Future battlefield… already present

Abstract:

Technical progress in sensors, guided weaponry, artificial intelligence and UAVs will have a major impact on future combat. In the same sense, the reduction in size of the Armies and the increasing difficulties to replace losses will imply also major changes in their way to operate. The aggregation of both phenomena brings to the fore the old Soviet concept of the "reconnaissance-strike complexes" (RUK), which foresaw a fundamental change in the way the Armies' would fight, due to the technologic advance in the aforementioned areas. As the technology is constantly advancing precisely in these fields, most probably, future combat will present many of the features described by the Soviet theorists for their RUK in the past 80s. The development of the recent fight in Libya and, especially, in Nagorno-Karabakh, seem to lead us to that outcome.

Keywords:

UAVs, reduced Armies, Nagorno-Karabakh, RUK, "reconnaissance-strike complex"

How to quote:

*NOTE: The ideas contained in the Framework Papers shall be responsibility of their authors, without necessarily reflecting the thinking of the IEEE or the Ministry of Defense.

Introduction

The expression "making predictions is very difficult, especially if they are about the future" is attributed to the Danish physicist and Nobel laureate Niels Bohr. However, it is possible, within certain limits, to venture changes when they are based on more or less solid trends. This does not mean that we will be free from mistakes: the "black swans" described by Nassim Nicholas Taleb can always derail the most elaborate of predictions, but it is also true that human beings need these predictions to guide their behaviour.

One of the permanent features of our time is continuous technological progress. This progress only accelerates[1]. Obviously, there are many technological advances with military application. These advances are translated into the emergence of new inventions, but also in falling prices in some key areas. This cost reduction is very significant in some technologies of obvious military use, specifically in everything related to sensors, satellite navigation, electric motors and batteries, communications, and microprocessors etc... As a result, many inventions dependent on these technologies have become mainstream: digital cameras (including those with night vision), navigation systems for cars, ships or aircrafts, small remotely controlled vehicles, (land, sea and air) and many others.

Another technology that is expected to be highly developed in the coming years is Artificial Intelligence (AI), at the very least in the field of "narrow" or "weak" AI (problem-solving restricted to a specific field)[2]. This advance in AI will be expedited by advances in other technologies, such as quantum computing, which in turn will improve their capabilities.

As can be easily deducted, the technological advances exposed are not "future", but "present". This fact can help us to reduce the risk Niels Bohr warned us about, in relation to the content of this article.

From a different perspective, another factor that is likely to have a decisive influence on the future shape of military operations is the decreasing size of the armies.

Indeed, one of the common predictions of all prospective studies on future conflicts is that the Armed Forces involved will become smaller by the day. Strictly speaking, this is not a future phenomenon but, as in the case of the technological advances mentioned, is very

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[1] LEÓN SERRANO, Gonzalo. *Repercusiones estratégicas del desarrollo tecnológico. Impacto de las tecnologías emergentes en el posicionamiento estratégico de los países.* Madrid, Instituto Español de Estudios Estratégicos, Cuadernos de Estrategia 207, p. 38.
[2] Ibid, p. 113.

present. Today, armies (especially Western armies) have a fraction of the personnel, equipment and budget they enjoyed during the Cold War years, and this trend seems to be more stressed due to the economic consequences of the current COVID crisis.

Western armies are forces composed of professional personnel and high-tech weaponry and equipment. The common feature of these characteristics is that they are resources that take a long time to obtain; it takes years to train competent military personnel and no less time to procure combat equipment, even if it is already designed. As a result, a professional army is very difficult to replace (impossible in the short term, actually). In our historical experience, we have an example of the consequences derived from the fielding of a similar type of armies: XVIII century "professional" armies.

On the other hand, our current small armies are not simply minor versions of the Cold War armies: they are forced to fight in a very different way than that of the huge forces that went into combat in the last World War, or even in the 1991 Gulf War.

The ageing of the population in developed countries and the continuing expansion of the "welfare state" make for ever expanding social expenditures. This is also a present trend. And military budgets —which, except in the event of imminent conflict, may be perceived as less of a priority—, is one of the most likely chapters to be cut in an environment of growing economic pressure on Western states.

Libya and Nagorno-Karabaj

Two recent conflicts have highlighted the impact (more present than future) of these technological advances in combat; those of Libya and Nagorno- Karabakh.

In the case of the conflict on Libyan soil, in December 2019, the forces of the self-proclaimed Field Marshal Khalifa Haftar were stopped in their advance towards Tripoli, capital of the rival "Government of National Accord" of President El-Sarraj, by air strikes from UAVs, mainly Turkish ones. Field Marshal Haftar is supported by Egypt, the United Arab Emirates, Saudi Arabia and Russia. This support resulted in the supply of weaponry to its so-called "Libyan National Army" (LNA), including old MiG-21 fighters, almost the only conventional aircraft used in the Libyan conflict, and Russian anti-aircraft systems, such as the Pantsir S-1.

