

THE POTOMAC FOUNDATION

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“Lessons Learned”
from the
Russo-Ukrainian War

Personal Observations

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*It is believed that smart people learn from the mistakes of others in order to not repeat them.*¹

The military conflict between Russian and Ukraine is now in its sixteenth month. What began as a relatively bloodless superpower intervention in Crimea and morphed into a proxy “separatist” insurrection in the Donbas has turned into a year-long real war.² Despite repeated attempts to negotiate an effective ceasefire, the struggle in Ukraine has involved the largest scale battles in Europe since the end of the Second World War.

The Russo-Ukrainian War has been full of surprises. First, it was totally unexpected. If some pundit had predicted as recently as 2013, that Europe would soon be experiencing such an event, with state-on-state violence and an increasing element of East-West crisis atmospherics,³ they would have been unceremoniously ejected from whatever “future security” forum had invited them. Second, few in the West have paid much attention to Russia’s doctrinal pivot toward “New Generation War” until its manifestation in Ukraine. This emerging strategy has been both under-appreciated and misunderstood – often muddled with our own constructs of “fourth generation warfare;” or “non-linear warfare” or “hybrid war.” This mirror imaging is misleading and “it is a conceptual mistake to try to fit Russian New

¹ Artis Pabriks “Foreword,” THE WAR IN UKRAINE: LESSONS FOR EUROPE, edited by Artis Pabriks & Andis Kudors, (Center for East European Policy Studies; Riga, LVA: University of Latvia Press, 2016): p. 6.

² The intervention in Crimea is dated from the first over-flight and entry of Russian airmobile units on 27 January 2014; the Donbas events started with protests in February, seizures of government facilities in March, and open insurrection in April; the Ukrainian government, after experimenting with an unreciprocated “ceasefire” in June, launched their “Plan B” counteroffensive on 2 July.

³ “Russia has made numerous nuclear threats, buzzed U.S. and NATO ships in the Black Sea, moved Iskander missiles to Crimea and Kaliningrad, built up a formidable anti-access and area-denial (A2AD) force along the Russian border, conducted major Arctic exercises and continued its probes against northern European and U.S. targets.” Stephen Blank, “The Slow Mobilization toward War with Putin,” NEWSWEEK, (3 July 2015), at < <http://www.newsweek.com/slow-mobilization-toward-war-putin-349765> > [accessed 3 July 2015 >.

Generation Warfare ... on Western concepts.”⁴

A third surprise is the relative lack of Western attention given to the military aspects of the Russo-Ukrainian War; particularly given the unexpected scale and duration of the conflict as well as the unanticipated Russian aggressiveness in sponsoring it. Part of this lacuna can be attributed to a political predisposition in the West to proclaim that “there is no military solution to the conflict” – as comforting an excuse for inaction as it is a rationale for ignoring of a military dimension that has been ruled irrelevant. Compounding this benign neglect is the US Administration’s ban on military, intelligence and government observers entering the conflict zone.

The purpose of this paper is to stimulate a dialogue on the military aspects of the Russo-Ukrainian War with a focus on emerging trends. It is based primarily on personal observation and interviews with Ukrainian troops and combat commanders at the front as well as informed by discussions in Kiev with the General Staff, Ministry of Defense, Ministry of Interior, Presidential Office, Members of the Verkhovna Rada (Parliament) and various representatives of the defense industry in Dnepropetrovsk, Kharkiv, Lviv and Mykolaiv. As such, it neither has the advantage of detached historical perspective nor the adversarial perspective necessary for a “net assessment” – both of which are needed for a conclusive set of “lessons learned.” Thus, the commentary presented here should be taken more as a set of informed hypotheses rather than definitive conclusions.

Given the personal nature of the observations expressed here, some explanation of the sources and access is in order. Between 1991 and 2011, The Potomac Foundation organized and hosted over 1,000 conferences with diplomats and military officers from former Warsaw Pact member countries and newly independent Soviet Republics to prepare them for potential NATO “Partnership” or

⁴ Jānis Bērziņš, “Russian New Generation Warfare is Not Hybrid Warfare,” in THE WAR IN UKRAINE: LESSONS FOR EUROPE, op cit: p. 43. “Therefore, it is a methodological mistake to try to frame a theory developed independently by the Russian military on a theory developed in another country, therefore reflecting another culture’s way of thinking, and strategic understanding about the way to conduct warfare.”

Membership. In the spring of 2014, the new interim government of Ukraine requested the Foundation's assistance in conducting an assessment of the security situation in that country.⁵ Subsequently, the Ukrainian Minister of Defense, Col. General Stepan Poltorak, issued a formal letter requesting "assistance to the Supreme Command of the MoD and the General Staff" which greatly facilitated access throughout the military establishment.⁶

As a result of this support, over the last sixteen months the author has made 15 separate trips to the front, logging in 7,100km of in-country ground travel and systematically debriefed most combatant commanders and many troops in the field:

2014

- MAR -- National Defense and Security Council & General Staff meetings & briefings;
-- Kiev armaments factory;
-- North East Front: Chernigov Oblast – 1st Armored BDE & Border Guards;
-- Eastern Front: Sumy Oblast: 30th Mechanized BDE & SBU;
- APR -- Southern Front: Odessa Oblast, Mykolaiv Oblast, Kherson Oblast, 95th Air Assault Brigade on Crimean causeway, Dnepropetrovsk HQ;
- JUN -- Kharkiv armament plant, 92nd Mech BDE, observed incoming MLRS strike;
- JUL -- Observed battle of Sloviansk with Special Forces & 95th Air Assault Brigade;
- AUG -- Kharkiv Tank Academy;
-- Kramatorsk ATO HQ, Armored repair facility, Attack Helo Unit;
- SEP -- 95th Air Assault BDE (armored);
-- Observed fighting at Sector "M" Mariupol, Azov Battalion, 25th Airborne Brigade;
- OCT -- Air Force Bases – Mig 29, Su-27, Su-24;
-- Aircraft Refit Factory at Lviv.

2015

- JAN -- MoD & MoI meetings and intell briefings;
-- Dnepropetrovsk Oblast: Dnepro-1 Regiment, Peacekeeper and Donbas volunteer Battalions;
-- Observed fighting at Pisky (Donetsk Airport) & Volnovaka;
- FEB -- Southern Front Command HQ;
-- Yusemash Missile Design Center & Factory;
-- Air Force units: Mig-29, Su-25, Mi-8, Mi-24;
- MAR -- Sector "M" Mariupol Defense Command;
-- Sector "B:" 72nd Mech BDE, 28th Mech BDE, 93rd Mech BDE;

⁵ Invitation from the Secretary of Ukraine's National Defense and Security Council, Andriy Parubiy, and Viktor Chumak, Head of the Parliamentary Committee on Fighting Organized Crime and Corruption, "Letter," (control # 0412101340; Kiev, UKRL Verkhovna Rada, 28 March 2014).

⁶ Col. General Stepan Poltorak, PhD, Minister of Defense, "Letter," (control # 000640; Kiev, UKR: Ministry of Defense, 27 November 2014).

- Sector "C:" 30th Mech BDE, 17th Armored BDE;
- Sector "A:" 24th Mech BDE, 92nd Mech BDE;
- Observed fighting on the Severtsky river line;
- APR -- Artemorsk Command & Hospital, Special Forces;
- Observed fighting at Pisky;
- JUN -- Mariupol & Volnovaka, observed fighting at Sheroke;
- 73rd Naval Infantry & SEAL team;
- Wounded in MLRS strike at Lebedyns'ky.

In addition to these front line visits in Ukraine, we have also met with senior NATO officials as well as Allied military, diplomatic and political leaders sharing and comparing perceptions of military developments in Ukraine.

The reasons for conducting repeated trips to the front line and visits with combatant units are several:

- Understand how the Russian theory of "New Generation Warfare" is being implemented in practice – including both their strengths & weaknesses:
- Evaluate Ukrainian military needs relative to requests for assistance:
- Observe effectiveness of the Minsk I and Minsk II Ceasefires:
- Assess current & future combat capability of the Ukrainian Army:
- Compensate for the Administration's ban on US military travel to the combat zone which seriously disadvantages their understanding of what is going on.

Based on these trips we have prepared six major reports for the US Congress⁷ as well as briefings and various topical reports for US Government Agencies, the Military Services and interested Commands, as well as various European Allies.

⁷ Reports on Ukraine by The Potomac Foundation:

- Gen. (ret.) Wesley Clark & Dr. P.A. Karber, "Non-Lethal Military Aid to Ukraine," (8 April 2014), commissioned by the House of Representatives Armed Services Committee, publicly released and available at < <https://www.documentcloud.org/documents/1114174-clark-karber-report-with-appendix.html> >.
- Gen. (ret.) Wesley Clark & Dr. P.A. Karber, "Russian State Sponsored Terrorism against Ukraine," (23 July 2014), presented in closed session to the full HASC, restricted distribution;
- Dr. P.A. Karber, "Ukraine's 'Plan B' & Russia's Summer Offensive," (5 September 2014), restricted distribution;
- Dr. P.A. Karber, "Russia's Winter Offensive," (16 February), restricted distribution;
- Dr. P.A. Karber, "Beyond Minsk II: Prospects for a New Russian Offensive, (12 May 2014), publicly available at < <http://www.thepotomacfoundation.org/beyond-minsk-ii-prospects-for-a-new-russian-offensive/> >;
- Dr. P.A. Karber, "Russian 'New Generation Warfare' in Ukraine: Implications for NATO and the US Army," (16 June 2015), restricted distribution.

“Lessons Learned” Framework for Analysis

All military institutions are a product of their organizational past, some steeped in historical inertia, others frenetically adjusting to new threats or recent combat experience. In either case, “lessons learned” become institutionalized under the assumption that their “past is prologue.” It is not unusual that larger powers with global interests and a wide variety of commitments can also be interested observers in regional conflicts where they are not directly involved in combat but nonetheless identify relevant trends and operational implications. Usually the “lessons learned” from these Proxy Wars are integrated into existing operational constructs with minor doctrinal or force structure tweaking,

Nevertheless, some regional wars are different. On rare but notable occasions, Proxy Wars reveal the impact of new technology or suggest new ways of fighting that challenge pre-existing assumptions and operational frameworks. Teasing out which “lessons” are real and which are epiphenomenal is neither easy nor symmetrically learned. For example, in the 1936-39 Civil War in Spain the French and British generally ignored the implications⁸ while both Germany and Russia drew radical conclusions from it – but did so in exactly opposite directions⁹ – the former getting it right,¹⁰ and the latter disastrously wrong.¹¹

⁸ Referenced repeatedly in: B. H. Liddell-Hart, *THE LIDDELL-HART MEMOIRS 1895-1938*, (London, UK: Putnam Sons, 1965).

⁹ Ironically, the lessons each drew with respect to tanks, were not from their own forces, but the opponents. Examining the poor results of German light tanks in the offensive, the Russians concluded that the main value of the weapons was in distributed defense; while the Germans were impressed with the heavier Russian tanks used in larger offensive concentrations. Robert M. Citino, *QUEST FOR DECISIVE VICTORY FROM STALEMATE TO BLITZKRIEG IN EUROPE, 1899-1940*, (Lawrence, KS: University of Kansas, 2002): p. 243.

¹⁰ This was particularly true with respect to the German Air Force, where they were able to introduce new weapons and rapidly adjust designs based on this test-bed environment. Peter H. Oppenheimer, “From the Spanish Civil War to the Fall of France: Luftwaffe Lessons Learned and Applied,” *INSTITUTE FOR HISTORICAL REVIEW*, < http://www.ihr.org/jhr/v07/v07p133_Oppenheimer.html > [accessed 10 May 2015].

¹¹ For a detailed discussion of Soviet mis-learning of the lessons of Spain, see: John Erickson, *THE ROAD TO STALINGRAD*, (New York, NY: Harper & Row; 1975).

