

21st Century Fires Wargame

The GCE fires gap

by Col Timothy Parker & LtCol Kevin Rogers, USMC(Ret)

Guidance outlined in the National Security Strategy (NSS), National Defense Strategy (NDS), and *Marine Corps Operating Concept* (MOC) (Washington, DC: HQMC, 2016), dictate a shift of Marine Corps focus to the “high end” fight. Analysis of this policy shift highlights critical capability gaps and a structure deficit within current Marine Corps indirect fires resources. Multiple potential adversaries’ indirect fire capabilities exceed the current organic indirect fire capabilities within the GCE. In addition, long-range assets within the MAGTF may not be available to prosecute these targets in a high-end air contested environment, requiring significant shaping fires at extended ranges including the reduction of threat anti-air weapons systems. The long-range precision fires (LRPF) initiative will assist in closing the fires gaps identified at the MAGTF and joint force maritime component commander (JFMCC) level; however, LRPF capabilities will not address fires gaps identified within the GCE battlespace. The fires gaps within the GCE are increasingly critical as “pacing” threats have exponentially increased their indirect fire capabilities—threatening the GCE commander’s ability to maneuver and dominate the area of operations in a high-intensity engagement. With the shift in policy to a high-intensity fight with a peer threat, a variety of capability gaps directly impacting the GCE commander’s ability to shape his battlespace, set conditions for success, and accomplish the mission have been identified. Specific indirect fire capability gaps include weapons system mobility, survivability, lethality, and an organic

“Develop fire support systems providing the range, precision, and agility to survive against peer fires systems.”

—Marine Corps Operating Concept, Sept 2016

>Col Parker enlisted in the Marine Corps in 1985 and was commissioned in 1990. He has commanded artillery units at the battery and battalion level, served as Artillery Battalion Operations and Executive Officers, Artillery Regimental S-3, and served as a Fire Support Coordinator for the 31st MEU. Col Parker deployed in support of OIF II-2 and OIF 06-08.1. He is currently Commanding Officer of the Marine Detachment, Fort Sill, OK.

>>LtCol Rogers is the Marine Corps Liaison at Fort Sill, OK. He has over 20 years as an active duty Artillery Officer including a variety of operational billets from the battery to the division level while serving within all active duty artillery regiments and tours in acquisition and requirements generation. For the past thirteen years, he has been embedded within the U.S. Army Capability Development Integration Directorate, Fires Center of Excellence working with artillery and fires related programs.

target acquisition capability within the GCE. These gaps must be addressed if the GCE commander is to be successful in a “fight tonight” scenario or a future fight.

Facts

The National Security Strategy dictates our capabilities must focus on “military overmatch (to) restore the readiness of our forces for major war, and grow the size of the force so it is capable of operating at sufficient scale and ample duration to win across a range of scenarios”¹ and where possible, we must *improve existing systems to maximize returns on prior investments*.² (emphasis added)

Additionally, the 2018 Marine Corps Ground Combat and Tactical Vehicle Strategy (GCTVS) focused on maneuver forces closure of the “protected land mobility performance shortfall.”³ Moreover, CMC has reinforced that all Marines must “be ready-now-tonight.”⁴ However, our currently fielded weapons systems face significant shortfalls that will be difficult to overcome when confronted with a greater number of threat indirect fire systems capable of firing farther, faster, and with a greater variety of lethal and non-lethal munitions. This was made evident through multiple wargames (Ellis Group, 21st Century Fires Wargame), studies (Operational Analysis Directorate), simulations

(MAGTF Staff Training Program, MEF exercises), and threat analyses (Marine Corps Intelligence Activity) based on recent lessons learned from operations in the Ukraine and Syria. Since the late 1980s, artillery structure has been reduced to the point where the GCE commander no longer has the ability to weight the main effort (reinforcing fires) or conduct concurrent counter-battery fire (general support) with organic resources. This problem is compounded by the concept of “every Marine is a sensor.” Over the past few years, technology has enabled an increase in the number of observers (squad leaders, joint fires observers, joint terminal attack controllers, and UAVs); however, the number of units capable of providing fires, ammunition load outs, or logistical sustainment capabilities have either remained the same or been reduced. The impact of these trends will be especially evident during distributed operations. Our current indirect fire weapon, the M777A2, 155mm towed howitzer, was originally fielded in 2005 and is scheduled to reach its end service life circa 2026. A replacement program for the M777A2 under the current JCIDS (Joint Capabilities Integration and Development System) and acquisition regulations is estimated to take twelve to fifteen years and require levels of funding that are not currently available. Therefore, it is a Service Life Extension Program for the M777A2 will be pursued in the 2025 timeframe. Will validated capability gaps be addressed by the Service Life Extension Program or will the same howitzer with the same capabilities just be rebuilt?

