets is no small task and provides those higher up with a valid evaluation of the technical and tactical competence of their commanders. The commander's ability to successfully employ all available assets to achieve desired conditions doesn't happen by chance. If they focus too much on organic maneuver capabilities alone, they will lose sight of how to effectively integrate and synchronize everything at their disposal. In effect, it will degrade their ability to maintain the momentum. If they lose sight of the ammunition consumed, they cannot sustain a support by fire position during the breach. If they do not truly understand how long it takes to call for, shoot and build an artillery delivered obscuration smokescreen, they will not be able to maintain the suppressive fires and set the conditions for the engineers to breach the obstacle. This exercise provided leaders invaluable repetitions on the actions and knowledge required to synchronize their maneuver elements with the host of enablers available in today's operating environment.

The third similarity in successful units was their ability to create a common understanding among leaders. This begins with the company commanders' ability to clearly articulate his intent. The expanded purpose, key tasks and desired end state provide the foundation for all leaders to visualize the operation in a similar manner. Task and purpose alone do not provide enough context for subordinate units to understand how their actions contribute to, and fit into, the larger plan. Units that excelled used execution checklists to articulate and communicate the actions each subordinate unit would take in and the conditions required at each step in the process. Detailed planning prior to the exercise and war-gaming potential contingencies allowed units to change required decisions to triggers. The more decision points that could be converted to triggers, the more units maintained operational tempo. These triggers were outlined in the execution checklist and provided a method for all leaders to understand what was occurring in the operation without clogging up the radio net with unnecessary communications. Additionally, when conditions changed in a manner not anticipated, the radio net was not jammed with unnecessary

SOURCE: IIR		TO: CO		SOURCE: IIR		TO: CO		SOURCE: RADAR		TO: BN FSE	
1 ENY ZSU (NO 15mm) PRI TGT		2 ENY armored vehicle in our watch position confirmed at 120mm(MTR) PRI		3		4 MTR POC w/ VC 36309 60267. Need OF clearance of fire (105mm)					
BERM 1A		BERM 1B		BERM 1C				MANEUVER BERM 1			
1 ENY armored vehicle (yellow tank)		1 ENY setting up IFF NO to brown tank and tree line		1 Enemy sniper team south of close brown tank				1 8-12 ENY BMDs create a defensive line just west of the creek bed.			
2 Enemy BMD comes out of defile (155, 105)		2 Enemy sniper team in creek south of white tank (105, 21, 80mm)		2 2nd BMD comes out of defile (155, 120, 105)				2 Friendly positions on PL, RED are being irradiated by ICF.			
BERM 2A		BERM 2B		BERM 2C				MANEUVER BERM 2			
3 Enemy diamondts dig in with overhead arc (155, 105)		3 Enemy sniper team east 300m NW (120, 105, 80mm)		3 ENY technical vehicle (Green Tank) OR ZSU (155, 120, 105)				3 An armored vehicle is positioning to engage friendly positions.			
2 ENY technical vehicle, pink APC (120, 105)		4 Enemy Armor approaching from west (Brown Tank) (155, 120, 105)		4 Friendlys receive small armor fire from creek bed (120, 105, 80mm)				4 Armor injury (Blue 2) should trigger a small mission for breach			
BERM 3A		BERM 3B		BERM 3C				MANEUVER BERM 3			
5 Squads from EN APC moved toward creek 200m west with crew served (120, 105)		5 ENY Armor Vehicle occupies BP (green armor tank) (120, 105)		5 ENY fire team attempting to flank friendly near bushes (80mm DANGER CLOSE)				5 EN mechanized forces located E of Creek bed with diamondt fighting positions in front.			
6 Friendlys receiving heavy IAO fire from tree line (120, 105, 80mm)		6 Enemy reinforcements are taking position in creek (155, 120, 105, 80mm)		6 Squads dismounted around white tank engaging friendly positions (120, 105, 80mm)				6 Mechanized platoon destroyed with suppressed fire (olive BMD)			

Figure 5. The lane inject sheet used by observer controllers during the 2nd Brigade Combat Team, 101st Airborne Division, walk and shoot exercise. Prior to the event, to observers were trained on each of the targets: how they fit into the tactical scenario, and the minimum safe distances for each weapon system based on where the training unit was on the range. (Courtesy illustration)

traffic which allowed leaders to communicate adjustments to the plan.

Another method was to synchronize actions and mitigate risk with the use of graphical and weapon control measures. The BCT developed the scenario with injects that forced leaders to understand fire support coordination measures. The placement of the brigade coordinated fire line (CFL) helped leaders understand how the BCT commander saw each echelon's fights. Prior to crossing the line of departure, the BCT's CFL was the training companies' limit of advance. Engagements against air defense threats beyond the CFL set the conditions for the company to cross their line of departure (LD) with supporting AWTs. As the training company crossed the LD, the BCT's CFL shifted deeper into the impact area. While the company was maneuvering to the objective, the BCT's radars acquired enemy indirect fire systems shooting from a location short of the CFL in the company's area of operations. The company had to clear the ground before the BCT conducted counter fire. Company teams that used the pre-established phase lines to track forward progress were quickly able to clear the ground and get effects on the enemy indirect fire systems. Units that did not have a method of tracking their forward progress lacked the common understanding to quickly clear the ground. Additionally, units that established common direct fire weapon systems control measures were able to efficiently synchronize maneuvering elements with direct fires. In all instances, success was closely tied to the leaders' understanding of time and space and their ability to put simple procedures in place to synchronize their actions across the depth, width and height of their area of operations.

The final lesson learned involved the tools and procedures leaders used to track the battle. Since all leaders receive and interpret information differently, there was no right answer on how to maintain situational awareness in combat. The bottom line is that leaders must develop a method and create the tools that work for them. Whether it is a certain size map board or tracking charts that outline critical information, they must translate information into the knowledge they need to make informed decisions. Additionally, since the volume of pertinent information is extensive, they must assign responsibilities to different personnel on the team to track certain types of information. They should rehearse how this information is tracked and how those Soldiers tracking the infor-



A platoon forward observer plots and reports his observer location as the platoon establishes a support-by-fire position. (Courtesy photo)

mation articulate it to those that need it. What information does the company fire support officer have to track? How is the company commander utilizing his radio telephone operator? Where is the forward observer in relation to the platoon leader? What is the company executive officer or first sergeant tracking and how is this enabling the unit? These types of questions need to be addressed prior to execution. Successful units thought all of this through and rehearsed it in conditions that simulated the event prior to LD.