The 1973 Yom Kippur War was similarly one of those occasions where a Proxy War had radical impact on American assumptions, technology investment, and new operational concepts. At the time, the U.S. Army was returning from a decade of relatively low-intensity combat in a frustrating counter-insurgency environment. They faced tight procurement budgets that restricted its potential for modernization and the forces in Europe were “bored and ignored” while “bled white to keep the U.S. war machine in southeast Asia supplied.”¹² And it showed in their “garrison mentality,” poor morale, and unrealistic training.¹³ As American forces returned from Vietnam and turned their attention to the Soviet forces across the border there wasn’t just an absence of operational material but a stark lack of realism.¹⁴ The Army’s “Aggressor Manual” was a mirror image of US doctrine exercised by guys wearing funny “French” helmets and literally issuing orders in Esperanto.¹⁵

The Yom Kippur War had a shock effect on the U.S. Army. It challenged decades of accumulated assumptions about: the intensity of large scale conventional combat -- the amount of ammunition expenditure, the loss rates of armored vehicles, and magnitude of casualties; the presumption of American qualitative superiority offsetting the other side’s quantitative advantage; and the belief that airpower would compensate for an imbalance in ground forces. On the other hand,

¹² Rick Atkinson, *THE LONG GRAY LINE*, (New York, NY: Houghton Mifflin, 1989): p, 383.

¹³ Robert Tomes, *US DEFENSE STRATEGY FROM VIETNAM TO OPERATION IRAQUI FREEDOM: MILITARY INNOVATION AND THE NEW AMERICAN WAY OF WAR*, (Miltin Park, UK: Routledge, 2007): pp. 70-77.

¹⁴ P.A. Karber, “Cold War Lessons in Competitive Awareness,” (working paper; OSD Net Assessment, revised 8 January 2010).

¹⁵ “Handbook on Aggressor Military Forces,” (FM 30-102; Washington, DC: US Government Printing Office, 1969); “Aggressor Order of Battle,” (FM 30-103; Washington, DC: US Government Printing Office, 1966); and “Esperanto, the Aggressor Language,” (FM 30-101-1; Washington, DC: US Government Printing Office, February 1962). For background on the Army’s use of Esperanto, see: Pat McWilliams, “A Most Unusual Army Manual,” (Kansas City, KS: Manion’s International, 2009), at < <http://www.manions.com/archive/articles/a%20most%20unusual%20army%20manual.htm> > [accessed 11 Sept. 2009]: notes that identifying the Soviet Union as the prime opponent and “the employment of Russian ... might have seemed a little too ‘aggressive’ so a ‘neutral inter-language’, not identifiable with any alliance or ideology “ was used to represent “a fictitious nation created by the Army to serve as an opponent in training exercises.” Aggressor forces were dressed in dark green uniforms “complete with a full range of collar & shoulder insignia. Standard M-1 helmets were fitted with a distinctive wooden ridge similar to the comb on an old French Adriane. In addition, special manuals were prepared for intelligence forces, detailing the history, politics, and military structure of Aggressor. There were even tables of organization of imaginary Aggressor units, complete with fabricated campaign histories.”

the 1973 war did for the U.S. Army what it couldn't do for itself – it provided an external foci, a high-intensity threat that challenged the best and the brightest, a mission worthy of extraordinary effort and one that justified to external audiences the necessity to invest in Army modernization and force structure.

The new Training and Doctrine organization (TRADOC), created barely a month before the Yom Kippur War, took the lead in sending teams of officers to the battlefield to learn first hand what was different about this new kind of conflict.¹⁶ They brought Soviet equipment back from Israel to the U.S. for testing. They identified unique asymmetries in tactics and operations.¹⁷ They produced a slew of periodic bulletins, each deconstructing a specific area of concern that differed from normal intelligence products by not only described a Soviet capability but explaining how to counter it.¹⁸ And, prioritizing Europe as the Army's strategic challenge, they initiated a major effort to develop both new tactics and realistic operational concepts tailored to meeting a specific, non-generic, opponent.¹⁹ Recognizing they were behind the learning curve in that theater, they began listening to allies instead of just lecturing them.

Interestingly, the Soviet military also undertook a series of “lessons learned” following the Yom Kippur War that lead to a radical set of operational and technological initiatives.²⁰ The comparison and contrast with US conclusions provided unique insight into both their and our own reactions.²¹ This produced an unexpected lesson TRADOC also had to learn while looking for “lessons learned” – i.e. “the fallacy of the last response.” The opponent also gets a vote on what lessons

¹⁶ Robert A. Doughty, *THE EVOLUTION OF THE US ARMY TACTICAL DOCTRINE: 1946-76*, (Ft. Leavenworth, KA: U.S. Army Command and General Staff College Press, 2001).

¹⁷ For the author's take at the time, see: P.A. Karber, “Operational Asymmetries in Combined Arms Combat.” (paper presented to the Office of the Secretary of Defense Symposium on Net Assessment Methodology, Leesburg, VA: May 1974).

¹⁸ For example: “Soviet ATGMs: Capabilities and Countermeasures,” (Bulletin #2; Ft. Monroe, VA: TRADOC, February 1975).

¹⁹ P.A. Karber, ““Dynamic Doctrine for Dynamic Defense.” *ARMED FORCES JOURNAL*, (December 1976).

²⁰ P.A. Karber, “Soviet Lessons of the 1973 Middle East War: A Tactical Revolution in Ground Warfare.” (paper presented at the Fifteenth Annual US Army Operations Research Symposium, Ft. Lee, VA: published in *PROCEEDINGS AORS XV*, Vol. I, October 1976); and P.A. Karber, “The Soviet Antitank Debate.” *SURVIVAL* (June 1976), Reprinted in *MILITARY REVIEW*, (November 1976).

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he will learn. New weaponry will be produced that compensates for the shortcomings of his earlier generation systems. New operational concepts will be explored with the explicit attempt to make the other side's learning irrelevant.²² A secretive opponent will actively try to hide his own "learning;" and thus, his modified systems and techniques may not be apparent for more than a decade. For TRADOC, by the time their Active Defense operations manual for combating a massed breakthrough was published, the Soviets were within a year of introducing the Operational Maneuver Group concept, which sacrificed mobilized mass in exchange for surprise and high-speed dispersed thrusts.²³ This in turn, encouraged the US Army to adopt the Soviet construct of an Operational level of war between Tactics and Strategy.²⁴ They introduced a new approach to Army force structure and major weapon modernization planning with TRADOC's "Battlefield Development Plan" which focused on "Central Battle" and "Force Generation" functions,²⁵ as well as react to the deepening battle space by extending the depth of strikes to target echeloned forces in the opponents rear area.²⁶ By working in unison, the American Air Force and Army jointly produced Airland Battle that then expanded to the Follow-On Forces Attack (FOFA) concept for NATO.²⁷

With the Yom Kippur War, TRADOC also learned an important lesson about the study of "lessons learned." There was a tendency among commentators

²² P.A. Karber, "The Impact of New Conventional Technologies on Military Doctrine and Organization." ADELPHI PAPER, no. 144, (1978); and reprinted in NEW CONVENTIONAL WEAPONS AND EAST-WEST SECURITY, edited by Christoph Bertram, (London, UK: International Institute of Strategic Studies, 1978).

²³ P.A. Karber, "Die Taktische Revolution in die Sowjetischen Militaerdoktrin." EUROPAISCHE WEHRKUNDE, Parts 1 and 2, (Jun/Jul 1977), reprinted as "The Tactical Revolution in Soviet Military Doctrine," in the volume ART OF WAR COLLOQUIUM, Vol. 39, (Carlisle Barracks, PA: US Army War College, 1983).

²⁴ Richard Swain, "Filling the Void: The Operational Art and the U.S. Army," THE OPERATIONAL ART: DEVELOPMENT IN THEORIES OF WAR, edited by B.J.C. McKercher and Michael A. Hennessy, (Westport, CT: Praeger, 1996), p. 153ff.

²⁵ Gen. Donn A. Starry, "Battlefield Development Plan," (Ft. Monroe, VA: TRADOC, 1979).

²⁶ Donn A. Starry, "A Tactical Evolution – FM 100-5," MILITARY REVIEW, (March 1977): pp. 2-11.

Donn A. Starry, "Extending the Battlefield," MILITARY REVIEW, (March 1981): pp. 31ff.

²⁷ See: John L. Romjue, "The Evolution of the Airland Battle Concept," AIR UNIVERSITY REVIEW, (May-June 1984); Richard Swain, "Airland Battle," in CAMP COLT TO DESERT STORM: THE HISTORY OF US ARMORED FORCES, (Lexington, KY: University of Kentucky Press, 1999); and Martin J. D'Amato, "Vigilant Warrior: General Donn A. Starry's Airland Battle and How it Changed the Army," ARMOR, vol. 59, no. 3, (May-June 2000): p. 19-46.

searching to draw conclusions about the performance of a given weapon system or a specific tactic to extrapolate that as a generalized trend. The more removed from the battlefield the commentator, the greater the tendency to convert a micro observation into strategic *veritas*. In contrast, TRADOC's approach provided the most useful insight with least distortion by separating the levels of analysis:

- Strategy;
- Operations;
- Technology & Tactics.

Differentiating between these paradigmatic levels is important because they necessarily involve different analytical techniques and decision-making perspectives.²⁸ At the tactical-technological level the challenge is to diagnose the changing nature of weapon interactions in a complex combine-arms environment. The next level is prognostic— where military establishments attempt to anticipate tactical and technological change by modifying their operations and organizational structures. At the strategic and policy level, national leaders are simultaneously attempting to do real-time bottom-up “learning” while providing top-down guidance, prescribing remedial measures and committing resources. It is also at this level where decisions are made about unleashing violence or restraining it, balancing expected benefits versus cost and risk, escalating or terminating a conflict. This trifold approach is used here as a framework for organizing our observations on the Russo-Ukrainian War.

The above experience is highlighted here, because I believe it was one of the most productive “lessons learned” efforts conducted by the U.S. Army, and certainly was influential in framing this author's approach. Unfortunately, the valuable learning gained by the American Army's reaction to the Yom Kippur War, and TRADOC's “lessons learned” methodology that produced it, has not been well documented. The generation that experienced it has now departed from the scene leaving little organizational memory of why that was such a dramatic challenge to American presumptions about the nature of modern high-intensity warfare as well

²⁸ P.A. Karber, “Battlefield Leverage: Hierarchy and Transition in Central Battle,” (Ft. Monroe, VA: TRADOC, 1979).

as how various institutions were able to adapt to it.

Today, the war in Ukraine, like the Yom Kippur War that preceded it forty years earlier, is a natural “test bed” and potentially insightful glimpse of what is to come on future battlefields.. However, unlike the 1973 experience, few (if any) US military officers have been able to directly observe that conflict or interview participants while their memories are fresh. Although various fact-finding missions have been sent to Kiev, what they pick up is filtered through Ukrainian perceptions of what is meaningful for them, not necessarily to us. Thus, there remains a pressing need to survey and analyze the nature of Russia’s “New Generation Warfare” as it is playing out in Ukraine and facilitate a candid discussion of its implications for American assumptions, operational concepts and force design.

I TECHNOLOGY & TACTICS

Historically, local wars, and particularly proxy conflicts where one or more major powers are actively arming and supporting a belligerent, have often foreshadowed new technological developments that end up having a significant, at times decisive, role in subsequent major power conflicts. Ukraine, is in fact a “proxy” conflict, but only in part. Soviet-era equipment is present in large numbers on both sides, while the Russians are actively introducing newly developed weapons systems from sniper rifles to advanced electronic-countermeasure vehicles. Arming a belligerent serves a dual purpose in tilting the military balance in a conflict to one side as well as providing valuable real-world testing and officer training – a vehicle for feedback that facilitates the supplier in developing new concepts of operations faster and more confidently than rivals who do not participate.

While Ukraine is putatively a stand-in for the West, weaponry and support from the latter are noticeable primarily in their absence. Thus, the Russo-Ukrainian War fits the definition of a proxy conflict only part. Despite this asymmetry, there are a number of important areas where lessons can be hypothesized about the changing role of technology and its tactical employment in modern combat:

- Ubiquitous Presence of Unmanned Aerial Vehicles;
- Increased Lethality of Indirect Fires;
- ATGMs and Armor's Counter-revolution;
- Declining Survivability of Light Infantry Vehicles.

Each of these will be briefly described with some kibitzing on tactics that illustrates both success and failure. There are also a number of other observations, less clear in developmental direction or long-term impact that are grouped in a summary grab-bag of speculation at the end of the Operations section.

Ubiquitous Presence of Unmanned Aerial Vehicles

The revolutionary impact of drones on the future battlefield has been anticipated for quite some time and the US has led the world in the use of drones for both reconnaissance and strike of high value targets. But Ukraine is the first conflict in which UAVs have been present on both sides in significant numbers and they can have a dramatic impact that is quite different than anything experienced in the unilateral American use.