Assumptions

The operational environment as outlined by the NSS, NDS, and MOC dictate we must be prepared for a high intensity fight with indirect fire weapons systems that are more capable than our currently fielded towed howitzer. In either a “fight tonight” or future fight scenario, the GCE commander will not have the depth of fires enjoyed during recent counterinsurgency operations. A majority of aviation assets will be held at the MAGTF and JFMCC level, lim-



A demonstrator live fire. (Photo provided by MC Detachment.)

iting availability for GCE operational support. The HIMARS, along with its MLRS (multiple launched rocket system) Family of Munitions, will be in high demand at the MAGTF level for long-range shaping fires—while support of the ACE and LCE will limit rocket/missile availability for the GCE close fight. As outlined in the NDS, NSS, and highlighted by MCIA threat briefs, potential enemy forces will have significant advantages in the number of indirect fire weapons systems possessing greater operational capabilities, such as enhanced mobility, longer range, faster rates of fire, and more lethal munitions. Moreover, other expensive pacing items (assault combat vehicle, light armored vehicle, joint light tactical vehicle, etc.,) are high procurement priorities and will preclude a new start program to address the identified short falls in our current howitzer. Alternate courses of action are needed to address indirect fire gaps in order to provide the required capabilities to support the GCE commander and set the conditions for success in future high end conflicts.

High End Threat

As stipulated in the MOC, China and Russia are our primary pacing

threats and will drive our capability development to counter and provide overmatch threat systems. Over the past fifteen years, both adversaries have significantly improved their indirect fire platforms, munitions, and operational doctrine. Russian operations in the Ukraine revealed a shift in fires structure and doctrine. As previously noted in Capt Isaac Williams, article “The King’s Match,” (MCG, Dec18), a much greater emphasis is placed on artillery units being supported by maneuver units vice maneuver being supported by fires. The shift resulted in 80 percent of casualties being attributed to artillery fires.⁵ The Russians prefer self-propelled vice towed artillery because of greater lethality, maneuverability, higher rates of fire, and crew protection.⁶ A Russian tactical battle group currently employs the 2S19, a 152mm self-propelled howitzer fielded in eight gun batteries.⁷ Each gun has an auto-loader and is capable of firing eight rounds per minute. This roughly equates to one 2S19 battery being able to fire the equivalent of one battalion of M777A2s in one minute. The next generation Russian self-propelled howitzer is the 2S35 and is scheduled to start fielding during the 2020 timeframe; it has a maximum range of 70Km (with precision munitions), a rate of fire of eight to ten rounds per minute, and can be remotely operated and autonomously fired using an integrated fire control system.⁸ Our other “pacing” nation, China, is currently fielded with the PLZ-52 155mm self-propelled howitzer that is capable of firing eight rounds per minute to a maximum range of 58Km with conventional munitions and out to 100Km with the WS-35 rocket assisted precision munitions. As with the Russian 2S19 and 2S35, the PLZ-52 has the ability to conduct multi-round simultaneously impact missions. This mission adjusts the elevation and timing of each round fired to allow multiple rounds to simultaneously impact on the target, significantly increasing the effectiveness of the munitions.⁹

Each pacing threat will also employ a variety of target location capabilities

including counter-fire radars, acoustic systems, observers, and UASs to locate, identify, track, and target our artillery and maneuver forces. According to recent MCIA threat briefs, it is believed pacing threat fires clearance procedures are flatter and less time consuming which supports a shorter kill chain. If these are the threat indirect fire capabilities a GCE commander will face, what improvements are required to adapt to and overcome these capabilities, shape the battlespace, and win in a direct fire engagement?