Exercises similar to the 2nd BCT walk and shoot TEWT are low-cost, high-yield tools that are invaluable in training and certifying leaders. Soldiers in the 2nd BCT used this exercise to validate their company-level leaders on the actions required to achieve synchronized combined arms maneuver. Each phase of the event provided the training progression essential for units to refine how they operate prior to executing higher level collective training with their formations. Through rehearsals, virtual simulation and blank and live iterations, the BCT commander was able to evaluate the company leadership on their ability to exercise the principles of mission command to achieve a shared understanding, their mastery of setting the conditions to overwhelm the enemy at a time and place of their choosing, and even unit training management. Along every step of the walk and shoot, commanders and subordinates were learning and fine-tuning their plan by getting repetitions in their understanding and application of mission command. Throughout the course of a unit's progression from the virtual simulation to the live-fire exercise, leaders grew exponentially. They refined how they tracked and used critical information requirements to improve their decision making. From start to finish, the company leadership

gained the competencies required to lead their organizations and the confidence to exploit opportunities.

Clausewitz stated that decision making is the correct application of knowledge and experience. A combined-arms Fires and maneuver exercise requires analytic decision making for planning and including the combined-arms rehearsal. During the execution of the lanes, analytical tracking of assets in time and space is still highly relevant. However, commanders and especially subordinates will rely on intuitive decision making using their assessment of the current enemy situation, their experience and their ability to recognize key elements and conditions resulting from the current situation. This type of exercise allows observers to see if decisions are either rushed or overthought. Conversely, it is a test to determine if commanders blend intuitive and analytical decision making to remain objective, or if they are making decisions purely by intuition.

As we continue to add enablers down to the lowest echelons of formations, there will be higher expectations of junior leaders to achieve synchronized combined-arms maneuver. There is no substitute for a combined arms maneuver exercise, similar to the 2nd BCT walk and shoot TEWT, to train commanders and subordinates on the skills required to achieve overwhelming effects on the enemy at a time and place of their choosing.

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Cross domain synergy

Using artillery in the fight for sea control

By Maj. Steven Huckleberry



Soldiers assigned to 5th Battalion, 113th Field Artillery Regiment (High Mobility Artillery Rocket System), North Carolina Army National Guard, fire a M142 HIMARS light multiple rocket launcher during a live-fire exercise at Drawsko Pomorski Training Area, Poland, during Exercise Anakonda 16, June 14, 2016. (Sgt. 1st Class Robert Jordan/ U.S. Army National Guard)

The concept of anti-access is not new. The Great Wall of China and Athenian walls demonstrate this strategy has existed for centuries. More contemporary illustrations are the Japanese perimeter defense strategy during WWII and Iraq's integrated air defense system, KARI, during the Gulf War. In both cases, invading forces used complementary capabilities in a strategy to reduce

the threat and penetrate their defenses.

Since the Gulf War, several nations have developed their own strategies to prohibit access and deny militaries freedom of action in their region. Termed anti-access and area denial (A2/AD), these strategies are enabled by advanced weapons to serve as a low-cost deterrent, allowing adversaries to pose a high cost on intervening military forces.¹ More

importantly, the relatively inexpensive nature of these systems allow many countries to isolate their region from outside influences, creating economic instability and eroding confidence in the international order.

The international order depends on the stability and economic vitality granted by the free access to the global commons. The most important of these commons continues to be the maritime domain. With

over 90 percent of the world's trade transported over the oceans, its unrestricted use is essential to the global economy.² Since WWII the U.S. Navy has protected access to this domain. With a robust trade economy and bordering two oceans, it serves U.S. interests to maintain freedom of navigation.³ However, preserving access under the threat of advanced A2/AD systems poses a risky and daunting challenge to the USN.

¹ The JOAC defines Anti-access as those actions and capabilities, usually long-range, designed to prevent an opposing force from entering an operational area. Area denial is defined as those actions and capabilities, usually of shorter range, designed not to keep an opposing force out, but to limit its freedom of action within the operational area.

² Joint Chiefs, Cross-Domain Synergy in Joint Operations, 43.

³ U.S. President, The National Security Strategy, 13.

Soldiers operate a High Mobility Artillery Rocket System in support of ground forces in Afghanistan May 5, 2017. (2nd Class Sean Furey/U.S. Navy)



Addressing this threat requires a new approach to maintaining freedom of action within the vital maritime domain. One such approach is using the cross domain potential of land-based Fires. Integrating Army and Marine Corps artillery capabilities into operations pursuing sea control increases the ability of the joint force to deter and defeat adversaries posing an A2/AD threat.⁴

Army and Marine Corps artillery assets, to include air defense artillery, should be implemented into the joint force maritime component commander's (JFMCC) fight for sea control. The findings of several research organizations and discussions by leaders at the Association of the U.S. Army in October, 2016, reinforce this idea.⁵ There are three main reasons to combine these forces. First, artillery units

can provide the joint force complementary capabilities to establish sea control. Second, the different employment concepts will support the JFMCC. Third, supporting joint functions will facilitate the implementation of these concepts. Finally, counter-arguments against using land-based artillery in support of sea control will be presented as well as recommendations to the

joint force on how to advance the application of this proposal.

In proposing this thesis a few assumptions were made. The first is that the Army and Marines would field a long-range, anti-ship missile for their organic M270A1 Multiple Launch Rocket System (MLRS) and M142 High Mobility Artillery Rocket System (HIMARS). Former Defense Secretary Ash Carter announced the intention

⁴ A Cooperative Strategy for 21st Century Seapower defines sea control as "allowing naval forces to establish local maritime superiority while denying an adversary that same ability." Maritime Superiority is defined by the DOD Dictionary of Military Terms as "That degree of dominance of one force over another that permits the conduct of maritime operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interference by the opposing force."