The first use of drones in this conflict was observed in May 2014, when the Russian "separatists" began using small fixed-wing tactical UAVs. At first of these were more of a novelty than a nuisance. However, from mid-July through the end of the Russian summer offensive in early September, Russia flooded the area with at least five types of drones, each operating at a different altitude with complementary strengths and some notable weaknesses. The Russian are employing no less than 14 different drone designs – 13 fixed wing and at least one quad-copter design -- over the Donbas in varying ranges and with differing sensor suites, some launched from the "separatist" areas and some from Russia proper:

- Very long-range strategic surveillance high-altitude UAV flying along the border and Ukrainian southern coast;
- Long range higher-altitude fixed wing drone flying over Ukrainian positions beyond Brigade rear area;
- Medium-range fixed wing drone used in target acquisition and real-time engagement with less than 15 minute response time, associated with Urgan and Smersh Multiple Launch Rocket Systems;

- Short-range fixed wing drone particularly associated working with BM-21 MLRS targeting;
- Very short-range tactical quad-copter used for scouting defense positions and post-strike Battle Damage Assessment (BDA).

Although there is little unique or surprising in this list, the Russian approach is functionally impressive -- by emphasizing tactical/operational ranges, they are able to identify target complex, net multiple sensor inputs, and produce a mass strike with high-lethality area fires.

The surprising thing about the Russian use of drones is not in the mix of vehicles themselves or their unique characteristics, but rather in their ability to combine multiple sensing platforms into a real-time targeting system for massed, not precision, fire strikes. There are three critical components to the Russian method: the sensor platforms which are often used at multiple altitudes over the same target with complimentary imaging; a command-and-control system, which nets their input and delivers a strike order; and, an on-call ground-based delivery system which can produce strikes within short order.

The author has been with Ukrainian units that have witnessed up to eight UAV over flights in one day. However, their presence at night appears very limited (or they are there but just not observed from the ground). The West has tended to emphasize UAV reconnaissance-strike as a long-range theater/strategic precision engagement albeit with considerable time-lapse between target identification and attack except in the case of the armed drone such as Predator, which carries its own weapon. The author personally witnessed a fire-strike east of Mariupol in September 2014 in which an overflying drone identified a Ukrainian position, and destroyed it with a "GRAD" BM-21 MLRS within 15 minutes of the initial over-flight and then returned shortly after to do an immediate bomb-damage assessment. Last month when hit by a "GRAD" fragment in a similar strike, there were two UAVs over us -- a quad-copter at 800ft and small fixed wing drone at about 2,500ft.

The strength of the Russian approach is its ability to deliver rapid massed fires against a typical area target with an intensity and speed of target location heretofore not seen on any battlefield. The weakness of this approach is threefold:

1. Need for pre-planning against fixed targets — although targets can be engaged quickly, there seems to be a considerable process measured in hours, even days, in setting up the conditions for the flight route assignment;
2. Lack of rapid reprogrammed routing — they do not appear to be able to respond rapidly to emerging (non-preplanned) routes;
3. Difficulty in tracking and attacking mobile targets -- which is compensated to some extent by attacking a fixed location through which a group of mobile targets are transiting (such as a bridge, defile or a road).

To date, the Russians have not fielded against Ukraine a predator-type armed drone, that combines real-time acquisition with direct engagement. Although this is probably just a matter of time. What the Russians have done at the tactical and operational levels is to close the temporal loop between acquisition and indirect fire engagement with massed, not precision fire.

Other than a few Cold War era Tu-141 unmanned pilotless aircraft,²⁹ Ukraine entered the conflict without a modern UAV capability. However, over the last year several of their volunteer units, like Dnepro-I have built their own tactical drones, using model airplane parts, off-the-shelf commercial optics married to a controllable camera-head manufactured using 3-D printing. These drones are used for reconnaissance, not strike. These short-range (20 km) tactical systems cannot do real-time target acquisition and designation, but they have greatly improved Ukraine's ability to understand what's going on in the immediate tactical area and they have been produced at a cost of less than \$10, 000 per unit. Lack of government

²⁹ The Tu-141, uses a high-resolution camera, but unlike "a modern-day Predator or Reaper drone, which can orbit for long periods while scanning with high-tech sensors. Nor is the Tu-141 capable of killing. The 47-foot-long, delta-wing Tu-141 is purely a reconnaissance vehicle. With its powerful KR-17A turbojet, it zips over a target at a height of nearly 20,000 feet and a top speed of more than 600 miles per hour—all while snapping pictures. The drone doesn't even land like a conventional aircraft. Instead, it relies on a parachute and retro rockets to gradually descend—while still floating in the upright and horizontal position." "Ukraine Resurrects Soviet Era Super-Drones," WAR is BORING, (14 June 2014), < <https://medium.com/war-is-boring/ukraine-resurrects-soviet-era-super-drones-3403f80c51ba> > [accessed 15 May 2015].

funding and the inability of the Ukrainian industry to produce their own have been compensated by the ability to crowd-source using social media.³⁰

Although both sides have experience UAV losses due to enemy action, the survivability of the drones appears to be quite acceptable on a per-sortie basis. The combination of small size, limited radar cross-section or IR signature, and lack of acquisition until they are over or past the target, makes engagement with SAMs a low probability and high cost proposition (particularly against the low-flyers). Some have been shot down by both sides using a 14.5mm machine gun or 23mm/30mm rapid-fire cannon, but the most successful weapon against the drones has been Russian use of a self-propelled Electronic Warfare vehicle with a targetable jammer. It breaks the GPS signal and the UAVs drop out of the sky. This is how the Russians took down the German supplied OSCE surveillance drones as well as most of the Ukrainian losses.

In order to monitor the Minsk II ceasefire, Ukraine desperately needs a high-altitude, extended loiter-time drone with a deep-looking sensor suite for looking fifty km across the border. With their artillery pulled-back out of range to be compliant with Minsk II, and an ineffectual OSCE monitoring regime, it's the only means for successfully providing strategic warning. In addition to the Donbas, Ukraine has 1,500km of adjacent border area deploying opposing forces (Belarus, eastern frontier with Russia, southern Azov Sea with the danger of amphibious assault, Crimean approaches, as well as Transnistria). The optimum strategic surveillance UAV for Ukraine would be similar to the General Atomic "Reaper:" operating at 40,000ft, with 20+ hour duration missions, and real time sensors. Interestingly, this is exactly the type of strategic warning drone needed by NATO's Baltic members.

The tactical impact of a UAV-infested world has profoundly changed the nature of battlefield tactics. Awareness (or fear of the prospect) that one is being

³⁰ "Ukrainian Activists are Developing a New Weapon to add to their Anti-Russian arsenal: Reconnaissance Drones," VOCATIVE, (30 May 2014), at <
<http://www.vocativ.com/tech/infosec/ukrainians-anti-putin-strategy-drones/> > [accessed 12 May 2015].

targeted inhibits movement, particularly in daylight. Likewise, the importance of camouflage, dispersing assets into civilian areas, and the use of deceptive signatures has had a behavioral impact and shifted movement into a nocturnal mode, which has had an impact for both offense and defense. For US and NATO forces that are used to having unilateral access to UAV technology the omnipresence of drones and the experience of real-time targeting by mass fires is likely to be a traumatic experience. From now on friendly forces ought to be exercising with opposing forces extensively utilizing drone technology and assuming that they are under constant UAV real-time surveillance.

Increased Lethality of Indirect Fires

In the wake of the Yom Kippur war, analysts of that conflict were surprised at the extra-ordinarily high expenditure of ammunition compared to US and NATO expectations prior to the conflict. The Yom Kippur War demonstrated artillery usage at 2 to 3 times the rate (up to 250 rounds per tube per day) assumed in various Western planning charts. In the Ukraine conflict the author has witnessed units firing 300-400 rounds per tube per day. This increased intensity of fire is both outgoing and incoming. However, Ukraine is different from the Yom Kippur war in that the high expenditure rates of fire are sporadic rather than continuous; and the conflict has gone on for a year, not three weeks, with Ukrainian artillery ammunition stocks are getting low.

In the 1980s, the US introduced an entire new family of artillery sub-munitions -- DPICM (Dual-Purpose Improved Conventional Munitions), artillery and MLRS delivered scatterable mines and top-attack munitions. It was widely believed that, since we had them and the Russians did not, this was a unilateral advantage and it gave Western forces 4-10 times the effectiveness of traditional high-explosive munitions. Evidence from Ukraine is that now this asymmetry has been reversed.

In the wake of international concern over collateral damage from the widespread use of mines and sub-munitions in third-world conflicts, the international convention popularized by Princess Diana placed very restrictive limits on the dud-

rate of sub-munitions. As a result, even though the United States has not signed that international convention, Secretary of Defense Gates ordered the U.S. military to observe it. As a result, an entire generation of advanced conventional munitions is in the process of being purged from the U.S. military stocks.³¹

Although most NATO countries never had an extensive inventory of these munitions, those who did are also following the US example and liquidating their stocks. The Ukraine conflict shows that Russia has been moving in exactly the opposite direction. Where they were a few decades behind in developing and fielding sub-munitions for artillery and MLRS, their extensive use of this weaponry in the Donbas shows that they have caught up in this area.

Data from the Ukraine conflict show that artillery is producing approximately 85% of all casualties on both sides. While the Ukrainians have generally used their artillery with considerable effectiveness in the defense, it is on the Russian side that we see five trends that are important for U.S. and NATO ground forces. First, is the increasing Russian emphasis on MLRS area fires. There are five MLRS types in prime use in the Ukraine conflict:

- BM-21 *Grad (Hail)* – original 122 mm 40-round mounted launcher mounted on a Ural-375 chassis, rocket range 20km firing a traditional round with high-explosive;
- BM-21-1 *improved Grad* -- a 122 mm 40-round launcher mounted on a Ural-43201 truck with new rocket with 50% increased range, satellite navigation, automated fire control, and auto-laying system firing a new version with DPICM as well as canister sub-munitions (HEAT, Anti-tank, mines);
- TOS-1 -- a 220 mm 30 round launcher mounted on T-72 chassis, with a range of 6km specializing as a flame thrower of thermobaric warheads;
- BM-27 *Uragan (Hurricane)* -- 220 mm 16 round launcher, with a range of 35km capable of firing a wide array of munitions including; DPICM, scatterable mines, anti-tank munitions and thermobaric warheads;
- BM-30 *Smerch (Whirlwind)* — 300 mm 12 round launcher with a range of 90km, canister capable of carrying DPICM, sub-munitions, top-attack self-guided munitions and thermobaric warhead.

The dramatic effect of these new munitions on the lethality of Russian in direct fire cannot be overemphasized. The combination of DPICM, scatterable mines, top-attack

³¹ Scheduled to be out of U.S. inventory by the end of the year.

munitions and thermobaric warheads -- when used in pre-planned massed fire-strikes -- can have catastrophic consequences for targeted units.

In July 2014, as the Ukrainians were successfully conducting their counteroffensive against the separatists strongholds in the Donbas and tried to drive a wedge between the proxies and their supplier, Russia initiated a series of cross-border artillery strikes against the Ukrainian units. In the space of six weeks, the Russians launched 53 fire strikes at 40 different locations, which decimated the Ukrainian forces. For example, at Zelenopillya, in a combined MLRS fire strike that lasted no more than three minutes, two Ukrainian mechanized battalions were virtually wiped out with the combined effects of top-attack munitions and thermobaric warheads.

Perversely, the Ukrainians, under pressure from the U.S. and Western Europe not to be “provocative,” were proscribed from cross-border counter-battery fire which would have offset some of the effects of the Russian attacks. After weeks of this fire preparation, and the cumulative attrition of the Ukrainian brigades on the border, the stage was set for the decisive Russian ground offensive of late August 2014.

The Russian emphasis on MLRS has grown since the Cold War. In the mid-1980s the ratio of one MLRS to four traditional artillery systems. This is a proportion Ukraine had maintained in its artillery park. However, the Russians have substantially increased their ratio of rocket launchers to artillery so that, in the Donbas, it is now three MLRS to four traditional tubes. The Russian emphasis on the massive use of area fire is in stark contrast to the Western preoccupation over the last decade with precision-strike.

