

SEVEN SECONDS TO DIE

A Military Analysis of the Second Nagorno-Karabakh War
and the Future of Warfighting

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Philadelphia & Oxford

INTRODUCTION

Why the Second Nagorno-Karabakh War is Important

*"War is a matter of speed—speed in decision, action, and coordination—and speed wins war. Speed is the most powerful weapon of war. **Speeding up the Kill Chain is the essence of modern war.**"*

COLONEL JOHN ANTAL, US ARMY, RETIRED,
IN AN ADDRESS TO THE US ARMY FIRES COMMAND CENTER OF EXCELLENCE,
AT FORT SILL, OKLAHOMA, SEPTEMBER 2, 2021

Foresight is a human quality in great demand today. Foresight is the ability to fix problems in the short term and develop solutions for the long run. We need leaders with foresight in our rapidly changing world. We particularly need leaders who can execute foresight in military affairs. Warfare consists of both principles and methods. Today, we desperately require leaders with the foresight to understand the unchanging principles of war and the ever-changing methods of war. "If you learn only methods," Ralph Waldo Emerson once famously said, "you'll be tied to your methods. But if you learn principles, you can devise your own methods." Methods are many and always change. Principles are few and remain constant. This is the difference between a chef and a cook. The cook wants the recipe and knows only the methods. The chef understands the principles and masters the methods to create something new and amazing. In short, the chef has mastered the recipe to make a meal for one person or can create a culinary delight for a huge multicourse banquet. Expert chefs develop foresight.

War is a timeless paradox. While its principles remain unchanged, its goals, ways and means are constantly evolving, requiring practitioners to study the changing methods to improve, upgrade, and prepare for the next conflict, or risk ignominious defeat. The principles of war outlined by Sun Tzu, the ancient Chinese author of the *Art of War* written around the 5th century BC, are as relevant today in the information age as when war was waged with

muscle power, spears and swords. The principles of strategy, operational art, and tactics of the Peloponnesian War, for example, fought between Athens and Sparta (431–405 BC), can also provide insights for current conflicts despite a myriad of conditions, not the least of which is technology, forcing means and methods to constantly change and adapt.

The changing methods of war

Today, the means of warfare, often referred to as the methods of war, are changing fast. Exponential technological growth in computing power and the microminiaturization of components is accelerating this trend. Keeping up with the changing methods of war requires focus and study.

War is the use of violence to achieve some purpose through a correlation of goals, ways, and means. According to Carl von Clausewitz, "... war is not merely an act of policy but a true political instrument, a continuation of political intercourse, carried on with other means ... The political object is the goal, war is the means of reaching it, and means can never be considered in isolation from their purpose."¹ Today, the means of warfare, often referred to as the methods of war, are changing fast. Exponential technological growth in computing power and the microminiaturization of components is accelerating this trend. Keeping up with the changing methods of war requires focus and study. To understand how these exponential developments impact the changing methods of war requires study in breadth and depth. Recent conflicts can provide vital insights and are, therefore, important to examine. The Second Nagorno-Karabakh War that occurred in the second half of 2020 is such a conflict and a pivotal event worthy of investigation. This war requires in-depth study by military professionals and those involved in national defense. We ignore this war, and the lessons we can derive from it, at our peril.

From late September 2020, in the mountainous region of the Caucasus called Nagorno-Karabakh, a war was fought between Azerbaijan and Armenia that provided a glimpse of conflicts to come. This was not only a war between medium powers with fully developed military forces, it was also a decisive military conflict. It resulted in a complete military victory for Azerbaijan. Decisive wars are rare. In 44 days, Azerbaijan conducted a multidimensional military campaign that ended in an indisputable military victory against a

near equally matched foe holding defensive positions in mountainous terrain. Conducted amid the worldwide Covid-19 pandemic, and during the run-up to a major presidential election in the United States which held the focus of much of the world, few people in the west paid attention to this far-off conflict. This is unfortunate, for the war waged in Nagorno-Karabakh was a watershed.

The Second Nagorno-Karabakh War was the first war in history won primarily by robotic systems. It is a dramatic harbinger of the dawn of unmanned, intelligent machine warfare.

The Second Nagorno-Karabakh War in 2020 ✱

The first war in history won primarily by robotic systems.

The title of this book, *Seven Seconds to Die*, was derived from a comment made by an anonymous Armenian soldier who said that, when they heard the enemy's Israeli-made Harop loitering munitions flying overhead, they had seven seconds to run or die. Seven seconds is a remarkably short time for a semi-autonomous weapon system to identify the target, verify a match with its targeting parameters, and strike. Speed is the essential element of war as speed wins time. Time is equal to all sides. The combatant that wins time, wins the battle. In a war where unmanned systems can find and then strike in seven seconds, and the opponent can do nothing but run or die, the side with this capability gains a tremendous physical and morale advantage. Throughout the battlespace, Armenian tanks, air defense systems, artillery, command posts, and soldiers were hit and destroyed by top-attack munitions, many of them autonomous. For the Armenians, whose air defense was either destroyed or ineffective, there was no way to stop the attackers. It did not matter if their positions were camouflaged or not. It did not matter if they were moving or stationary, or whether it was day or night. When they rushed inside their bunkers for protection, the loitering munitions would follow them into the entrance and explode. There was no rest and no safe places. The Armenians had nowhere to hide and nowhere to run. They could not mask from the enemy's machines; they were slaughtered at machine speeds.

Asking tough questions is the key to gaining insight. Answering those questions is the key to developing foresight. *Seven Seconds to Die* identifies key combat trends from a careful study of the Second Nagorno-Karabakh War and then uses those changing methods to generate questions relevant

to the development of military technology and war. These questions also provide the elements for the creation of case studies to test future concepts in thought experiments, wargames, and simulations against a full spectrum of military threats. It seems self-evident that if we ignore the lessons of the Second Nagorno-Karabakh War, and assume through hubris or cultural bias that this conflict is not worthy of our study, we will pay for our ignorance in blood and treasure. Learning from other conflicts is the most effectual means of gaining insights at low cost and without risk. It is the key to choosing either technological stagnation or breakthrough, blindness or foresight.

Learning from other conflicts

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Seven Seconds to Die is a book that uses open-source information about the Second Nagorno-Karabakh War to discover lessons that have applicability to future military operations. This book uses the conflict as a jumping-off point to peer into the future of warfare. Every war has its unique elements and any system that generates an advantage in one conflict can be countered in the next. Not studying how this was won, however, almost guarantees those unheeded lessons will have to be relearned in blood in the next conflict. Learning these lessons and preparing in time to deter or win the next conflict is what is at stake.

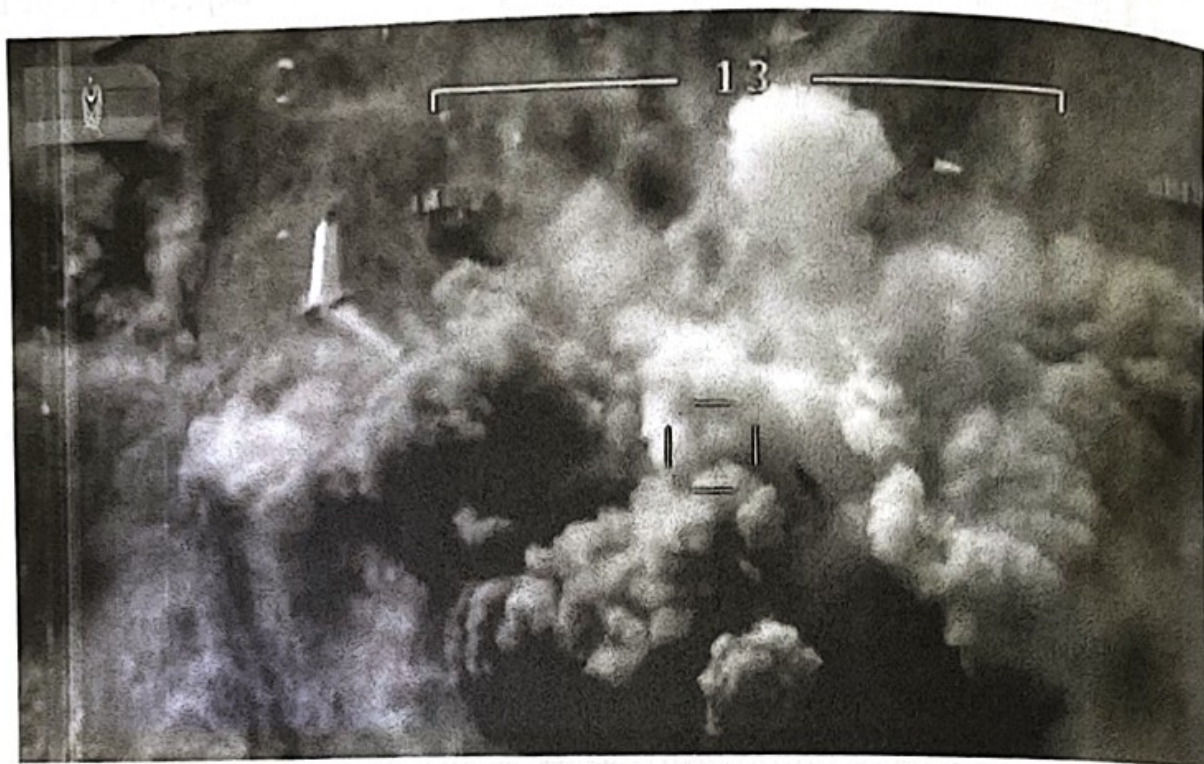
War is changing and the Second Nagorno-Karabakh War offers vital insights into the nature of multi-domain combat. The object of war, as explained by Sun Tzu, Thucydides, and Clausewitz, is the submission of the enemy as quickly and efficiently as possible and is intended to advance political objectives. Azerbaijan achieved its political objectives by waging a decisive military campaign using new methods of war and timeless principles. The methods of warfare used in the Second Nagorno-Karabakh War should not be overestimated or underestimated. The war did not usher in an era that ended combined arms operations, nor did it announce the death of the tank. It does, however, provide a glimpse into unmanned systems combat as no other conflict

ever has. The lessons from this war are, therefore, instructive and prescient. Military professionals, government leaders, and informed citizens should be aware of these lessons, contemplate their significance, and take appropriate action. We need leaders with foresight. The intent of this book is to assist you in that journey.

John Antal
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This image is a frame from a real-time video feed from an Azerbaijani loitering munition that is recording strikes on Armenian D-20 Howitzers. The drone in this strike is an Israeli-made Orbiter 1K unmanned aerial system. A second loitering munition, at the top left of the image, flies past the explosion to strike another howitzer. Orbiter 1Ks attacked and destroyed all six guns of the artillery battery in less than five minutes. The Orbiter 1K independently scans the battle area and automatically detects and destroys stationary or moving targets. If the loitering munition does not observe a target, it will search the battlespace until it does. Once a target fits its predesignated parameters, it dives into the target and explodes. If it does not observe a target, the Orbiter 1K will fly to a predesignated area before it runs out of fuel. Arriving at the landing area, it then falls to the ground by parachute and airbag to allow for reuse. The CP Aeronautics Orbiter 1K is a catapult-launched loitering munition that carries a 3-kilogram (6.6lb) warhead, has a range of 100 kilometers (60 miles), and an endurance of 2.5 hours. (Image capture from Azerbaijani Ministry of Defense video).

CHAPTER I

Preparation for War

"It is better to be wise after the event than not wise at all, and wisdom after one event may lead to wisdom before another."

SIR JOHN C. SLESSOR, *AIR POWER AND ARMIES*

There is a Russian saying that applies to the Caucasus: "Two bears don't live in one lair." An American version of this might be: "This town ain't big enough for the both of us." This was the crux of the problem between Christian Armenia and Muslim Azerbaijan in 1988 as the Soviet Union dissolved. Armenians and Azerbaijanis both coveted the same lair, Nagorno-Karabakh. They called most of the same places by different, culturally possessive names, and they were willing to kill to own it.