⁵ Urness, "Milley Addresses Attendees of AUSA Meeting," 4.

to develop this capability.⁶ With these systems already possessed by the Army, Marine Corps, and 14 allied countries, it suits Army Chief of Staff Gen. Mark Milley's cost-effective method of improving existing platforms and maximizing interoperability within the joint force and allies abroad.⁷ The second assumption is that the anti-ship missile would meet or exceed the range of the Army Tactical Missile System (ATACMS) projectile. This missile can range 300 km (162 nm). The Strategic Capabilities Office and Lockheed Martin have designed a version of the ATACMS with a seeker capable for use against ships.⁸ The third assumption is that there will be fielding of anti-cruise missile capabilities developed for short-range ADA formations.⁹

Development of JOAC

"The experience of the Great Patriotic War showed that the success of the actions of land forces and the capture by them of new coastal areas also help to gain dominance at sea."

—Admiral S.G. Gorshkov
Commander-in-Chief of the
Soviet Navy

The proliferation of systems designed to deny operational access to strategic areas around the globe present a challenge to U.S. leaders seeking to maintain the current international order and its economic benefits. The Joint Chiefs' solution, the Joint Operational

Access Concept (JOAC), prescribes using cross domain synergy to leverage each service's strengths against an opponent's vulnerability to establish superiority in a domain.¹⁰ The first approach, Air-Sea Battle, fell short of its goals by limiting the focus to defeating an adversary's A2/AD network, primarily from the two domains corresponding with its name.¹¹

In its newest subset, Joint Concept for Access and Maneuver in the Global Commons, the Joint Chief's emphasis is not to combat an adversary's A2/AD system, but to consider an operational approach that would defeat an opponent's plan and intent.¹² Its focus on identifying joint force capabilities to defeat evolving threats provides the Army and Marine Corps an opportunity to leverage their capacity in controlling freedom of maneuver within the global commons. By introducing ground forces with capabilities to destroy ships and defend against aerial threats, the joint force commander (JFC) can gain an advantage by changing the nature of the problem adversaries face.

Artillery's contribution

"One gun on land is equal to three on the water."

—Admiral D.D. Porter
At the Battle of Fort Henry, American
Civil War

Land forces can counter adversaries' efforts to deny sea control using the concept of cross domain synergy. Long-range artillery systems equipped with anti-ship mis-

siles paired with air defense artillery can quickly deploy to strategic locations, thereby denying an adversary's freedom of action and sanctuary within its own A2/AD system. Additionally, by conducting these operations in support of the JFMCC and in coordination with other services, these efforts can assist the joint force in establishing the maritime superiority necessary to obtain freedom of maneuver. Artillery maximizes the joint force's strengths of distributed firepower, persistence and resilience as outlined by the precepts to establish operational access.¹³

By employing artillery batteries in key littoral areas, U.S. forces can provide distributive firepower and increase the complexity of an opponent's problem.¹⁴ Using mobile, ground-based launchers to concentrate Fires across time and space present challenging targets for enemy forces to combat.¹⁵ By their very nature, artillery units operate in dispersed formations with considerable mobility and concealment. The ability to disperse formations in concealed, hardened positions make them more difficult for adversaries to locate and neutralize. Mobility makes the information perishable. The time an opponent has to acquire a firing battery, target it, and hit it is fleeting. Unlike ships that are limited in their capacity to move and hide from counter-fire, "shoot and scoot" is an artillery unit's best method of survival.¹⁶ Furthermore, in keeping with the Navy's concept of

distributed lethality, artillery units will add more platforms to maximize offensive firepower and tax an adversary's resources.¹⁷ Increasing the number of platforms compels opponents to expend resources to locate them and prevents them from massing forces in areas where artillery is present.

The Army and Marine Corps provide the JFC with the advantage of a persistent force. Artillery requires significantly less logistical support and infrastructure than air or naval assets with similar offensive firepower. Designed to work in modular formations, forces can be arrayed to meet the needs of the mission and deployed with a tailored sustainment package. These modular elements can remain in austere environments for extended periods of time. This grants them the capability to deploy to regions with little infrastructure and maintain a persistent, forward-deployed threat to potential adversaries navigating in nearby littorals. Thus the JFC has viable solutions to present a credible, persistent force despite the geographic and infrastructure problems associated with forcible entry operations.¹⁸

The Army and Marine Corps' persistence is supplemented by the number of partners they possess. Stationed in 70 countries and at 800 bases across the world, the U.S. military has many partners it can depend on.¹⁹ The Army especially prospers in this regard because many nations are unable to afford the exceptional

6 Freedberg, "Carter, Roper Unveil Army's New Ship-Killer Missile."

7 Lockheed Martin, Multiple Launch Rocket System M270; Maze, "Radical Change is Coming."

8 Freedberg, "Army Races to Rebuild Short-Range Air Defense."

9 Ibid.

10 Joint Chiefs, Joint Operational Access Concept, 14.

11 Hutchens, "Joint Concept for Access and Maneuver," 136.

12 Ibid.

13 Joint Chiefs, Joint Operational Access Concept, 30; Lindsey, "Beyond Coast Artillery," 4.

14 Distributive is defined as the ability to disperse, reposition, and use a variety of bases and operating locations, while retaining the ability to maneuver and concentrate combat power; Hutchens, "Joint Concept for Access and Maneuver in the Global Commons," 137.