In fact, the LNA was the first party to employ UAVs, with significant success in the areas of Derna and Benghazi. Since 2016 they have been using the Chinese *Wing Loong* model, equipped with *Blue Arrow 7* anti-tank missiles, reportedly piloted by UAE personnel. However, in 2019, the government of El-Sarraj received substantial Turkish support, resulting in the supply of numerous UAVs of the *Bayraktar* TB-2 models (capable of carrying different weapons) and *Anka* (a reconnaissance aircraft, equipped with an advanced synthetic-aperture radar). Despite the exchange of statements from both contenders, each denying their losses and attributing numerous kills to their own systems, the final result is that the LNA had to withdraw, largely due to the action of these UAVs[3], losing even the strategic Watiya air base, the only one near Tripoli. This loss made air support (essential for LNA offensive operations) extremely difficult, precluding it from continuing its offensive.

With respect to the recent Nagorno-Karabakh conflict (27 Sep to 10 Nov 2020), Azerbaijan has successfully employed UAVs of various types (the aforementioned *Bayraktar*, along with Israeli models *Harop/Harpy* —"suicide" drones of the "loitering" type—, *Heron, and Hermes*). In that conflict, fought over a small slice of a small region, and in just a few days, Armenia lost hundreds of tanks (their losses are estimated at 232 T-72 tanks, of which 130 were destroyed, 5 damaged, and 97 captured), in addition to 147 infantry combat vehicles and other pieces of equipment[4]. This number of tanks is more than half of the arsenal of these weapons in countries such as the United Kingdom or Spain, and their loss would mean a severe blow to the combat capabilities of these armies[5]. For example, Armenian artillery losses are estimated in 243 howitzers and 77 rocket launchers, a number far greater than that of the entire Field Artillery in our Army.

The widespread use of UAVs is a direct consequence of the huge drop in price of the technologies needed for their manufacture and operation, which allows for their production in middle-tech countries, and makes them accessible not only to Great

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[3] "Lethal Stalkers : How Turkish Drones Are Neutralizing Haftar's Pantsirs in Libya (BDA)", *T- Intelligence,* May, 22, 2020. Available at: https://t-intell.com/2020/05/22/lethal-stalkers-how-turkish-drones-are-neutralizing-haftars-pantsirs-in-libya-bda/ Accessed: 11 April 2021.

[4] MITZER, Stijn y JANOVSKY, Dan Jakub. "The fight for Nagorno-Karabakh : documenting losses on the sides of Armenia and Azerbaijan". ORYX, September 2020. Available at: https://www.oryxspioenkop.com/2020/09/the-fight-for-nagorno-karabakh.html Accessed: 11 April 2021.

[5] MARIN DELGADO, José Alberto. "Guerra de drones en el Cáucaso Sur: lecciones aprendidas de Nagorno Karabaj". Madrid, Instituto Español de Estudios Estratégicos, Documento de Opinión, 21/2021, February 22, 2021. Available at: http://www.ieee.es/Galerias/fichero/docs_opinion/2021/DIEEEO21_2021_JOSMAR_DronesCaucaso.pdf Accessed: 25 February 2021.

Powers, but also to States with much smaller capabilities or even to sub-state groups. These UAVs have a radar signature equivalent to that of a bird[6] and can fly at very low speeds, making them very difficult to detect for current anti-aircraft systems. Their low price also makes it inefficient in the long-term to shoot them down with extremely expensive anti-aircraft missiles (a missile costs several hundred thousand or millions of Euros, while some UAVs with military capability may cost only a few hundred). This conflict proved that UAVs of medium-to-low technological level may produce huge strategic advantages.

The use of UAVs in the two cases cited has demonstrated a very novel use of the technology: initially they were tasked to destroy the adversary's anti-aircraft defence system, provoking when necessary, the emission of their radars through the use of decoys. Once the enemy's anti-aircraft defence has been neutralized, they have been used as deep-fire vectors, locating (using ISTAR UAVs) the main enemy weapons systems, and destroying them with impunity. That is to say, the destruction of the enemy's anti-aircraft defences has been the initial (and inescapable) step that has triggered a hard-to-avoid result[7]. On the other hand, the difficult topography of the terrain, which initially for the Armenians was an advantage, has become a problem, as the dependence of their defensive positions on limited communication routes within the rear area (and with many easily identified required crossing points) has enabled the Azeri ISTAR UAVs to concentrate their operations, increasing their effectiveness. Thus, the Azeris have been able to isolate Armenian positions quite easily, regularly achieving local superiority in fires and in the number of troops involved in each single battle[8].

Another interesting aspect of the conflict is revealed by the spatial distribution of casualties between the two adversaries: Armenian casualties are equally spread throughout the battle space, while Azeris occur almost exclusively in the line of contact. The Azerbaijani Army were able to use fires in depth (thanks to its control of the air) shaping the battlefield in its favour, while the Armenians were constrained to defending

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[6] Ibid.
[7] FRIAS SANCHEZ, Carlos Javier. "La Artillería Antiaérea, ¿la base de la victoria?". Madrid, Secretaría General Técnica del MINISDEF, Memorial de Artillería, 176/1, 2019, pp. 48-58.
[8] GRASSER, GUSTAV. "Military lessons from Nagorno-Karabakh: reason for Europe to worry". Paris, *European Council of Foreign Relations*, November 2020. Available at: https://ecfr.eu/article/military-lessons-from-nagorno-karabakh-reason-for-europe-to-worry/ Accessed: 27 February 2021.

themselves where the Azeris have decided to fight[9]. The dominance of the air has thus given the Azeris a wide margin of initiative, denying it to the Armenians.