A second noteworthy fire-support trend coming from the Russo-Ukrainian War is the emphasis on both sides of direct fire artillery. The Cold War era design of the 2S1 *Gvozdika (Carnation)*, Self-propelled 122 mm has been extremely successful and popular on both sides. Even though “an old system” its high maneuverability (particularly in soft soil and marshy areas) and mechanical reliability make it

popular in roles for which it was not designed. For the Russian side, the 2S1 is used in the dual role of both indirect Howitzer and as an assault gun. In this latter direct fire role it is used as an over-watch system targeting at a range of 1 to 6 km Ukrainian strong points and suppressing anti-tank defenses. In interviews with the author, numerous Ukrainian anti-tank missiles and anti-tank gun operators have noted their reticence in opening fire against Russian armor because of the expectation that they themselves will immediately be targeted by the *Gvozdika*.

Conversely, the Ukrainians have been using their 2S1 systems less as an assault gun but rather in the anti-tank role — to compensate for their lack of effective antitank weapons against Russian armor. Although the 122 shell is not designed for armor penetration, the force of the impact of the shell when fired at a reasonably close range can have a disastrous effects even without penetrating the armor, such as knocking the turret off the tank. However, there is a negative consequence in using a light-skinned armored vehicle in direct fire engagements that results in very high loss rates for *Gvozdika*.

Interestingly, there is no comparable system to the 2S1 in the American or West European armies. However, there are large stocks of *Gvozdika* inherited by former Warsaw Pact countries. For example, Poland has an inventory of 2S1T *Goździk* of these systems —most in storage— but they could play a critical role in Baltic defenses, where their amphibious and dual direct/indirect capability would make a noteworthy contribution.

A third trend, manifested uniquely only on the Russian side, is the decentralization of artillery down to the level of maneuver battalions. Historically, since the end of the World War II most armies have placed their artillery fire support at the brigade (US and NATO) or regimental (USSR) levels. However, in the Donbas, the Russians are permanently assigning (not cross-attaching) artillery batteries to mechanized and tank battalion battle groups. As mentioned earlier, many of these systems are the self-propelled 2S1T *Goździk* 122 mm or towed D-30 gun-howitzer, which makes sense, given their dual direct/indirect role. However, there are many examples, where the Russians are providing either a self-propelled

2S3 *Akatsiya* or towed D-20 152 mm howitzer battery and/or a BM-21 *Grad* MLRS. At first glance this appears to be an anomaly because the 18km range of the 152mm artillery exceed the normal operating area of a maneuver battalion. But there is an unexpected rationale for this trend— it is necessitated by the abnormal dispersed nature of combat where the battalions are operating on a much broader front and thus the area typical of a Cold War brigade. The increased operating area of Russian maneuver battalion reflects both a condition and an imperative: the Donbas battlefield has a relatively low force-to-space ratio; and the increase lethality on it mandates wider dispersion for survivability.

A fourth fire-support trend, complementing the others, is the pursuit of increased range of artillery. Ukrainian artillery employment remains in the tradition of a normal brigade (typical of NATO standard), but recently they also recognize the dispersion trend and need for counter-batter suppression -- reacting to it by bringing older longer-range (27km) towed 2A36 152mm guns out of retirement.³² On the Russian side, this trend is illustrated in their range extension of the *Grad* MLRS, heavy use of the *Smersh* MLRS, introduction into the Donbas of the self-propelled version of the 152mm gun 2S5 *Giatsint-S* and 2S7 *Pion* 203mm long-range cannon. It is also evident in the deployment of the new 2S35 *Koalitsiya-SV* 152 mm self-propelled gun/howitzer, which reportedly fires a rocket-assisted projectile out to 70 km – four times the range of its Cold War predecessor the 2S3 *Akatsiya*.

Ironically, many of the characteristics of the 152 mm 2S35 *Koalitsiya-SV* mirror the specifications of the US Army's proposed 155 mm Crusader design — extended range projectiles, automatic loader and dedicated armored resupply vehicle — which was cancelled in 2002. This trend pushing the extension of artillery reflects the perceived need both to cover force dispersion and for effective counter-battery missions. With respect to the latter, discussions with Ukraine artillery commanders suggest that the objective in counter-battery fire is less the destruction of the opposing artillery than disruption of its fire missions by forcing it to move.

³² "Artillery Section of the 55th Brigade successfully conducted Exercises with New Tools," PHOTONEWS, (4 July 2015), at <http://censor.net.ua/photo_news/342629/pushechnyyidivizion_55yi_brigady_uspeshno_provel_ucheniya_s_novymi_orudiyami_fotoreportaj> [accessed 5 July 2015].

The reciprocal of that is also important – not being able to conduct real-time counter-battery fire condemns the recipient to prolonged fire strikes and each salvo becoming more lethal. This is a trend that is made possible by a combination of both UAVs on the battlefield and the increased capability of counterbattery radar.

The fifth trend in fire-support is the increased emphasis by both sides on counter-battery radar. The Russians have introduced some of their best systems Zoopark-1, Leopard-T and Lyx-1 into the Donbas, which has significantly improved the accuracy of their long-range counter-battery fire. Not having a similar capability of their own, the Ukrainians have begged the United States to supply the ANTPQ 36 counter-battery radar in September 2014 while visiting Washington. President Poroshenko believed that he has received assurance from Obama that such systems would be supplied. However, what arrived seven months later, was not the long-range ANTPQ36, but the ANTPQ35 -- a counter-mortar radar with only a 5 km range. Even though the Ukrainians have been creatively triple the range of that system in good weather, its high elevation orientation makes it ineffective against the systems the most damaging: long-range artillery and LMRS strikes. Nevertheless, Ukraine's counter-mortar experience should teach the U.S. and NATO a valuable lesson. Because it is an active emitter, the Russians are able to accurately identify its location; and because it is a towed system and a computer requires a half-hour shut-down, it cannot be moved rapidly and thusly is highly vulnerable to the very counter-fire it is intended to suppress³³.

The one effective antidote to the increased lethality of the modern battlefield is the creation of prepared defenses. This includes multiple lines of entrenchments, the installation of covered firing positions and pillboxes and extensive use of preregistered defensive supporting artillery fire. Following the negotiation of the Minsk II ceasefire agreement, Ukraine began construction of two lines of concentric entrenchments parallel to the line of contact. This digging covers in total some 800km and is one of the most extensive efforts at fortifying a modern battlefield as

³³ The U.S. supplied 20 counter-mortar radar. At least 20% of which have been lost: 2 lost to counter-fire; and 2 lost in the overrun of the Debaltseve encirclement, one of which is now being used by separatists against the Ukrainian 24th Mechanized Brigade.

has been seen since the end of the Korea war. Likewise, the Russian side is also digging in with infantry trenches and protected artillery firing positions. This is a nascent development -- the implications of which are still unclear -- but will likely be determined by the side that can concentrate the heaviest massed fire strikes.

ATGMs and the Armored Counterrevolution

One of the “lessons” quickly drawn from the 1973 Yom Kippur War was about the proliferation of the antitank munitions on the modern battlefield. This portended a “revolution in warfare -- for the first time since the invention of the battle tank infantry were seen as having the opportunity to effectively destroy the tank at longer range and with greater probability than main gun of a tank. This was heralded both in the West and in the Soviet Union as a major challenge not just to the survivability of the main battle tank but its future viability.

In the mid-80s, the Russians began fielding explosive reactive armor (ERA)—steel plated explosive boxes mounted on the frontal hull and turret of the tank which detonate outward upon the impact of an incoming shell or missile, distorting the trajectory or jet and reducing the probability of penetration.³⁴ By the collapse of the Soviet Union, virtually all modern Russian MBT (T64, T72, T80) had been outfitted with a protective layer of ERA. And, Ukraine, like the other former Soviet Republics gaining independence inherited its tank inventory with equivalent protection to the Russian tank fleet.

With both sides’ tanks equally protected, the conflict in Ukraine has demonstrated a major reversal of the Yom Kippur “revolution.” Explosive reactive armor effectively defeats all single warhead antitank guided missiles (ATGMs) and all infantry hand-held anti-tank rockets (RPG-7, RPG-26). Despite new designs for a dual tandem- warhead for ATGMs in both Russia and Ukraine neither side has deployed them in noticeable numbers, if at all. Therefore, the prime antitank weapon in the Donbas is the high velocity 125 mm gun of the main battle tank.

³⁴ P.A. Karber, “Reactive Armor and the New Soviet Tank Threat,” Armed Forces Journal, (May 1987).

Infantry are once again, rendered impotent against concentrated tank attack due to the lack of effective antitank weaponry.

Ukraine has attempted to compensate for the lack of ATGM weaponry by concentrating artillery fire in close proximity (within one km) of their prepared positions -- and this generally has been quite effective, particularly when used in conjunction with prepared positions (entrenchments, overhead cover and minefields). However, the consequence of dismounting infantry in prepared positions is that the defense sacrifices its mobility. Once a defense position is penetrated, the defender is in danger of either overrun or being bypassed with its rear area overrun by deep armored advance.

The great advantage of the ATGM was its ability to engage tanks at extended range (3-5 km) and, when mounted on light armored vehicles, allowing the defender to use mobility to repeat the engagement process in a series of fallbacks and ambushes -- attriting and slowing the armored advance without exposing its own forces to heavy fire suppression or close-in engagement. When repeated in successive engagement this "active defense" thus becomes stronger and the attacker—weaker.

Realizing the impact of ERA on opposing tank survivability, over two decades ago the US began developing ATGMS with tandem warheads: the first round igniting the reactive armor, and the second penetrating the targeted vehicle's armor. The first of these systems was TOW II (a 5 km range missile) which could be fired from either a dismounted launcher or launched from the (M-2) Bradley infantry fighting vehicle turret, or mounted in a specialized vehicle, the ITV (a M-113 APC with elevating launcher) that reduced vehicle exposure and increased inter-visibility to the target. TOW II was produced in large numbers and is available in dozens of countries around the world, although it is neither in the inventory of Ukraine or most East European countries.

A more recent American ATGM development is Javelin (a 4 km range missile) fired from a dismounted launcher but unlike the TOW II not requiring engagement

of the target on direct line of sight. Rather, it can fly in an arc and is able to strike the tank from the top where its protection is the weakest. Although the Javelin missile is 50% more expensive than TOW II, it is much easier to train and use. The Ukrainians have repeatedly made requests for the Javelin and attempted to procure TOW II from third-party sources. But these systems have been denied by the U.S. out of a fear of “fuelling a proxy war.”

It is bitterly ironic, that Russia has enjoyed the liberty to introduce over 600 ERA-protected main battle tanks into the Donbas in the last 10 months; while the Ukrainians have been denied access to the defensive Javelin or TOW II which are the only antidotes to a Russian tank threat protected by ERA. What’s worse, the Minsk II ceasefire requires the Ukrainians to remove their artillery out of range, 50 km behind their prepared defenses, which robs them of the only effective antitank weaponry they have left. In theory, the Minsk II artillery removal mandate applies to both sides and it has had a demonstrable effect in decreasing the intensity of the daily violence. However, that forced withdrawal has high destabilizing potential. It provides a strong incentive to an aggressor to quickly deploy its forces across the 50 km zone and attack the defender before their own artillery has had an opportunity to react and move within range— making the defense much more vulnerable to rapid overrun and deep penetration.

Compounding Ukraine’s anti-tank problem, the Russians have introduced into the Donbas much more modern tank designs. Originally separatists were equipped with tanks of the same generation and capability as the Ukrainians (T-64, early model of T-72 and T-80) which allowed the Russians to maintain a modicum of deniability in arming the proxies (claiming that these were captured Ukrainians MBTs). However, as early as April 2014, the newer model T-72B3, unique to only the Russia, was deployed along the Ukrainian border.³⁵

³⁵ “In late March 2014 a number of videos were published online reportedly showing the deployment by rail of Russian Main Battle Tanks (MBTs) to areas adjoining the border with Ukraine. These include an unknown number of T-72B3 MBTs.... The T-72B3 is the latest update of the venerable, Soviet-era T-72 MBT family, which forms the majority of the active Russian MBT fleet.... In comparison to earlier T-72B series variants, the T-72B3 incorporates a number of upgrades designed to improve offensive capability.