Nagorno-Karabakh is a land-locked, kidney bean-shaped mountainous region situated between Armenia and Azerbaijan in the southern Caucasus. In Persian, "kara" means "dark" or "black" and "bak/bagh" refers to garden; so, "black garden". In Russian, Нагорный Карабах (Nagorno-Karabakh) translates as "Mountainous Karabakh." The area was named the "Republic of Artsakh" by Armenians after the first war, as Artsakh was the original name of the ancient Armenian Kingdom's 10th province. The Nagorno-Karabakh mountains dominate the Aras Valley to the south and southeast and overlook the lower ground to the east that runs to Baku, the capital of Azerbaijan. Most of this mountainous terrain is 950 meters (3,120 feet) above sea level. Considered by many as the heart of the south Caucasus, the region is roughly 4,400 square kilometers (1,700 square miles) in area, about the size of the US state of Delaware, or twice the size of the US Army's National Training Center at Fort Irwin, California. There are grass-covered steppes in the lowlands and thick forests of oak, beech, birch, and hornbeam in the higher elevations. Nearly 36 percent of Nagorno-Karabakh is covered in forest. The area is also dotted with ancient and holy religious sites, most dating back to the

Middle Ages. Some of these, like the fortress in Shusha, still offer formidable protection from small arms and mortar fire. The weather is moderate until winter, from mid-November until April, when it turns cold with heavy fog and frequent snowfalls. From a military point of view, the high ground in Nagorno-Karabakh favors the defense. For an attacker, the best time to seize the critical terrain and mountain passes is before winter sets in and makes movement in the higher elevations difficult.

The distance from Stepanakert (the capital of Armenian-controlled Nagorno-Karabakh) to Baku (the capital of Azerbaijan) is roughly 274 kilometers (170 miles). The distance from Stepanakert to Yerevan (the capital of Armenia) is about 195 kilometers (121 miles). Roads are key to traversing mountain regions and military movement through the Nagorno-Karabakh mountains can be blocked by controlling key passes and chokepoints. "The immediate objective of a mountainous defense is to deny the enemy access to key terrain that helps him conduct further operations. Therefore, it is necessary to defend in terrain that restricts and contains the enemy, as well as control the high ground that dominates this terrain."² Narrow, winding roads up steep mountains provide the defender with many opportunities to ambush an attacker. The road network in the mountainous Nagorno-Karabakh area is largely undeveloped and movement through the mountains is slow, difficult, and dangerous to an attacking army. Other than foot-trails through the mountains, the only major, modern road in Nagorno-Karabakh is the M-12 Highway that runs from Goris, traversing the narrow Lachin corridor to connect Lachin, Shusha, and Stepanakert. Control of the highway is key to controlling Nagorno-Karabakh.

The US Army defines "key terrain" as "any locality, or area, the seizure or retention of which affords a marked advantage to either combatant." The US Army further defines "decisive terrain" as key terrain whose seizure and retention are mandatory to accomplish the mission. Decisive terrain is relatively rare and it may not be present in every military situation. There can be several areas of key terrain, but there should only be one piece of decisive terrain in a battle area. "In the mountains, more so than in the lowlands, the strength of the defense depends on its selection and use of key and decisive terrain. Key and decisive terrain provides the defender—and usually denies the attacker—excellent observation and fighting positions."³ The key terrain in Nagorno-Karabakh, therefore, consists primarily of five areas: The Horadiz passage, the town of Hadrut, the Lachin corridor, the city of Shusha, and the capital city of Stepanakert.

The Horadiz passage is a narrow passage 10–12 kilometers (6–7 miles) wide along the Aras/Araks/Araxes River. This passage leads to the Geyan steppe and, to the north, roads that lead to the M-12 Highway that connects Lachin–Shusha–Stepanakert. To move along the Nagorno-Karabakh/Iranian border and avoid a direct assault up steep mountains, you must control, and move through, the Horadiz passage and then the Aras Valley. For the Azerbaijanis, controlling the Aras Valley was vital as it is the only way to approach the M-12 Highway, Shusha and Stepanakert without a direct east-to-west mountain assault. Once into the Aras Valley, any attacking force has room to disperse and maneuver. If the Armenians interdicted the Horadiz passage, with artillery or air forces, they could inflict heavy casualties on any Azerbaijani forces moving through.

Hadrut is a village and a regional center, with an Armenian population of less than 4,000 inhabitants (in 2020), that controls the road to the center of Nagorno-Karabakh and the cities of Shusha and Stepanakert. The largest city in Nagorno-Karabakh is Stepanakert and has an Armenian population of approximately 75,000.

The Lachin corridor connecting Nagorno-Karabakh with Armenia is also key terrain, the two-lane M-12 being the only major road. The corridor is easy to defend as there are many places to establish roadblocks and ambushes. Attacking up the corridor can be a challenge for a mechanized-armored force. If you control the Lachin corridor with enough anti-tank guided missile units supported by artillery, you can establish a robust defense. If you control the corridor, then you control everything that comes by road into and out of Nagorno-Karabakh.

Shusha, and ten nearby villages, is in the center of Nagorno-Karabakh and is the decisive military terrain. The city overlooks the city of Stepanakert, sitting on a plateau that forms a natural fortress with steep cliffs. Shusha sits on this high ground, south of Stepanakert, only 15 kilometers (9 miles) away by road. More importantly, the straight-line distance from Shusha to Stepanakert, and therefore the distance for artillery and missiles to range, is only four kilometers (2.5 miles). He who holds Shusha gains a tremendous, war-winning advantage.

Stepanakert, the city with the largest population of any urban area in Nagorno-Karabakh, is key terrain as threatening, or seizing, it would provide a marked military and political advantage to Azerbaijan. It is unknown if Azerbaijan's general staff ever seriously considered fighting for Stepanakert, but if they seized Shusha, there would be little need to do so.



Map 3: Key Terrain in Nagorno-Karabakh. The key terrain is shown on this map (compare with Map 1), in order from east to west to north: 1. Horadiz passage into the Aras Valley; 2. Hadrut; 3. Lachin corridor; 4. Shusha (decisive terrain); and 5. Stepanakert. (Source: adapted from Wiki commons)

The First Nagorno-Karabakh War 1988–1994

The First Nagorno-Karabakh War was fought between hastily organized Armenian and Azerbaijani forces using Soviet-era equipment and tactics. Armenia, the victor, suffered nearly 30,000 civilian and military casualties. Azerbaijan, the loser, lost up to 80,000 civilians and military personnel killed or wounded. Hundreds of thousands of civilians were displaced on both sides as Armenians occupied their territorial gains after this hard-fought conflict.

Since the end of World War I, Armenians and Azerbaijanis have been at each other's throats. The *casus belli* for the First Nagorno-Karabakh War, fought from February 20, 1988, to May 12, 1994, was the combination of decades of hatred between the Armenians and Azerbaijanis over a decision made by Soviet dictator Joseph Stalin in 1921 to designate the region as a part of the Soviet Socialist Republic of Azerbaijan rather than the Soviet Socialist Republic of Armenia. Both consider Nagorno-Karabakh culturally and religiously significant and worth fighting for. Since most of the population of Nagorno-Karabakh was ethnic Armenian in Stalin's time, this decision laid the seeds for future conflict. When the Soviet Union collapsed in 1991, the future of the region "became central to national movements in Armenia and Azerbaijan. As the two republics gained independence in 1991, the conflict became a fully-fledged war."⁴ Turkey was the first country to recognize Azerbaijan's independence after the fall of the Soviet Union and the first to offer support.

The First Nagorno-Karabakh War was a prolonged conflict fought between hastily organized Armenian and Azerbaijani forces using Soviet-era equipment and tactics.

The deep-rooted causes of the war remain an issue of conflict between Baku and Yerevan. Azerbaijan argues that the war was initiated by a land-hungry Armenia eager to seize its territory. Armenia maintains that the war started between Nagorno-Karabakh and Azerbaijan, and that Armenia became engaged only to protect Nagorno-Karabakh's overwhelmingly Armenian population and their right to self-determination. Both sides consider the disputed territory vital to national survival, and a symbol of national aspirations and of the hostility of the other.⁵

The military leaders of both Armenia and Azerbaijan had trained in Soviet military schools, but, during the First Nagorno-Karabakh War, the Armenians were better organized and better led. Finally, after six years of conflict, Armenia

defeated Azerbaijan, took possession of Nagorno-Karabakh, and occupied several surrounding regions that belonged to Azerbaijan. The local Azerbaijani population fled or was displaced. Although a ceasefire was negotiated, a peace treaty was never signed. The situation between the two countries became a "frozen conflict" with no resolution. The dislocation of hundreds of thousands of inhabitants only fueled the fire for future conflict.

Casualties on both sides were heavy for these two small countries. Armenia, the victor, suffered nearly 30,000 civilian and military casualties. Azerbaijan, the loser, lost up to 80,000 civilians and military personnel killed or wounded. Hundreds of thousands of civilians were displaced on both sides as Armenians occupied their territorial gains after this hard-fought conflict. "The displaced included about 500,000 Azerbaijanis from areas surrounding Nagorno-Karabakh and the region itself, about 185,000 Azerbaijanis from Armenia, and more than 350,000 Armenians from Azerbaijan."⁶ The Armenian population of Nagorno-Karabakh aspired for independence and created the independent Republic of Artsakh, but it was not recognized by anyone, not even Armenia who did not want to sour relations with Russia. Stepanakert became the capital of the republic.

The post-war development of Azerbaijan and Armenia placed both countries on a collision course. The Republic of Artsakh was independent, and declared to be a democracy, but it was totally dependent upon economic, military, cultural, and political support from Armenia. The Azerbaijanis swore revenge and used their wealth generated by the oil fields of Baku to build up their military.

Armenia is a poor country, dependent on both Russian economic and military assistance and the remittances of the Armenian diaspora. The economic embargo that Turkey and Azerbaijan have imposed on Armenia since the ceasefire in Nagorno-Karabakh further limits the country's opportunities for economic development and trade. By contrast, Azerbaijan possesses rich reserves of gas and oil, whose prices have risen significantly over the last decade, enabling Baku to sharply increase its military spending since 2005–2006. Since 2011, Azerbaijan's defense outlay, at three billion US dollars annually, is as large as the entire Armenian state budget. Between 2010 and 2015, Azerbaijan increased its defense spending from 2.8 to 4.6 per cent of GDP.⁷

The Azerbaijanis used this wealth to create a professional, modern military force. Discarding some of their Soviet-era oriented military doctrine and training, they retrained their officers, non-commissioned officers and soldiers in a hybrid-western methodology, borrowing much from Turkey's military. Turkey is a North Atlantic Treaty Organization (NATO) member, has a very professional military force and is a regional power with regional ambitions.⁸

With Turkey's help, Azerbaijan developed a professional officer corps. Azerbaijani officers were educated in Turkish and Pakistani military schools and developed new tactical methods.

From 2010–2020, Azerbaijan spent US\$24–42 billion to prepare its armed forces. The investments were targeted to create asymmetric advantages for Azerbaijan—command and control systems, unmanned precision strike forces, long-range artillery, layered air defense systems (many purchased from Israel and Turkey), and cyber and information war capabilities. In the Russian tradition, the Azerbaijanis stressed long-range artillery fires and tanks, but they also adopted new precision weaponry such as the Israeli-made Harop loitering munition (LM) and the Turkish-made TB2 unmanned combat aerial vehicle. They emphasized the training and leadership of their special forces, expecting these units to bear the brunt of close combat with the Armenians. These advantages gave Azerbaijan a qualitative and technical advantage over the Armenians. Most importantly, the Azerbaijanis relied on Turkey to help them plan and prepare for the pre-emptive war they were waiting to unleash. The Turks were very happy to oblige.⁹

After the First Nagorno-Karabakh War, the Armenians basked in the glories of their past victories and prepared for a repeat of the first war. They spent a valuable portion of their defense budget, and money from donations they received from the large Armenian diaspora, to improve fixed defensive positions, trench lines and bunkers along the Line of Contact with Azerbaijan. These defensive works became known as the Bagramyan and Ohanyan lines. Elaborate trench lines, sited on high ground overlooking the valleys where Azerbaijani attackers would have to ascend, gave the Armenians a solid sense of security. These defenses were particularly strong along the few roads that led through the mountains. The Armenians, and the forces assigned to the Republic of Artsakh, expected any future war would be protracted where they held the high ground in prepared positions, holding the Bagramyan line against the invaders. They also expected the tempo of any future fighting to be like the first war. If the Azerbaijanis attacked, Armenian defenses were strong and there would be plenty of time to mobilize reserves to bolster their unassailable lines.

After Armenia's victory in 1994, Azerbaijan and Turkey demanded Armenia withdraw from Nagorno-Karabakh and seven surrounding districts. Armenia refused and the independent Republic of Artsakh was established. The alliance between Turkey and Azerbaijan became a crucial part of the evolving situation concerning Nagorno-Karabakh. There are significant historical, cultural, linguistic, and economic ties between Turkey and

Azerbaijan, particularly in the military sphere. The militaries of Azerbaijan and Turkey first started working together in 1992 and this bond was strengthened after Azerbaijan's defeat in the First Nagorno-Karabakh War. Turkey helped rebuild, retrain, reorganize and professionalize the Azerbaijani military, gaining from this arrangement through trade and profiting from the importation of oil and natural gas from Azerbaijan's growing energy sector. The pace of Turkish-Azerbaijani military cooperation and training accelerated from 2010–2020. They consider each other as strategic partners and use the slogan "two countries, one nation."