15 Biddle, "Future Warfare in the Western Pacific," 12.

16 Gunzinger, "Outside-In," 65.

17 Rowden, "Distributed Lethality."

18 Joint Chiefs, Joint Concept for Entry Operations, 8.

19 Vine, "Where in the World is the US Military?"

cost of air and naval forces, but have an army for self-defense.²⁰ By leveraging these partners, U.S. Army elements can establish a presence within any region in the world. Additionally, this contains a secondary, strategic implication; from the opponent's perspective, an attack within the borders of another sovereign nation, as opposed to in international waters or air, has greater consequences and can potentially serve as a more effective deterrent by removing the ambiguity of contested maritime space. If an attack was to occur, it can generate more support for entry operations and increase condemnation against an adversary.²¹

Artillery's capabilities can serve in several roles that complement other services, providing resilience to the fight for sea control. By introducing artillery units to the maritime fight, the U.S. military provides additional capacity to deter enemy actions and limit their opportunities to achieve their goals. Placing artillery in key positions, such as maritime straits, strategically located littorals, and archipelagos deny these avenues to adversaries, while easing the demands on other services. Reducing the burden on naval and air forces to secure such areas frees them to conduct operations they are uniquely equipped to accomplish.²² Additionally, artillery can be inserted, or maneuver themselves, into contested areas to attrite opponents and deny freedom of maneuver to adversaries located within their own A2/AD sanctuaries. Their inherently redundant Fires ca-

pability reduces the risk of failure to operational commanders while offering an alternative that can be more easily replaced than expensive and complex platforms in other domains.²³

ADA provides additional capacity in making the force more resilient by increasing defenses against air and missile threats. This serves a multitude of purposes. One, it can reduce the expenditure of defensive munitions by air and naval assets in the fight for sea control. Ground assets can rearm their launchers in minutes, whereas ships and aircraft must return to base to rearm. This can increase the duration of assets on station. Secondly, as depicted in Clark's "Advancing Beyond the Beach," they can create their own area denial bubbles to facilitate safe areas for intelligence, surveillance and reconnaissance (ISR), sustainment assets or merchant shipping to operate.²⁴ It also benefits Navy ships, whose layered defense systems are less effective in littoral waters and thus, they prefer open-ocean areas to maximize their utility.²⁵ Lastly, ADA can establish persistent defenses around critical infrastructures, such as airfields and port facilities, reducing their vulnerability and providing sustainers flexibility to decrease their distances from the operational area.

By introducing artillery to the battle for sea control, maritime commanders can leverage its strengths to overcome their own time, space, and force disadvantages. Properly employed, artillery is well suited for operations under these conditions. They can act as a resil-

ient and persistent force with the distributed firepower to afford commanders more freedom of action in achieving their objectives. Artillery serves as an asymmetric enabler to the maritime operational plan.

Employment concepts

"In war at sea, the operational objective is usually accomplished by obtaining control of a certain sea or ocean area, destroying or neutralizing a major part of the enemy fleet, or cutting off or defending the flow of maritime trade."

—Milan Vego
Joint Operational Warfare

The Army and Marine Corps cross domain ability to assist the JFMCC's operations depends on the method in which employed. Exploiting their advantages against an opponent is critical for shaping the situation. Planning artillery's employment to maximize its mobility, dispersion and persistence affords the JFMCC commander several options unique to each operation and each environment. The concepts listed here do not account for all the diplomatic concerns that may affect employment and are not meant to serve as a prescription, only to provide ideas for how these forces can be used in the joint operations phasing construct.

The shaping phase is one of the most important in a joint operation. Here joint forces conduct security activities to dissuade adversaries and as-

sure allies.²⁶ During this phase, artillery units can focus on developing and integrating partner capabilities into the combined force. Allies across the world are contemplating ways to deal with A2/AD issues in their own backyard, such as in the Strait of Hormuz, Baltic and Black Seas.²⁷ With over 45 variations of anti-ship missiles being produced, many U.S. allies possess the capability to deny sea control.²⁸ By training with these partners, U.S. forces can develop relationships that will reduce friction and integration issues in a coalition built to address an aggressor's actions. This serves as a force multiplier, with host nation forces prepared and readily available to respond to potential issues. The JFC can quickly leverage these artillery forces as a deterrent in the event of a crisis, such as an indication of an amphibious assault by an opponent. With both China and Russia building amphibious assault ships, this may prove crucial.²⁹ Figure 1 shows a hypothetical example in Taiwan.

As shaping operations begin transitioning into deterrence, artillery's mobility enables rapid deployment into a theater. Variations of U.S. rocket launchers can be transported by C-130, C-17, or C-5, in addition to USMC surface connectors.³⁰ The JFC has the flexibility to surge them into a theater and maneuver them within it as needed. Marines demonstrated this in 2016 by deploying HIMARS via C-130 to the Philippines and subsequently maneuvering it throughout the archipelago to conduct raids.³¹

20 Gordon, "The Army's Role in Overcoming Anti-Access and Area Denial Challenges," 22.

21 Lindsey, "Beyond Coast Artillery," 6.

22 Lindsey, "Beyond Coast Artillery," 5.

23 An M142 HIMARS cost \$2-3 million apiece, as opposed to \$1.7 billion for an Arleigh Burke-class DDG and \$360 million for an Independence-class LCS: Marvel, "Exploring a Shore-to-Ship Fires Capability," 10.

24 Lindsey, "Beyond Coast Artillery," 5.

25 Hughes, *Fleet Tactics and Coastal Combat*, 162.

26 Joint Chiefs, *Joint Operations*, V-8.

27 Simon, "A European Perspective on Anti-Access/Area Denial and the Third Offset Strategy."

28 Kelley, "Employing Land-Based Anti-Ship Missiles," xii.

29 Majumdar, "China's New Amphibious Assault Ship." Nagornykh, "Sea Trials of Russia's Large Amphibious Assault Ship."

30 Marine Surface Connectors are a critical sea component to transport personnel, supplies, and equipment within the sea base and maneuver them from the sea base to objectives ashore.

31 Simcock, "HIMARS," 24.

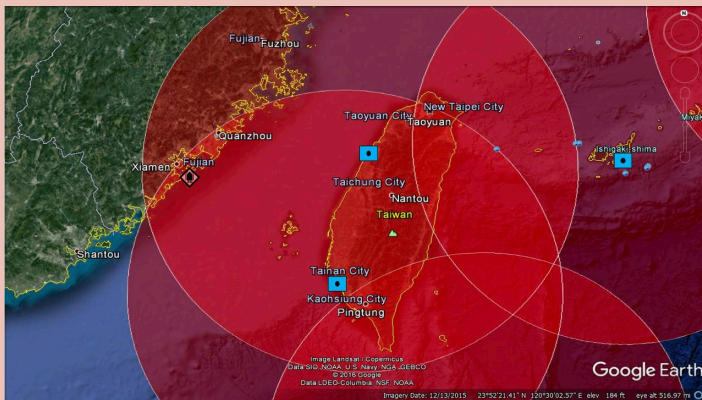


Figure 1. Artillery units' range if employed in Taiwan to prevent amphibious invasion. (Courtesy illustration)