Starting with Russia's late Summer offensive, the pattern sending only old models similar to Ukrainian MBTs changed dramatically with their introduction of more modern tank designs. For example, the T-72B3s that crossed the border and joined the fight the first week of September, had better armor protection, were equipped with a new version of the 125 mm gun, and most significantly has vastly improved computerized fire-control system with advanced optics and modern night/all weather vision.³⁶

In early September, the Russians also introduced small numbers of the T-90 MBT, which also sports upgraded armor, a new gun and more sophisticated fire control with very effective night/all weather vision; but its most noteworthy attribute is a new active-armor defense system in addition to ERA. Using radar to detect an incoming missile, the active armor system fires a shotgun-like spray of pellets which disables the guidance in the head of the missile as it approaches the tank. The author has interviewed several Ukrainian anti-tank ATGM gunners, who have complained bitterly about the "magical shield" that sends their AT-5 guided missiles off in the sky or to the ground out of control just as the missile is about to hit the tank.

The Russians have been employing the T-90 sparingly, both in numbers introduced into the Donbas and frequency of commitment to combat. Moreover, generally the T-90 has been limited to an over-watch while the earlier model tanks are assigned to the lead line in the assault. But when the T-90 participates in battle, it has had a decisive effect. For example, even though not committed in more than company strength it has proven to be sufficient to tip the balance in critical battles at both Luhansk (Sep. 2014) and Donetsk (Jan. 2015) airports, in the southern breakthrough at Novoazovsk (Sep. 2014) and the disastrous encirclement of Debaltsevo during the recent Winter offensive (Feb. 2015).

³⁶ These are reported to include a new fire-control system, a ballistics computer to improve accuracy, and all-weather thermal sights. In addition, the MBT features a new arrangement of Explosive Reactive Armour (ERA) on the turret (a key recognition aid)." Joseph Dempsey, "Russia deploys latest Tank variant to Ukraine Border," IISS MILITARY BALANCE BLOG, (17 April 2014), at < <https://www.iiss.org/en/militarybalanceblog/blogsections/2014-3bea/april-7347/russia-deploys-latest-tank-fa72> > [accessed 11 May 2015].

The impact of disparity in modernization between Ukrainian and Russian MBT forces in the Donbas is empirically measureable. Against tanks of equal generation and capability,³⁷ the Ukrainian gunners have generally been able to achieve a favorable loss exchange ratios. This reverses, when the modern T-72M are introduced, with Ukrainians losing three tanks to every one killed. In five company-size engagements documented where T-90s have participated, the Ukrainians have taken double their normal losses and there is no evidence they have been able to kill a single T-90. For NATO's East European forces, most of whom retain, like the Ukrainians, an inventory of Soviet era armor and have few or no tandem warhead ATGMs, the task of taking on new Russian tanks will be no less challenging.

Declining Survivability of Light Infantry Vehicles

Having proclaimed the return of armor as a major and viable player on the future battlefield, we also need to add a severe caveat. Since the end of the Cold War, armies around the world have given increased emphasis to light Infantry Fighting Vehicles (IFV), which prioritizes mobility and fire-power over survivability. The evidence coming in from the Ukrainian conflict seriously questions the validity of that emphasis. The experience of the both sides in the Donbas highlights the vulnerability of these vehicles to the increased lethality of the artillery munitions as well as the proliferation of anti-tank weapons and medium-caliber (30mm) automatic cannons mounted on other light armored vehicles. But the big killer of IFVs is artillery sub-munitions and thermobaric warheads == when hit, these vehicle tend to suffer catastrophic damage, killing or severely burning everyone on board. \

Both sides of the conflict in Ukraine are essentially armed with the same IFVs: the eight-wheeled BTR and various models of tracked BMP (BMP-1, BMP-2, BMP-3). The later models of these vehicles have been up-gunned with a 30 mm cannon but their lethality remain disproportionate to the vehicles protection. This has several effects on the battlefield:

³⁷ T-64 versus other T-64, early model T-72 and T-80s.

- Troop losses are so high soldiers on both sides prefer riding on top of the vehicle as opposed to riding in it;
- Assaults tend to be conducted with dismounted rather than mounted infantry; and
- The vehicles mounting the automatic cannon tend to be used in an over-watch suppressive fire role rather than exposed forward.

The net effect is that tank attacks are less effective because they no longer have accompanying mechanized infantry with equal mobility and able to protect them from other infantry.

There have been make shift technological and tactical efforts to address this problem in the Russo-Ukrainian War. The addition of bar “gates” or “grates” around the vehicles to give stand-off protection from heat rounds has proved effective against the RPG-7 and RPG-26 hand-held unguided rockets, but not against the larger ATGM warheads and of course does not address either the 30mm cannon threat or impact of top-attack artillery rounds. Another expedient that both sides seem to have toyed with – is splitting the infantry squad across two BMPs. This reduces the squads single vehicle vulnerability as well as offers advantages in extended dispersal and the use of one of the vehicles for overwatch. On the other hand, it doubles the number of infantry vehicles which adds cost as well as maintenance and logistics issues. In any case, these experiments may have been more reflective of unit manning levels down to 50% of authorized strength rather than a survivability contribution.

Despite the omni-presence of reactive armor on all tanks in the Donbas, there author has only encountered one effort to use it for added protection on the lighter infantry vehicles. While Russian models may be too thin skinned to take advantage of it, heavier IFVs like the American M-2 Bradley might benefit from it. It would be worth an experiment.

The issue of disproportionate IFV vulnerability relative to the tank has been evident for over a decade as witnessed with Israel’s combat experience. And it is noteworthy that both Russia and Ukraine, in the last year, have begun following the Israeli example, with newly announced heavy IFV designs based on a tank chassis

and with equivalent protection of the main battle tank. Thus, the increased lethality of the modern battlefield is driving the demand for increased survivability of mechanized infantry — the implications of this are pregnant for NATO.

Over the last two decades American forces have made major efforts in developing and deploying wheeled light infantry vehicles, such as the USMC LAV, and the Army's Striker. Like their Russian and Ukrainian counterparts, both of these wheeled vehicles are relatively lightly armored, but mount powerful 25mm cannons. This emphasis is now widely shared in NATO and for the last decade aggressively promoted among the Baltic countries. The U.S. Army in 1980 actively considered, under congressional pressure, developing a heavy infantry fighting vehicle based on a M-1 tank chassis (reversing the engine and putting it in the front with a heavily protected infantry compartment in the rear, and mounting a turret with an automatic cannon and dual antitank missile launcher. A design which is virtually identical to the "new" Russian and Ukrainian heavy IFVs prototypes. However, driven by considerations of costs and strategic mobility, the American heavy IFV design remained on paper and the Bradley IFV was deployed *enmasse*.

Thus, the survivability of infantry on the modern battlefield poses serious challenge to those likely to face Russian mechanized forces and being on the receiving end of their artillery and MLRS firepower. Will the challenge be met with a reconsideration of the role of light armored vehicles and renewed effort at tank equipment protection for mounted infantry? Or, will the criteria of cost and strategic deployability remain dominant, and consequential infantry losses remain determinative?

Bottom-line on Technology & Tactics: There is no single technological "silver bullet" that emerges from the Russo-Ukrainian War that ushered in a new "revolution" in military art. In some areas this experience merely underscores the tried and true wisdom that professional military should already know by instinct – the Main Battle Tank is not dead, light infantry in light armor die in droves, top

attack is the way to go for anti-tank defense. But in this mélange there are also warning signs of a new level of battlefield transparency that, cross-fertilized with the fire intensity of area munitions and synergized with real-time targeting, augurs radical change in the wind, and it is an “ill wind that blows” on those who ignore its warning.

II OPERATIONS

The Russo-Ukrainian War has produced a series of “lessons” beyond those of weapons systems and battlefield tactics. At the operational level there are at least three major themes that need to be studied in terms of both understanding what happened as well as tracking the “learning” that is taking place on both sides:

- Mobilization and Deployment to execute and defend against a full Russian invasion of eastern Ukraine;
- The experience of both sides in major Central Battles – won and lost;
- Changing conventional force structures and organization for combat.

Each of these topics is deserving of its own paper describing the details as well as analyzing the implications but here there is only room for a brief summary and the focus will be limited to the first two topics; the third, driven primarily by recent Russian experience with Battalion Tactical Groups (BTG) needs more data.

Mobilization & Deployment

Both Ukraine and Russia entered the conflict with a set of preconceived notions of how their forces to be used and the kinds of threats they would face. As one would expect, given the difference in size and legacy there was a stark asymmetry in the two sides. Ukraine, like most of the other former Soviet Republics and members of the Warsaw pact, inherited a Cold War force structure it could not afford. But it was by far the largest of any former Soviet Republic or Warsaw Pact member. As elsewhere in the post-Soviet world, divisions were converted to brigades; unit manning was cut to cadre status with a concomitant impact on

readiness; maintenance was kept to a minimum; higher-level logistics infrastructure was cut to the bone; and modernization of the air and ground forces was a luxury beyond existing budgets. The remaining force was in essence a territorial army going through the motions of basic training and little else.

Again, as elsewhere in Europe, Ukraine perceived no sense of imminent threat and “temporary” economic belt tightening was perpetuated over two decades. Thus, when the Crimean crisis broke out, the Ukrainian military, despite its strength on paper, had no real military options to stop the aggression. With three-fourths of its army deployed West of the Dnepr as the conflict escalated into the Donbas, the Ukrainian military did the unexpected and conducted the largest military mobilization and redeployment of any army in Central and Eastern Europe since the end of the World War II.

At the same time, in the Spring of 2014, Russia mobilized and deployed its forces on the Ukrainian Eastern border. Whether this was intended, merely a form of intimidation, or the precursor for the intervention to change the government in Kiev, is not known. However, recently, the planning documents for a full-scale invasion have become publically available.

We now have what appears to be an authentic set of documents related to the 2014 Russian OP PLAN for the seizure of eastern Ukraine as far west as the Dnepr River.³⁸ Labeled “Top Secret,” the series includes the following items with the originating source identified as the Headquarters of the Western Military District, located in St. Petersburg:

- “Explanation Note for the Decision of Using Group of Forces ‘North’,”³⁹
- “Explanation Note for the Plan of Fire Destroying of the Enemy,”⁴⁰

³⁸ INFORESIST (14 June 2015) < <https://psb4ukr.org/> > [accessed 22 June 2015]. See: P.A. Karber, P.A. Petersen, Nicholas Myers, Rafal Atachowski, Natalya Anfilofyeva, Oksana Skidan, and Roman Mashovets, “Russian 2014 Invasion Plan: Major Objectives, Axes of Advance & Time Lines,” (working paper; Tysons Corner, VA: The Potomac Foundation, 22 June 2015) for a summary of the documents and analysis of the 2014 Russia offensive OP PLAN to seize eastern Ukraine up to the Dnepr.

³⁹ “Explanation Note for the Decision of Using Group of Forces ‘North’,” with unsigned signature blocs for Commander of the Western Military District. Colonel-General. A.Sidorov & Chief of Staff of the Western Military District, Lieutenant-General. V.Astapov; partial document: pp. 1-12, 19-41.

- “Decision for Using Group of Forces ‘North’ in the Special Operation;”⁴¹
- “List of Most Important Objects of Reconnaissance of Ukraine;”⁴²
- Fire Plan Matrix allocating Time Sequenced Assets against Targets;⁴³
- Target Allocation Plan for Artillery, Rockets and Missiles;⁴⁴
- Special Forces Assets and Requirements;⁴⁵
- Information Warfare plan.”⁴⁶

It should be noted that these documents are clearly in a draft stage, not signed, and incomplete – actions by the Southern Military District (Group of Forces “South”) and VDV special force inside the Donbas are alluded to but not detailed and mention of the role of the Air Force, Navy and Crimean assets are noticeable in their absence -- planning for those assets are not included in this series.

Nevertheless, these documents appear authentic, have details that would only be available to the Russian Army, and are directly relevant to an understanding of the past and future of the ongoing Russo-Ukrainian War. What is most interesting about this material is that it not only provides incredible detail on the forces of both sides as well as key terrain and operational level objectives BUT also gives a unique perspective into how the Russians methodically plan for such a large-scale offensive operation and, even more unique, provides a base for understanding how than can

⁴⁰ “Explanation Note for the Plan of Fire Destroying of the Enemy;” with unsigned signature blocs for Chief of Staff of the Western Military District, Lieutenant General, V. Astapov & Director of Operations of the Western Military District Headquarters. Maj.-Gen. I. Kovalenko; complete document: pp. 1-18.

⁴¹ “Decision for Using Group of Forces ‘North’ in the Special Operation;” with unsigned signature bloc for Commander of the Western Military District, Colonel-General, A. Sidorov; complete document: pp. 1-16.