In April 2016, both sides clashed for four days along the Line of Contact (LoC), losing about 500 soldiers each. Azerbaijani special forces attacked across the LoC and captured two villages. Moscow arranged a ceasefire on April 5, but Azerbaijan had demonstrated its forces could fight a modern combat operation. Of note was that the four-day war in 2016 saw the first use by Azerbaijani forces of the Israeli Harop loitering munition.

For the first time since the 1994-95 ceasefire, Nagorno-Karabakh had to accept the loss of a minor amount of territory to Azerbaijan, despite successfully fending off the Azeri attack. This diminutive territorial gain was celebrated throughout Azerbaijan as a first victory. Armenia, by contrast, experienced a series of disappointments in Russia and the Russia-led Collective Security Treaty Organization (CSTO). Moscow was unwilling to explicitly name the original aggressor, and Russia and the other CSTO states provided Armenia with very little public support, whereas Azerbaijan was fully backed in public by Turkey's President Recep Tayyip Erdoğan.¹⁰

There were claims from both sides of atrocities committed by the other, including the execution of prisoners and civilians, and the use of banned weapons such as cluster bombs and white phosphorus munitions, but no movement towards a peace settlement was forthcoming.

By 2020, the growing cooperation between the military forces of Azerbaijan and Turkey had transformed the former's military into a more modern and disciplined fighting force. The upgrade was made at the expense of Russia and of those in Azerbaijan who associated with, or were trained by, the Russian military. Russian media reported in 2020 that most of the Russian-trained officers of Azerbaijan's Army were "purged" and that Turkish generals were closely advising Azerbaijan's military.

According to vz.ru [a Russian military news outlet], the Azerbaijani army is being purged of the officers and generals who started their careers in the Soviet Union and studied in Soviet military schools. Instead, those officers who have completed an internship or a training program in Turkey are placed in key military positions. In addition, Turkish advisers are placed above them.¹¹

Armenia, on the other hand, received almost all its training and equipment from Russia. As a member of the Russian-inspired Collective Security Treaty Organization (CSTO), a Russian version of NATO in the Caucasus, Armenia purchased Russian equipment at a discount and its military trained in Russian schools. Russia, however, was playing both sides and traded with Azerbaijan, primarily in military equipment and energy. Although Armenia was totally dependent on Russia for its economy and military, its new government, led by Nikol Pashinyan, hoped to gain more independence from direct Russian control. In early 2020, the President of Russia, Vladimir Putin, reiterated that his country did not recognize Nagorno-Karabakh as part of Armenia and would not consider an attack against the Republic of Artsakh as an attack on a CSTO member state. If the fighting was restricted to Nagorno-Karabakh proper, and did not spill into greater Armenia, the Russians would not interfere. Armenia, therefore, was isolated and on its own if a conflict broke out with Azerbaijan.

During the period July 12–16, 2020, both sides fought again for four days. Armenia restored an abandoned border checkpoint and skirmishing began. Each side engaged the other along the LoC. Azerbaijan claimed they killed 120 Armenians and destroyed one tank, several other armored vehicles and five unmanned aerial vehicles (UAVs). The Armenians reported that they killed 21 Azerbaijani soldiers, and destroyed one tank and 13 UAVs. Each side claimed fewer friendly casualties in their official reports. Azerbaijan also announced the loss of several senior leaders, a Major General Polad Hashimov, a colonel and two majors. Hashimov was a popular general on the rise in the Azerbaijani military and his death to Armenian artillery fire incited widespread anger in Azerbaijan. Infuriated Azerbaijanis called for his death to be avenged and spurred widespread protests across Azerbaijan, particularly in the capital of Baku. Hashimov was the first Azerbaijani general killed in battle.

The most significant point of the July 2020 fighting, however, was the increasingly sophisticated way Azerbaijan used its UAVs. Not only did it use sophisticated Israeli UAVs and LMs to strike, but real-time video from these weapons was used to fight an information war campaign via social media outlets, hoping to demoralize Armenian public support for their government. Armenia should have learned from this, but it appears the fighting was too short to provide impact.

Although the fighting died down by July 30, with occasional exchanges of gunfire and artillery, neither side committed to a lasting ceasefire, let alone a peace settlement. War was in the air with tensions running hot. Prime Minister Nikol Pashinyan of Armenia and President and Commander-in-Chief Ilham Aliyev of Azerbaijan both declared victories. In addition, the



Map 4: 2020 Pre-War Border Clashes. In July 2020, Armenian and Azerbaijani forces clashed in the areas shown above by boxes. The fighting was blamed on Armenia. Sergey Lavrov, Russian Minister of Foreign Affairs, stated that "a trigger of sorts was the geographical factor: Armenia's decision to restore an old border checkpoint, located in 15 kilometers distance [9 miles] from Azerbaijan's export pipelines, caused strong concerns on one side and unwarranted response from the other." Armenia reported it was merely reacting to Azerbaijani forces crossing the border illegally. The July incident resulted in casualties on both sides, including the death of an Azerbaijani general. The July 2020 fighting and the death of the general was considered the spark that ignited the Second Nagorno-Karabakh War on September 27, 2020. (Map Wiki commons)

Armenia's Missile, Multiple Rocket Launch Systems (MRLS) artillery, Unmanned Aerial Systems (UAS), and Loitering Munitions (LM) Arsenal available at the start of the Second Nagorno-Karabakh War

Weapon (by NATO Designations)	Number	Information
SS-26 Stone (Iskander-E (Russian made)	8	Ballistic Missile, 300 km max range
SS-1C Scud B (Russian made)	8	Ballistic Missile, 300 km max range
SS-21 Scarab (9K79 Tochka-U) (Russian made)	4	Ballistic Missile, 120 km max range
BM-30 Smerch (Russian-made MRLS)	6	300mm Rockets, 90 km max range
Norinco WM-80 (Chinese-made MRLS)	4	273mm Rockets 120 km max range
TOS-1A (Russian-made MRLS)		220mm Rockets, 10 km max range
BM-21 Grad (MRLS)		122mm Rockets, 20 km range
Orlan-10 (Russian made)	?	Class 1 UAS
X-55 (Armenian made)	?	Class 1 UAS
Krunk-9 or 11 Crane (Armenian made)	?	Class 1 UAS
HRESH (Armenian-made—PROMAQ)	?	Class 1 LM, Possibly a copy of the Israeli Hero-30 drone, 20 km range

2020 Covid-19 pandemic affected both but hit Armenia the hardest. In July, Armenia reported 34,001 cases and 620 deaths, while Azerbaijan noted 26,165 Azeris infected and 334 deaths. Leyla Abdullayeva, head of the Press Service Department of Azerbaijan's Foreign Affairs Ministry, reported in an interview with *The Jerusalem Post* that "The situation internally in Armenia is so bad with coronavirus, its leaders want to deviate the attention of the masses." Whether or not this is true, waging war during a pandemic clearly added a new dimension to the conflict and infections spiked in both countries from September to November 2020 during the Second Nagorno-Karabakh War.

Despite the pandemic, Azerbaijan wanted revenge. In the summer of 2020, strong Turkish support bolstered President Aliyev's resolve and gave him confidence. In Armenia, as the developing political and military situation inexorably headed toward a conflict, there was a reluctance to see the gathering storm. Doubtful and hesitant, Armenia seemed to be sleepwalking while Azerbaijan prepared for a war that would retake all the "occupied" lands and restore the country's prestige and power. Armenia, landlocked and isolated without allies, was confident its forces could hold the mountains against any assault. Russia did not want a confrontation with Turkey and searched for ways to avoid triggering the CSTO defense treaty with Armenia. Turkey, the rising regional power in the Caucasus, enabled and encouraged its oil-rich

Azerbaijan's Missile, Multiple Rocket Launch Systems (MRLS) artillery, Unmanned Aerial Systems (UAS), and Loitering Munitions (LM) Arsenal available at the start of the Second Nagorno-Karabakh War

Weapon (by NATO Designations)	Number	Information
LORA Precision Guided Missile (Israeli made)	8	Ballistic Missile, 280 km max range
EXTRA Precision Guided Missile (Israeli made)	6	Ballistic Missile, 150 km max range
SS-21 Scarab (9K79 Tochka-U) - (Russian made)	4	Ballistic Missile, 120 km max range
Polonez (Belarusian-made MRLS)	10	300 mm Rockets, 200 km range
TRG-300 Tiger (Turkish-made MRLS)	20	300 mm Rockets, 120km max range
T-300 (Turkish-made MRLS)	20	300 mm Rockets, 120 km max range
BM-30 Smerch (Russian-made MRLS)	30-40	300mm Rockets, 90 km max range
T-122 Sakarya (Turkish-made MRLS)	40	122mm Rockets, 40 km max range
RM-70 (Czech-made MRLS)	30	120 mm Rockets, 20 km max range
T-107 (Turkish-made MRLS)	30	107 mm Rockets, 11 km max range
TOS-1A (Russian-made MRLS)	36	220mm Rockets, 10 km max range
HERMES-900 (Israeli made)	2	Medium Altitude Long Endurance (MALE) Intelligence, surveillance, and reconnaissance (ISR) UAS, 36 hours endurance
HERMES-450 (Israeli made)	10	MALE UAS, 20 hours endurance
HERON	5	MALE UAS, 30 hours endurance
AN-2 COLT (Russian-made biplane)	60	Repurposed as a Remotely Piloted Vehicle (RPV) flying bomb and decoy, max range ~845 km
Bayraktar TB2 (Turkish made)	36	MALE UAS, 24 hours endurance
Aerostar (Israeli made)	14	MALE UAS, 12 hours endurance
Searcher (Israeli made)	5	UAS, 20 hours endurance

Azerbaijani "brothers." Azerbaijan took confidence in the full support and cooperation of Turkey. Both countries held joint military training exercises, involving ground and air operations, in July and August 2020.¹² In September,

the Azerbaijanis were ready to execute their plan, codenamed "Operation Iron Fist," and began mobilization weeks before the outbreak of hostilities. The Armenians, confident in their mountain defenses, did not mobilize early. Artsrun Hovhannisyan, Press Secretary of the Armenian Ministry of Defense, boasted a few days before the war: "If Azerbaijan starts a war, Armenian tanks will go as far as Baku." By late September, the stage was set.



The guns began firing all along the Line of Contact on September 27, 2020. The war continued for 44 days. (Azerbaijan Ministry of Defense photo).

CHAPTER 2

The Second Nagorno-Karabakh War

"History shows us that no entirely new weapon has radically affected the course of any war; that the decisive weapon in a war has always been known, if but in crude and undeveloped form, in the previous war."

B. H. LIDDELL HART

As the sun rose on Sunday, September 27, 2020, the sky was lit by the fire of rockets and the ground rocked by the explosions of hundreds of artillery shells. Along the Line of Contact (LoC), from the village of Talish in the north, with an Armenian population of about 600, to Martuni Province in the southeast, the Azerbaijani military was on the move against the Armenian forces defending Armenian-controlled Nagorno-Karabakh, what they called the Republic of Artsakh. The defenders were not even in their trench lines when the war started, signifying an intelligence failure that would plague them throughout the coming weeks.

As the guns blasted away along the Nagorno-Karabakh LoC, Armenia and Azerbaijan launched a virtual barrage of invectives in an evolving information campaign. On September 27, the Azerbaijan Foreign Ministry announced: "Another [act of] aggression by Armenia against Azerbaijan is a blatant violation of fundamental norms and principles of international law, international humanitarian law, including the Geneva Conventions of 1949 ..." Armenia's Defense Ministry responded that its troops destroyed three tanks, downed two helicopters and knocked out three unmanned aerial vehicles in response to an attack on civilian targets that included the regional capital of Stepanakert. Azerbaijan replied that its army had launched a "counter-offensive operation along the entire front to suppress the combat activity of the armed forces of Armenia and ensure the safety of the civilian population." Armenia responded that Azerbaijan's attack was a declaration of war, declared martial law, and began mobilizing its reserves. Azerbaijan also declared martial law. Both

sides immediately blamed each other for starting the conflict, but it quickly became clear that Azerbaijan had mobilized and prepared prior to the clashes on September 27 and was launching a carefully orchestrated "counter-attack" designed to change the status quo. The next morning, Armenian Defense Ministry spokesperson Shushan Stepanyan reported: "During [the] night, battles continued with different intensity. Early in [the] morning, Azerbaijan resumed its offensive operations, using artillery, armored vehicles, and TOS [Russian-made] heavy artillery system."¹

The six weeks that followed involved the deliberate implementation of the Azerbaijani plan to take back Nagorno-Karabakh and remove Armenian settlers from what the Azerbaijanis called their "historic lands." Although the Azerbaijani military campaign plan has not yet been released to the public, there have been several open-source articles that outline the plan in multiple phases. From a detailed study of what happened, the war unfolded in three general phases.