Despite the unique characteristics of these conflicts (for example, the air forces were hardly used), this form of combat is perfectly exportable to other scenarios. In reality, aircraft radars have the same or more problems, in detecting UAVs, as surface anti-aircraft radar systems do, and in addition, these UAVs do not require bulky infrastructure for their use (Libyans and Azeris have regularly used short stretches of paved roads as makeshift airfields, while the logistical needs of these small aircrafts are very limited).

In my opinion, these conflicts are the first practical step in the materialization on the battlefield of the Soviet concept of "RUK" (Russian for "reconnaissance and strike complex"), which we will describe later.

The effect in combat of reduced Armies

The ongoing reduction in size of the armies has many consequences. The first and most obvious is the effect on doctrine: since 1914, the armies of all the advanced countries are used to operating in a very specific way, derived from the existence of "fronts". These fronts were an unforeseen consequence of the "race to the sea" that characterized the first months of the German offensive in France in 1914, while the enormous increase in firepower forced the Armies to entrench themselves along a line of fortified positions. These fronts were lines of contact between opposing armies, which clearly delimited the ground under the control of each side. The fronts were materialized in more or less continuous lines of field fortifications. In principle, behind the fortifications that define the fronts, no enemy presence is expected, beyond small units of guerrillas or "partisans", etc. Under cover of the fronts, numerous essential elements for combat are deployed, but those elements are "soft targets" in case of an attack carried out by combat units: Artillery (Field and Anti-aircraft), Command Posts, logistic organizations, communications nodes, lines of communications... These elements grew not only in number but also in importance from 1914: attempts to "break" the enemy front (or to prevent its penetration) required an enormous amount of artillery fires, which implied a logistical organization

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[9] WATLING, Jack and KAUSHAL, Sidharth. "The Democratisation of Precision Strike in the Nagorno-Karabakh Conflict". Londres, RUSI, Commentary, October 2020. Available at: https://rusi.org/commentary/democratisation-precision-strike-nagorno-karabakh-conflict Accessed: 27 February 2021.

never seen before, without which, these fires would have been impossible; and the side without superiority in firepower was doomed to defeat. In the same way, the Command Posts grew in importance: The Armies were huge, much larger than in any previous period of history, which greatly complicated command and control, and logistics. In addition, the Command Posts had to be able to control impressive indirect fires requiring thousands of howitzers and millions of shells. The development of the aviation obliged a parallel requirement for anti-aircraft artillery. In return, the protection granted by the fronts allowed these elements to deploy with a very limited self-protection capacity, barely enough to confront those bands of guerrillas or "partisans" that could appear (though not always) in the territory controlled by their own forces.

Second World War presented a much more fluid battlefield, but the general structure remained: defined fronts and more or less secure rear zones, with massive armies.

Obviously, the first requirement to create a front is the availability of sufficient forces to cover the entire length of the line of contact with the enemy. In 1914, this was not a problem: as an example, at the time the French Army was organized into sixty infantry divisions, a dozen cavalry divisions and many other smaller units. At the same time, after the mobilization, the German Army was composed of 2.2 million soldiers. Today, the level of ambition of the biggest European countries is reduced to field one or two combat divisions.

Our current doctrine still contemplates the operation of our units as part of one of these fronts, and therefore, they will have their flanks protected by similar units. However, the number of units we can deploy today is far from the numbers used in 1914. Yet still, our current doctrine continues to prescribe deployments in which our units operate side-by-side with other similar formations, covering their flanks. The reality is that these additional units simply no longer exist. How do we do this? Well, in peacetime, we apply several "solutions":

- The first assumes that our allies are going to provide a certain number of units with which we are going to integrate, together being able to constitute a front. However, the reduction of the armies is not only a Spanish trend, but is also being applied by our allies, so those allied units that we count on for our exercises are not real either.

- A second one is to choose a favourable physical scenario to perform our exercises. For example, the border between Norway and Sweden, characterized by a

rugged mountain range that leaves very few gaps, allowing us to cover them with the scarce forces available.

- Another possibility is to "expand" the areas of action of the units, with the idea of covering a greater zone with the reduced available forces. This is an attractive but dangerous option: the doctrinal distances attributed to each type of unit are based on their internal organization, on the range of their weapons and their sensors and on their means of communications. Widening these distances implies decreasing the ability of the unit to concentrate its combat power and creating "gaps" through which the enemy could infiltrate. The more this area of action grows relative to the theoretical, the greater these problems will be.