⁴² “List of Important Objects of Reconnaissance in Ukraine;” and “List of Critical Objects of Reconnaissance in Ukraine;” with unsigned signature blocs for Chief of Staff, First Deputy Commander of the Western Military District, Lieutenant General, V. Astapov & District Intelligence Chief, Col. L. Toropov; complete document: pp. 1-15.

⁴³ “Report of Chief of Rocket & Artillery Directorate, with unsigned signature bloc for Chief of Missile Forces and Artillery of the Western District, Maj.-Gen. O. Kyvshynov; partial document: 4 pages with Unit, Weapon & Target Allocation Charts.

⁴⁴ “Distribution of Forces and Means of Missile and Artillery on Operational Tasks,” unsigned signature bloc for Chief of Missile Forces and Artillery of the Western District, Major General, O. Kyvshynov; incomplete document: 2 pages.

⁴⁵ “Calculation of Forces and Special-Purpose Resources,” chart, no author identified, incomplete document: 1 page.

⁴⁶ “Conduct of Information Action Forces and Means of Maneuvering,” no author identified, complete document: pp. 1-10.

be deterred by a defenders prudent military response.

The Russian documents provide an incredible amount of geographic detail: tactical, operational and strategic objectives; axes of advance; specific target lists with coordinates. The Op Plan calls for the establishment of five routes of ingress of military forces into Ukraine: two from Rostov Oblast into Donetsk Oblast and three from Belgorod into Kharkov Oblast west of the city. However, the documents do not include any maps by which to organize and integrate this data into a coherent picture of the overall plan. From D1, three cities are listed as the primary objectives of the operation. One is Kiev itself. The other two are staging grounds: Bogodukhov in the north and Donskoye in the Donbass. The following gives a brief synopsis of the time line for the first two weeks of an invasion as geographic positions are reference in the documents:

- D1 Invasion starts north and south of the Donbas with major forces crossing into Ukraine from Russia following massive fire strikes and corresponding with a uprising in the Donbas led by Spetsnaz troops.
- D2 Both Bogodukhov and Donskoye are captured, with forces taking Donskoye slated to begin their advance on Dnepropetrovsk and were to be across the Volchya River (which runs west of Donetsk city) by the end of the day.
- D3 The southern force was to advance to and cross the Samara River, which flows into the Dnepr River at Dnepropetrovsk. A no-fly zone will be in effect over both Dnepropetrovsk and Kharkiv Oblasts, enforced by integrated Air Defense network. Simultaneously Spetsnaz actions take place in the Donbas.
- D4 Actions directed toward advancing to the strategic crossing points of the Dnepr-Donbass Canal to consummate closing of the encirclement of all Ukrainian forces available for the defense of Kharkiv.
- D5-D6 Dedicated to establishing "Security Zone 1," which is extends along the Vorskla River (including the city of Poltava) down to the Dnepr and extending a region of direct control to Dnepropetrovsk and Bogodukhov. This completes the encirclement of Ukrainian forward forces in Kharkiv.
- D7 Kharkiv and Dnepropetrovsk Oblasts are "under control;" Chugusa Airfield is captured and used as staging field for further Russian aviation [attack & transport helio) missions inside Ukraine. Russian 2nd echelon begins moving into Bogodukhov even as the 1st echelon settles into occupation mode and VDV forces are instructed to take control of Ukrainian border crossing sites along the entirety of the remainder of the border.
- D9 2nd echelon commences active operations, operating principally along the axis Bogodukhov-Lubny-Kiev. Secondary axes are identified for the capture of Kotelva (crossing point for the Vorskla River) and Kremenchuk (which controls

the dam that forms the largest reservoir on the Dnepr).

D10 Spetsnaz are directed to capture all major crossing points of the Sula River with special emphasis on Romny and Goroshino while the major thrust of the 2nd echelon captures Lubny.

D10-D15 2nd echelon establishes "Security Zone 2," which follows a series of towns defining all the major crossing points for control of the Desna, Sula, and Udai Rivers. Russian forces are in the suburbs of Kiev on the east side of the Dnepr, with the capital within artillery range. Ukrainian forces east of the Dnepr are destroyed or surrounded. Russian troops control all of the Dnepr crossing points down to Zaparoche and hold a line directly south through Melitopol to the Sea of Azov.

Presumably actions, referenced but not detailed in this "northern Front" OP PLAN cover the option of Airborne seizure of Kiev and link up with "southern Front" forces advancing out of Crimea.

Unless proven to be in-authentic, this series of Russian OP PLAN documents, in conjunction with what we observed in both Russian and Ukrainian mobilization and force deployment to the border, deserves a day-by-day comparison as well as an extensive "lessons learned" evaluation. It needs to be addressed both on its own merit in understanding how Russian general staff planners plan for large-scale offensives but also to be extrapolated as a model in terms how such a similar plan might be applied to the Baltic area and other vulnerable East European members of NATO.

In March and April of 2014, the Russian Army was massed on the eastern Ukrainian border. Although weakened by two decades of force structure decline, lack of modernized technology, and abject neglect of readiness, the Ukrainian Army conducted the largest counter-mobilization of any European army since the end of World War Two and deployed its fifteen Brigades east of the Dnepr to confront the Russian threat illustrated in these documents. The Russian OP PLAN was designed to be executable as of 29 April 2014. However, within a week of that date, President Vladimir Putin blinked, and, for whatever reason, instead opted for a less overt hybrid-surrogate campaign in the Donbas. Thus, this set of documents, albeit incomplete and of uncertain provenance, provides here-to-fore unavailable background into Russian strategic calculations for a large-scale offensive and also

insight into how they can be influenced (deterred?) by a defenders prudent military response

In comparing the timeline of Ukraine's redeployment to the East with Russia's concentration on their border, it becomes apparent, that the option for a quick fait accompli was denied. One of the classic academic debates over deterrence is the difficulty in proving the success of an action that produces a non-event. This case potentially provides one of the clearest examples of deterrence working as a result of a defensive effort. That is a lesson that should not be lost on NATO.

"Central Battles" Won and Lost

One of the distinguishing characteristics of a major war, as opposed to low-intensity operations, is the phenomenon of major combat where each side concentrates forces and effort in achieving a decisive result. General Don Starry called this "Central Battle." And there have been a number of these in the Russo-Ukrainian War.

After several months of struggling with the Donbas insurgency, and experimenting with a cease-fire which ultimately failed, Ukraine's newly-elected President Poroshenko authorized "Plan B" -- a joint police-military counteroffensive against the growing separatist bastion in the Donbas. The plan was organized along three vectors: first, to reduce the size of the separatist sanctuary in areas where they had the least popular support; second, to seal the border between Russia and the separatist area to reduce the influx of weaponry; and third, to militarily divide the Donyetsk and the Luhansk People's Republics. Plan B produced initial success with two Central Battle operations.

Battle of Sloviansk:⁴⁷ In early July 2014, a combined operation between Ukrainian Special Forces and the 95th Air Assault Brigade recaptured the third most important city in the Donbas in a short and decisive battle. A team of sixty Ukrainian special forces troops were infiltrated into the center of the city. When the separatists

⁴⁷ This battle was personally witnessed by the author and is also based on interviews with the commanders of the Special Forces and 95th Brigade.

realized that a force had broken into their rear area and began reacting to it, the 95th Brigade outflanked their positions and threatened to cut their force off from the rest of the Donbas. This caused a panic in the separatist ranks. They abandoned prepared positions and fled in disarray, abandoning large stocks of supplies and retreating 50 km to the rear.

With the line of retreat limited to one clogged road, this provided a unique opportunity for the Ukrainian air force to intervene. Unfortunately, the sudden collapse of the separatists' defenses was not expected and the Ukrainians didn't have sufficient preparations to exploit this victory. Likewise, provision had not been made for an exploitation of an opening by other Ukrainian units and those that had taken Slovansk were preoccupied with taking over the city and restoring order and civil services. Thus, a successful attack, with minimal destruction to the city and few civilian casualties, was a model of tactical success but missed a unique opportunity for operational/strategic results.

Zubrowski's Raid:⁴⁸ In early August, Ukraine's 95th Air Assault Brigade conducted the largest and longest armored raid behind enemy lines in recorded military history. The 95th was widely viewed as Ukraine's best-trained and best-led brigade, but it had entered the conflict in Spring as a light brigade equipped only with wheeled APCs and mortars. By mid-summer it had been heavied-up with two battalions of infantry-fighting vehicles, a battalion of main battle-tanks and a battalion of self-propelled artillery.

Operating on several parallel axes of advance, combined-arms company-sized teams were able to penetrate thinly-defended separatists' positions, regroup in the rear, and in a daring maneuver operating with the power of full mechanized brigade, split the two People's Republics in half. The 95th Brigade then turned and cleaned out 200 km of the infiltration area along the southern border of the Donbas, overrunning and capturing Russian tanks and artillery, relieved several isolated Ukrainian garrisons (including the beleaguered 25th Airborne Brigade surrounded

⁴⁸ Based on interview with the Commander and troops of the 95th Air Assault Brigade (Armored) a week after they returned from their raid.

at the Luhansk Airport), and returned to their starting position near Slovianks. In all they had marched 450 km, most of it behind enemy lines and brought back a stash of captured Russian armor and heavy artillery as well.

The success of this raid, led by Colonel Mikhail Zubrowski, a graduate of U.S. Command & General Staff course at Leavenworth where he had studied a similar raid from the America civil war and used it as his model,⁴⁹ created a wedge between the two People's Republics as well as an opening along the Russian border that follow-on Ukrainian forces could exploit.

With the exception of these two battles, the rest of Ukraine's "Plan B" was plodding and anything decisive. Although they had committed a dozen brigades and 25 independent battalions to "Plan B," the overall operation was under the direction of the Ministry of Internal Affairs and treated as an antiterrorist operation rather than a major military campaign. In order to minimize civilian casualties artillery and armor were generally not employed in the small battles for dozens of town and villages. Most of the engagements were relatively small and conducted by dismounted infantry and volunteer units involved in house-to-house firefights, as opposed to employing combined-arms to achieve decisive results. The net effect was to prolonging the operation in excess of two months, when it should have been completed in half that time. This, in turn, gave the Russians and the chance to launch decisive battles of their own.

Fire Strike at Zelenopillya:⁵⁰ In the wake of Zubrowski 's armored raid, Ukraine deployed the elements of four brigades and a dozen light infantry battalions strung out between the separatists' positions in the Donbas and the Russian border in an attempt to close off the insurgent resupply lines. Starting in mid-July, Russia launched a series of intense fire strikes employing long-range artillery and multiple rocket launchers, successively engaging Ukrainian units over a six-week period in

⁴⁹ Jeb Stewart's cavalry raid around the rear of McClelland in the Peninsular campaign.

⁵⁰ Based on interviews with survivors and secondary accounts.

53 of attacks on 40 different positions. One of the most dramatic was at Zelenopillya, where a combination of artillery and MLRS, with the latter employing top-attack munitions and thermo-baric warheads, caught two Ukrainian mechanized battalions in the open. This intensely concentrated fire strike created high casualties and destroyed most of the armored vehicles in a shelling that lasted only a few minutes. Inhibited by Western warnings “not to be provocative” by firing counter-battery into the Russian territory and without having the means of real-time target acquisition, Ukrainian forces were at a severe disadvantage. This left their troops demoralized, decimated, and prepared the way for the subsequent Russian summer offensive.

Battle of Ilovaisk:⁵¹ In the last week of August, as Ukraine’s “Plan B” appeared to be nearing its fruition, the Russian army intervened in eastern Ukraine with a counteroffensive to relieve beleaguered Donetsk and open a new Western front in the direction of Mariupol. The initial wave of attacks was conducted by only a half dozen Russian Battalion Tactical Groups (BTG); but, catching the Ukrainians in the rear and by surprise, they rolled-up and overran successive mechanized and light battalions which were strung out in a thin perimeter defense along the border and had already been subjected to weeks of Russian cross-border artillery bombardment.

Within less than a week, the Russian forces had not only linked up with their proxies in the Donbas positions, but caught the elements of four brigades and four independent volunteer battalions in a large pocket south of Ilovaisk. In the ensuing panic, the 51st Mechanized Brigade was ordered to hold the door open for retreat, but with inexperienced commanders and recently drafted troops major elements fled the battlefield before even having contact with the invading Russians.⁵² With the defenders surrounded and a hastily assembled armored relief force failing to break through, combined with mounting casualties, the Ukrainian government

⁵¹ Based on interviews with the Senior Commander, and most unit commanders as well as many surviving veterans of the battle.