Figure 2. Artillery's capability to blockade access to the South China Sea. (Courtesy illustration)

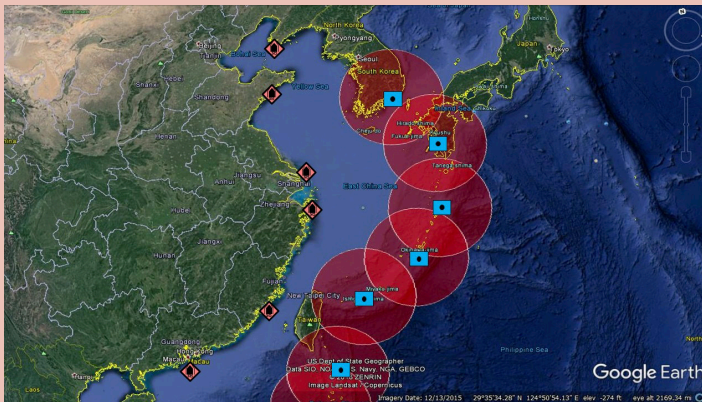


Figure 3. Artillery unit's capability to blockade access to the East China Sea from allied nations. (Courtesy illustration)

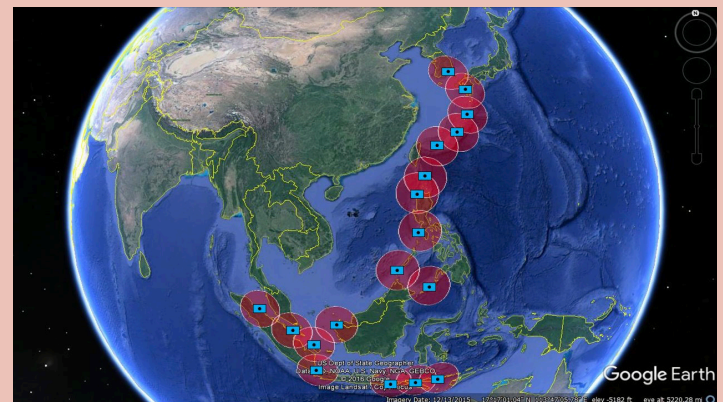


Figure 4. Isolating Chinese maritime traffic with artillery from key locations throughout the region. (Courtesy illustration)

Artillery's mobility provides an effective flexible deterrent option to naval aggression that assures allies of our commitment to the region.³²

Should deterrence fail and combat operations ensue, artillery forces can assist the JFC in transitioning phases to quickly seize the initiative and dominate key terrain. Artillery's decentralized nature enables the joint force to use them in numerous locations throughout the operational area. Additionally, their ease in changing munitions quickly make them very versatile. For instance, Marines can conduct amphibious raids on targets in an adversary's kill chain using standard artillery munitions to support raiding

forces and strike enemy sensors, control nodes and artillery.³³ Then they can transition to an anti-ship mission to neutralize enemy vessels responding to the attack. Bringing air defense assets forward can protect raiding parties from aerial counterattack and extend reach into enemy territory.³⁴ This method could also be used to seize intermediate staging bases, which would increase operational reach of naval forces and reduce the time ships need to be offline to rearm and refit. The Army could replicate this technique in contiguous terrain along littorals, as found in Southeast Asia, Europe and the Middle East.

The threat anti-ship artillery poses to an adversary's maritime traffic during phase two and three operations can present a dilemma to the adversary's leadership. Positioning artillery assets along critical narrow waterways can disrupt an opponent's merchant traffic. Conducting a blockade at choke points in the Asia-Pacific region could effectively stop all traffic in the western Pacific north of Australia.³⁵ In a theoretical conflict with China, this cumulative approach would deny 80 percent of its vital oil imports, a necessity to maintain its economy.³⁶ Estimates indicate conducting a blockade in the Malaysian Archipelago would

require at least 16 surface vessels, four replenishment ships, and relief ships in reserve, in addition to other supporting assets.³⁷ This taxing requirement represents almost a tenth of the Navy's 275 ships.³⁸ As Figure 2 depicts, the need for surface vessels can be dramatically reduced by replacing ships with the durable persistence of artillery, to work in conjunction with smaller craft to intercept and board vessels. Figure 3 depicts a blockade of the East China Sea and Figure 4 shows a blockade of the entire region. Using artillery in this manner makes more forces available for offensive operations to increase

32 Joint Chiefs, JP 3-0, V-8.

33 Clark, "Advancing Beyond the Beach," 22.

34 Ibid., 19.

35 Terrance Kelley, "Employing Land-Based Missiles," 8.

36 Friedberg, Beyond Air-Sea Battle, 106.

37 Ibid., 108.

38 U.S. Navy, Status of the U.S. Navy

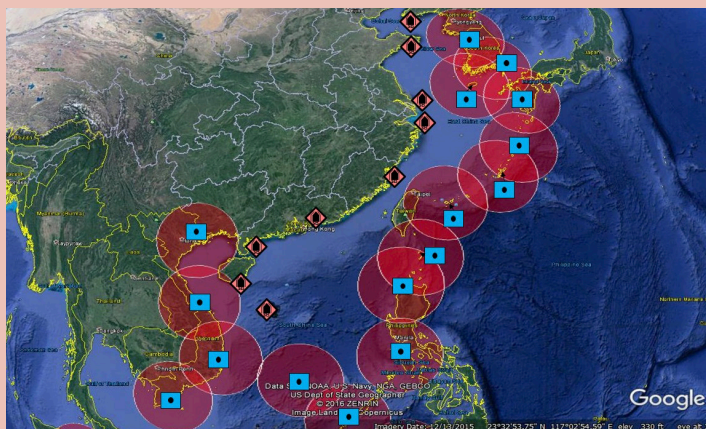


Figure 5. Inserting artillery in nearby nations, along the first island chain, and on Filipino Spratly Islands can limit adversarial freedom of maneuver in the Western Pacific. (Courtesy illustration)