Phase 1: Blind, destroy and disrupt key warfighting networks

Armenia was not prepared for what was about to unfold. Confident their defensive lines in the mountains of Nagorno-Karabakh were unassailable, the Armenians developed a passive psyche focused on holding an area defense. As the first day of battle erupted, soldiers from the Artsakh defense force and Armenian Army deployed to their defensive positions as Azerbaijan launched a well-planned offensive. Former Secretary of the Artsakh Security Council (2020), and former Commander of the Defense Army (1993–99), Samvel A. Babayan talked about his experience on the first day of the war and described it as an unmitigated disaster.

On the morning of September 27, the Armenian side lost 50% of its anti-aircraft forces and 40% of its artillery in 15 minutes. The enemy had satellites looking at us. It happened in 15-20 minutes. If the Armenian side loses 40% of the artillery and 50% of the anti-aircraft, it is a big disaster.

Although Armenia had 26 years since the end of the First Nagorno-Karabakh War to prepare for this day, it was not ready. The elaborate trench lines and bunkers, that may have been well-suited to win the First War, were not camouflaged, prepared or properly defended for the new systems the Armenians would face in the Second War. As events developed, it is doubtful any trench lines without layered and resilient air defense coverage, no matter how well



Map 5: Azerbaijani Battle Plan. This map depicts the general movements of Azerbaijan (AZE) forces during the execution of Operation *Iron Fist*. The numbers represent key terrain features (see Map 3). It also shows the general area of the Armenian defense. As Azerbaijani drones and long-range precision fires shaped the battlespace, Azerbaijan's II Corps conducted the main attack to penetrate the Armenian defenses in the south, capture Hadrut, and then move on to secure the Lachin corridor. Armenian forces blocked the corridor and Azerbaijan continued the attack by infiltrating their special forces to capture Shusha. For a description of the shaded areas of territory, see Map 2. (Map adapted from Wiki Commons)

camouflaged, would have made a difference. "Armenia has an army of the 20th century," reported Sergey Sovetkin, Russian military analyst for *Russian Military Review* on October 2, 2020, "while Azerbaijan has elements of the 21st century. Hence the difference in battle tactics."²

The Armenian battle plan appears to have been to rapidly mobilize two self-contained divisions, which operated as small corps, and a separate command for air defense. The Armenians were able to mobilize and deploy about 30,000 troops during the war, but, when they did mobilize, it was only partially effective. The first line unit, the 10th Mountain Rifle Division, positioned in the north and center of Nagorno-Karabakh, consisted of "at least nine motorized rifle regiments, an artillery regiment, a tank brigade, and other divisional subordination units. The second line was the 18th Motorized Rifle Division (in the south), deployed as a second echelon,"³ with at least five mountain rifle regiments. These two divisions were deployed to defend prepared positions on the high ground running north to south. These defenses were referred to as the Bagramyan and Ohanyan lines. The Bagramyan Line consisted of trenches and bunkers established during the First Nagorno-Karabakh War. The Ohanyan Line, named after a former Armenian defense minister, was a trench and bunker defensive zone reinforced with mines and barbed wire that ran across most of the LoC between Armenia and Azerbaijan. Built and upgraded since the First Nagorno-Karabakh War, these fortifications gave the Armenians confidence they could stop any Azerbaijani offensive, even though the bunkers and trenches were designed to stop a 20th century, rather than 21st century, military force. Some of the roads and trails that led through the Ohanyan Line were even blocked by World War II-like steel anti-tank "hedgehogs." That confidence would prove misleading. With a total lack of camouflage or other deceptive techniques, the trench lines were clearly seen from unmanned aerial systems (UASs), loitering munitions (LMs), and aircraft systems flying over the battlespace, and from Azerbaijani and Turkish satellites in low-earth orbit. The Armenians could not hide from Azerbaijan's sensor network.

The Azerbaijanis, on the other hand, were primed and ready. Years before the outbreak of the Second Nagorno-Karabakh War, they were laying the foundation of victory. Valuable lessons were learned from the short four-day war fought against Armenia in 2016. With the close assistance of the Turkish military, the Azerbaijanis planned to outmatch their adversary in the next round of fighting.⁴ As A. V. Lavrov, a Russian military analyst said in the 2021 Russian study of the Second Nagorno-Karabakh War, *Storm in the Caucasus*:

The offensive didn't feel like improvisation or a sudden emotional decision of Azerbaijan's leadership: three times in 2020, the armed forces of Azerbaijan and Turkey held joint exercises; twice inspections by the Turkish Armed Forces General Staff checked the combat readiness of the Azerbaijani troops; and on September 22, Azerbaijan seized off-road vehicles from private owners.⁵

In fact, Russian news outlets reported Turkey was involved in both the planning and execution of the war:

... the group headed by Major General Bahtiyar Ersay, Chief of the Operations Directorate of the Turkish Land Forces of Turkey, directly participated in planning the military campaign against Nagorno-Karabakh ... Another Turkish commander who took part in leading the operation in Nagorno-Karabakh is Major General Göksel Kahya, head of the Turkish Air Force's 1st Supply and Maintenance Center ... to control the Turkish Bayraktar TB2 drones.⁶

The intent of Operation *Iron Fist* was to capture as much of Nagorno-Karabakh and the "occupied" areas as possible, before the fighting was halted by the major powers, such as Russia, the US or the European Union. Azerbaijani and Turkish planners realized any assaults up steep mountain slopes would result in heavy casualties and would be slow going. To avoid casualties and deliver a more rapid advance, the Azerbaijani plan aimed for precision fires to enable maneuver. Fire without maneuver is indecisive. Maneuver without fire is fatal. The Azerbaijani plan tried to balance both fire and maneuver by leveraging their newly acquired precision strike capability. The concept was to focus on the disintegration of key Armenian networks and systems within a designated strike zone. These networks and systems, in priority, were air defense radars and air defense systems, electronic warfare (EW), command and control, then artillery and rocket forces, tanks, armored vehicles, logistic vehicles and sites, and then troops. The concept was to blind the Armenian defense network, disintegrate the network, then take apart the other systems. To do this the Azerbaijanis were counting primarily on their flying robotic combat systems—unmanned combat aerial vehicles (UCAVs), loitering munitions, and intelligence, surveillance and reconnaissance (ISR) unmanned aerial systems. Whenever possible, artillery and rocket forces would attack Armenian systems identified by the drones. The first step was to deceive and overwhelm the Armenian Soviet-era air defense radars and missile systems, by using decoys and electronic jamming, and then destroy key targets using Turkish and Israeli-made UASs for ISR, and UCAVs and LMs for ISR and strike.

The Azerbaijani ground units consisted of three separate corps and the Azerbaijani special forces (see Map 4). I and III Corps attacked in the center and north, against the most mountainous terrain, while II Corps and the

special forces attacked through the Horadiz passage and then along the Aras Valley in the south. I and III Corps' operations intended to pin Armenian forces in place while the main effort of the ground offensive, led by II Corps and the special forces, maneuvered in the south. This southern attack was a larger version of the 2016 assault, this time with full support and ample forces following in echelon and ready to follow through. Most importantly, the special forces were assigned to assist the main effort and take over the fight if the Armenian defenses and restricted terrain stopped II Corps from reaching its objective. The special forces, numbering less than 1,000 soldiers, were trained by Turkey and Pakistan and ranked as one of the best light infantry forces in the Caucasus.

Shortly after Azerbaijani artillery began shelling Armenian positions on September 27, Azerbaijan initiated the assault aimed at the destruction of the opposing air defense network. Every other aspect of the plan depended on this first step. To determine where the main air defense strength of the Armenians was located, Azerbaijan set in motion a sophisticated deception operation. Earlier in 2020, it had purchased 60 1940s-designed, Antonov An-2 biplanes (codenamed "Colt" by the North Atlantic Treaty Organization, NATO). The seller, Russia, was more than happy to sell these ancient aircraft for a good price, not understanding or caring about their intended use. Azerbaijan, most likely with help from the Turks, repurposed these aircraft as unmanned, remotely piloted vehicles (RPVs). They then filled each aircraft with explosives. In the opening phase of the conflict, the Colts were flown against the Armenian air defenses. Flying at a medium altitude so radar would be sure to pick them up, the Armenian air defense network turned on, identified, and then destroyed several of the incoming aircraft.

As the Armenians were congratulating themselves over this victory, the air defense systems that had engaged the incoming RPVs were identified by Azerbaijani ISR UASs and then hit by precision fire attacks from groups of UCAVS and Harop and Orbiter LMs. One report indicated the repurposing of the biplanes was even more rudimentary. "These decoys were quite low-tech: the (Azerbaijani) pilots simply aimed ... the cheap biplanes at Armenian lines, strapped the controls with belts to maintain course, and bailed out. Paired with strike UAS, this proved to be an extremely cost-effective method of revealing and then targeting an enemy air defense." Rapidly, the Azerbaijani precision attack disintegrated the Armenian air defense network. By the second week of the war, the Armenians were reduced to mostly shoulder-fired man portable air defense systems. Azerbaijan won air supremacy in the first few days of the

war and now their UASs, UCAVs, and LMs could fly unmolested across the strike zone to hunt Armenian systems.

The term “kill chain” describes the military concept related to the structure of an attack by long-range fires and consists of target identification, force dispatch to target, decision, and order to attack the target, and, finally, the destruction of the target. To optimize the kill chain, Azerbaijani and Turkish planners developed a reconnaissance strike zone, a three dimensional area of space above the battlefield, to engage targets. Since many of the LMs were “human on the loop,” where an operator flies the munition to the target area and then orders it to attack, or “human out of the loop” (systems that, once sent into a circling pattern over a target area, would identify and strike a target on its own), the ability to sense and then immediately strike at machine speeds created an accelerated kill chain. A focus of Azerbaijan’s expensive investment in its military forces was the purchase of the latest unmanned systems from Israel and Turkey, as well as air defense and ballistic missiles. This provided the Azerbaijan military with an asymmetric precision deep strike capability the Armenians did not possess. The three most important systems in this “reconnaissance-strike” asymmetric capability were the Turkish-made Bayraktar TB2 and the Israeli Harop and Orbiter LMs (see Chapter 3 for more information on each system).

<i>Semi-autonomous</i> Human in the loop	<i>Human-autonomous</i> Human on the loop	<i>Fully autonomous</i> Human out of the loop
Weapon system that, once activated, is intended to only engage individual targets or specific target groups that have been selected by a human operator. Includes “fire and forget” munitions.	An autonomous weapon system that is designed to provide human operators with the ability to intervene and terminate engagements, including in the event of a weapon system failure, before unacceptable levels of damage occur.	A weapon system that, once activated, can select and engage targets without further intervention by a human operator.
Note: Definitions per DoDD 3000.09, Autonomy in Weapon Systems		

More important than these “strike” weapons, or “shock drones” as they are often called in Russia, was the depth of sensors Azerbaijan had at its disposal. Ultimately, sensors are more important than strike systems. Without the ability to find targets, the best UCAVs and LMs will merely fly circles in the

sky. Turning the battlespace transparent, however, magnifies the potential of precision and non-precision weaponry.

These sensors multiplied the effectiveness of Azerbaijan's UAs [sic, Unmanned Aerial Systems], ballistic missiles, and older guided missile systems, giving Azerbaijan close-range tactical strike capabilities matched by long-range operational-level strike capabilities. These complementary precision strike capabilities proved to be a game changer tactically, which enabled the Azerbaijanis to overcome well-prepared Armenian defenses on the high ground, and at a higher level of war, an operational game changer that enabled them to isolate the battlespace.⁹

Nearly every day of the war, except for a few days from 7–8 November, when the fog was so thick as to ground many UCAVs and LMs, Azerbaijan had a superior view of the battlespace while the Armenians were relegated to a limited picture generated by only a few unmanned ISR systems.

