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The continued relevance and modernization of the Marine artillery community demands constant scrutiny and new ideas. Complexities of the future operating environment and the evolving character of modern warfare combined with the long duration associated with institutional change demands the artillery community begin preparing for future conflicts immediately. Recent conflict in Eastern Europe illustrates the changing character of modern warfare and offers a glimpse of what the future may require of the Marine artillery community to achieve technological and tactical parity. Trends and observations from the Russo-Ukrainian conflict should be used to inform future artillery force modernization efforts.

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New Generation Artillery:
Modernizing Marine Artillery Using Observations from the Russo-Ukrainian Conflict

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Executive Summary

Title: New Generation Artillery: Modernizing Marine Artillery Using Observations from the Russo-Ukrainian Conflict

Author: Major Nickolas D. Whitefield, United States Marine Corps

Thesis: Using salient examples of modern warfare, like the recent Russo-Ukrainian conflict, to inform future force development decisions, Marine artillery must modernize current structures, promote and develop new technologies, and embrace a new way of thinking about modern conflict to provide the future Marine Air Ground Task Force (MAGTF) with an advantage over potential threats.

Discussion: The continued relevance and modernization of the Marine artillery community demands constant scrutiny and new ideas. Complexities of the future operating environment (FOE) and the evolving character of modern warfare combined with the long duration associated with institutional change demands the artillery community begin preparing for future conflicts immediately. Recent conflict in Eastern Europe illustrates the changing character of modern warfare and provides an excellent glimpse of what the future security environment may require of the artillery community to achieve technological and tactical parity, let alone an asymmetric advantage, with a 'peer' competitor. This paper will examine predictions for the FOE while analyzing trends from the Russo-Ukrainian conflict. Based on the findings and analysis, this paper concludes with recommendations for modernizing the Marine artillery.

Conclusion: Only through changes and advancements in Information Operations, the effective utilization of UAV platforms, and continued development of advanced munitions will the Marine Artillery community be poised to fulfil the requirements of the FOE.

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Renown awaits the commander who first restores artillery to its prime importance on the battlefield.[1]

-Winston Churchill, 1941

Introduction

Napoleon Bonaparte once said that "with artillery, war is made."[2] While this axiom still resonates with artillerymen everywhere, the rapidly evolving character of modern warfare has the potential to make current Marine artillery obsolete if it fails to change with the times. The future operating environment (FOE), while complex and unknowable, is rife with opportunity for the aging 'King of Battle' to again evolve and resume its prominence on the modern battlefield. The onus for this much-needed evolution of the Marine artillery rests on the shoulders of the community leadership charged with modernizing the current structures and developing the future force. Only by reviewing and applying the most accurate predictions and relevant examples of the FOE will Marine artillery progress. To best shape these decisions, leaders in the artillery community must begin by asking, "to what extent does modern conflict inform decisions relating to the development of the future force?" The artillery community must remain ahead of the times by examining emerging global concepts and conflict trends in an effort to prepare the artillery community for all possible missions across the Range of Military Operations (ROMO). The Russo-Ukrainian conflict provides an unabashed glimpse into the rapidly emerging realm of modern conflict. While only a single example of modern warfare among developed states, it provides an excellent insight into the changing character of modern warfare from which to draw a multitude of trends and observations that will guide the modernization discussion and the development of the future force. Using salient examples of modern warfare like the Russo-

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[1] T.F. Bristol, "The Queen's Gunners," *Artillery Trends: U.S. Army Artillery and Missile School* (1961): 8, http://sill-www.army.mil/firesbulletin/archives/1961/AUG_1961/AUG_1961_FULL_EDITION.pdf.

[2] "Artillery Quotes," Napoleon Bonaparte, *Military Quotes*. http://www.military-quotes.com/artillery-quotes.htm (Accessed on 04 January 2016).

Ukrainian conflict to inform future force modernization decisions, Marine artillery must modernize current structures, promote and develop new technologies, and embrace a new way of thinking about modern conflict to provide the future Marine Air Ground Task Force (MAGTF) with an advantage over potential threats.

This paper will address these issues by first examining the FOE to establish a baseline of informed predictions regarding future conflicts and emerging threats. The next section will review the history and theory of Russia's 'Gerasimov Doctrine' as context for its application in the Russo-Ukrainian conflict.[3] Salient lessons learned from the Russo-Ukrainian conflict will be extracted and examined for applicability to the artillery community. Drawing on the discussion of the FOE and emerging trends from the Russo-Ukrainian conflict, the final portion of this paper will offer three recommendations for the modernization of the Marine artillery.

The Future Operating Environment

MCDP-1 defines the nature of war as not only timeless, but, "a violent clash of interests between or among organized groups characterized by the use of military force…. a violent struggle between two hostile, independent, and irreconcilable wills, each trying to impose itself on the other."[4] As the Marine Corps looks to the future, it is not the unchanging nature of war that should give pause; it is the rapidly changing character of warfare that is of paramount concern. Emerging threats and evolving adversaries require the Corps to constantly update and refine its structures and equipment to meet these new challenges. However, the force of the future will only be as effective as the informed predictions used to define it. To this end, it is imperative that those who will engage in 'educated futurology' and shape the future force of the

[3] Referring to the theory posited by General Gerasimov as 'Doctrine' is a western oversimplification, and more probably represents a general lack of understanding regarding the topic.
[4] Headquarters U.S. Marine Corps, *Warfighting*, MCDP 1 (Washington, DC: U.S. Marine Corps, June 30, 1991), 3.

Marine Corps (and by extension the artillery community) thoroughly understand the FOE and associated implications.[5]

Before embarking on a study of the unknown, there are several inherent dangers planners must understand and guard against: institutional myopia and oversimplification. As a culture, it is very easy for Marine Corps planners to selectively craft, using accurate and relevant information, a shortsighted view of the future to bolster institutional relevancy. Limiting the scope of the FOE to satisfy short term goals is dangerous and has potentially disastrous long term implications. This flawed way of thinking will invariably inhibit the flexibility of the future force and create significant capability gaps across the MAGTF. Marine and artillery planners should use accurate and properly informed ideas of the FOE to shape the future force, not vice versa.

The second danger in positing about future war is oversimplification. This type of thinking, or rather the lack of, represents the antithesis of the aforementioned institutional myopia. Oversimplification does not allow for quantification or qualification of future threats for fear it may severely limit available responses/options in the event of a failed prediction. When used exclusively to inform future force concepts, the 'war is war' adage is dangerous and misinformed. It only examines broad, fundamental and historical views of warfare and fails to posit on specific threats. Future warfare theorist Colin Gray submits that, "To identify authoritatively by doctrinal fiat that challenges come in two, three, or more categories, which is to say classes, of events sufficiently exclusive as to justify distinctive labeling, is to construct

[5] The term 'Educated Futurology' was pulled from Colin Gray, "Defense Planning for National Security, Navigation Aids for the Mystery Tour," Strategic Studies Institute, Carlisle, PA, March 2014, 4, quoted from F. G. Hoffman, "Thinking About Future Conflict," *Marine Corps Gazette* 98, no. 11 (November 2014): 16.

conceptual walls that are certain to be substantially fictitious."[6] However, in the author's opinion this view is flawed. Studying and classifying the *character* of conflict allows planners to *create options*, not doctrine that is supplementary to a basic, fundamental way of warfighting that is the bedrock of any professional fighting force. Un-biased, current, detailed and well informed trends must serve as the guidepost for the formulation of the future force.