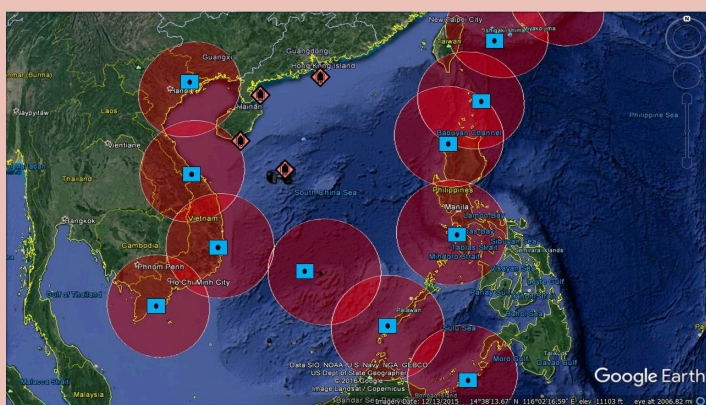


Figure 7. Artillery units limiting adversarial freedom of navigation within littoral areas and Filipino Spratly Islands in the South China Sea. (Courtesy illustration)

the blockade's effects and overwhelm the enemy.

Artillery can also be used for sea denial during phase two and three operations. In this capacity, artillery assets can establish area-denial zones to thwart opponents' air and maritime traffic.³⁹ In keeping with the Pacific example, Figures 5, 6 and 7 show that inserting batteries in nearby nations, Filipino-occupied Spratly Islands, and along China's first island chain from Korea to the Malay Peninsula would create mutually supporting, overlapping zones to turn large portions of the East and South China Seas into mutually denied space. In addition to blocking 85 percent of its in-

ternational trade, this would contain Chinese air and naval forces while the U.S. and allies determine a diplomatic resolution or build combat power to go on the offensive.⁴⁰ As Figures 8 and 9 depict, artillery can employ sea denial against Russia's Baltic and Black Sea Fleets should an escalating event occur with NATO allies.⁴¹ As Figure 10 illustrates, this concept's versatility enables it to be an effective option against the Iranian A2/AD threat in the narrow Persian Gulf and Strait of Hormuz.⁴²

An advantage U.S. joint forces maintain over many other nations is its ability to operate along multiple lines of effort



Figure 6. Artillery units limiting adversarial freedom of navigation within littoral areas of partnered nations in East China and Yellow Seas. (Courtesy illustration)

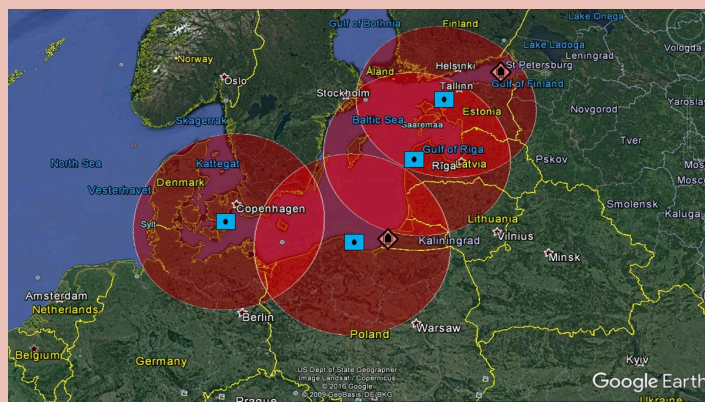


Figure 8. Artillery units' capability to conduct sea denial against the Russian Baltic Fleet from NATO allied countries. (Courtesy illustration)



Figure 9. Artillery units' capability to conduct sea denial against the Russian Black Sea Fleet from NATO allied countries. (Courtesy illustration)

simultaneously, overwhelming an opponent's ability to cope.⁴³ Using artillery's capabilities in these roles can set the conditions for the JFMCC's success in obtaining sea control by increasing the complexity of the

problem our adversaries face. Opponents will be compelled to either attempt to neutralize the artillery units, costing them force and time, or move their naval forces into open seas, in-

39 Clark, "Advancing Beyond the Beach," 25.

40 Friedberg, Beyond Air-Sea Battle, 117.

41 Bugajski, "Black Sea Rising," 11; Osborn, "Russia Beefs Up Baltic Fleet."

42 Gunzinger, "Outside-In," 51.

43 Joint Chiefs, Joint Operational Access Concept, 20.

creasing vulnerability to joint naval and air forces.

Supporting joint operational functions

“We are accustomed to speak of naval strategy and military strategy as though they were distinct branches of knowledge which had no common ground. It is the theory of war which brings out their intimate relation. It reveals that embracing them both is a larger strategy which regards the fleet and Army as one weapon, which coordinates their action, and indicates the lines on which each must move to realize the full power of both.”

—Julian Corbett
Some Principles of Maritime Strategy

The effort to employ artillery units in support of the Navy’s battle for sea control would require thorough integration and synchronization of the corresponding joint functions. The most crucial functions that would have to be developed for this operational concept to work are command and control (C2), intelligence interoperability and logistical support. Failing to implement a process to support these functions would severely limit the potential effectiveness of these assets and may induce an unacceptable level of risk to commanders.

An important aspect in enabling C2 for this concept is the seamless transmission of data ship-to-shore and vice versa. Similar to friendly forces,

the ability of mobile enemy anti-ship missile launchers to “shoot and scoot” and camouflage their location requires U.S. forces to collect timely and precise targeting information.⁴⁴ To achieve this, all targeting data should be in an interoperable automated fire control system.⁴⁵ Utilizing a common system enables leaders at each echelon to develop a better understanding of the situation and quickly determine an appropriate response. An artillery battery may service a target detected by a ship, thereby preserving the ship’s munitions and extending its time on station. The joint air and missile defense community is developing this capability for itself with the creation of the Integrated Air and Missile Defense Battle Command System.⁴⁶ Currently, incorporation of C2 is spread across multiple systems throughout the joint force. Prospects appear promising to simplify the number of interfaces and improve their functionality, to include artillery fire control assets. Developing a common system reduces latency, provides a better common operating picture and redundant coverage of threats to all elements. Potential targets of a salvo could quickly take defensive actions while a second element, land or sea based, conducts counterfire on the shooters. This would dramatically increase responsiveness and survivability in a fight for sea control.