In the first weeks of the war,

Bayraktar TB2s frequently operated within range of several 9K33 OSA systems⁹ at the same time without ever being targeted. It is likely that Armenia had envisaged that it could at least partially compensate the lack of capabilities of the 9K33 by deploying them in far greater numbers so that their engagement envelopes would overlap. This would mean that if a TB2 was in the process of engaging one 9K33 it would automatically fly into the range of another system located nearby. As Armenia found out the hard way, these systems turned out to be completely unable to identify the Bayraktar TB2s flying circles above them even with their radar system visibly turned on. This was likely the result of the TB2's low radar visibility, and possibly due to the use of electronic warfare (EW) measures by Azerbaijan, resulting in at least 16 9K33 OSA destroyed with no TB2s lost in return.¹⁰

Turkey possesses a robust synthetic aperture radar (SAR) and ground moving target indicator radar capability. During the war, Turkish drones, aircraft and satellites provided Azerbaijan with enhanced situation awareness and real-time targeting information, covering any gaps in its coverage of the battlespace. Since Turkey is just to the west of Nagorno-Karabakh, Turkish manned and unmanned systems, flying safely in Turkish airspace, could employ their SAR systems to identify and report the location of Armenian forces. These SAR systems are in aircraft that can operate day and night in all weather conditions. A November 7, 2020, *Global Defense Corp* (a military news internet site), report cited that the Turks identified and located Armenian targets and sent the global positioning satellite data to the Azerbaijani drone operators. The report also identified the Turkish E-7A airborne early warning (AEW) aircraft as one of the systems used to coordinate the Azerbaijani battle for air dominance.

When the E-7A flies at an altitude of 9,000m [29,500 feet], the radar can track 180 targets and has a detection distance of air targets of 600 km [373 miles]. ELINT [Electronic Signals

Intelligence] equipment uses the same antenna and can detect enemy radars up to 850 km [528 miles] ... At the same time, the E-7A AEW is a command and control hub, transmitting and receiving the tactical, air and ground situation to pilots in their planes and to units on the ground ... This way, the Turkish Army General Staff has on the map the location of all Armenian weapons in Nagorno-Karabakh.¹¹

If this report is true, the Armenians were fighting a very lopsided fight and their erstwhile ally, Russia, did not come to their aide in any significant manner. The combination of "shock drones" and a sophisticated sensor and battlespace coordination effort by the Azerbaijanis and Turks destroyed the Armenian air defense network and provided Azerbaijan with air dominance for the rest of the war.

By October 4, Azerbaijan announced the capture of the town of Jabrayil in southeast Nagorno-Karabakh. Jabrayil is a "ghost town" abandoned due to the fighting in the First Nagorno-Karabakh War and lies along a critical road that leads northwest toward the town of Hadrut. Azerbaijani President Ilham Aliyev announced in a televised address: "Nagorno-Karabakh is our land. This is the end. We showed them who we are. We are chasing them like dogs." Armenian Prime Minister Pashinyan offered a more conciliatory statement and said his country was ready for "mutual concessions" with Azerbaijan. On October 9, Azerbaijan announced the capture of Hadrut, in the Khojavend District (an area in the west of Nagorno-Karabakh), and eight other villages by the Azerbaijani Army. High-resolution images, from Azerbaijan's Azersky satellites, were published on the internet the day Hadrut was captured. Hadrut was a key victory for Azerbaijan, as the town is the first regional center with an Armenian population in Nagorno-Karabakh. This was also a major blow to Armenian morale. Hadrut was tactically important as military forces can control the approaches to the vital M-12 Highway into Nagorno-Karabakh. The seizure of Hadrut forced Armenian defenders in the Fizuli and Jabrayil regions to withdraw from their prepared positions or risk being cut-off and surrounded. In the next two days, Armenian forces counterattacked, in an attempt to retake Hadrut, but these attacks were poorly coordinated and the Azerbaijanis repulsed every assault.

As this fighting was taking place, a missile war erupted between the two belligerents. Azerbaijan reported it had destroyed missile launch sites in Armenia. Armenia vowed to hit more targets in Azerbaijan. The Israeli-made ballistic missile defenses Azerbaijan purchased were effective in stopping most of the Armenian strikes. Some Armenians may have hoped that, by escalating the missile war, they might trip the conditions for the Russians to come to their aid under the CSTO agreement. Russia announced it would not get involved over Nagorno-Karabakh.

A few weeks before the war between Azerbaijan and Armenia erupted, Russian Defense Minister Sergei Shoigu visited Baku—most likely to discuss Russia's reaction to Azerbaijan's plans to engage in an open conflict in Nagorno-Karabakh. One can safely assume that Russia's position was, as later publicly articulated by the Kremlin in response to Armenia's request for military help under the auspices of the Collective Security Treaty Organization (CSTO), that it would not get involved, because Nagorno-Karabakh is an unrecognized republic, officially being Azeri territory.¹²

Armenia, therefore, was on its own against the Azerbaijani-Turk alliance.

And what about the air forces of Armenia and Azerbaijan? Armenia's air force situation was quite embarrassing. It had just been equipped with new, Russian-made Sukhoi Su-25 (NATO codename "Frogfoot") ground attack aircraft, to complement the existing fleet of Su-30 ("Flanker") fighters, but their readiness rate sat at an abysmal 28 percent.¹³ Apparently, missiles for these aircraft were not available during the war, so the Armenian air force stayed largely on the ground. The Azerbaijani Air Force had a total inventory of about 145 aircraft, including Russian-made Su-24 "Fencer" all-weather attack aircraft, Su-25s, MiG-21 "Fishbed," MiG-25 "Foxbat" and MiG-29 "Fulcrum" fighters, and Mi-24 and Mi-35M "Hind" attack helicopters. According to a 2021 study, their aircraft readiness was routinely only 50 percent.¹⁴ The Azerbaijani Air Force flew about 600 sorties during the war, mostly launching stand-off weapons and keeping out of the range of Armenian, and potentially Russian, air defenses. It seems that the Azerbaijanis went to great lengths not to put their pilots in harm's way by using UASs, UCAVs and LMs instead.

Phase 2: Fix Armenian combat power inside the strike zone and shape the battlespace

The next step in the Azerbaijani plan was to find, fix, track and destroy targets within the designated battlespace. During the First Nagorno-Karabakh War, both sides fought each other on the front lines. In this new war, Azerbaijan was able to execute a deep operation with robotic systems to attack Armenian positions everywhere in the designated strike zone. A deep operation has roots in the Soviet theory of "Deep Battle" developed before World War II. The concept involves destroying enemy forces throughout the entire depth of the battlespace. During this phase of the Azerbaijani offensive, unmanned systems in Azerbaijan's arsenal led the fight in the strike zone to destroy Armenian targets. The most logical priority of targets in this effort was: any remaining air defense systems; electronic warfare systems, command and control facilities

and headquarters; artillery and rocket forces; tanks; armored vehicles such as BMP infantry fighting vehicles; trucks and wheeled vehicles; and, finally, troops. A deep operation employs multiple attacks, hitting the opponent at many points, destroying key systems that disintegrate his ability to employ combined arms. With the robotic systems at their disposal, the Azerbaijanis were able to induce a catastrophic failure of the enemy's defenses.

With their air defenses destroyed, the Armenians could not defend their EW and artillery systems.

Almost all [Armenian] towed artillery pieces were placed in pre-prepared pits, which although giving some protection against counter-artillery fire, left them completely exposed to drones hovering overhead. It should thus come as no surprise that no less than 130 artillery pieces were destroyed by Bayraktar TB2 UCAVs alone (out of more than 225 artillery pieces confirmed to have been lost by Armenia in total).¹⁵

Once the EW and artillery were destroyed, the ability of Armenian infantry and tank units to conduct local counterattacks was severely limited. Once the tanks and BMPs were removed, the infantry could only stand in their trenches and hope to repel an Azerbaijani ground assault. When drone strikes hit trucks and wheeled vehicles hauling supplies and reinforcements, the entire defense weakened. When the drones started hunting troops, Armenian morale began to shatter.

By the third week of the conflict, these deep strikes were taking a severe toll on the Armenian war effort. Ammunition was beginning to run low at the front, reinforcements were not reaching positions, and the Armenians struggled to mass units in their rear to conduct counterattacks against Azerbaijani breakthroughs. While in the mountainous and forested North the Azerbaijanis continued to make little headway, Azerbaijani forces began to make rapid advances in the South.¹⁶

Azerbaijan's main effort

The main effort was led by Azerbaijan's II Corps, under the command of Major General Mais Barkhudarov, a "Hero of the 2016 Four-Day War" and a rising star in the Azerbaijani Army. He had the largest share of Azerbaijani combat power, particularly drones, artillery and rocket forces. In addition, the special forces, under the command of Major General Hikmet Mirzayev, another experienced and decorated Azerbaijani officer, supported the main effort.

By destroying the Armenian ability to conduct combined arms counterattacks and fixing the Armenians in their trench lines, the Azerbaijanis gained freedom of maneuver. While Azerbaijani forces attacked along the entire front to pin down the defenders, casualties mounted on both sides. On October 4, the Azerbaijani main effort, led by II Corps, exited the Horadiz passage with minimal casualties and attacked southwest into the Aras Valley. This main effort was led by II Corps, under the command of Major General Mais Barkhudarov. He had the largest share of Azerbaijani combat power, particularly drones, artillery and rocket forces. In addition, the Azerbaijani special forces, under the command of Major General Hikmet Mirzayev, supported the main effort. In previous fighting in 2016, the special forces had performed brilliantly.

... [they] demonstrated two essential qualities for this category of troops. The first is a high level of interaction with other branches of the military, especially with the artillery battalions; they demonstrated a good level of adjustment of the artillery and MLRS [multiple launch rocket systems], including on related subjects located behind the enemy lines (the use of drones to correct the location is not always the best option). Secondly, the ability to perform tasks independently, in the depths of the enemy's defense (20 km).¹⁷

By October 17, the battle was tipping in Azerbaijan's favor. Doctor Can Kasapoglu, the director of the Security and Defense Research Program at the Istanbul-based think-tank EDAM (Ekonomi ve Dış Politika Araştırmalar Merkezi, The Centre for Economics and Foreign Policy Studies), reported that the Armenian forces were quickly routed in an "irregular and undisciplined withdrawal" from the frontline positions they'd been fortifying along the 'line of contact' since a 1994 cease-fire brought an end to the previous war.¹⁸ Eric Chan, writing for *The Diplomat* online newsletter put it succinctly:

For the Armenians, this proved to be fatal. While there was some understanding prior to the outbreak of war that a static "trench defense" was precisely what the Azerbaijanis were prepared to fight against, the slow rate of change meant that Armenia ended up with a flood of volunteers trained by veterans of the 1994 war with wooden guns to execute trench defense. These forces were then correspondingly demoralized by a way of war that had nothing to do with the old Soviet firepower-attrition method that gave Armenia the victory in 1994. The Armenians were fixed and then destroyed – not just in position, but mentally as well.¹⁹

The famous American World War II general George S. Patton, Jr. said, "Untutored courage is useless in the face of educated bullets." In the Second Nagorno-Karabakh War, the Turkish drones and Azerbaijani LMs were brilliant. The Armenians, no matter how brave, could not stand against such a precision onslaught.

In an effort to add an information war victory to advances on the ground, on October 17, Azerbaijani President Aliyev announced:

... the list of the destroyed Armenian equipment includes: 234 tanks have been destroyed, 36 tanks have been taken as military booty, 49 infantry fighting vehicles have been destroyed, 24 have been taken as military booty, 16 self-propelled artillery pieces have been destroyed, 190 cannons of various calibers, two "Hurricane" systems, one TOS flame-thrower, two "Elbrus" operational tactical missile complexes, one "TOCHKA-U," 35 "OSA" anti-aircraft missile systems, three "TOR" anti-aircraft missile complexes, five "KUB" and "KRUG" anti-aircraft missile complexes, nine radio-electronic combat systems, two S-300 anti-aircraft missile systems, 196 trucks have been destroyed, and 98 have been taken as booty.²⁰

Armenia disputes these numbers, but the drone footage Azerbaijan and Turkey saturated the internet and social media with had a telling effect on their enemy's morale. Armenia had not invested in the same class of sensor and strike drones as Azerbaijan. As a result, the high-definition videos produced by these drones, and used by Azerbaijani and Turkish information warfare teams, had a dramatic effect on the Armenian home front. Mothers closely scanned dozens of strike videos on social media, hoping their sons were not in one. Never before in the history of warfare has an information war campaign had such immediate and dramatic high-quality video footage. By October 20, the Aras Valley, and the stretch of land bordering Nagorno-Karabakh and Iran, was completely under Azerbaijani control.