Expeditionary Force 21 (EF 21) describes a FOE that is volatile, instable, complex and full of challenges that will stretch the capacity of the U.S. Military and the Marine Corps.[7] It describes future conflicts that will force Marines to operate in congested, densely populated mega-cities that are located within 200 miles of shoreline in the littorals.[8] EF 21 has a decidedly small scale, amphibious, 'crisis response-esque' focus for future Marine Corps (and by extension the artillery) missions. This capstone concept has, and will continue to shape the development of the future force. For the artillery community, the creation of small, scalable forces capable of deploying with Company Landing Teams (CLTs) from an amphibious ship, the continued development of the Expeditionary Fire Support System (EFSS) and the increased focus on precision guided munitions (PGMs) all support the EF 21 MAGTF. Much like the provisional infantry, convoy security and Civil Affairs (CA) missions in Iraq and Afghanistan, the author believes that structuring and training for the EF 21 mission has merit in specific situations and is required for mission accomplishment, but *should not* be the fundamental mission-set by which the future artillery force is developed.[9] Artillery planners must broaden their aperture when

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[6] Colin Gray, "Categorical Confusion? The Strategic Implication of Recognizing Challenges Either as Irregular or Traditional," *Strategic Studies Institute* (February 2012): 49.
[7] Headquarters U.S. Marine Corps, *Expeditionary Force 21,* Concept (Washington, DC: U.S. Marine Corps, March 4, 2014) 9-10.
[8] Expeditionary Force 21.
[9] Nothing in the mission statement of the field artillery requires a 'light and lethal' force. Fundamental tenants of effective artillery employment will include be massed lethality and sustainability.

viewing the FOE and apply a holistic approach to this modernization that includes EF 21 models, but is not defined by them.

Futures research outside the confines of the Marine Corps Capstone 'glossy' provides predictions that are broader in scope but inherently complimentary to those offered in EF 21. In their "2015-2025 Future Operating Environment" publication, The Marine Corps Intelligence Activity (MCIA) details the top five findings, based on extensive research of emerging global trends that will challenge the Marine Corps over the next decade:[10]

1. Sophisticated Information Operations (IO) campaigns by state and non-state actors as a result of increased global communications and social media influence on decision making speed.
2. Industrial Age acquisition processes will not keep pace with the commercial availability of technology (UAVs, GPS, NVGs, precision munitions).
3. Future conflict will be marked by ambiguity-uncertainty as to who the adversary is, what the objectives are, and whether a state of war exists.
4. Proliferation of advanced weapons has globally spread long range stand-off weapons.
5. Potential adversaries seek to attain overmatch in the information sphere. In future conflicts, effective operations in the IO and cyber domains will be vital to success.

These five challenges represent an expansive view of problems that should shape the conversations regarding modernization and force development. Planners must look at these emerging trends relative to current conflict for validation of these predictions to continue planning. Moreover, many of the aforementioned trends are directly in line with the trends emanating from the Russo-Ukrainian conflict.

While preparing for a future replete with conflicts that are deemed most probable, it is imperative that training, education and force developments are still being conducted for situations that are possible. To distort or oversimplify an inherently complex concept like future

[10] The cited sentence and the subsequent (5) findings are all from: Marine Corps Intelligence Activity, 2015-2025 *Future Operating Environment: Implications for Marine (*Quantico, VA: MCIA, 2015), 5.

warfare is irresponsible, but avoidable. The Corps and its artillery community must look closely at potential opponents, examine their training, explore ongoing battles, and speculate with humility about what will come next.[11] The Marine Corps must be prepared to fight in any environment, in any type of conflict and against any foe. Armed with a baseline understanding of the FOE, one can now begin to look at specific examples of manifested FOE predictions from the Russo-Ukrainian conflict to better inform their predictions of future conflict.

Russo-Ukrainian Conflict

Russian Non-Linear Warfare

In February 2007, Vladimir Putin delivered his now famous Munich Speech.[12] In his speech, the Russian President was overtly critical of the expansion of the North Atlantic Treaty Organization (NATO) into the Baltics (circa 2004) and openly criticized what he viewed as the United States' (US) increased use of military force is support of its foreign policy. Additionally, Mr. Putin declared that Russia would no longer accept the U.S. led unilateral military actions declared that Russian would no longer accept the U.S. led, unipolar model of international relations and that Russia would enact its own, independent foreign policy in pursuit of its geopolitical interest.[13] This speech, followed closely by the appointment of Anatolyi Serdyukov as the Russian Minister of Defense signaled the beginning of a shift in Russian military strategy.[14] However, months of political wrangling and military infighting prevented any substantial reform of the existing military structure. In early 2008, it was evident that true

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[11] F. G. Hoffman, "Thinking About Future Conflict," *Marine Corps Gazette* 98, no. 11 (November 2014): 16.
[12] http://www.washingtonpost.com/wp-dyn/content/article/2007/02/12/AR2007021200555.html (Accessed 03 January 2016).
[13] "Putin's Prepared Remarks at 43rd Munich Conference on Security Policy," The Washington Post, February 12, 2007, http://www.washingtonpost.com/wp-dyn/content/ article/2007/02/12/AR2007021200555.html.
[14] M. Snegovaya, *"Putin's Information Warfare in Ukraine: Soviet Origins of Russia's Hybrid Warfare*", Institute for the Study of War, (September 2015), 9.

military reform would only materialize following an event of national significance. That event, the catalyst for change, came in August of 2008 during the Russo-Georgian war.

Despite protests from the Baltic States and Poland, on August 26, then Russian President Medvedev claimed that "humanitarianism" dictated that Russia recognize the independence of the break-away regions of South Ossetia and Abkhazia, and he called on other countries to also extend diplomatic recognition.[15] Russia ostensibly had achieved its objectives in the war; but at a significant cost. At the strategic and operational levels, the Russia military was extremely successful. However, at the tactical level, Russian forces were often technologically outmatched by Georgian equipment and were often victim of their own poor training. Save for speed and the massing of their forces, the employment of antiquated Soviet-era doctrine and techniques increased the potential for casualties and loss against a better U.S. trained and equipped Georgian force. [16] The Russian military forces, at the small unit level, often lacked effective command and control (C2) structures, still relied on Soviet-era mass mobilization techniques, and employed outdated Soviet-era weaponry that proved unreliable and continuously failed during the conflict.[17] As stated by As Mikhail Barabanov, the co-author of *Tanks of August*, "Though from the position of unsophisticated extraneous observers one saw a quick, massive and decisive action of the Russian army and successful crushing of the Georgian armed forces, in reality, as became completely clear, the experience of the utilization of the Russian armed forces in conflict was considered sufficiently contradictory by the political-military leadership of the RF, which led in the end to a new stage of radical military reform."[18]

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[15] Jim Nichol, "Russia-Georgia Conflict in 2008: Context and Implications for U.S. Interests," *Congressional Research Service* (March 3, 2009), 21.
[16] Not all Georgian forces involved in the 2008 Russo-Georgia War were trained or equipped by the United States.
[17] M. Snegovaya, 10.
[18] M. Barabanov, *The Tanks of August*, taken from A. Cohen and R. Hamilton, "The Russian Military and the Georgian War: Lessons and Implications", *The Security Studies Institute*, ERAP Monograph, June 2011, 49.