⁵² The leadership who fled were imprisoned for “cowardice” and the 51st Brigade as a unit was dissolved and its colors permanently stricken.

accepted a truce offered by Russia's President Putin that included the right of safe passage for the withdrawal of Ukrainian troops and their wounded. Tragically, Putin did not keep his word, and the Russians attacked the retreating Ukrainian column with massive fire strikes (including top-attack munitions and thermobaric warheads). Those Ukrainian troops that managed to escape this caldron had to exfiltrate on foot, leaving their heavy equipment and wounded behind. Contrary to the Russian promise not to turn over surrendering Ukrainian troops to the separatists, this commitment was not honored -- wounded were summarily shot and prisoners of war tortured.⁵³

The disaster at Ilovaisk and speed of the Russian offensive created a massive gap in the Ukrainian defense line south of Donetsk. The prime objectives after Ilovaisk were the towns of Volnovaka and Donskoye, which sit astride the main north-south highway between Donetsk and Mariupol, control the major railway junction in the area, and serve as the gateway for many secondary roads heading west. After initially seizing a broad swath of new territory between Donetsk and the Sea of Azov, the Russian mechanized combined-arms BTG approached Volnovaka and Donskoye, but facing only a hastily assembled Ukrainian task force, they ran out of steam due to limited supply and organic lift – and the opportunity to exploit the breakthrough to Crimea and the Dnepr was lost.

Battle of Mariupol:⁵⁴ The only major port in the Donbas is Mariupol, which is also the home of one of the largest steel mills in Ukraine. In the last week of August, several Russian BTG crossed the border along the Rostov-Mariupol main highway and directly attacked a defending Ukrainian armored battalion holding the town of Novoazovsk and the key to defending the Mius River line. Following large MLRS fire strikes employing canister top-attack submunitions and thermobaric warheads, the

⁵³ In one of the more barbaric acts of the war, the Separatists castrated a number of the Ukrainian POWs, presumably as part of a "demoralization campaign," and then later returned them as part of a prisoner exchange.

⁵⁴ The September defense of the outskirts of the city and presence of T-90 tanks at Novoazovsk were personally witnessed by the author and local commanders as well as members of the volunteer Azov battalion were interviewed. In March the Sector Commander was interviewed at length. In May return visits were made to the defending units, and in June, while observing the burning of Sheroke on patrol with Ukrainian Special Forces, the author was wounded in MLRS strike at Lebedyns'ky.

defenders were engaged in a large tank battle with Russian late model T-72B3 and a company of T-90 tanks – a fight which they decisively lost. And the battle moved to the outskirts of Mariupol with the Minsk I ceasefire temporarily halting operations.

Following the implementation of Minsk I, Russian forces made repeated attempts to capture the city by direct assault on the surrounding hamlets and villages to the east and north throughout the fall of 2014 and winter of 2015. And, as of this writing, fighting continues in Shiroke and in the vicinity of Lebedyns'ky. However, a dogged defense by Ukrainian volunteer infantry backed up by Army long-range artillery, prevented a Russian success. The tactical key to this stalemate lies in the lack of sufficient Russian infantry on this southern direction where unlike in the center and north they have minimal separatist or mercenary troops available to conduct direct assaults. Operationally, the key is not at Mariupol at all, but rather, as in the Russian OP PLAN the seizure of Volnovaka and Donskoye to the north and then isolating and enveloping it with a western drive across the steeps rather than engaging in urban house-to-house combat.

Battle of Luhansk Airport:⁵⁵ In the spring of 2014, when the separatists were seizing an expanding array of towns and villages of the Donbas, Ukraine decided to defend the two major airports in the region at Donyetsk and Luhansk by rapidly inserting the major elements of Airborne brigades at each. While these troops were well-trained and led, they were only armed with light weapons and no heavy artillery or armor. Because of that, they were forced into a positional defense around each airport, which in turn, left the surrounding countryside in the hands of the opponent and effectively left them besieged. At Luhansk, air resupply and reinforcement became increasingly difficult as the Russians introduced large quantities of modern air defense weapons into the area and cut off aerial reinforcement by shooting down a large transport full of troops.

Luhansk was resupplied during the Zubrowski raid, but when the 95th Brigade moved on the Airborne troops remained isolated and attempts to

⁵⁵ Based on secondary reports and detailed interview with the near-by 92nd Mechanized Brigade Commander.

breakthrough to them from the north were unsuccessful. In early September the Russians launched a large mechanized force with heavy artillery, including the a battery of the 2S4 Tyulpan 240mm heavy mortars which hit the Luhansk airport with such heavy bombardment and large explosives, the Ukrainian Defense Minister wondered aloud if a small nuclear weapon had been used. The Ukrainians tried to relieve the surrounding force with a tank attack led by the 1st Armored Brigade but it suffered a heavy defeat when their 40-year-old T-64 tanks were engaged by modern Russian T-72B3 and T-90 main battle tanks. In the resulting melee, the Ukrainian Airborne troops were able to successfully withdraw. The results of this prolonged siege and culminating armored battle was the loss of the Luhansk airport with substantial losses on the Ukrainian side.

As result of Russian summer offensive and the continued attacks throughout the duration of the Minsk I ceasefire, a number of Ukrainian key positions were exposed. On the 17th of January of 2014 the Russians launched a massive winter offensive aimed at exploiting Ukrainian vulnerability. In this offensive there were six major points of attack: a continuation of the battle for Mariupol; an attempt to break out to the West at Volnovaka; the seizure of the Donyetsk airport; encirclement of the Ukrainian bulge at the Debal'tseve; seizure of the bridgeheads along the Seversky river line; and breakout north of Luhansk. Of these, the Russians were successful at two of the six.

Battle of Donyetsk Airport:⁵⁶ Similar to events at Luhansk, the Ukrainians initially held the Donyetsk airport with light airborne forces in a positional defense of the facility. But unlike at Luhansk, they were able to retain, if tenuously, a line of resupply for the defenders and support them with in-range artillery.

After a successful defense of the airport for 240 days, it was finally lost. Following a massive artillery bombardment, including fires from a battery of 2S4

⁵⁶ Based on direct observation in January, including interviews with the troops going in for the last rotation (none of which survived). Returned in May during the ceasefire and personally observed heavy incoming artillery and machine gun fire at Pisky as well as interviews with adjacent Commanders.

Tyulpan 240mm heavy mortars (as at Luhansk), Russian tanks broke through -- the Ukrainians having no effective anti-tank weapons capable of penetrating reactive anti-weapon armor. Driving onto the tarmac with impunity, they fired point-blank into the terminal until the structure collapsed and buried the defenders.

The tragedy was compounded when the Ukrainian General Staff intervened at the as the airport was falling, over road the advice of the local Brigade command, and hastily attempted to orchestra a two-pronged counteroffensive flanking each side of the airport. Initially, the battalion to the north succeeded, but, due to mismanagement, the southern prong was impaled on its own minefield, losing virtually the entire armored battalion, and with its failure, the northern prong was also decimated. With the fall of the airport, a fallback defense line was held in the villages to the west of Donetsk, once again with infantry dug in and depending on their artillery to keep them from being overrun. Despite repeated attempts to push them out during the Minsk II ceasefire, so far they have held on.

Battle of Debal'tseve:⁵⁷ As result of the Russian summer offensive, one of Ukraine's key defensive positions was a choke point at the road-rail junction of Debal'tseve. As a defense position it was All through the fall, was deeply penetrated on both flanks creating an exposed bulge and natural incentive for an offensive encirclement.

Given the importance of the position, and having successfully held it for five months, the Ukrainians chose to reinforce it heavily, putting 8,000 troops in the pocket, rather than withdraw their exposed forces. By the third week of the winter offensive, surrounded on three sides and, under unrelenting attack, Debalt'seve was in danger of being cutoff. President Putin used this as leverage in the ongoing Minsk II ceasefire negotiations, which only reinforced Ukrainian obstinacy in holding it. For a week, after the new cease-fire was agreed to, Russia concentrated massive artillery strikes and armored assaults (including the use of T90 tanks) all orchestrated and commanded by Russian generals and staff.

The Ukrainians were able to use American-supplied counter-mortar radars to good effect, but they didn't have the range to offset Russian heavy artillery and

⁵⁷ Based on interviews with adjacent Brigade commanders and many survivors of the pocket.

massed MLRS fires. When the attacking forces finally broke into the town of Debal'tseve, the possibility of organized retreat was foreclosed, and Ukrainians were able to salvage the majority of their troops by exfiltrating through the wooded countryside on foot, albeit leaving behind a large inventory of heavy equipment and the 128th Mechanized Brigade virtually destroyed.⁵⁸ With extreme effort, Ukrainians were able to reconstitute the defense line 30 km back at the neck of the bulge and the Russian/proxy forces, having taken heavy casualties were unable to exploit the success.

Bottom-line on Operations: Ukraine's experience with a series of "Central Battles" in the Donbas represents a mixed score card: 2 Wins (in offensive battles against proxies); 1 Draw (in defensive battle against Russians); and 5 loses (in defensive battles against mixed opposing forces). But these "Central Battles" also produce a number of noteworthy operational level insights of potential relevance to the defense of Eastern Europe.

First, the increased availability of overhead surveillance, combined with massed area fires of artillery and MLRS has produced a new level of intensity in modern conventional combat. In theory, this should be to the advantage of the defense because it increases their awareness of offensive movement and concentration and the attacker is more exposed to lethal fires. However, when the defender is not able to conduct a maneuvering defense (due to a lack of heavy armor and long-range anti-tank guided missiles) light infantry in fixed positions become extremely vulnerable to the attacker's UAV target acquisition and massed fires. This lesson is important for NATO countries who have, for reasons of economy or strategic mobility, decided to rely on light infantry and precision artillery fires.

Second, when the defense is penetrated by armored forces threatening a deeper breakthrough, without equally strong and modern armored forces of their own, they do not have the means of active counterattack, become surrounded, and

⁵⁸ The commander received a "hero's" medal, the unit flag and survivors were sent back to their home base in Mukachenvo on the Western border to reform it from scratch.

take disproportionately high losses. In theory, the proliferation of modern anti-tank missiles should allow infantry to inflict heavy attrition at long-range on attacking armor. But when their ATGM inventory is old, unreliable and not outfitted with tandem warheads capable of penetrating reactive armor, theory is defeated by reality. There is a lesson here for those NATO countries that do not possess modern tandem warhead ATGMs.

Third, Airland battle has been noticeable by its absence in Ukraine. Initially, the defenders tried to use the Ukrainian Air Force for deep attack. However, their limited target acquisition and lack of air-to-surface guided munitions seriously limited their effectiveness. When the Russians introduced large quantities of air-to-air defenses, the Ukrainians were shot out of their own skies.

To date, the Russian side has not employed its Air Force, but if it did, the small number of Ukrainian airbases, their lack of integrated air defense early warning system, and the absence of shelters for their aircraft, will likely produce decisive results. There is a lesson here for NATO.

For air to be effective, its base infrastructure needs to be survivable through a combination of dispersion, hardening and bases defenses. It needs an integrated air defense system which combines long-range surveillance with effective surface-to-air missile defenses. To achieve significant results against ground targets it requires large-scale reinforcement with strike aircraft supported by escorting fighters and ECM aircraft, and a close integration with long-range ground-based artillery capable of suppressing enemy air defenses with area fires.

III STRATEGY

The opening line of Sun Tzu's classic work says: "Strategy is the great work of the organization." Yet, having argued at the beginning of this paper that it is important to differentiate tactical technology "lessons" from operational "lessons" from strategy "lessons", in the end, it is hard to say something meaningful about strategic "learning" at the high end.

Ukrainian Strategy

Like most countries in Eastern Europe, Ukraine did not have a serious military strategy since becoming independent from the Soviet Union. There was no perceived threat, there were no resources to modernize the military, so why waste time with strategy? After the Yanukovich regime collapsed and Russia invaded Crimea, massed its Army on the eastern border and began sponsoring the separatist movement in the Donbas, Ukraine suddenly found itself trying to make up for 20 years of neglect in two months. The surprise is not that they have made mistakes, or lost some “Central Battles” that they needed to win, but that they have survived at all.