The most logical solution would be to "rethink" our current doctrine, trying to return in a certain way to the solution existing before 1914. Until that date, the units deployed securing their own flanks and rear, without counting on other units taking on that role. However, this solution presents complex problems: all these "soft" elements that are supposed to deploy behind the front may be forced to "harden" (probably changing their organisation materials), while it will also be necessary to improve the "self-sustainment" of the units (to survive a possible cut of lines of communication that will no longer run through "safe" territory). In addition, Spain follows the NATO doctrine. Therefore, the adoption of such a significant doctrinal change is not simple, but requires consensus among all allies, and the support of the United States (who, having the largest Army of the Alliance, is the least affected by this problem: the U.S. Army is almost the only one capable of constituting a front by itself, albeit of small dimensions, while its means - current and future - allow it to considerably expand the area of action of their units).

In addition to the small size of the armies, another fundamental factor is the lack of reserves. Western armies, in addition to being small, can barely grow (again with the exception —partial— of the U.S. Army). The disappearance of conscription means that many countries do not have reserves with a minimum level of training (including Spain). Another additional and linked problem is the long timescale required to obtain new materials to equip these reserves or to replace losses. Indeed nowadays, the production of military equipment and armaments implies very long timelines (the supply of advanced weapons systems - tanks, helicopters, howitzers, missiles etc. requires months or years). As a result, in the event of a high-intensity conflict, armies will be losing capabilities progressively, because of personnel and material losses, with no immediate

replacements possible. In case of a protracted or very lethal conflict, the armies may completely lose their combat capability. As the conflict drags on, these losses will only increase, with little chance of being compensated. And what has not changed is that the loss of the fighting capacity of the Armed Forces implies defeat.

Like almost everything in history, this situation is not new. During the eighteenth-century armies were also "professional" (composed mostly of foreign mercenaries, in fact), states had few reserves, and the training of troops to fight with the doctrine of the time was complex. For example, the Prussians estimated that they needed two years of instruction to have a trained infantryman. As a result, in some respects the situation was like the current one: once the war started, the armies were progressively reduced. The strategists of the time made a choice which was the result of this situation: to avoid combat at all costs. Certainly, a major battle could be "decisive"... for better or for worse, and since the loss of the Army was very difficult to compensate, the risk of these battles was extremely high. The whole of the 18th century is a succession of limited sieges, marches, and counter-marches to threaten vital points, and battles that only happened when superiority was sufficient to ensure victory. And they were not always accepted, choosing the weakest adversary for a prudent retreat.

Centuries ago, Sun-Tzu already stated that "a general can spend his whole life making war, without being forced to fight a single battle". This same reluctance to wager everything in a decisive battle can be seen in the writings of Maurice of Saxony, of Frederick the Great of Prussia[10], or even in those of the Duke of Alba[11], who significantly, also commanded a professional army.

In practice, in the absence of effective intelligence, it was very difficult to detect the movements of enemy troops, which favoured rapid manoeuvres that allowed surprise. The objective of a good strategist of the time was to manoeuvre with his Army in the most discreet way possible until he was in that position of advantage, making use of all kinds of stratagems to hide his movements or confuse his enemy over them.

The size of the armies of the time also did not permit the occupation by force of a rival State (except for the smallest ones), so the objectives of wars were necessarily limited. Victories and defeats had moderate effects, so they responded to cost/benefit

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[10] WHITMAN, James Q. *The Verdict of Battle: The Law of Victory and the Making of Modern War*, Harvard, Harvard University Press, 2012, p. 63.
[11] Ibid, p. 86.

calculations, a situation far from the "passion" that later characterized the Napoleonic Wars. Therefore, if the Armies managed to cause enough damage to the enemy (depleting its economy, occupying a province etc..), agreement was usually reached.

This situation of small and hard to replace armies is not different in essence from the current one, so that predictably, if future conflicts occur between advanced states, this aversion to the decisive battle will reappear, and with it a situation of "limited war", characterized, as in the 18th century, by a moderate level of hostilities[12]. However, the possibilities of manoeuvring and seeking a position of advantage will be much more limited, given the enormous development of ISTAR means, which will make the hidden movement of military units of a certain size almost impossible. As a result, the way these "moderate hostilities" will be conducted may be different.

However, as then, our reduced armies are unable to occupy a state of a certain size (as the results of the invasions of Afghanistan in 2001 and Iraq in 2003 dramatically prove). This fact, coupled with the presence of nuclear weapons, removes the possibility of the "total war" proposed by Clausewitz, and takes us back to the situation of "limited wars" with equally limited objectives, based on rational cost/benefit calculations.

As a result, and as in the 18th century, Armies must find a way to cause enough damage to the enemy to force him to agree to negotiate an advantageous settlement. If the decisive battle is excluded as too risky, and the manoeuvre to reach an advantageous position is extremely difficult to achieve, the remaining possibilities of causing the enemy enough damage to force him to accept an agreement, are few:

A commercial blockade (usually executed by the Navy), or a "strategic" bombing campaign (to neutralize the enemy's command and control system, or to destroy industries and infrastructure critical to its economy) are the two most historically frequent options. However, both bring difficulties; blockades require the enemy to be highly dependent on maritime trade, present legal problems and, in any case, historically have not been particularly effective[13].