Ultimately, the performance of the Russian armed forces in Russia's 2008 war with Georgia would be the impetus for military reform.

Drawing on lessons learned from their 2008 war with Georgia, the Russian military began a significant overhaul of their aging military in 2009. The overhaul of the military establishment represents the most significant changes to the Russian armed forces since their creation in 1992, following the dissolution of the Soviet Union. The Russian government increased military spending by over 30%, and revamped the military and defense industry in an effort to rebound from its' post-Cold War decline.[19] And much like the aging force and industry, Russian military leadership also required an upgrade. Following the dismissal General Nikolay Makarov by President Putin, General Valery Gerasimov assumed his duties as the Chief of the Russian General Staff on November 6, 2012.

On 26 February 2013, shortly after his appointment, General Gerasimov published "The Value of Science is in the Prediction: New Challenges Demand Rethinking the Forms and Methods of Carrying out Combat Operations" in Voyenno-Promyshlennyy Kurier (VPK).[20] In his article, Gerasimov appeals to the Russian military leadership to develop new theories and warfighting doctrines for Russia's future conflicts. Additionally, recognizing the ever-

Figure 1. Competing Constructs
Taken from "Thinking About Future Conflict", by F.G. Hoffman, *Marine Corps Gazette*, November2014.

[19] M. Snegovaya, 10.
[20] Charles.K. Bartles "*Getting Gerasimov Right*", Military Review (January-February 2016), 30.

changing and rapidly evolving character of warfare, he used the article to propose his own view on how Russia should view future war. It is this proposed methodology and view of the FOE that would be manifested by proxy and Russian forces in the Russo-Ukrainian conflict and would come to be referred to in Western circles as Hybrid Warfare.

It is important to note that the emerging concept of warfare as described by General Gerasimov in his now famous 'Predictions' article and the warfare methodology recently employed by the Russian military in the Ukrainian conflict is often referred to by many different names.[21] These include: hybrid war, ambiguous warfare, non-linear warfare, fourth-generation warfare, and new generation war. This paper does not have the space nor scope to thoroughly examine the political, strategic and operational considerations associated with Gerasimov's view of the operational environment, and their application in modern conflict. For accuracy, simplicity and consistency throughout this paper, it is the view of the author that this methodology is best referred to as non-linear warfare.

Russia's non-linear warfare is not new.[22] It does not represent a radical shift in the evolving character of warfare. General Gerasimov's approach to achieving Russia's political-military aims mixes existing Soviet era military doctrine with modern technologies and unconventional non-military methodologies. This developing character of war is inherently complex and difficult to define. Currently, there is no standardized or collectively agreed upon definition of this 'style' of warfare. Discussing the ever changing character of conflict in 2008, then Army Chief of Staff, General George Casey defined the hybrid threat as, "diverse and dynamic combinations of conventional, irregular, terrorist and criminal capabilities."[23] Most

[21] Specific to western circles. Discussion of the Russian naming convention is discussed later in the paper.
[22] This statement solely represents the opinion of the author.
[23] George C. Casey, "America's Army in an Era of Persistent Conflict," Army Magazine (October 2008), 28.

recently, in 2015, the United States Army's Hybrid Force Structure Organization guide expanded on Casey's definition and states:

> A hybrid threat is a diverse and dynamic combination of regular forces, irregular forces, and or criminal elements all unified to achieve mutually benefitting effects. Hybrid Threats are innovative, adaptive, globally connected, networked, and embedded in the clutter of local populations. They can possess a wide range of old, adapted and advanced technologies—including the possibility of weapons of mass destruction (WMD). They can operate conventionally and unconventionally, employing adaptive and asymmetric combinations of traditional, irregular, and criminal tactics and using traditional military capabilities in old and new ways.[24]

It is important to note that the concept of the Russian methodology as being a Hybrid War is a uniquely Western view. Russian officers and military strategist are adamant that their concepts are not new and that they do not practice a hybrid war strategy.[25] Russians refer to this concept as '*nelineinaia voina*', or non-linear warfare in Russian.[26]

Traditional Military Methods	New Military Methods
- Military action starts after strategic deployment (Declaration of War). - Frontal clashes between large units consisting mostly of ground units. - Defeat of manpower, firepower, taking control of regions and borders to gain territorial control. - Destruction of economic power and territorial annexation. - Combat operations on land, air and sea. - Management of troops by rigid hierarchy and governance.	- Military action starts by groups of troops during peacetime (war is not declared at all). - Non-contact clashes between highly maneuverable interspecific fighting groups. - Annihilation of the enemy's military and economic power by short-time precise strikes in strategic military and civilian infrastructure. - Massive use of high-precision weapons and special operations, robotics, and weapons that use new physical principles (direct-energy weapons – lasers, shortwave radiation, etc). - Use of armed civilians (4 civilians to 1 military). - Simultaneous strike on the enemy's units and facilities in all of the territory. - Simultaneous battle on land, air, sea, and in the informational space. - Use of asymmetric and indirect methods. - Management of troops in a unified informational sphere

Figure 2. Changes in the Character of Armed Conflict according to General Valery Gerasimov, from his 2013 VPK article. Published in *"Putin's Information Warfare in Ukraine: Soviet Origins of Russia's Hybrid Warfare"*, by M. Snegovaya, September 2015.

The main objective of Gerasimov's non-linear methodology is to reduce

[24] Headquarters Department of the Army, "*Hybrid Threat Force Structure Organization Guide", (*Washington, DC: Department of the Army: June 2015), 1-1.
[25] Charles Bartles, 34
[26] David Sikorsky, "The Fog of Non-linear War: Russia's Strategic Coercion in the Near Abroad," *ASU School of Politics and Global Studies*, (January 2016): 4.

the necessity for deploying hard military power to the minimum amount necessary (4:1 soft to hard power), making the opponent's military and civil population support the attacker to the detriment of their own government and country.[27] This new way of thinking indicates that the Russians now sees war as being something much more than a purely military conflict.[28] Rather, they envision a modern battlefield based on the idea that the main battlespace is the mind, and as a result future wars are to be dominated by *information* and *psychological* warfare.[29] This old-made-new again style of warfare best explained by a brief examination of the five elements and six phases that comprise the Russian non-linear warfare methodology.