Capabilities Required to Close the GCE Fires Gaps

While the M777A2 is a superb towed howitzer and has performed exceedingly well over the last fourteen years of COIN operations, the results of numerous exercises, simulations, studies, and wargames demonstrate that the M777A2 falls short when faced with an enemy force comprised of a greater number of guns that shoot farther, faster, and employ more lethal munitions. These gaps will adversely affect the GCE commander's operational flexibility by limiting the ability to maneuver and conduct effective counter-fire. The following are common capability gaps highlighted across the studies, wargames, simulations, and analysis (in priority):

- *Mobility/survivability.* These two capabilities are directly linked. Greater mobility is essential in keeping pace with supported highly mobile (via the GCTVS) maneuver forces, especially during distributed operations. Mobility is also a critical component to survivability and the primary component of defeating enemy counter-battery fires. Artillery units must be able to rapidly emplace, fire, and displace prior to being targeted and engaged by enemy indirect fire forces repeatedly for extended periods of time (often after every fire mission). This is something a towed battery will be unable to accomplish because of ergonomics of the weapons system and extensive physical requirements leading to sheer crew exhaustion.
- *Range.* Currently, the M777A2 with fielded munitions provides a 30Km

maximum range (40Km with precision munition). Greater maximum range is essential to enable the GCE commander to shape the battlespace and attrite enemy maneuver and artillery forces prior to a direct fire engagement. This requirement will be especially important when conducting distributed operations because it allows artillery forces to mass against enemy formations or deny enemy mobility from multiple dispersed locations.

- *Lethality.* Lethality can be broken down into three primary components: munition lethality, rate of fire, and accuracy. As demonstrated in both Ukraine and Syria, threat forces are not restricted to the type and quantity of conventional munitions employed in their battlespace. Threat forces employ a variety of munitions including high explosive, white phosphorous, dual purpose improved conventional munitions (DPICM), and thermobaric munitions. The most lethal munition in the U.S. artillery inventory (against all target sets) is DPICM; however, because of a politically unacceptable dud rate, a DOD policy letter restricted the use of all cluster munitions across the U.S. inventory in 2008. This policy has subsequently been modified to allow U.S. forces to employ cluster munitions with a combatant commander's approval until replacement munitions are developed and fielded. That said, current stockpiles of artillery cluster munitions have been in the inventory for decades and, if needed under a distributed operational concept or in a counter-fire engagement, do not possess the range required to shape the battlespace or defeat enemy long-range artillery forces. The GCE commander requires munitions capable of defeating the spectrum of the enemy target sets (personnel in the open to widely dispersed mobile armored targets) and at greater ranges than our current munitions provide. As noted, current threat artillery systems have a significantly greater rate of fire than the M777A2. This negatively affects the M777A2's lethality and survivability. A slower rate of fire forces the howitzer and crew to remain in position twice as long to fire the same

number of rounds as threat systems. This increases crew exposure and the likelihood of being killed by counter-battery fire. In addition to new and improved munitions, an auto-assist or autoloader is required to significantly increase our rate of fire and improve the lethality of our artillery systems. The third component of lethality is accuracy, which is critical for first round effectiveness, maximizing limited stocks of munitions, and when engaging all types of targets, including point targets, larger formations, and inaccurately located target sets. Moreover, we must maintain a similar level of accuracy whether we fight in a technology enhanced or technology denied environment.

- *Target acquisition.* UASs have become a critical element in both offensive and defensive operations. UASs are used in a variety of capacities; consequently, they are a high demand item with many organizations competing for usage across the MAGTF. While artillery regiments will be receiving a much more capable counter-fire radar in the G/ATOR to assist with the counter-fire fight, an *organic* type II UAS capability is essential to support targeting efforts across the range of military operations (ROMO). The platform could be laid over existing structure within the artillery regiment's target acquisition platoon and provide a visual capability beyond line of sight for CAT I-level grid coordinates needed for precision and first round fire for effect missions. This capability would also be advantageous in determining battle damage assessment, reduction of unnecessary ammunition expenditures, conducting dynamic targeting, and facilitating rapid re-attack.
- *C4I* (command, control, communications, computers, and intelligence). Maneuver and artillery commanders must have dependable and robust command and control (C2) systems. Pacing threat forces have significantly improved their electronic warfare capabilities and will employ them to disrupt, jam, and hack our C2 systems. Our future systems must reduce these threats and improve our