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[12] KAUSHAL, Siddarth. "Positional warfare: A paradigm for understanding Twenty-first-century conflict". London, *RUSI Journal*, June 2018. Available at: https://rusi.org/publication/rusi-journal/positional-warfare-paradigm-understanding-twenty-first-century-conflict . Accessed: 27 February 2021.

[13] SAND, Eric. "Desperate Measures: The Effects of Economic Isolation on Warring Powers". Austin, *Texas National Security Review*, Vol. 3, Iss. 2, primavera de 2020. Available at: https://tnsr.org/2020/04/desperate-measures-the-effects-of-economic-isolation-on-warring-powers/ . Accessed: 26 February 2021.

Air bombing campaigns bring problems that do not differ substantially from those of the Armies: Air Forces are equally scarce and irreplaceable, and the proliferation of advanced air defences make these operations as risky for the Air Forces as "decisive battles" for Armies. The effects of air bombing campaigns have only been decisive (and this is debatable[14]) in the case of the NATO operation on Serbia during the 1999 Kosovo crisis[15]. The results of an exclusively aerial action, even with success, can be seen in the case of Libya, when the Gaddafi regime was overthrown in 2011, a situation that led the country to the chaos that lasts until today.

Under these conditions, how are military operations to be conducted?

The "Reconnaissance-Strike Complexes" (RUK)

In the described situation it is interesting to recall the concept of RUK[16] (from the Russian рекогносцировочно-ударный комплекс), also called "RYK" or "ROK"[17] (when the concept is implemented in lower levels of military operations). This concept was born from the Soviet analysis of the Yom Kippur war of 1973, when the modern systems of guided weapons provided by the Soviets to the Egyptians (mainly anti-aircraft and counterattack missiles) were on the verge of defeating the Israelis, and the great technological advances of the American "second offset strategy" of the 1980s[18]. In principle, the Soviet theorists used the concept to describe what they thought NATO was developing[19], but soon they tried to implement these ideas, a project aborted by the demise of the Soviet Union.

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[14] GALLIS, Paul E. "Kosovo: Lessons Learned from the Operation *Allied Force*". Washington, CRS Report for Congress, November 1999. Available at: https://www.hsdl.org/?view&did=451448 Accessed: 26 February 2021.

[15] HARVEY, Frank P. "Getting NATO's Success in Kosovo Right: The Theory and Logic of Counter-Coercion". Conflict Management and Peace Science, April 2006. Available at: https://journals.sagepub.com/doi/10.1080/07388940600665842 Accessed: 26 February 2021.

[16] WATTS, Barry D. "The Evolution of Precision Strike". Washington, Center for Strategic and Budgetary Assessments, 2013. Available at: https://csbaonline.org/uploads/documents/Evolution-of-Precision-Strike-final-v15.pdf Accessed: 21 February 2021.

[17] GRAU, Lester W. and BARTLES Charles K. "The Russian Reconnaissance Fire Complex Comes of Age". Oxford, Changing Character of War Centre, May 2018. Available at: http://www.ccw.ox.ac.uk/blog/2018/5/30/the-russian-reconnaissance-fire-complex-comes-of-age Accessed: 26 February 2021.

[18] BRIMLEY Shawn. "Offset Strategies & Warfighting Regimes", website *War on the Rocks,* October 2014. Available at: https://warontherocks.com/2014/10/offset-strategies-warfighting-regimes/ Accessed: 26 February 2021.

[19] VEGO, Milan. "Recce-Strike Complex in Soviet theory and Practice", Fort Leavenworth, Soviet Army Studies Office, 1990, p. ii.

The translation of RUK as "reconnaissance-strike complex" comes from the fact that it is based in the use of intelligence ("reconnaissance", at the time), to provide targets for long-range, precision weapons ("strike") in an automatized way ("complex" or "system"). The concept is born on the consideration that the advances in sensors meant that, for the first time in history, the battlefield could become "transparent"; everything present on the battlefield could be detected and located, quickly, and with sufficient precision[20]. In the same sense, the advances in guided weaponry meant that every detected target, could be quickly engaged and destroyed. Consequently, the combination of advanced sensors and precision fires would dominate the battlefield, minimizing the role of manoeuvre.

The reconnaissance-strike complex is a joint concept, in the sense that it integrates all sensors and fires, irrespective of their Service of origin, in a single, centralized system (in fact, the Soviet Navy was the first service in fielding one of these complexes, using submarines —armed with cruise missiles and torpedoes—, guided-missiles escort ships, bombers and land-based missiles)[21]. In their turn, the "ROK" is the same concept, but in a smaller scale, applied only in a purely tactical land environment[22]. In fact, the organization of the present Russian Mechanized Brigades[23] —rich in fires, air defence and EW— are very well adapted to this kind of combat, and they are introducing new weapon systems[24] improving their capability to survive in a combat environment dominated by these complexes.

For Soviet theorists, this trend was inevitable, since these "complexes" were nothing more than a consequence of the unstoppable technological advancement, specifically in the fields of precision sensors and vectors for weapons, capabilities provided (among others) by modern UAVs. Thus, future combat would be played by rival reconnaissance-strike complexes, so that the most perfected of them would end up beating the opponent.