According to Dr. Karber, a noted expert on the Russo-Ukrainian conflict, the Russian non-linear warfare model consists of five distinct elements: political subversion, proxy sanctuaries, intervention, coercive deterrence, and negotiated manipulation carefully orchestrated into a conflict specific application.[30] These five elements are at crux of the modernized character of the Russian way of war. Figure two illustrates the shift from traditional military methods to the new methods, as described by General Gerasimov.

The implementation of this theory is best examined through a brief discussion of the six phases that constitute this methodology. In his article, General Gerasimov proposes a correlation of non-military to military measures of 4 to 1.[31] This reduced reliance on traditional military measures to achieve political and military goals is central to his theory. Examining Gerasimov's concept by phase, as shown in Figure 3, provides for a greater level of detail and understanding.

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[27] Janis Berzins, Russia's New Generation Warfare in Ukraine: Implications for Latvian Defense Policy," National Defense Academy of Latvia, (April 2014): 4, http://search.ebsochost.com.
[28] Charles Bartles, 34
[29] Janis Berzins, 6.
[30] Phillip Karber, "'Lessons Learned' from the Russo-Ukrainian conflict: Personal Observations," *Historic Lessons Learned Workshop*, 6 July 2015.
[31] Mary Connell and Ryan Evans, "Russia's 'Ambiguous Warfare' and Implications for the U.S. Marine Corps," *Center for Naval Analysis*, (May 2015): 4. http://search.ebsochost.com.

It is important to note that the six phases are not entirely sequential, as they contain overlapping actions. [32]

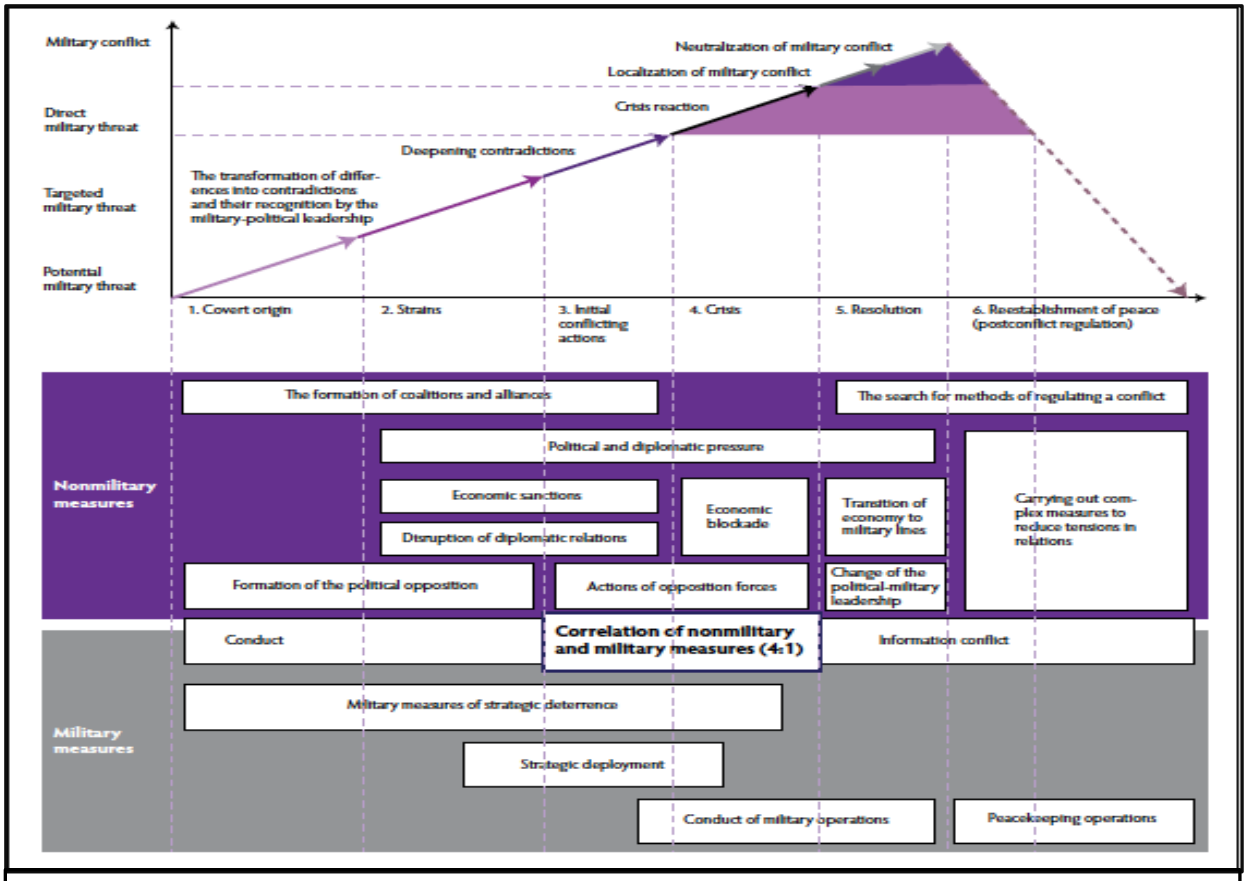

Figure 3. Phases of Russian Hybrid War
Graphic from Gersaimov's VPK 'Foresight' article published 26 Febuary 2013. Translation taken from Charles Bartles article, "Getting Gerasimov Right", in *The Military Review*, January-February 2016.

During phase one, Russia employs ethnic Russian populations already residing in the target state to incite protests and resistance. This is done in an effort to generate backlash from the state government and non-Russian population, creating an internal discord and the potential opportunity for Russian intervention. In phase two, Russia employs economic warfare and diplomatic/political pressure to intimidate and coerce the target state and continue to weaken

[32] Mary Connell and Ryan Evans, 5-6.

their already diminished position.[33] In phase three, the covert intrusion of nondescript security and military forces (read: 'little green men') into the target state continues to incite internal conflict and discontent. Phase four exacerbates existing turmoil through criminal activities within the state, and the infiltration of ambiguous military and security personal (more 'little green men') into the target state. In phase 5, the Russian military and government rely heavily on information (read: disinformation) operations to refute claims of their involvement, and to create an overwhelming sense of confusion and doubt about the actual occurrences within the target state. This phase makes any potential response or assistance by other countries or organizations very difficult. Lastly, in phase six Russia will consolidate its gains in the target country, attempt to de-escalate conflict and lessen tensions, and then establish a government that is agreeable to Russian influence.[34]

General Gerasimov's increased reliance on the non-lethal and non-military aspects of warfare are significant and demand extensive further study. However, Russia's continued, effective use of conventional warfare methods remains a key component of this non-linear warfare theory and must not be dismissed. In his article on Gerasimov, Charles Bartles submits, "Russia is experimenting with some rather unconventional means to counter hostile indirect and asymmetric methods, but Russia also see conventional military forces as being of the utmost importance. At a time when the U.S. military is cutting back on heavy conventional capabilities, Russia is looking at a similar future operational environment, and doubling down on hers."[35,36] The modernization of the Russian way of war is best illustrated in the technological and tactical

[33] Mary Connell and Ryan Evans, 5-6.
[34] Mary Connell and Ryan Evans, 5-6.
[35] Charles Bartles, 36.
[36] Continued reliance on conventional, kinetic methods is business as usual for the Russian military.

lessons that emerged from the Russo-Ukrainian conflict and one that U.S. leadership and Marine Corps planners must heed.