When the author arrived in Kiev in March of 2014, the political odds of seasoned observers that the interim government would succeed in creating a democratic government were viewed as less than those of “Russian Roulette.” The chance of a direct Russian invasion was universally spotted at 50/50. Senior Western officials told me without hesitation that “the Ukrainian Army won’t fight for more than two days.”

Sixteen months later Ukraine has held a free and democratic election for President, a new representative Parliament has been seated, and the Constitution is being reformed. The Ukrainian Army has been fighting for over a year and despite problems — old weapons, lost battles, poor logistics, a missing Air Force and no help from the West — morale at the front is as good as its been. They know they may not win this war but they have one more fight in them and they are committed to taking as many Russian with them as they can. As one commander said to me on my last visit several weeks ago: “Having decided to align with the West, given the evil demonstrated by the opponent and our lack of resources, strategy is irrelevant, our only option is to fight. Its not the preferred option, its just the only one we have left.”

Thus strategic “lessons learned” with respect to Ukraine are now “in the lap of the gods;” the relevant strategic question is not for them but for us: Who in their

right mind would want to abandon 40,000,000 people who are Western, want to be part of the West, are willing to fight for their freedom, and can provide a 200,000 man Army as a forward glacis to protect NATO's struggling democracies?

Ukraine has found the will, its just running low on means;

The West has the means, its just running low on will.

Russian Strategy

No one except Putin really understands what he wants and what he is willing to risk to get it — in fact, if he is the ad hoc “player” many believe, even he may not be able to answer those strategic questions. So a strategy of offering him an “off ramp” is a hope not a plan. Likewise, while we often use the term “Deterrence” we seem to forget that it is a psychological construct not a material one. If we don't know what is in the mind of the opposing “strategist” we have little hope of hitting the right buttons that “deter” him.

However, we do know what Putin's game plan is — its called “New Generation Warfare” and its targeted on Western weaknesses not our strengths. And that is what needs to be countered with action, not rhetoric. In the classic words of Sun Tzu: “What is of supreme importance in war is to attack the enemy's STRATEGY.”

In retrospect, 1999 is likely to be viewed as a pivotal turning point in European security. That is the year when former *KGB* agent Vladimir Putin came to power believing “the collapse of the Soviet Union was the greatest geopolitical catastrophe of the century.” Since then he seems committed to reestablishing Russian hegemony in Eastern Europe and restoring Moscow's coercive leverage as far West as the Vistula. The Russian military have a concept they call “New Generation Warfare” and they seem to be using Ukraine to both test and perfect it.

Russian “New Generation Warfare” differs from Western views of “hybrid conflict” in that it combines both low-end “hidden” state involvement with high-end

direct, even braggadocio, superpower involvement. Contrary to Western politicians, the Russian leadership understands “military options” and plays them like a Stradivarius. Aspects of this Russian strategy were evident earlier in Chechnya and Georgia, but its implementation in Ukraine is where the veil has been lifted on this toxic brew. From the Arctic Circle to the Caucasus, front-line NATO members are expressing anxiety. Norway, Denmark, Estonia, Latvia, Lithuania, Poland and Romania all feel threatened. Neutrals and NATO “partners” like Sweden, Finland, Moldavia and Georgia look for help.

As practiced in Ukraine, Russian “New Generation Warfare” is manifested in five component elements — each represents a threat, but each also offers a “lesson” in how it can be countered.

Political Subversion: Insertion of agents; classic “agi-prop” information operations employing modern mass media to exploit ethnic-linguistic-class differences; corruption, compromise of local officials.

Lessons learned: Those NATO Members and Partners with multi-ethnic populations need make a determined effort to integrate them into mainstream society, honoring their traditions but also giving them a piece of the economic and political pie. If Russian media and particularly its television broadcasts are being used to undermine a country’s stability, its political elite need to have the courage to ban the broadcasts. Corruption, independent of which political party benefits, is a breeding ground for Russian influence operations — clean the swamp, you take care of the mosquitos.

Proxy Sanctuary: Seizing local governmental centers, police stations, airports and military depots; arming and training insurgents; creating checkpoints and destroying ingress transportation infrastructure; cyber attacks compromising victim communications; phony referendum with single party representation and establishment of a “People’s Republic” under Russian tutelage.

Lessons learned: Former communist countries need to insure that their security organs have been cleansed of Russian agents and fellow travelers. Local police can not handle “agent cells” or counter Spetnaz operations. A national level police organization — on the model of the French Gendarme or Italian Carabinieri — needs to be imbedded in local areas, armed and trained to counter proxy violence, but always mindful of treating locals with honesty and dignity.

Intervention: Deployment of the Russian forces to the border with sudden large scale exercises involving ground, naval, air and airborne troops; surreptitious introduction of heavy weapons to insurgents; creation of training and logistics camps adjacent to the border; commitment of so-called “volunteer” combined-arms Battalion Tactical Groups; integrating proxy troops into Russian equipped, supported and led higher level formations.

Lessons learned: Russia’s Army is not ten-feet tall; in fact its ground forces are only marginally large than Ukraine’s. Russia’s biggest weakness is its dependence on conscripts — they don’t want to be there, they are not motivated to fight, they don’t fight well, and they take disproportionate casualties that anger Russian mothers. USAERU’s General Hodges had it right several months ago when he said “the best deterrent to Russian aggression is body bags.” NATO needs to develop a real OP PLAN for defense of the Baltics and Eastern Europe that is based on reality, not rhetoric. This means providing friendly countries with our best weapons, not just the surplus junk we are trying to get rid of. They need to be integrated, supported by the best intelligence and situation awareness, they need to be trained and organized to fight together not individually — that is a role and mission only the US military can provide, and given the dominance of land forces in this arena, it is the U.S. Army that should take the lead.

Coercive Deterrence: Secret strategic force alerts and “snap checks;” forward deployment of tactical nuclear delivery systems; theater and intercontinental “in your face” maneuvers and aggressive air patrolling of neighboring areas to inhibit their involvement.

Lessons learned: The West no longer needs to depend on “nuclear first use” but the Russians seem to be considering it. In the first George Bush Administration, we committed to the joint unilateral downsizing of tactical and theater nuclear forces. We cut our inventory down to 300 (all air delivered), the Russians have retained over 5,000 and appear to be modernizing both warheads and delivery systems for air, artillery, SAM, missile defense and naval warfare. If Russian nuclear intimidation efforts continue in Europe, the U.S. Army needs to reconsider its options to return being “nuclear player” in Europe.

Negotiated Manipulation: The use and abuse of Western negotiated “ceasefires” to rearm their proxies; using violations to bleed the opponent’s Army white while inhibiting other states from helping under the fear of “escalation;” divide the Western alliance by playing economic incentives, selective and repetitive phone

negotiations infatuating a favorite “security partner.”

Lessons learned: Sanctions are a crude instrument however, coupled with the fall of oil prices they have hurt the Russian economy. Nevertheless, Putin seems determined to make Ukraine an example – possibly seizing a land bridge to Crimea, or even extend Moscow’s control of *Novorossiaya* all the way to Transnistria. The decision of the West not to provide replacements for Ukraine’s lost weaponry or even meet their request to purchase modest numbers of modern anti-tank guided missiles (like Javelin or TOW II) serves as a virtual military embargo. Ironically, the most successful Western sanction has been in preventing a friendly country from defending itself.

There is nothing wrong with negotiated constraint between major rivals. But we need to temper our innate idealism with a dose of reality. Ceasefires and Arms Control agreements are only as secure as they are enforced. Monitoring and inspection regimes are not enforcers but weathervanes. Enforcement requires being able to react before the storm hits.

The Minsk II ceasefire is being violated every day but there is no international *deus ex machina* that is going to descend from the heavens to keep an aggressor from exploiting it — the only enforcer is the Ukraine Army. Likewise the Russians say they want out of the INF and CFE Treaties and are acting like it. World public opinion or the United Nations Security Council may or may not opine on that prospect. But the only enforcer will be the American military committed to helping our Allies from being victimized.

American Strategy and the U.S. Army

For nearly a hundred years American forces have had a major responsibility defending democracy in Europe and helping secure peace for the continent. In two World Wars a million US servicemen were killed or wounded fulfilling that mission in the region.

Since the end of World War II, this effort has involved approximately 400 million man-years of troop deployment. An enormous national commitment one that is historically unique. But the return on investment was also high: it prevented the Cold War from turning hot, led to the end of an arms race and the withdrawal of the Red Army from Central and Eastern Europe, stopped the Balkans bloodletting and provided a secure environment for self-determination and economic development for twenty-two countries formerly behind the Iron Curtain.

Today storm clouds are once again darkening over the east, with a major power sponsoring attacks against a sovereign country as well as making threatening statements and military demonstrations against American Allies. Month-by-month since Russia's invasion and occupation of Crimea, Moscow has doubled down in their aggressive actions against Ukraine and escalated its hostile posturing vice NATO. What seemed unimaginable eighteen months ago is now a reality,\; not one the West sought and few saw coming but one with which EUCOM now has to cope.

Over the next few months, the Administration & Congress need to develop a new strategy for securing Eastern Europe that includes the following:

1. Establishing a new NATO defense concept that moves beyond rhetoric and serves as a solid foundation for a realistic defense of the Baltic States, Poland and the southern region of Eastern Europe.
2. Immediately providing Ukraine with the defensive weapons (Javelin & TOW II anti-tank guided missiles; long-range counter-artillery radar; and high-altitude UAV surveillance) necessary to ensure the continued viability of the Minsk II Ceasefire and initiate a series of bilateral and alliance studies on how Ukraine's defense potential can be integrated to support NATO Air, Land & Maritime security.
3. Re-envisioning the role of the U.S. Army in Europe, not merely as a US national reinforcement in time of crisis, but rather the in-place forward-deployed, high-tech spine around which East European muscle can be built-up and integrated into a synergistic defensive force where the total deterrent value is more than the sum of the parts.
4. And, In the event of continued hostile Russian nuclear posturing and coercive threats, fielding of low-yield nuclear artillery, and deployment of SS-26 Iskander missiles in Kaliningrad and Crimea – reassessment of NATO's own nuclear deterrents in term of expanded delivery options and halting the two-decade long freeze on U.S. warhead design.
5. Resurrecting the concept of a bipartisan *Long-Term Defense Plan (LTDP) for NATO*¹ focused on East European defense and security; incorporating many of its original concepts, but adjusting them for current conditions, such as:
 - Prepositioned equipment (in much smaller unit sets to reduce vulnerability);
 - Establishment of an active U.S. Corps Headquarters located in Poland—the new center of gravity for NATO's defense;
 - Negotiation of host-nation support packages and hardened shelters for rapid-reaction U.S. air assets deployable to the region;
 - Provision of standardized and secure command, control & intelligence between the U.S. and East European forces;

- Deployment of a Patriot air defense belt from the Baltic to the Black Sea integrated with AWACS surveillance and incorporating allied air assets;
- Advancing modernization, standardization and interoperability of East European armies by supplying surplus U.S. artillery systems, anti-tank weapons, long-range rocket launchers and A-10 ground support aircraft;
- Preparation of a NATO infrastructure and training fund to improve East European logistics, rapid reinforcement reception, and intra-Allied interoperability.

Although the LTDP worked as a bi-partisan initiative in the 1970s-1980s. It may not take 18 months for America to rediscover that it can't "lead from the rear," and that it is in its strategic interest to protect Eastern Europe with or without an EU consensus.

The strategic "lesson" for the U.S. Army can also be put as a question: Whether they are going to drift waiting to see which way the political winds blow, or whether they have "learned" from the example of leaders like Donn Starry, and, in a similar environment to the late 1970s, start laying the ground work for a new and robust American Army that has a mission worthy of its past, and is worth a national commitment of resources to make it relevant and viable for the future.

Selling "global rapid reaction" is a great slogan — the U.S. Marine Corps will love it. But we don't need another Marine Corps. Eastern Europe needs American presence on the ground and in the air. A CONUS based U.S. Army designed for "assurance and deterrence" but that arrives too late with too little is not a solution to their problem and not a structure the country will sacrifice for.

For a U.S. Army struggling under budgetary pressure, trying to find a voice and a vision — one last unsolicited observation, a "lesson learned" after nearly a half century in Washington — don't ignore those European Allies who need American help, and neither the next Administration nor the U.S. Congress will ignore the future needs of the U.S. Army.