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[20] See *Bundeswehr* program aimed at producing a digital, "transparent battlefield" ("gläsernen gesichtsfeldes"). FRANTZMAN, Seth J. "Germany hires Rafael and Atos to create a 'glass battlefield'". C4ISRNET, March 2019. Available at: https://www.c4isrnet.com/battlefield-tech/it-networks/2019/12/13/germany-hires-rafael-atos-to-create-a-glass-battlefield/ Accessed: 27 February 2021.

[21] VEGO, Milan, op. cit. p. ii.

[22] GRAU, Lester W. and BARTLES Charles K., op. cit.

[23] MANRIQUE MONTOJO, Fernando. "Las Brigadas Mecanizadas Rusas". Madrid, revista *Ejército*, nº 947, pp. 24-31. Available at: https://publicaciones.defensa.gob.es/ejercito-de-tierra-espanol-947-revistas-papel.html Accessed: 16 January 2021.

[24] "Russian army uses BM-21-1 Grad MLRS with RP-377VM1 jammer in Belarus", *Defense News*, 19 March 2021. Available at: https://www.armyrecognition.com/defense_news_march_2021_global_security_army_industry/russian_army_uses_bm-21-1_grad_mlrs_with_rp-377vm1_jammer_in_belarus.html Accessed: 29 March 2021.

As a result of this concept of combat, the reconnaissance-strike complex incorporates elements dedicated to degrading the effectiveness of its enemy's equivalent capability, and to protect its own vectors (EW directed against enemy sensors and CIS, including anti-satellite weapons, anti-aircraft defence to protect their own elements and facilities, and to prevent the operation of enemy airborne sensors and weapons). New equipment with ever-increasing ranges is in constant development (sensors, ground and naval fire vectors, and anti-aircraft weapons)[25].

In fact, combat against one of these complexes is a problem of fires, in which the range (of sensors and weapons) is the key element, together with the reaction time of the system (the time from which a target is detected until it is hit).

The original concept of the reconnaissance-strike complex had no special emphasis on mobility; technology would allow practically global reach without any need to redeploy the fire vectors and their sensors, other than to provide them with the capability to survive enemy strikes.

The current relevance of the described concept lies in the fact that the now popular "A2/AD"[26] are nothing else than the Western denomination for the practical materialization of the RUK concept.

In practice, the technological promises on which the reconnaissance-strike complex concept is based have only been partially fulfilled; while in the naval and air domains, technology allows the battlefield to be quasi-transparent, this has not happened on the ground, where despite technological advances, there are still problems in detecting, identifying, and locating all the elements present on the battlefield. Consequently, the deployed RUKs (the "A2/AD" in Western terminology) have focused on the air and naval environments (South China Sea, Hormuz Strait, etc.).

In principle, they are conceived as a "bubble" within which the Armed Forces deploying the A2/AD can operate freely with its air, naval and ground assets, while making it very difficult (ideally preventing) the entry and permanence of hostile elements within it. This

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[25] As an example, a top priority for the U.S. Army is a program called "Long Range Precision Fires", including the *Strategic Long-Range Cannon* (SLRC), a weapon whose predicted range will reach 1000 miles, designed to fight enemy A2/AD. JUDSON, Jen, "Strategic Long-Range Cannon effort on hold ahead of report", *Defense News*, 9 March 2021. Available at: https://www.defensenews.com/land/2021/03/09/strategic-long-range-cannon-effort-in-holding-pattern-ahead-of-tech-feasibility-report/ Accessed: 11 March 2021.

[26] A2/AD: Anti-Access/Area Denial.

"bubble" can also be used as a safe haven from which to project air, naval or ground attacks against the enemy, taking refuge in it after executing them ("hit and run").

The effectiveness of these reconnaissance-strike complexes is based on four main factors: the range and precision of weapons (which must be superior to that of enemy's), their ability to neutralize enemy fires (degrading the adversary ISTAR capability, deploying effective anti-aircraft defence, moving continuously) and the speed of its "decision cycle" (which, in fact, will translate into the time between the detection of a target and the attack on it, "sensor-to-shooter-time"). This time will be shorter and shorter, thanks to advances in AI, another area in which progress seems guaranteed.

In addition, U.S. "third offset strategy" puts even more emphasis on technological development in these same areas (robotics, autonomous systems, miniaturization, artificial intelligence, big data, etc...)[27], which will further boost the capabilities of sensors, fire vectors, and system-wide means of operation. In fact, one of the programs receiving higher attention in the U.S. Army is "Project Convergence", dedicated to shorten the duration of the "sense, make sense, and decide" cycle, the first step in the "sensor-to-shooter" process, thanks to the new developments in big data, cloud computing and artificial intelligence. In 2020, the experiments in the framework of "Project Convergence" allowed to hit targets in around one minute, instead of the previous dozens of them, even in a strictly designed and controlled scenario.

The growing attention that NATO devotes to the concept of "targeting" is another symptom of the renewed validity of the describe concept: in reality, the process of "targeting" is nothing more than the logical way to operate one of these "complexes".