Technological and Tactical Trends

The Russo-Ukrainian conflict began in a manner very unlike traditional military conflicts. Early 2014 saw no formal declaration of war, no rapid mobilization of conventional forces or massed formations of armor units along territorial borders that conventionally served as a line of departure. Rather, it began following the Russian annexation of Crimea, with an abrupt and intense pro-Russian insurgency in Donbass, the southeastern coal mining region of Ukraine.[37] The ensuing Russo-Ukrainian conflict would follow the six-phase, non-linear warfare methodology as described in the previous section. Relying heavily on information warfare, political manipulation, proxy forces, and conventional methods, the Russian backed separatists, Russian military forces and the Ukrainian military would become embroiled in a series of armed conflicts. In February 2015, Minsk II, crafted by the Organization for Security and Cooperation in Europe, represents the second attempt at a ceasefire after the failed Minsk protocol of September 2014 and attempted to bring an end to major conflict between the Ukrainian military and the pro-Russian separatists.[38] However, Minsk II is flawed at best. With its inherent structural flaws and poor enforcement mechanisms, there is a concern among the international community that Minsk II may also collapse. Despite continued hostilities and tension between the Ukrainians and the Russians in the region, relevant information on the conflict is now available for those who wish to analyze its' lessons and learn from the emerging warfare trends.

This portion of the paper focuses specifically on three important developments to emerge from the Russo-Ukrainian conflict. The ubiquitous use of Unmanned Aerial Vehicles (UAVs),

[37] Janis Berzins, 5.
[38] Mary Connell and Ryan Evans, 11.

the increased lethality of indirect fires, and the effective use of information operations all represent a significant change in the role of technology and its tactical employment in the combat environment.[39] These developments deserve attention not only to provide insight and understanding for the methodology by which a competing nation engages in modern war, but too validate the predictions of the FOE that planners employ to modernize and prepare the U.S. military (specifically the artillery) for future conflicts.

UAV Employment

Over the past 15 years, during combat operations in Iraq and Afghanistan, the U.S. military has enjoyed an unthreatened monopoly on the employment of UAVs in relatively uncontested airspace. Those days appear to be over. The Russo-Ukrainian conflict highlights the first conflict in which UAVs have been present on both sides in significant numbers.[40] Following the 2008 Russo-Georgian war in which Georgia relied heavily on Israeli manufactured and supplied UAVs (Hermes Elbit 450), Russia's recognized the military value of the unmanned systems and accelerated their development and acquisition.[41] The extensive Russian use of UAVs represents a tremendous shift in the ability to conduct operations at the tactical level.[42] Though not armed, Russia's employment of UAVs for observation and reconnaissance has produced remarkable results. With an estimated inventory that exceeds 800 drones of 13 different fixed wing designs, and one quad-copter design, the Russians, by stressing

[39] Phillip Karber, 14.
[40] Phillip Karber, 18.
[41] Dan Gettinger, "Drones are not toys: the Russian Drone Program", *Center for the Study of the Drone at Bard College,* March 5, 2014. http://dronecenter.bard.edu/drones-toys-russian, accessed on 20 January, 2016.
[42] The value of UAVs is not limited to military operations at the tactical level. U.S. military operations have proven this over recent years. However, for the scope of the paper, the tactical level was the exclusive focus.

tactical/operational ranges, are capable of identifying targets, net multiple sensor inputs, and produce mass strikes with high lethality area fires.[43]

The Russian employment of UAVs has significantly advanced the sensor to shooter relationship for lethal fires employment. In 2014, Dr. Karber, "witnessed a fire strike… in which an overflying drone identified a Ukrainian position, and destroyed it with a "GRAD" BM-21 MLRS strike within 15 minutes of the initial over flight and then returned shortly after to conduct BDA."[44] Moreover, the continued use of UAVs to conduct lethal fire strikes created an almost 'Pavlovian' response among the Ukrainian forces. Learned the hard way, Ukrainians know that within 10-15 minutes of spotting certain Russian drones, a barrage will follow.[45] The Russian Federation, as the Soviet Union, has put primacy on the artillery.[46] By making extensive and effective use of an unmanned Forward Observer (FO), the Russian military has made great strides in making UAVs a critical component of the modern ground based fire support system.

Equally important to note are the downsides of Russia's UAV employment in Ukrainian conflict. Two key weaknesses must be addressed. First, route planning for UAVs against fixed targets is extensive.[47] Depending on the tempo and fluidity of the modern battlefield, hours and days spent route planning for a fixed target may prove too slow to justify their employment. Next, the Russian drones are not capable of quickly rerouting.[48] Again, this poses serious issues for non-linear battlefields that require flexibility and the need to constantly update and refine

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[43] Michael Person, "Russia's Resurgent Drone Program," *CNN*, October 16, 2015, http://www.cnn.com/2015/10/16/world/russia-drone-program, accessed on 25 January 2016.
[44] Phillip Karber, 15.
[45] Sydney Freedberg, "Russian Drone Threat: Army Seeks Ukraine Lessons," *Breaking Defense*, (14 October 2015), 2. http://breakingdefense.com/2015/10/russian-drone-threat-army-seeks-ukraine-lessons.
[46] Jeff Stone, "Russian Military tests Artillery Drones to Increase Firing Range; U.S. Military Not Surprised," *International Business Times*, 18 August 2015, http://ibtimes.com/russinan-militar-tests-artillery-drones-2058666.
[47] Phillip Karber, 17.
[48] Phillip Karber, 17.

targeting solutions. These flaws provide a valuable opportunity for competing military's to create an asymmetric advantage with similar technology, if viable solutions are developed.

Lethality of Indirect Fires

With progressive military cultures, like the U.S., often narrowly focused on precision strikes, collateral damage concerns and counter-insurgencies; it is easy to dismiss massed, highly lethal artillery as archaic and barbaric. The Russo-Ukrainian conflict serves as a reminder that artillery remains a lethal threat and a force multiplier even on the modern battlefield. So lethal in fact, that cannon and rocket artillery are responsible for 85% of Ukrainian casualties in the conflict.[49] Of the five emerging tactical level, indirect fire developments that have been produced by this prolonged conflict, three rate a brief discussion as they are directly linked to potential advancements in the current Marine artillery community. These trends include: Increased Russian emphasis on Multiple Launch Rocket System (MLRS) fires with improved munitions, the decentralization of Russian artillery down the maneuver battalions, and lastly, the increased emphasis (by both Ukrainians and Russians) on counter battery RADAR.[50]