At the same time as the fighting was occurring, the information war was being waged on Twitter, Facebook, and YouTube. Winning the information war was a part of Azerbaijan's shaping operations and the Armenians fought back in kind. As of September 2020, the US Department of Defense did not have an established definition for information warfare. A good definition was provided by Commander Mike Dahm, US Navy (Retired) as "offensive and defensive actions in physical and virtual space that enable and protect the friendly force's ability to access, process, and communicate information that also deny, exploit, corrupt or destroy an adversary force's ability to use information."²¹ Even this definition does not go far enough to express how an information war can impact the opponent's morale by waging a messaging campaign on the internet and social media outlets. The high-definition drone videos mentioned before are one example. Azerbaijan often used these videos to exaggerate their effects and the decapitation of Armenian leaders. "During the 44-day war, the Azerbaijani media published many false reports about the deaths of Armenian soldiers, generals, and members of the political leadership. Also, journalists and officials made statements about large-scale losses on the Armenian side."²²

An example of information war messaging during the shaping phase of the Azerbaijani offensive is a report by *TRT World*, a Turkish media enterprise and

strongly pro-Azerbaijani, on October 23. In this report, most of the talking points of the government or Azerbaijan were expressed, especially push back on a story about foreign mercenaries. TRT interviewed Fariz Ismailzade, the Vice Rector for External, Government and Student Affairs at the ADA University in Baku, Azerbaijan:

[The] Azerbaijani army is very professional, organized and motivated. They fight without any foreign help and they are eager to liberate the occupied territories. The Armenian defense line turned out to be very weak and [the] Azerbaijani army broke it very fast. Armenian myth is gone ... It is clear that [the] Azerbaijani side is using Turkish drones and Israeli technology, and this gives them clear superiority. [The] Armenian army has no drones and lost many tanks and other military equipment which [Azerbaijan] ... estimated at \$4.6 billion. All Armenia does so far is to launch SCUD missiles to Ganja and other towns of Azerbaijan far from the conflict area and killing kids there.²³

From reports like this one, and the constant barrage on social media of full-motion videos of successful drone strikes, Azerbaijan won the information war and shaped the battlespace for the next phase of Operation *Iron Fist*.

Phase 3: Maneuver to capture the center of gravity by seizing the decisive terrain

By October 23, Azerbaijan was ready for the final push to gain as much as possible before Russia either intervened or forced a ceasefire. The Turkish and Azerbaijani general staff knew time was not on their side. In October, at least three ceasefires brokered by Russia, France, and the United States were attempted but quickly broken. After the second week of fighting, Armenia was pressing Russia to arrange any ceasefire possible to freeze the Azeri advance. Azerbaijan and Turkey, on the other hand, were unwilling to stop the attack with the tide of battle going in their favor.

Armenian losses were horrific and the destruction of so much equipment and material presented the Armenian and Artsakh leadership with few options. Their way of war, rooted in the combined arms concepts of the last war, and fixated to defending prepared positions, was failing fast against the Azerbaijani high-tech assault. "The first lesson that the Azerbaijani-Armenian clashes showed is the vulnerability of traditional land units—armored, mechanized, and motorized formations—in the face of advanced drone warfare weaponry and concepts," wrote Dr. Can Kasapoglu, the director of the Security and Defense Research Program at the Istanbul-based think-tank EDAM in an article dated October 30, 2020. "At the time of writing, open source intelligence publications documented some 175 main battle losses for the

Armenian occupation forces in Nagorno Karabakh [sic].”²⁴ Those losses were catalogued shortly after each strike by the *Oryx* blog operated by Belgium military analysts Stijn Mitzer and Joost Oliemans.²⁵

The Armenians hunkered down in their trench lines, pressed day and night by drone attacks across the width and depth of the Nagorno-Karabakh battlespace. Armenian troops were shackled by the persistent fear, real or imagined, of an attack from above that could come at any time and any place. Against the drone onslaught, the Armenians had no place to hide and nowhere to run. In this phase of the war, they appeared to be stunned and unable to respond. As their air defense, artillery and counterattack capabilities were negligible, their options seemed bleak. Reports of Armenian units disobeying orders or deserting were reported. The words of Carl von Clausewitz had warned that defenders in mountainous terrain should “Never depend completely on the strength of the terrain and consequently never be enticed into passive defense by a strong terrain.” At this point, the Armenians had only the passive defense of their mountain positions left. As the Azerbaijanis moved closer to the M-12 Highway, the Armenians hoped to stop them in the narrow passes.

Comparison to the Yom Kippur War of 1973

In the first week of the Yom Kippur War, the Israelis adapted, improvised and overcame disruption. They did this by rapidly assessing the changes; rapidly adapting their tactics, techniques and procedures; and by taking bold operational and tactical decisions. In the Second Nagorno-Karabakh War, the Armenians did not. Their command and forces were paralyzed. Their reactions were a matter of too little, too late. Once tipped, the Armenians never regained their balance.

There is an interesting parallel to make at this point in the Second Nagorno-Karabakh War. In nearly every conflict, there is a decisive point where the defender either rallies or falls apart. In 1973, the Israel Defense Forces (IDF) faced a similar situation. The methods of war were changing and the IDF had not recognized the changes in time. The surprise attack by the Egyptians and Syrians in 1973 had disproven many of the IDF's basic assumptions about the methods of waging war. “We thought our tanks could stop the Egyptians from putting up bridges but we didn't imagine the forest of antitank missiles,” Moshe Dayan, Israel's Minister of Defense in 1973, was quoted as saying during the

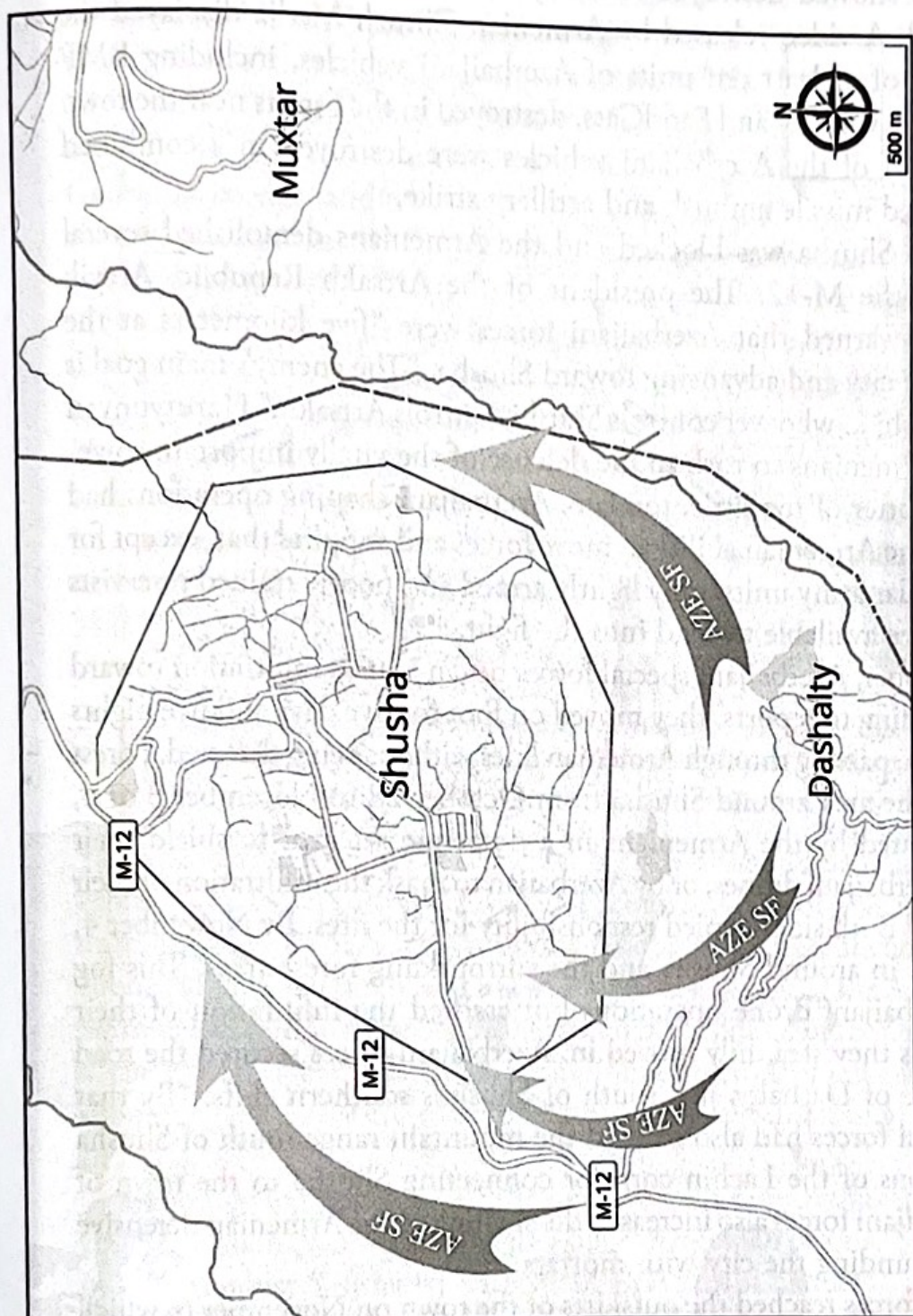
initial days of the Yom Kippur War. "The air force had plans for eliminating the antiaircraft missiles but they didn't work. We have to learn life anew." In the first week of the Yom Kippur War, the Israelis adapted, improvised and overcame this disruption. They did this by rapidly assessing the changes; rapidly adapting their tactics, techniques and procedures; and taking bold operational and tactical decisions. In the Second Nagorno-Karabakh War, the Armenians did not. Their command and forces were paralyzed. Their reactions were a matter of too little, too late. Once tipped, the Armenians never regained their balance.

With the Armenians unable to maneuver as precision attacks by drones kept them mostly pinned to their defensive lines, the Azerbaijanis moved to secure key villages and open approaches to the Lachin corridor and the M-12 Highway. Gaining control of the highway, or at least holding a portion of it and thus blocking Armenian movement, would be a vital step to winning the war. The focus of Azerbaijan's military command now shifted to the prize: seizure of the mountain plateau city of Shusha. In the case of Shusha, the city was not only located on decisive terrain (decisive terrain is key terrain whose seizure and retention is mandatory for successful mission accomplishment) but its seizure was, understandably, also the decisive point of the war.²⁶

Shusha

The hilltop city of Shusha is considered a fortress by both the Azerbaijanis and the Armenians and is a defender's dream. It not only dominates the Lachin road, but there are only three access roads into the city, two in the south and one in the north.

The city of Shusha is a cultural treasure to both the Armenians and Azerbaijanis. Both sides pledged to fight fiercely for Shusha. The hilltop city sits on a high plateau that commands the approaches to the M-12 Highway, the single road that connects Lachin in the southwest and Stepanakert to the north. The city itself is considered a fortress by both the Azerbaijanis and the Armenians and is a defender's dream. It not only dominates the Lachin road, but there are only three access roads into the city, two in the south and one in the north. Once Azerbaijan's II Corps was on the M-12 Highway and within striking distance of Shusha, they attempted a quick rush to overwhelm the defenses. Sensing success, tanks, mechanized infantry and SandCat weapons carriers²⁷



Map 6: Infiltration Attack on Shusha. This map depicts the probable infiltration routes of Azerbaijani special forces into the city of Shusha. It is reported in other open sources that the special forces approached the city from multiple directions and that some even scaled steep cliffs to get past the defenders. Since there is no open-source report to provide the definitive Azeri infiltration plan, this image is provided to illustrate the difficult task Azerbaijani special forces performed to capture the city. Note: The road at the bottom left of this photo is the M-12 Highway. (Map modified by the author from Google Maps)

were sent forward along the narrow road to Shusha. The Armenians were waiting and here, for nearly the first time in the war, they could accurately declare they were able to repulse the Azerbaijani attack. Armenian videos of "Hell's Gorge" showed destroyed Azerbaijani BMPs and dead soldiers lying along the road. A video released by Armenian Zinuzh Media displayed the wrecked hulks of at least ten units of Azerbaijani vehicles, including BMP infantry fighting vehicles and SandCats, destroyed in the forests near the town of Lachin. Most of the Azerbaijani vehicles were destroyed in a combined anti-tank guided missile ambush and artillery strike.

The road to Shusha was blocked and the Armenians demolished several bridges along the M-12. The president of the Artsakh Republic, Arayik Harutyunyan, warned that Azerbaijani forces were "five kilometers at the most" from the city and advancing toward Shusha. "The enemy's main goal is to capture Shushi ... whoever controls Shushi controls Artsakh." Harutyunyan called on all Armenians to rush to the defense of the vitally important town, but it was a matter of too little, too late. Azerbaijani shaping operations had so decimated the Armenian ability to move forces and supplies that, except for a very few regular army units, only lightly armed and poorly trained reservists and militia were available to send into the fight.