Another essential aspect to support these functions is the integration and interoperability of all ISR information. As described by the JOAC manual, “the increased lethality, precision, and accuracy of A2/AD systems requires the ability of

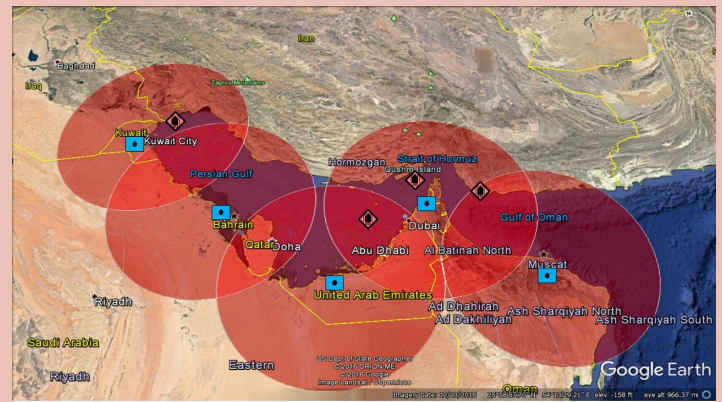


Figure 10. Artillery units’ can shape the Persian Gulf’s operational environment by providing persistent air defense and targeting Iranian mobile anti-ship missile launching platforms from friendly and allied nations. (Courtesy illustration)

the joint force to collect, fuse, and share accurate, timely, and detailed intelligence across all domains.”⁴⁷ In particular, information from reconnaissance and surveillance will be vital for access operations. Navy warships depend on finding the enemy and firing effectively first.⁴⁸ To do this, they are equipped with capable arrays of sensors networked through multiple air, surface and underwater platforms. Conversely, due to longer emplacement times, the effects of terrain-masking and their smaller size, mobile ground sensors tend to be less effective at capturing data. For artillery units to effectively neutralize enemy forces, batteries will depend on full integration into the JFMCC’s ISR network to receive the accurate and timely information they require.⁴⁹

Sustainment is another important aspect to consider for artillery operations supporting the JFMCC. Army doctrine states that its expeditionary forces can deploy anywhere in the world and be ready to fight immediately.⁵⁰ Rapid deployment of artillery as a deterrent

will likely result in these formations being employed in austere environments with limited supporting services. In such a scenario, they will initially depend on a combination of host nation support and prepositioned supplies. Success in sustaining these initial entry operations depends on planning and forethought by joint staff and host nation allies.

As operations continue, formations will begin to exhaust on-hand supplies and become attrited. These units will likely require the assistance of joint force sustainment to maintain their operational tempo until follow-on forces can establish a lodgment.⁵¹ The JFMCC will need to plan for afloat forward-staging bases and other lift assets to provide interim sustainment when artillery units are put ashore without host nation support, preposition stocks, or the units are at isolated locations to support the fight for sea control.⁵²

To successfully employ artillery units in support of obtaining sea control, the operational functions must be coordinated. By establishing

44 Gunzinger, “Outside-In,” 65.

45 Marvel, “Exploring Shore-to-ship Fires,” 10.

46 Integrated Air and Missile Defense Battle Command System, Northrop Grumman; Freedberg, “Army Races to Rebuild Short-Range Air Defense.”

47 Joint Chiefs, Joint Operational Access Concept, 29.

48 Hughes, Fleet Tactics and Coastal Combat, 162.

49 Marvel, “Exploring Shore-to-ship Fires,” 10.

50 U.S. Army, Unified Land Operations, 1-10.

51 Joint Chiefs, Joint Concept for Entry Operations, 17.

52 Wonson, “Embrace Afloat Forward Staging,” 12; Joint Chiefs, Joint Operational Access Concept, 32.



Marines assigned to 5th Battalion, 11th Marine Regiment and Airmen assigned to the 8th Fighter Wing, "The Wolf Pack," work together to disembark two M142 High Mobility Artillery Rocket Systems during exercise III Marine Expeditionary Force Fires onto Kunsan Airbase, South Korea, June 1, 2017. (Lance Cpl. Jesus McCloud/U.S. Marine Corps)

an effective command and control structure, integrating intelligence and targeting data and planning for sustainment, the JFMCC can optimize the asymmetric effects artillery systems have on adversarial forces. Staffs and subordinates synchronizing these functions permit the commander to coordinate attacks along multiple lines of operation, thereby massing forces in time and space. It is through these coordinated efforts the commander can overwhelm the enemy to achieve maritime superiority and obtain access to denied areas.

Counterargument

"It is critical that there be no disconnect or mismatch between the ends and the means; otherwise, the ultimate objectives of a campaign or operation might not be attained."

—Milan Vego
Joint Operational Warfare

Some critics argue that employing land forces to obtain sea control is unrealistic. Without the ability to maneuver on the domain, they will be incredibly challenged to gain any form of superiority on it.

To support their claim, they point to Japan's failed area denial strategy during WWII. To secure the territory it captured, the Japanese built "unsinkable carriers" on strategically located islands along the perimeter to create impenetrable zones of defense. From these locations, they envisioned projecting forces to attrite and ultimately destroy invading U.S. forces.⁵³ This strategy failed because it permitted the U.S. Navy to choose which island fortresses it needed to attain and which ones it could isolate, destroy or bypass. In much the same way, opposing navies today can choose which positions

they must allocate resources to secure and which ones they can simply avoid.

Additionally, critics question the feasibility of deploying land forces into the operational area and sustaining operations in a contested A2/AD environment. As adversaries continue to develop sophisticated anti-access networks and long-range targeting capabilities, they can put critical and irreplaceable assets, such as ships and aircraft, at unacceptable risk from far greater distances than before.⁵⁴ This could result in land forces, deployed as part of a deterrent option, being subsequently isolated by an ad-

⁵³ Baer, *One Hundred Years of Sea Power*, 132.

⁵⁴ Work, "Hitting the Beach in the 21st Century."

versary denying access via air, water and land once a conflict erupts. Such a scenario would present a substantial dilemma for the JFC. The defeat and capture of isolated forces on the Philippines during WWII serves as a somber reminder of this threat.