In the author's opinion, the most significant trend relating to indirect fires is Russia's increased reliance on improved munitions and MLRS employment. This is not to discount the other two developments, but this trend indicates a significant loss of a previously held asymmetric advantage by the U.S. military; the use of sub-munition round and extensive MLRS employment.[51] The effects of Russian MLRS and cannon artillery delivered Dual Purpose Improved Conventional Munition (DPICM), scaterable mines, top-attack munitions, and thermobaric warheads against Ukrainian targets have been profound. This is clearly illustrated in

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[49] Sydney Freedberg, 3.
[50] Phillip Karber, 20.
[51] In a 2008 memo published by then Secretary of Defense Robert gates, U.S. military forces will no longer employ sub-munitions rounds with a dud rate greater than 1 percent.

the July 2014 shelling of Ukrainian forces near the village of Zelenopillya in the Lugansk region of Ukraine. In response to a Ukrainian counter-attack, Russian forces launched a series of massive fire strikes, with 53 attacks on 40 different positions.[52] The attack on Zelenopillya was among these 53. In that fire strike, which lasted no more than three minutes, a combination of Russian artillery and MLRS, the later employing top-attack munitions and thermobaric warheads, wiped out two Ukrainian mechanized battalions.[53]

The next development represents a significant departure from traditional Russian (read: Soviet) artillery employment; the decentralization of artillery batteries down to the battalion level. This change only showcases a shift in the means to achieving the same massing effects from their indirect fires. During the Russo-Ukrainian conflict, Russian artillery batteries were permanently assigned to mechanized and tank battalion battle groups.[54] Key to this concept is understanding that the artillery battery was, to use the Western vernacular, 'attached' to their respective maneuver battalion, not in General Support of a larger maneuver unit. This is a shift from old Soviet doctrine that centralized much of its artillery at the Regimental level and above. But more importantly, this represents a new way of Russian thinking and of understanding of the operational environment. Survivability and increasingly distributed operations were the catalysts for change, and were effective.

The increased reliance on counter battery RADAR systems is the final indirect fire development to emerge from the Russo-Ukrainian conflict that is applicable to the scope of this paper. During the war, Russia employed many of their most effective counter battery RADAR systems. The introduction of the Zoopark-1, Leopard-T, and Lyx-1 significantly improved the

[52] Phillip Karber, 20.
[53] Phillip Karber, 21
[54] Phillip Karber, 23.

accuracy of Russian long range counter-battery fires.[55] Constant observation via UAV platforms, increased dispersion among units and an increased reliance on long range artillery pieces (i.e. 2S5, 2S35, MLRS variants, and the 2A36) combine to highlight the importance of effective counter-battery operations during the conflict. Units are no longer able to occupy terrain for extended periods of time, especially not artillery units conducting fire missions. Effective counter battery employment is once again crucial to survival on the modern battlefield.

Information Operations

Perhaps the most significant trend to emerge from Russo-Ukrainian conflict was the extensive and highly effective use of Information Operations (IO). Moreover, it is the belief of the author that IO is *the* fundamental component of the success of the Russian non-linear warfare methodology and is a critical component of Reflexive Control.[56] It is at the heart of General Gerasimov's 4:1 correlation of non-military to military means in war and is linked directly to his views on modern conflict in the rapidly changing operational environment. In his article on Information Operations during the Russo-Ukrainian conflict, Brett Perry accurately and succinctly asserts that:

> Russia has emphasized influence operations in the informational domain to reduce the requirement for military forces, which is exercised through: subversion, disinformation campaigns and false narrative control, English and Russian language propaganda, protests and disruptive "trolling" and Twitter.com activities online. Although disinformation campaigns erode over time, employing a whole of government approach using information operations and attacks in the cyber domain supports the overall nonlinear, destabilization efforts in Ukraine as a key component of this type of new warfare.[57]

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[55] Phillip Karber, 23.

[56] The concept of Reflexive Control and its theories trace back to the 1960s. Reducing the enemy's ability to make a decision that is beneficial to his goals is the essence of Reflexive control. Reflexive Control is explained in detail on the following page.

[57] Brett Perry, "Non-Linear Warfare in Ukraine: The Critical Role of Information Operations and Special Operations," *Small Wars Journal* (August 2015). smallwarsjournal.com/printpdf/2701.

The importance of Information Operations and their subordinate/adjacent disciplines in modern and future conflict is emphasized further by Checkinov and Bogdanov by stating, "No goal will be achieved in future wars unless one belligerent gains information superiority over the other."[58]

Before discussing specific relevant actions in the IO sphere taken by Russia during the conflict, it is prudent to understand the history of Soviet era discipline known as Reflexive Control theory.[59] Reflexive Control theory first appeared in Soviet military literature over 40 years ago and has been in use for much longer than modern concepts like Information Warfare and Information Operations.[60] Employed at all levels of war, Reflexive Control is a means of conveying to a partner or an opponent specially prepared information to incline him to voluntarily make the predetermined decision desired by the initiator of the action.[61] It aims to usurp the adversary's decision making cycle my manipulating information to the extent that the adversary willingly chooses to act in a manner beneficial to the originator of Reflexive Control. At the heart of Reflexive Control is *maskirovka,* the Soviet means of deception, denial, and disinformation.[62] Reflexive Control is a uniquely Russian concept with the closest western equivalent being 'perception management'. The two differ in several ways with the most important being the Russian emphasis on 'control' of the adversary's decisions, vice the western desire to only 'manage' the perception created by information manipulation.

Modern Russian IO, stemming from Reflexive Control, and maskirovka have undergone a facelift and now relies on modern technologies in the information and cyber realms to

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[58] S. G. Chekinov and S.A. Bogdanov, "The Nature and Content of a New Generation War", *Military Thought,* no. 4 (2013): 13.
[59] Can Kasapoglu, "Russia's Renewed Military Thinking: Non-Linear Warfare and Reflexive Control," *NATO Research Pape*r no. 121, (November 2015): 3
[60] M. Snegovaya, 12.
[61] Timothy Thomas, "Russia's Reflexive Control Theory and the Military," *Journal of Slavic Military Studies* 17 (2004): 237.
[62] The Military Balance 2015, 18

influence, coerce, and shape the battlefield. The modern technologies and 'means of achieving political and strategic goals' as stated by General Gerasimov in his 2013 'Predictions' article and employed by Russia during the conflict include: extensive social media usage (i.e. Twitter and Youtube), cyber warfare, television and newspapers. Russia's actions in the information environment are built around the Russian theory of reflexive control blended with modern maskirovka and technology to elevate their effectiveness and broaden their reach.

Russian IO efforts in the conflict focused on two key aspects: Global and Ukrainian media efforts. Theses media efforts are the backbone of the Russian IO campaign, but are predicated on actions taken by the Russians well before the start of the conflict.[63] Russian media efforts targeting the Ukraine relied primarily on television and newspaper to spread pro-Russian messaging. In 2007, there were 3,966,113 newspapers in circulation in Ukraine and of those 2,647,385 (66.7%) were in Russian while 1,141,877 (28.7%) were in Ukrainian.[64] Similarly, of the 45 licensed TV programs in Ukraine in 2008, 37 were Russian.[65] With the majority of media mediums in Ukraine being delivered in the Russian or identifying as pro-Russian, Russia was able to manipulate the dominant narrative.