On 25 October, Azerbaijani special forces began a mass infiltration toward Shusha. According to reports, they moved on foot for five days and five nights to reach Shusha, passing through Armenian lines without being detected. Forest fires raged in the area around Shusha from October 28 to November 3 or 4, possibly instigated by the Armenians in a desperate attempt to shield their forces from Azerbaijani drones, or by Azerbaijan to mask the infiltration of their special forces.²⁸ Both sides denied responsibility for the fires. By November 4, a heavy fog set in around Shusha and the surrounding forest areas. This fog inhibited Azerbaijani drone operations but assisted the infiltration of their special forces as they stealthily moved in. Azerbaijani forces secured the road near the village of Dashalty, just south of Shusha's southern cliffs. "By that day, Azerbaijani forces had also secured the mountain range south of Shusha and key portions of the Lachin corridor connecting Shusha to the town of Lachin. Azerbaijani forces also increased the shelling of the Armenian defensive positions surrounding the city with mortars."²⁹

The special forces reached the outskirts of the town on November 6, which was another day of thick fog. They then approached Shusha from multiple directions, in groups of about 100 men, attempting to avoid contact until they moved into their designated objectives inside the city. It was a slow and stealthy process, and they had to carry personal weapons, guided anti-tank

missiles, food, water and equipment to sustain them in their mission. Samir Bakhshaliyev, who was assigned to the special forces for the infiltration attack on Shusha, said in an interview that one detachment blocked the M-12 Highway to stop any reinforcement of Shusha from the southwest.³⁰ A team secured the hamlet of Dashalty while another group moved around the city from the eastern side. The eastern side comprised steep cliffs, some 30 meters (100 feet) high. Samir reported they did not think the Armenians were defending the cliffs as they seemed an unlikely and nearly impossible avenue of approach. Counting on this, and under the cover of night and fog, the soldiers climbed the cliffs and infiltrated the city without being discovered.

Once in the city, the individual groups occupied defensive positions. "They established additional blocking positions and ambush sites around the city to further prevent the defending Armenians from being reinforced or resupplied."³¹ One group occupied the castle. When the fighting began, most likely in daylight, the Armenians found Azerbaijanis firing from key points in the city. At this point the Armenians were demoralized and running low on everything. When Armenian commanders asked for artillery support, they were told there was none to provide.

With 20–30 salvos of Smerch we can destroy all Azeri forces in Shusha. We take the town back. But then what? The condition of the army does not allow us to continue the war. Yesterday, I tried to organize an operation with three battalions. We have only four howitzers. Without the artillery, how can we advance? Imagine, for the entire army we only have two Grads, and about 10 howitzers for which we have no rounds.³²

The Armenians used the fog as cover to launch tanks and BMP infantry fighting vehicles against the invaders, but the advancing armor was either destroyed or forced back by anti-tank weapons. The Armenians launched at least three counterattacks but made no headway towards dislodging the Azerbaijanis. The fighting went on with heavy casualties on both sides. Sometime on November 6, the senior Armenian leaders, including Argishti Kyaramyan, who had been appointed the commander of the Armenian forces in Shusha, abandoned the city.

The heavy fog began to lift the next day and the Azerbaijani TB2 UCAVs and LMs could once again operate against Armenian targets. By the afternoon of 7 November, Shusha was mostly in Azerbaijani hands.

On the morning of November 8, the Artsakh Ministry of Defense reported that intensive fighting had taken place through the entire night along the length of the front line surrounding Shusha. Armenia also claimed that its forces had downed three Azerbaijani TB2 Bayraktar unmanned aerial vehicles and had destroyed twenty armored vehicles and four tanks throughout the day.³³

These false reports were denied by Azerbaijan and did not match with the situation on the ground. Without leadership, the Armenian forces fled Shusha for Stepanakert and paid dearly in the process under the enemy's guns. The Armenian leadership knew they had lost the fight for Shusha³⁴ and sued for peace. As the sun rose on November 8, the Azerbaijanis had won the city.

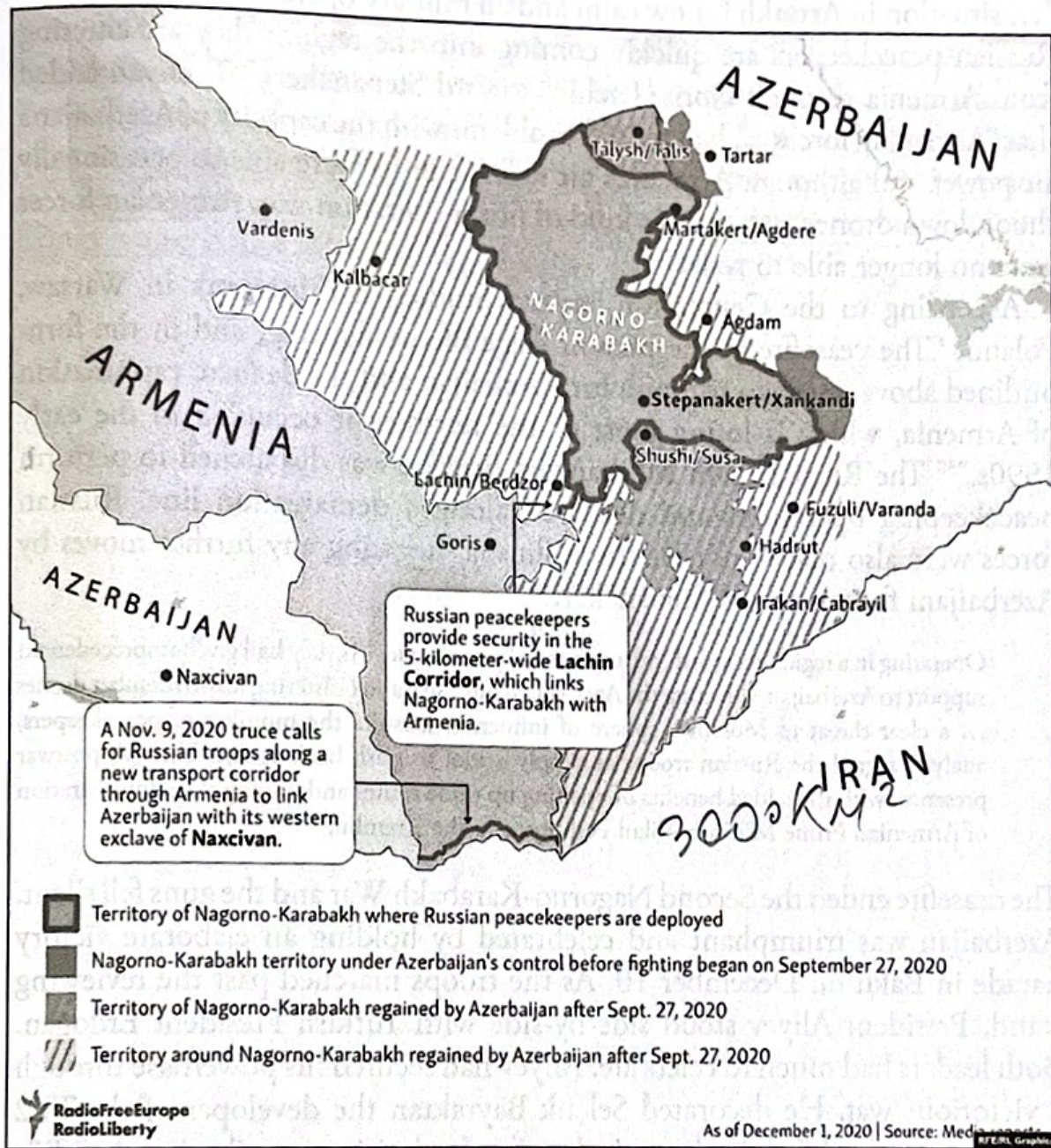
The Battle of Shusha was the decisive point of the Second Nagorno-Karabakh War. In the end, the decisive terrain and the key objective of the war was captured by light infantry special forces teams using small arms, shoulder-fired anti-tank missiles, and bayonets. The skill, superior training, and leadership of the Azerbaijani special forces gained the upper hand over the confused and demoralized Armenian defenders.

Despite all the coverage, the lessons missed about the Nagorno-Karabakh War are the ones showing how urban warfare remains a key part of modern combat. The most important battle of the Nagorno-Karabakh War occurred in the city of Shusha. Once Shusha fell, Armenia surrendered and entered a lopsided agreement, ceding massive amounts of their previously held territories.³⁵

Azerbaijan's president proudly announced:

We have destroyed the enemy in an almost hand-to-hand battle, crossing ravines, forests and mountains with light weapons, and liberated Shusha, the crown of Karabakh ... We were strengthening the combat capability of our army because it was clear that victory could not be won by weapons alone. It is a soldier and an officer who raises the flag, raises the flag on the enemy's positions, raises it on liberated lands. Our soldiers and officers fought like lions.³⁶

Late on November 9, Armenia, Azerbaijan and Russia signed an agreement to end the conflict and bring Russian peacekeepers into the region. Russia brokered a ceasefire that both sides accepted. Armenia's President Pashinyan was desperate for a ceasefire and feared the fall of Stepanakert to Azerbaijan forces. Azerbaijani President Aliyev understood his forces were at the end of their logistics line, had fought a hard battle to win Shusha, and needed to consolidate their gains. They had risked much, taken about as many casualties as they had inflicted on Armenia, and won a tremendous victory beyond their expectations. Armenia had acceded to all their demands for territory, virtually surrendering. The Azerbaijani victory was dramatic and decisive. Armenia's defeat was humiliating and catastrophic. The war ended in this ceasefire, but without a peace treaty. On November 13, following the ceasefire agreement, Russian peacekeepers deployed to the outskirts of Shusha. As they traveled up the road from Stepanakert to Shusha, a *Reuters* reporter took the photos of piles of dead Armenian soldiers, militia, and destroyed vehicles lining the



Map 7: Ceasefire agreement of November 9, 2020. Under the agreement, the warring sides kept control of the areas they held within Nagorno-Karabakh at the time of the ceasefire, while Armenia returned the surrounding territories it occupied in 1994 to Azerbaijan. Azerbaijan also gained transport communication to its Nakhchivan ("Naxcivan" on this map) exclave bordering Turkey and Iran. (Map courtesy of *Radio Free Europe/Radio Liberty*)

road. For Azerbaijan, the slaughter had come in the pursuit, and they had chased the fleeing Armenians nearly to the gates of Stepanakert.

On November 10, Armenia's Minister of Defense Davit Tonoyan said the "... situation in Artsakh is now calm and all military operations have stopped. Russian peacekeepers are quickly coming into the region; they are entering from Armenia through Goris, Lachin, toward Stepanakert." Tonoyan added that "Armenian forces ... had serious problems with the capacity of Azerbaijan's air power and although Armenia's air defense units were able to occasionally shoot down drones, etc., in this kind of fifth generation war, Armenian forces were no longer able to resist."³⁷

According to the Center for Eastern Studies, a think-tank in Warsaw, Poland, "The ceasefire at the present stage of the fighting, and in the form outlined above, means a triumph for Azerbaijan and the de facto capitulation of Armenia, which is losing most of the territory it occupied in the early 1990s."³⁸ The Russian 15th Mechanized Brigade was dispatched to perform peacekeeping operations and deployed along a demarcation line. Russian forces were also placed not far from Shusha, negating any further moves by Azerbaijani forces toward Stepanakert.

Operating in a region regarded by Russia as its "near abroad," Turkey had given unprecedented support to Azerbaijan, directing the Azerbaijani offensive and bolstering it with combat drones ... a clear threat to Moscow's sphere of influence. Despite the moniker of peacekeepers, analysts regard the Russian troops as simply a tool to push back against Turkey's postwar presence, with the added benefits of opening up trade routes and linking the administration of Armenian Prime Minister Nikol Pashinyan to the Kremlin.³⁹

The ceasefire ended the Second Nagorno-Karabakh War and the guns fell silent. Azerbaijan was triumphant and celebrated by holding an elaborate victory parade in Baku on December 10. As the troops marched past the reviewing stand, President Aliyev stood side-by-side with Turkish President Erdoğan. Both leaders had much to celebrate. Aliyev had secured his powerbase through a victorious war. He decorated Selçuk Bayraktar, the developer of the TB2 UCAV system and Erdoğan's son-in-law, for the decisive contribution the TB2s played in winning the war. For Turkey, the war was another step in its rise as a regional power. Erdoğan had extended Turkish military might, economic interests and influence. He had successfully dealt with Russia and the world powers. The successful war also reinforced the alliance between Turkey and Azerbaijan. The Turks celebrated the victory as much as Azerbaijan.

Armenia, on the other hand, experienced a catastrophe. The raw truth was exposed for all to see. The myth of Armenian invincibility, that had grown

from the victory in the First Nagorno-Karabakh War, was shattered. The entire nation and diaspora were devastated and humiliated by the defeat. The loss of most of Nagorno-Karabakh forced Armenia into an uncertain future. Armenian political, economic and social life sunk into a vortex. Russia had not come to their aid during the war, as many Armenians had hoped, and the result of the disaster left the country weakened, wounded, and without hope. For many, the only salvation possible was to "embrace the bear" and align more closely with Russia. This is the fate of nations decisively defeated in war. The Armenians learned, as Ernest Hemingway once stated, "defeat brings worse things than any that can ever happen in war."