The conflicts in Libya and Nagorno-Karabakh are a modest (perhaps unintentional) attempt to set up an embryonic RUK. However, the basic premises on which the concept is based are even more valid now than in the distant 80s: technology grants today, more than ever, that everything present on the battlefield can be detected and located quickly, precisely enough to be swiftly destroyed with "smart" (and increasingly economical) weaponry. And, as has been said, the future seems likely to ensure that the technologies needed to apply this concept will only increase in their development.

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[27] ADÁN GARCÍA, Ángel José. "¿Una tercera estrategia de compensación? Mejor una «gran estrategia»". Documento de Opinión IEEE 32/2021, March 2021. Available at: http://www.ieee.es/Galerias/fichero/docs_opinion/2021/DIEEEO32_2021_ANGADA_Estrategia.pdf Accessed: 13 March 2021.

In addition, the proliferation of anti-satellite (lethal or non-lethal) weapons and electronic warfare equipment (currently the most effective weapon against UAVs), increases the defensive and offensive capabilities of these RUKs. For all these reasons, the concept of RUK may also be more present than future, as the case of the Nagorno-Karabakh conflict seems to underline.

Some consequences

As we have already mentioned, in the future that seems to be on the horizon, some authors foresee a return to the "limited war" of the eighteenth century, with some important nuances[28]. On the one hand, conflicts will be short-lived, as international pressure, coupled with the limitations stemming from the reduced size of armies, will be powerful forces driving the end of ongoing conflicts (however, the conflicts in Syria, Iraq or Afghanistan seem to discredit this opinion). In this vision, armed conflicts will be focused on the rapid capture of some relevant slice of land, preferably by surprise, taking advantage of a careless adversary (any mistake could create a "window of opportunity"), to retain it (in the case of land of great economic or moral value) or of using it as a "bargaining chip" in future negotiations (probably imposed by the international community). If this vision becomes reality, "deterrence by denial"[29] (through the physical deployment of military forces in disputed areas) would take on added value.

In a different interpretation, we could be back in the situation of the Cold War, when the hostilities would be conducted "by delegation", using "proxies" or covert actions (cyber-attacks, always, but also special operations, information operations…), while the regular armies would have a role much more focused in deterrence and "control of escalation" than a real intention to be engaged in combat. In fact, this is a trend already present. Thus, armies would have the function of keeping, by their very existence and capabilities, any possible conflict below the level of open war. This function of deterrence does not imply that military capabilities can be neglected, since deterrence lies, inter alia, in warfighting capabilities and in the perception that the potential adversary has of them[30].

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[28] KAUSHAL, Siddarth, op. cit.

[29] FRÍAS SÁNCHEZ, Carlos Javier. "La disuasión convencional". Madrid, *Revista del Instituto Español de Estudios Estratégicos*, nº 8, November 2018. Available at: https://revista.ieee.es/article/view/221 Accessed: 13 March 2021.

[30] Ibid.

Nevertheless, the results of the Nagorno-Karabakh conflict seem to confirm the hypothesis that the normalisation of guided weaponry in armies favours the offensive[31], and thus provides an incentive for the attack. Combining the two previous proposals, the situation seems to favour rapid offensive actions, but limited in objective, seeking a favourable subsequent negotiation process.

In any case, if a conventional confrontation breaks out, the battlefield described in which two rival RUKs fight each other is not completely new. It is an evolution of the static fronts of the First World War. On those fronts, action happened only at night, because, during the day any movement immediately attracted enemy artillery fire. In the same way, snipers would appear, taking as a target any combatant who neglected their concealment, making it very difficult to conduct any activity that could be detected.

The resulting battlefield, even in the absence of major battles, was extraordinarily lethal and demanding for soldiers. In this war, the elements needed to mount a RUK are deployed for the first time, albeit in an embryonic form: sensors, long-range fires, communication systems that link them, and prioritization and coordination procedures that allow the fires to be directed[32]. It is not by chance that "targeting" was born in that conflict, and with procedures that are noticeably like those of today.

In fact, the recent fighting in Nagorno-Karabakh is a rudimentary application of the RUK concept using novel means, in this case, UAV, but the basic idea is the same one. Sensors and long-range precision fires, that begin their action with the suppression of the anti-aircraft defences, and end by the destruction of the reserves, command posts and enemy combat units[33]. Technological advances in the fields of advanced sensors (day and night), long-range fire vectors (including armed UAVs), and automatic systems (Artificial Intelligence), that shorten the time between the detection of a target and the engagement of it, and the huge drop in price of many of these elements, bring closer the application of the RUK concept, and not necessarily exclusively by the Great Powers.