Unlike the Ukrainian messaging efforts, global media messaging, which revolve around denial and deception, aims to distract international actors in an effort to hinder any potential response to the Ukrainian crisis.[66] The medium for delivery favored television and internet/social media outlets. Understanding the wide range of its international target audience, Russian television efforts were broadcast in English, Spanish, Arabic, French and German. The

[63] Pushing for the expansion of Russian culture, language and thinking into the Ukraian culture through compatriots effectively set the conditions for the Russian IO campaign to be effective. If the target state does not have a large enough segment of the population that identifies as 'Russian' the aforementioned model would be rendered ineffective.
[64] Bret Perry, 9.
[65] Bret Perry, 9.
[66] Bret Perry, 10

most important of Russia's international messaging and programming efforts is Russian Today (RT). RT reaches over 600 million people globally, and has an online following via Youtube subscribers in excess of 1 billion.[67] RT, with a budget of over $300 million, was used to great effect during the Russo-Ukrainian conflict to disseminate disinformation and spread falsities that were designed to bolster the pro-Russian message.[68]

Another medium central to the Russian IO efforts during the Russo-Ukrainian conflict was social media and the cyber realm. Armed with amply named 'troll-armies' Russia made extensive use of the cyber domain to counter anti-Russian news stories and promote the pro-Russian message.[69] Relying on swarm tactics, Russian internet trolls working (presumably) from the 'Internet Research Agency' in St. Petersburg, spend 24 hours a day spreading pro-Kremlin messages and countless disinformation narratives over multiple internet mediums.[70] Additionally, tens of thousands of pro-Russian Twitter accounts were used to continuously swarm social media with disinformation and confusion.[71]

Russia's use of Information Operations during the Russo-Ukrainian conflict was well coordinated, carefully integrated, and pivotal to the success of operations in other domains. A careful analysis of Russia's use of IO and its specific actions and ideas should be a requirement of those charged with defining the future requirement's and force structure of the Marine Corps. At a minimum, a study of Russian actions throughout the Information environment should

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[67] Benjamin Bidder, "Russia Today: Putin's Weapon in a War of Images," *Der Spiegel International,* (13 August 2013). Taken from [67] Brett Perry, "Non-Linear Warfare in Ukraine: The Critical Role of Information Operations and Special Operations," *Small Wars Journal* (August 2015). smallwarsjournal.com/printpdf/2701.
[68] Brett Perry, 11.
[69] Troll is a slang term for an individual who contributes to internet based discussion only in an attempt to disrupt or distract from the topic at hand.
[70] Internet Research Agency is the only unofficial reference to the Russian arm of the government responsible for the internet troll-style attacks.
[71] Adrian Chen, "The Agency," *The New York Times* (June 2015), http://www.nytimes.com/2015/06/07/magazine/theagency.html. Accessed 25 January, 2016.

generate a conversation about balancing our kinetic and non-kinetic fires capabilities within the artillery community.

Recommendations

The emerging trends and observations from the Russo-Ukrainian conflict provide many valuable insights about the future of warfare. However, these insights stem from a single conflict, are representative of a single (state) competitor and do not provide a holistic view of the future security environment; nor should they. The Russo-Ukrainian conflict provides those who study it with a competing, and yet complimentary view of the FOE. It does not focus on small scale crisis response, amphibious/littoral maneuver, or even Anti Access/Area Denial (A2/AD). It focuses on a hybrid threat from a near peer competitor that effectively uses modern technology to seamlessly leverage nonlethal information operations with traditional, conventional, military tactics. But perhaps most importantly, it offers a modern, relevant framework for which to make recommendations on how to modernize the current Marine Artillery community. A close examination of the conflict at the strategic, operational and tactical level informs three important recommendations that should be considered when modernizing and developing the artillery community for its next fight:

1. Information and Cyber Operations
2. UAVs
3. Improved Artillery Munitions

Information Operations

Perhaps the most significant recommendation for the modernization of the artillery community stems directly from the most important trend emerging from the Russo-Ukrainian conflict. If the artillery community is to remain a relevant, capable arm of the GCE, they must improve their ability to effectively conduct and coordinate Information Operations. The

evolution process is three-fold and decidedly less tangible than two subsequent recommendations: Improvements in PME, increased importance within the community, and a fundamental change in how the community views 'fires'.

Information Operations should be taught at every level of Marine Corps Officer Professional Military Education, beginning with entry level schools. For the Artillery Officer, IO should be part of the curriculum at the Field Artillery Officers Basic Course (FAOBC) and the Artillery Captains Career Course (ACCC). Inclusion in the officer PME curriculum at every level should be scaled appropriately and taught based on the applicability and relevance relative to the target audience. At a minimum, inclusion of IO beginning with the entry level officers will guarantee a baseline understanding and appreciation from which the Corps (and artillery community) can expand and build upon.

Next, the artillery community must make a conscious decision to make IO important. This decision must extend to every aspect of the community, from schools to battalions. Commanders must send their best to resident IO courses and exploit opportunities to fill IO billets across the MAGTF. The FOE will require a mastery of IO. If the artillery community fails to recognize this and adjust accordingly, the requirement will be removed from the community along with any remaining relevance.

Finally, and perhaps the most nebulous of all the recommendations to stem from this study, the artillery community must adopt a more progressive view of 'fires'. At the most basic level, the fact that the artillery community continues to promote the distinction between 'lethal' and 'non-lethal' fires is problematic. This distinction only perpetuates the communities' already unbalanced idea of fires as those delivered almost exclusively via M777A2 or HIMARS. It is the belief of the author that the artillery community must change this view. The artillery

community does not provide lethal and non-lethal fires. They coordinate and provide *fires* to create *effects*. Contrary to popular sentiment, changing this paradigm will not detract nor undermine the communities' ability to mass fires ISO kinetic operations. It is not an either/or proposition. Looking at fires holistically will increase the artillery community's utility and relevance to the MAGTF exponentially. It will create flexibility and balance in a community that badly needs it.

UAVs in Artillery

The effective, timely, and multi-layered approach to UAV employment, specifically their use as Forward Observers, by Russians forces during the conflict should illicit a visceral reaction in Marine artillerymen everywhere. It should leave them asking, 'Why do we not have that in our community?' The reason aside, the solution is simple: Marine artillery needs UAVs, and need them quickly.

Digital fire controls on the M777A2 howitzer, faster and more accurate AFATDS programs and digital communications have all improved the timeliness and accuracy of artillery over the past decade. However, even as the aforementioned fire support systems have advanced over the years, accurate target location continues to be point of friction that is not easily rectified. Improved maps, laser range finders and digitized target location devices have alleviated much of the human error from the days of 'compass and binos'. But despite these improvements, the limiting factor remains the Marine FOs ability to visually acquire and accurately associate a specific target to a universally understood spot on the earth. UAVs employed by Marine scout observers would eliminate this limitation.