Some details should be considered in response to these criticisms. During WWII, Japan's defensive plan failed, in part, because the size of its empire had exceeded its military's span of control. At its zenith, the Japanese oceanic perimeter stretched over 14,200 miles.⁵⁵ Considering the limitations of technology available during that time, the Imperial Japanese Navy did not have an adequate number of personnel and equipment to secure it all. What makes an A2/AD strategy different today is the improvement in weapons, sensors and communication technology. These developments have enabled new means for employing a maritime denial strategy without fielding a large, modern navy or air force.⁵⁶ One needs not look any further than Iran to prove this point. Iran realized after the Tanker War that it lacked the means to pose a credible symmetric naval threat to the U.S. Navy.⁵⁷ Instead, using little more than speedboats and land-based missiles, Iranians exploited their advantageous geographic position to create a challenging A2/AD problem.⁵⁸

As detailed in the Joint Concept for Entry Operations, initial entry forces must have the capacity to sustain themselves internally for a predetermined amount of time.⁵⁹

The key to extending the time before that force reaches its culminating point is its relationship with allies. Forethought in establishing good partnerships with allies, using interoperable equipment and prepositioning essential supplies will prove critical to sustaining combat operations. Additionally, entry force operations will have to be a joint effort, with services leveraging capabilities across all domains to suppress the enemy's battle network. The initial phase of any entry operation will require friendly forces exploiting an adversary's vulnerabilities to achieve superiority in the objective area.⁶⁰ Infiltrating the opponent's A2/AD bubble with artillery that can subsequently deny the area's use to the adversary and open its access for allied exploitation can present a crucial opportunity for joint forces to establish a lodgment and extend its operational reach. With the relative value these asymmetric assets offer, compared to the cost of a single platform in another domain, it is a capability worth considering.

Interconnected domains

"The emphasis on cross domain synergy that is central to this concept applies first and foremost to Fires."

—Joint Operational Access Concept

As President Dwight D. Eisenhower proclaimed over half of a century ago, "Separate ground, sea, and air warfare is gone forever. If ever again we should be involved in war,

we will fight it in all elements, with all services, as one single concentrated effort."⁶¹ In this era of fiscal constraints and A2/AD threats to air and maritime forces, we must integrate capabilities from across all domains to project military forces, overwhelm opponents, and achieve freedom of action. The U.S. Army and Marine Corps offer one such capability. It is a resilient and persistent artillery force with the distributed firepower to achieve freedom of action within the operational environment.

Mobile launchers have the advantage of surviving by hiding among a complex background of terrain, trees and urban features.⁶² They can rapidly deploy to assure allies or deter opponents. They have the ability to disperse across the operational area, while providing synchronized, massed Fires. They provide an enduring capability with lower sustainment needs. The presence of artillery can present a dilemma to adversaries. These relatively low-cost assets deliver a more complex operational environment that opponents must address. They require an enemy to expend resources to locate and neutralize them. As retired Capt. Wayne Hughes stated in his book, "For littoral operations, it is no longer possible to define a fleet merely as a set of warships, because land-based systems play a prominent part."⁶³ Artillery can provide an asymmetric advantage that an opponent cannot afford to discount when part of a synchronized campaign working across multiple domains.

Recommendations

Employing artillery in this manner will require modifications to current capabilities and structures. Recommendations for proceeding with this cross domain approach include:

- Continued development and fielding of munitions to be utilized by MLRS and HIMAR platforms capable of dual-purpose use, striking moving targets on land or at sea, in a contested electromagnetic environment.
- Continue to increase the capability and number of short-range, ADA units to meet the demands of the joint force currently abroad and needed in implementing this concept.
- Land, air and naval target acquisition and fire control systems should be integrated and interoperable on a common battle net, much like the integration and interoperability of air missile defense assets to a central battle net.
- Use simulations and war-games to test operational concepts, determine requirements for expeditionary packages and develop potential courses of action for use in crisis response.
- Negotiate allied sustainment provisions and prepositioning of supplies to support identified potential courses of action.
- Leverage knowledge of allies that currently possess mobile anti-ship missile launchers.

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55 James, *Makers of Modern Strategy*, 717.

56 Biddle, "Future Warfare in the Western Pacific," 19.

57 Gunzinger, "Outside-In," 23.

58 Ibid, 41.

59 Joint Chiefs, *Joint Concept for Entry Operations*, 16.

60 Joint Chiefs, *Joint Concept for Entry Operations*, 20.

61 Dempsey, "The Future of Joint Operations."

62 Biddle, "Future Warfare in the Western Pacific," 20.


63 Hughes, *Fleet Tactics*, 168.

FKN

**FIRES
KNOWLEDGE
NETWORK**

KNOWLEDGE MANAGEMENT

FKN gathers and organizes
actionable knowledge so you can
successfully accomplish the mission



**TODAY'S ARMY IS MUCH LESS ABOUT THE
KNOWLEDGE YOU HAVE SO MUCH AS THE
KNOWLEDGE YOU CAN SHARE.**

[HTTPS://WWW.US.ARMY.MIL/SUITE/PAGE/130700](https://www.us.army.mil/suite/page/130700)

" ONE LEARNS, EVERYONE KNOWS "



In the next issue of Fires

Sept.-Oct. 2017, Intelligent warfare: Drones can kill, but the information they gather can be even deadlier. This issue will cover leveraging the division and brigade unmanned aerial system (UAS) fleet to support Fires tasks, counter-UAS strategy, from concept to reality, synchronizing intelligence collection and fire support, understanding electronic warfare in the era of cross domain Fires, field artillery and air defense artillery schools training Soldiers and Marines to meet and identify the challenges.

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

A soldier drives a heavy expanded mobility tactical truck to pull a radar system from the belly of a C-5 Super Galaxy at Osan Air Base, Republic of Korea, Jan. 26, 2017. The addition of the inbound Patriot equipment will support 35th Air Defense Artillery Brigade as the brigade conducts the largest Patriot modernization effort ever executed outside a depot facility. (Capt. Johnathon Daniell/35th ADA BDE)