The way to conduct the cited "limited" hostilities to which the size of modern Armies leads us, will most likely be based in the forming of our own RUK (or "A2/AD"), with which the enemy will be harassed with long-range fires, using armed UAVs as vectors, missiles of

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[31] BRIMLEY Shawn, op. cit.
[32] BAILEY, Jonathan. "The First World War and the Birth of the Modern Style of Warfare". London, *Strategic and Combat Studies Institute*, Occasional paper nº 22, 1996, p. 4.
[33] MARIN DELGADO, José Alberto, op. cit.

various types, and long-range artillery. All these activities will be conducted from the security provided by a powerful anti-aircraft defence (and anti-ship, if applicable), and combat units charged with neutralizing (and, where appropriate, destroying) enemy combat forces. To be able to do this, these combat units must be able to move faster than the enemy RUK is able to locate and hit them. This scenario will imply a very mobile and demanding form of combat for soldiers at all levels: very quick decisions will be required (which inevitably will lead to the adoption at all levels of the "mission command" approach), to deal a very high operational tempo that will call for substantial physical endurance. Special Operations Forces will also play a crucial role in locating and/or destroying key elements of the opposing system.

In any case, high intensity combat will consist mainly of an exchange of "fires" (including in that term many offensive actions that today escape the combat function of that name) on a large scale. This will be done with our own vectors (armed UAVs, missiles, rockets, howitzers, attack rotary and fixed-wing assets), and by incursions of combat units, and the actions of Special Operations Forces, cyber-attacks, electronic warfare, information operations… These will all be protected by robust air defence and combat units dedicated to providing security for these vectors and making rapid incursions when and where an enemy weakness is detected. If these incursions lead to the seizure of new pieces of ground, the coverage of our system will be extended to include the newly occupied area, and the battle will resume using similar procedures with the new configuration of the battlefield. In the aforementioned war of Yom Kippur, the Egyptian forces were able to fight the Israeli in favourable conditions inside the area protected by their own air defences and deep fires. However, when the Egyptian forces moved into the Sinai, they did not redeploy forward their air defences and fires, and they were easily destroyed by the Israeli. In turn, the Israeli used combat units to enter Egypt in order to destroy key elements of the Egyptian system (long-range missiles systems, mainly), before being able to defeat the main Egyptian forces.

All the elements of our own system must be very mobile; especially those of high value: command posts, communication nodes, long-range anti-aircraft weapon systems etc… because as it stands, no anti-aircraft defence in the world can prevent the impact of atmospheric ballistic missiles with terminal guidance (as evidenced by the destruction of

the bridge over the Akari River by the Azeris in the Nagorno-Karabakh conflict[34], using an Israeli ballistic missile LORA, with a probable circular error of 10 m.[35]), implying that survival must be based on mobility, concealment (including the concealment of the "electronic signature"[36]), and protection, when and where possible.

When some of our troops and elements operate outside the area covered by our own air defences (combat units operating offensively, Special Operations Forces), the mobility and concealment requirements will be even more demanding.

This type of combat is a very attractive option for the political level, because, by controlling the "target lists", it will always be able to maintain political control of the fight (which does not always yield good results, as Robert McNamara's handling of the air campaign over North Vietnam showed[37]). However, the likely cost will be to unduly slow down the operational tempo of the system (by increasing the time between the detection and the engagement of targets), an aspect that can nullify the efficiency of the whole system, especially at the tactical level. In any case, for operational and strategic level objectives, political level involvement will always be necessary.

On another level, the use of these complexes, in principle, allows for a limited number of casualties in our own forces; no major battles are foreseen, although a sustained and moderate rate of casualties will be suffered. The figures of the comparative low numbers between Armenians and Azeris (very favourable to the latter) seem to support this thesis[38].

It is also an attractive option for the industry. This type of combat is essentially industrial and therefore requires major investments in the sectors responsible for producing these types of weapons, ammunitions, and sensors. These are also very expensive. While UAVs and their associated technologies have fallen in price, but this type of combat also requires modern and powerful anti-aircraft defences (very expensive), advanced

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34 WATLING, Jack and KAUSHAL, Sidharth, op. cit.
35 "LORA Precision Strike Tactical Missile", Army Technology. Available at: https://www.army-technology.com/projects/lora-precision-strike-tactical-missile/ . Accessed: 26 March 2021.
36 Some new weapon systems use the electromagnetic emissions of military equipment for guidance: LACDAM, Joseph. "Army begins testing advanced seeker for Precision Strike Missile". Army News Service, 8 de junio de 2020. Available at https://www.army.mil/article/236251/army_begins_testing_advanced_seeker_for_precision_strike_missile Accessed. 26 March 2021.
37 RHYNEDANCE IV, Georges H. "McNamara vs. the JCS Vietnam's Operation ROLLING THUNDER: A Failure in Civil-Military Relations". Quantico, USAWC Strategy Research Project, 2000.
38 MITZER, Stijn y JANOVSKY, Dan Jakub, op. cit.

electronic warfare equipment (also very expensive), long-range fires, armed UAVs, missiles of various types, anti-satellite capabilities etc... all very expensive.

This future is perhaps closer than we imagine. The rise of "targeting" in NATO's military environments is a symptom, the fighting in Nagorno-Karabakh or Libya are others, but they are not the only ones: technological advances are concentrating precisely in the fields that enable the implementation of the RUK concept: sensors, precision weapons, and elements that streamline the link between the two and their decision cycle (such as Artificial Intelligence). Perhaps more than the future, we are talking about the present.

*Carlos Javier Frías Sánchez**
Colonel, Spanish Army, Artillery
Doctor in International Peace and Security