Any honest conversation about UAVs in the Marine artillery must center around three key components: ownership/maintenance, interoperability with existing systems, and

compatibility with current force structures. UAVs should not be owned and/or maintained by the artillery community. Increasing the maintenance burden on an already resource constrained community is laughable. Moreover, expensive, exceeding technical and sometimes classified nature of UAV maintenance precludes the creation of a UAV section within the artillery ranks. Rather, the UAVs (not the operators), should be sourced and maintained by the artillery regiments respective division; retaining the capability within the Ground Combat Element (GCE) is paramount. The UAVs would be provided to artillery units following training requests via the artillery regimental HQ.

The UAVs must be simple yet accurate and compatible with existing digital communications architecture (ANW2C structure and PRC-117G radios) currently resident in artillery units. Specifically, these drones must be able to transit and observe past the visible range of the scout observer and transmit in real time, via video down link technology, back to the observer's location. The target location error of the system must be sufficient to employ Precision Guided Munitions (PGMs) from any of the ground based Fire Support Platforms (M777, EFSS or HIMARS).

Finally, the UAV operator should be created from the existing artillery Fire Support Team structure. Specifically, artillery scout observers should be trained to operate UAVs as part of their technical skill set.[72] Training scout observers to locate and prosecute target using UAVs is not a radical or untenable concept. . UAVs will greatly expand and compliment the current capabilities of the scout observers and will provide the supported commander with greater flexibility and confidence when employing artillery in support of his plan.

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[72] C. Boston, "Creating Ground Strike Sections," *Marine Corps Gazette* 99 (December 2015): 31.
While this concept remains the opinion of the author, other artillerymen share the same sentiment. Following the writing of this paper, the author discovered the aforementioned article in the Marine Gazette which advocates for a similar concept, hence the foot note requirement.

Improved Artillery Munitions

In addition to their use of UAVs to accurately locate targets, the effectiveness of Russian fires against Ukrainian forces comes as a result of improved and increasingly lethal artillery and MLRS munitions. This trend, while alarming and informative, expands the scope of the discussion regarding the future artillery munitions. Marine artillery must improve our existing munitions capabilities in two areas: Precision Guided Munitions (PGMs) and DPICM. However, it is paramount that these advancements only supplement the artillery's fundamental ability to mass fires, not replace it.

PGMs are a critical component of the future artillery. When used in conjunction with modern target location technologies (i.e. UAVs), advanced delivery methods (DFCS equipped M777A2 howitzers) and against appropriate target sets, PGMs allow the commander to achieve the desired effects of his fires with little to no collateral damage. However, current artillery delivered PGMs lack extended rage and require a constant GPS signal. Future rounds should be capable of doubling existing max ranges, be effective against moving targets and must be capable of operating in a GPS denied environment. Increasing max ranges to 70+km and reducing the GPS limitation would satisfy the MAGTF requirements ranging from littoral operations in A2/AD environments to more conventional, land based conflicts. The development of the Moving Target Artillery Round (MTAR) aims to achieve all of the above improvements.[73] However, programs like the MTAR are still in their infancy and are years fielding to the FMF. Until rounds like the MTAR are available to the Marine artillery, units must continue to train with existing rounds, both PGM and non-PGM, including DPICM.

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[73] Headquarters III Marine Expeditionary Force, Long Range Precision Fires Maritime Capability, Information Paper, 2015.

Much like the MTAR, a replacement round for DPICM is not currently available. Current restrictions on the employment of cluster munitions that exceed a 1% dud rate and the forced reduction of DPICM stockpiles have created a capability gap in the artillery community. In a future conflict that does not presuppose air superiority or GPS connectivity (read: EMDCOA against a peer competitor), without DPICM artillery and HIMARS systems are currently incapable of effectively prosecuting large formations of armor or mechanized vehicles (moving or not). The artillery and the Marine Corps cannot afford to lose a conventional capability like DPICM. The future artillery must continue to advocate for a ground delivered, non-PGM capability akin to DPICM, that meets the <1% dud rate requirement. In the interim, artillery units must continue to train with and be prepared to employ the current lots of DPICM in a combat situation.

These recommendations are not intended to be a refined, implementable solution as the community leadership moves to modernize the artillery. Rather, these three recommendations should be used to foster dialogues on the three, critically important topics. A great deal more research and debate will be required to turn these academic recommendations into actionable force modernizations.

Antithesis

The first counterargument against studying the Russo-Ukrainian conflict as an indicator of future conflict is built around the idea that this conflict was an isolated incident involving Russia and a former Soviet state and that the U.S. will never directly engage Russia in conventional conflict. This argument assumes that an increasingly aggressive Russia is willing to use force to bring former Soviet states back under its control, and that the conflict is purely regional and doesn't pose a threat to U.S. interest at home or abroad.

While the conflict was geographically isolated and limited to only two states, this argument is too narrowly focused and fails to address the much larger implications. Studying the Russo-Ukrainian conflict does not assume a future U.S.-Russia conflict. Studies of Russia's most recent war provide near real time insights into how a near peer competitor views the modern operating environment. Studying how a potential threat to the U.S. thinks and operates is central to preparing for future conflicts and for improving the methodologies and actions of U.S. forces.

The second counterargument against using the Russo-Ukrainian conflict, specifically the aspects of Information Warfare and Information Operations, to inform future decisions is one of relevancy. Specifically, "Basic analysis reveals that all of the main principles and approaches (to Information Operations and Warfare) the Russian government utilizes today were taken from Soviet toolkits."[74] This argument posits that Russian IO is 'old-hat' and that we learned everything we need to during the cold war.

This argument, while factually sound, fails to grasp the modern reasons for its study. Much like war, the nature of Russia's Reflexive Control and Information Warfare remains unchanged, but the character is fundamentally different. It is this dramatic shift in the character and application of Information Operations that demands our attention and future study. The changing character of war will influence the manner in which the U.S. prepares and structures for future conflict and requires undivided attention.

Conclusion

Developing tomorrow's artillery force through informed modernization efforts is a daunting task. As the Marine Corps moves forward in developing the force of the future, the

[74] M. Snegovaya, 18.

Marine artillery community must ensure that future structure and capabilities will be capable of meeting the requirements of tomorrow's MAGTF. To contribute to this effort, this study used relevant trends of the Russo-Ukrainian Conflict in conjunction with other educated predictions about the FOE to provide recommendations for the modernization of the Marine Artillery. Central to the artillery community's progress and development is the premise that new ideas, requirements and technologies are supplemental and complimentary to the fundamental mission of artillery. Technological improvements like UAVs and improved munitions will be essential to artillery's advancement and will enhance the ability to mass fires at the decisive point. But equally important, and often overlooked, will be the community's ability to coordinate and employ non-lethal fires in the IO realm. Balance is central to the community's future. The King of Battle must relearn how to think about fires and must temper their age old love of cannons and rockets with a more modern view of fires across all domains.

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Russian Artillery supporting Winter Offensive

Russian supplied MLRS Canister munitions & Themobaric warheads create catastrophic injuries & have destroyed entire Battalions

Russian supplied Artillery and MLRS Strikes cause most casualties