A HIMARS during a firing exercise. (Photo provided by MC Detachment.)

offensive capabilities by supporting C2 on the move and digital data correlation/fusion—ensuring every sensor on the battlefield, whether ground, air, sea, cyber, or space, can rapidly communicate with every other sensor. On the modern battlefield, to transmit is to be targeted. We must find ways to reduce or mask our digital signatures while also developing systems to electronically spoof friendly signatures to exacerbate the enemy's targeting challenge. We must also review our procedures to reduce the time to target, process, coordinate, and clear our fires and reduce the kill chain timeline. Improving these capabilities will significantly enhance the operational capabilities of the GCE. However, the ability to sustain these capabilities is critical in a high intensity engagement with a peer threat.

Logistics/Costs

An extended high intensity conflict, especially across a distributed battlespace, will be logistically challenging. Logistical operations have always been a significant test which will only get more difficult with the anticipated increase in the number and variety of munitions to defeat a greater number of targets stretched across an extended battlefield. For example, current HIMARS units estimate expenditures of five to ten rockets per day per launcher during sustained operations. A HI-

MARS battery consists of 82 pieces of rolling stock which can provide 54 pods or 324 rockets in a basic load, so for a HIMARS battalion that equates to 232 pods or 1,392 rockets. Accounting for the number of fire missions in existing plans across the MAGTF, the resources required to replenish the vehicles and munitions can quickly become unsustainable. Additionally, because of the procurement costs of a GMLRS rocket and an ATACMS missile (approximately \$110,000 and \$1,000,000 respectively), the inventory for these munitions is limited and spread across the combatant commands. However, a 155mm Base Bleed projectile costs approximately \$4,000, and is more readily available. Cannon and rocket/missile fires are required across the MAGTF ROMO, rocket/missile fires alone are not only operationally inappropriate, but fiscally unsustainable. War plans, exercises, simulations, and wargames all indicate MAGTF and GCE commanders will face a significantly greater number of targets in a high intensity fight. There must be sufficient and appropriate-level systems and munitions to support both commanders' priorities and needs.

To support the capability gaps highlighted previously, let us review the recent Marine Corps Warfighting Laboratory (MCWL) initial insights, conclusions, and recommendations obtained from the latest 21st Century Fires Wargame.

21st Century Fires Wargame

Following the guidance outlined in the NSS, NDS, and the MOC, the Wargaming Division from the MCWL was tasked with conducting a series of wargames to identify fires-related capability and capacity gaps when engaged in high-intensity combat operations across the ROMO against a peer threat. Once identified, the gaps will guide and inform the development of future requirements and concepts for indirect fires for the GCE. By design, the initial wargame was focused on GCE organic indirect fires capabilities and capacities (a subsequent wargame, scheduled for 9 to 12 April 2019, will examine fires from an amphibious MAGTF/JFMCC perspective). This examination of the GCE fires gap was primarily oriented toward combined arms operations against a peer threat in an austere battlespace with realistic logistical resources and timelines. The wargame was conducted from 29 October to 2 November 2018 and was sponsored by the Commanding Officer, Marine Corps Artillery Detachment, Fort Sill, OK, with Ground Branch, Plans, Policies, and Operations as a key stakeholder. MCWL provided game design, captured game data, and conducted a post-game assessment. Officers and senior SNCOs from a variety of fires and maneuver MOSs participated from all three MEFs, the National Capital Region, and Supporting Establishment personnel provided subject matter expertise regarding future systems capabilities, with players from Australia, the United Kingdom, and Canada providing an allied perspective. The game was set in the 2030 timeframe, with a notional MEF conducting offensive operations against notional peer threat force. As this article is being drafted, the Wargame Final Report is still in staffing, however, a quick look report has been made available with the following noteworthy initial insights, conclusions, and recommendations:

Wargame initial insights:

- A self-propelled capability provides agility to firing units which increases survivability, especially in the direct support role. Agility is defined as the ability to emplace and displace rapidly,

while providing close and continuous fires from a survivable posture. *The agile unit able to conduct fire missions and displace prior to being attacked by counter-battery fire was assessed in this game to be lethal and survivable in the artillery fight.* Long-range towed cannon artillery (55 caliber) with a larger powder chamber and new long-range munitions provided the GCE commander depth and shaping fires to the battlespace. Player discussion assessed GCE fires would improve with a self-propelled weapons system providing greater mobility, agility, and survivability. Players discussed the tactical advantages may come at a cost to operational and expeditionary mobility. A requirement for a self-propelled capability is the most significant issue coming out of the game; however, it was noted this was at odds with the current howitzer capability development strategy.¹⁰

- GCE organic fires units require the capability to attack massed formations of armor and light armored vehicles as well as widely dispersed and poorly located targets via indirect fires. As mentioned in previous paragraphs, this capability was historically filled by DPICM munitions; however, these munitions are no longer in production, stockpiles are well past the end of their shelf-life, do not meet updated range requirements, and stocks are rapidly being depleted.¹¹

- GCE fires require the capability to seek out and engage moving armored targets. Game play highlighted the ability, or lack thereof, to engage highly mobile threat self-propelled artillery and other armored systems. The inability to defeat area targets, including moving armored systems, significantly improved the survival rate for threat indirect fire and maneuver systems.¹²

- GCE fires would benefit from the capability to engage threat counter-battery radar and air defense artillery (ADA) assets with a dedicated anti-radiation type munition. The notional enemy force's counter-battery radar capabilities were considered a significant threat to the notional MEF's indirect fire systems and UAV platforms.

Players determined an anti-radiation munition effective against threat radar systems would positively contribute to the survivability of friendly indirect fire and UAV assets in a counter-battery engagement.¹³

- GCE fires lack an effective long-range target acquisition capability to engage deep threat assets. Notional threat forces had a robust UAS capability which was used successfully in ISR, targeting, and counter-battery roles. In addition, robust notional threat air defense capabilities were successful in denying the notional MEF's UAV capabilities. A lack of the notional MEF to employ a counter-UAV capability allowed threat forces to detect, track, and attack Blue forces during all phases of play. Players argued for an organic UAS capability within the GCE but also acknowledged additional study is required on this topic.

Wargame conclusion:

The purpose of the wargame was to examine potential GCE indirect fires gaps, confirm or deny their existence, and inform the development of future requirements and concepts for indirect fires in the GCE. The game also allowed players to work through issues and hypothesize solutions to perceived gaps, both current and future. The game produced initial insights that align with results from previous wargames and studies. The insights are also in consonance with fires related imperatives in the MOC and functional concept for MAGTF fires, as well as with Combat Development Division and Marine Corps Systems Command GCE fires and related programs and acquisitions, with the notable exception of a self-propelled howitzer capability. While progress was made, issues remain within the subject of ground-based fires that still need to be researched, studied, and refined.

Wargame recommendations:

- Continue to develop and acquire capabilities that will ensure Marine Corps artillery systems possess a family of munitions with scalable effects.
- Pursue a dedicated organic UAS ca-

pability for the GCE with the intent of providing persistent, deep ISR to allow for detection, tracking, and targeting in direct support of the delivery of organic GCE fires.

- Direct efforts toward the further study of the efficacy and utility of a self-propelled artillery capability corresponding to the firing capabilities of the current 155mm system.¹⁶

The results from 21st Century Fires Wargame findings fall closely in line with the capability gaps, operational requirements, and future concepts as outlined by the Artillery Operational Advisory Group (AOAG) and supported by the Ground Board and PP&O through the advocacy process.

- Artillery way forward. With the understanding and consideration of current budget challenges, in what ways can the Marine Corps address the capability gaps highlighted in the previous paragraphs? The Marine Corps is not the only Service to face these challenges. The U.S. Army infantry brigade combat teams and Stryker brigade combat teams face incredibly similar gaps and challenges.

- U.S. Army efforts. Marine Corps senior leadership recognizes the need to expand ground "fires" capabilities and is closely following U.S. Army efforts in development of a 155mm mobile howitzer system and the long-range precision fires (LRPF) program. Analysis, simulations, experimentation, and intelligence estimates are driving the U.S. Army to expand the number and size of their cannon and rocket/missile artillery units across the force. They have validated two requirements documents outlining the operational requirement for improved mobility, survivability, and lethality. The Mobile Howitzer system is supported by a validated Operational Needs Statement (ONS) from the 2d Cavalry Regiment and a Capabilities Need Statement highlighting the need to improve mobility, survivability and lethality over the currently fielded M777A2. The U.S. Army is developing Courses of Action to address this shortfall. Options include either evaluating existing foreign wheeled howitzer platforms, or the potential of



A wheeled howitzer demonstrator. (Photo provided by MC Detachment.)

refining an industry provided concept demonstrator comprised of components from a M777A2, a FMTV 5-ton truck, and new technology to produce a wheeled 155mm mobile howitzer. Both of these options are being addressed at an Army Requirements Oversight Council (AROC) decision scheduled during April 2019. This capability may not be a 100 percent solution to the capability gaps currently resident within the GCE; however, this may provide a cost and time effective bridging strategy to satisfy a large portion of the tactical challenges against a peer threat and may be a suitable interim system until funding can be set aside for a program of record solution.

A second portion of the U.S. Army efforts which may be leveraged is the LRPF program, a long-range missile program intended to replace and improve the performance of the currently fielded ATACMS. The current LRPF munitions requirement stipulates a missile fired from a current HIMARS or MLRS launcher out to 499Km with a follow-on Increment II variant capable of hitting a moving target. When considering operations in the western pacific and the potential to influence shipping lanes, an Increment II solution will provide MAGTF commanders an ability to engage enemy forces over a wide area of the battle space. However, when considering the GCE commanders battlespace challenges, a

high-explosive version of this munition will not be effective against the types of target sets that are of greatest concern to the GCE commander. Due to potential procurement costs, it is anticipated LRPF will be limited in quantity and deemed more effective against MEF and JFMCC target sets.

Conclusions/Recommendations

The pace of technological advancements of traditional and non-nation state actors have narrowed, and in some cases, eliminated many of our historically assumed battlefield advantages. A near-peer or peer adversary with modern air forces could consume our capacity to effectively leverage air assets against ground threats. The GCE commander must have the ability to shape his battlespace and defeat enemy indirect fire capabilities that have the capacity to restrict operations and attrite his forces. Each of these challenges require that future surface to surface MAGTF/GCE fires platforms be highly mobile, possess greater ranges and accuracy, continue to provide 24/7 fires capability in both a technology enhanced and technology denied environment, and remain survivable in order to provide fires on the modern battlefield in support of the ground commander. A deliberate universal needs statement (D-UNS) was drafted to initiate the process of addressing the current capability gaps identified in this article and is being staffed for action. The D-UNS outlines a system

that will field a long-range weapon system specifically designed to support the GCE. To achieve these goals, the AOAG recommends leveraging U.S. Army efforts in developing a Marine Corps version of the wheeled howitzer, using existing systems (principally a M777A2) for experimental purposes, and assisting in the development and refinement of requirements for a future program of record that will meet the fires requirements of the GCE fighting and winning on the high end battlefield, tonight and tomorrow.

Notes

1. White House, *National Security Strategy of the United States of America*, (Washington, DC: 2017).
2. Ibid.
3. Marine Corps Combat Development Command, *Marine Corps Ground Combat and Tactical Vehicle Strategy*, (Quantico, VA: 2018), available at www.mccdc.marines.mil.
4. Headquarters Marine Corps, *Message to the Force*, (Washington, DC: 2018).
5. Phillip Karber and Joshua Thibeault, "Russia's New Generation Warfare," *Association of the United States Army*, (Online: May 2016), available at <https://www.ausa.org>.
6. Ibid.
7. Ibid.
8. *Army Technology*, (Online), available at <http://www.army-technology.com>.
9. *Jane's 360*, (Online) available at <http://www.janes.com>.
10. Marine Warfighting Laboratory, *21st Century Fires Wargame Quick-look Report*, (Quantico, VA: November 2018).
11. Ibid.
12. Ibid.
13. Ibid.