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"The most powerful aircraft of the future will be unmanned aerial vehicles," Baykar's Technical Director Selçuk Bayraktar predicted in an interview with *CNN Türk* on September 16, 2021. Bayraktar is the Massachusetts Institute of Technology educated entrepreneur behind Turkey's thriving combat drone industry. The Bayraktar TB2, shown above, was a key weapon in the 44-day Azerbaijani victory over Armenia in the Second Nagorno-Karabakh War. The TB2 merges "find" capabilities with "strike." The most powerful trend exemplified by the Second Nagorno-Karabakh War is for Intelligence Surveillance and Reconnaissance (ISR) systems to merge ISR and strike capabilities into the same platform. Future systems will be smaller, lighter, unmanned, and armed with long-range precision-guided munitions. (Turkish Defense Industries SSB photo)

CHAPTER 3

When Sensors are Shooters

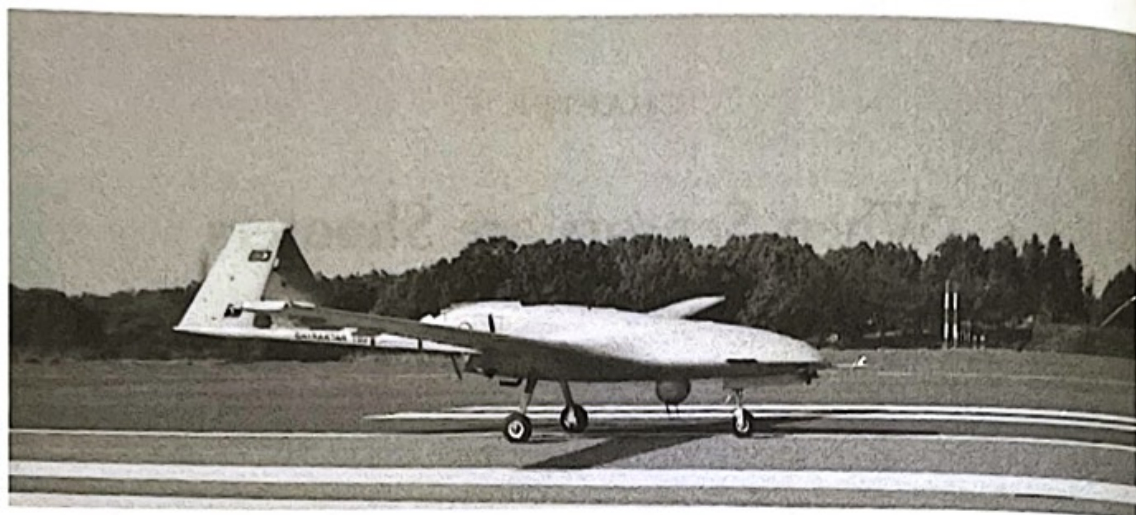
"Right now, we have some success doing that in less than 20 seconds."

GENERAL MIKE MURRAY, COMMANDER, US ARMY FUTURES COMMAND,
SEPTEMBER 2020, WHEN EXPLAINING TO REPORTERS THE LATEST CAPABILITY TO TIE
SENSORS TO SHOOTERS, FROM START TO FINISH, SENSOR TO SHOTS FIRED.

The Second Nagorno-Karabakh War provided a vivid impression of wars to come. In the past, intelligence, surveillance, and reconnaissance (ISR) platforms primarily found targets for other systems to destroy. The recent fighting in the Caucasus, which involved two near-equal medium powers, has shown how ISR and precision-guided munitions (PGMs) are now blending to become one. During this conflict, the Azerbaijani forces used strike systems, unmanned combat aerial vehicles (UCAVs) and loitering munitions (LMs) to provide critical ISR information. These systems had high-end, active sensors that generated real-time intelligence during combat. In addition, they provided accurate, real-time, battle damage assessment. In the next few years, strike systems will become smaller, faster, less expensive, and better networked. Multipurpose systems that merge sensor platforms with precision-guided strike munitions can dramatically shorten the kill chain. The lessons learned for next-generation ISR from this conflict were dramatic and were key factors in Azerbaijan's decisive victory. Some of the primary systems used by Azerbaijan, principally the TB2 UCAV¹ and the Harop LM,² provide an important insight into the future of ISR/Strike systems.

The TB2 UCAV

The Bayraktar TB2 medium-altitude, long-endurance UCAV was the star of the Azerbaijani war effort and is the premier product of the family-run Turkish defense company Baykar. Headquartered in Istanbul, Baykar operates under



Turkey's TB2 UCAV, with its distinctive triangular tail section and loaded with "Roketsan MAM-L and MAM-C micro-missiles," was a major factor in Azerbaijan's war with Armenia in late 2020. According to Baykar Defense, the "TB2 is a Tactical Armed / UAV [unmanned aerial vehicle] System, developed and manufactured by Baykar and a highly sophisticated design that provides all solutions that operators may need in one integrated system. The system consists of Bayraktar TB2 Armed / UAV Platform, Ground Control Station, Ground Data Terminal, Remote Display Terminal, Advanced Base with Generator and Trailer modules ... [the TB2's] Baykar Real Time Imagery Transmission System (BGAM) provides real-time image transmission and processing solutions ... [that] allows high-resolution, non-delay live broadcasts to be monitored by multiple users at the same time. BGAM is a web-based application that allows users to watch live broadcasts securely on the network or on tablets using the mobile application via internet. The system automatically stores all transmitted imagery into 30-minute files. While monitoring live imagery, users can take multi-tag notes on the system. Saved tags and labels will facilitate, at a later date, the search through archive videos. In a similar way, based on these notes, a mission log can be created and then exported. Archived files can be filtered by date and by metadata." During the Second Nagorno-Karabakh War, the video feeds from the TB2 were instrumental in Azerbaijan's efforts to win the information war. (Bayhaluk photo)

the names "Baykar Savunma" (Baykar Defense) and "Baykar Makina Sanayi ve Ticaret A.Ş." (Baykar Machine Industry and Trade Inc.). The Chief Technical Officer of Baykar Makina, Selçuk Bayraktar, studied UAV development while earning his master's degrees at the University of Pennsylvania, and later the Massachusetts Institute of Technology. He is also the son-in-law of Turkish President Recep Tayyip Erdoğan.

The TB2 is Turkey's first indigenous armed-reconnaissance UCAV. Operators on the ground pilot the unmanned craft from a ground control station (GCS) by direct radio link or, in the case of the new satellite receiver equipped TB2S,³ via Turkey's TürKSAT satellite network. During the Second Nagorno-Karabakh War, the TB2 found and destroyed Armenian tanks, infantry fighting vehicles, artillery, and infantry positions. The impressive confirmed-kill list of targets included the BM-30 Smerch (the Russian

"Tornado" or "Whirlwind") Multiple Launch Rocket System (MLRS), the 9K36 OSA (what NATO calls the SA-8 "Gecko"), and five S-300 (NATO's SA-10 "Grumble") air defense systems. Of the 200 artillery pieces confirmed lost by Armenia, they claimed the TB2s destroyed 120.

The TB2 is 6.5 meters (21.3 feet) long, with a wingspan of 12 meters (39.4 feet), a distinctive inverted V-tail, and a pusher propeller. The two-blade, variable pitch propeller is powered by a 75-kilowatt (100-horsepower) Rotax 912 gasoline internal combustion engine. The TB2's cruising speed is 70 knots, and the maximum speed is 135 knots. Cruising altitude is 22,500 feet with a maximum of 25,000 feet. Although a Turkish design, many of the original components, including the transponder, engine, electro-optical (EO), micro-munition bomb rack, and other technologies, come from other countries, many of them members of NATO. Some of these manufacturers stopped selling their products directly to Turkey when Armenian social media displayed manufacturer logos and component markings from the wreckage of several TB2s downed in the fighting. Turkey is now working with Ukraine and other suppliers to secure an alternative source for engines, EO systems and miscellaneous components.

To engage targets identified by its EO sensors, the UCAV carries Turkish MAM (Mini Akıllı Mühimmat, Smart Micro Munition) laser-guided smart micro-munitions developed by Turkish defense manufacturer Roketsan. The TB2 has four hard-points that can carry two MAM-C and two MAM-L micro-munitions, or four MAM-Ls. The MAM-C has a multipurpose warhead (blast fragmentation, incendiary and armor piercing); there is also a high-explosive blast fragmentation variant. The MAM-C weighs 6.5 kilograms (14lb), is 70mm (2.75 inches) long, and has a range of 8 kilometers (5 miles). The MAM-L has a tandem warhead variant, effective against reactive armor, and high-explosive blast fragmentation, and thermobaric, versions.⁴ The MAM-L weighs only 22 kilograms (48.5lb), and is one meter (3.3 feet) long, and can be used to engage stationary or moving targets with high precision within a range of 8 kilometers (5 miles). The range can be extended to 14 kilometers (8.5 miles) with the inertial navigation system/global positioning system option. Selçuk Yaşar, president and CEO of Roketsan, emphasized the multi-role ISR and strike capability of the TB2:

The design and application concept of the Smart Micro Guided Munitions allow operators to effectively neutralize time-critical targets, particularly those that arise during reconnaissance and surveillance missions. Meanwhile, thanks to their precision guidance and small dimensions, they offer a solution with a low collateral damage. When compared with all the other capabilities of the armed forces, a combination of the Smart Micro Guided Munitions

and a tactical UAV is the most cost-effective solution. We believe that other countries will also start taking an interest in this solution soon.⁵

With the success the TB2 experienced during the Second Nagorno-Karabakh War, Roketsan is exporting the system to new customers around the world, including Ukraine and Pakistan. According to *Jane's World Air Forces 2020*, Azerbaijan had at least 36 TB2s during the Second Nagorno-Karabakh War.

The Harop

The Harop is a "kamikaze drone," a loitering attack weapon that combines the characteristics of a missile and a UAV and is designed to locate and precisely engage stationary or moving targets. The LM concept is not new, but Israel Aerospace Industries (IAI) has turned the idea into a war-winning solution, particularly for military forces that do not have access to other long-range, precision-guided options. IAI designed and produced the Harop LM in the early 2000s. Turkey became one of IAI's first customers for Harop in 2005 and successfully employed the system in combat in Libya in 2018–2020. Turkey's ally, Azerbaijan, then became a major customer and IAI sold the system in ample quantities to the Azerbaijani military several years before the Second Nagorno-Karabakh War. The Harop's primary purpose is to attack radar and anti-aircraft systems but, during the war, it destroyed a wide range of targets that included air defense systems, command posts, and convoys of Armenian soldiers traveling to the front lines. The shrill scream the Harop generates during its terminal dive is reminiscent of the World War II-era German Stuka dive-bomber and had an equally demoralizing effect. When Armenian soldiers spotted or heard the Harop, they knew they had seven seconds to take cover before it struck. One Armenian soldier stated: "There was no place to hide and no way to fight back."

The Harop is EO-guided and provides high-definition video of its flight and terminal attack. Accuracy is within 1–2 meters. The Harop is 2.5 meters (8.2 feet) long, with a wingspan of 3 meters (10 feet), and weighs approximately 135 kilograms (300lb), including a 23-kilogram (50lb) high-explosive (HE) fragmentation warhead. It has a nine-hour flight endurance, a range of about 1,000 kilometers (621 miles), and a maximum speed of about 225 knots. During a mission, the Harop can loiter, identify prescribed targets, and dive into a target, or, if no appropriate targets are identified, autonomously return to a designated landing strip. With its impressive range and loitering time of approximately six hours, the system can fly autonomously to a designated



According to Israel Aerospace Industries, "the HAROP Loitering Munition (LM) is programmed before launch by the Ground Control Station (GCS) to autonomously fly to a pre-defined "Holding Area," where they loiter. The Mission Control Station (MCS), in communications with the HAROP, periodically checks their position and status during the route to the "Holding Area." The MCS operator can thus control several HAROP LMs that loiter over a "Holding Area," and can select one LM for target search and attack, while the others are monitored periodically. The operator directs the selected LM to the target area and uses the video image to select a target, and to attack it. The HAROP tracks the target and then dives on it, detonating the warhead upon impact. If required, the attack can be aborted and the operator can re-attack with the same LM." (IAI photo)

strike zone to identify targets that meet its targeting parameters. A human operator then gives the weapon the order to attack. According to IAI:

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Harops can be fired from truck-mounted "MLRS-like" platforms to create an ISR/Strike capability that only elite air forces had in the past. Considering the fleeting engagement times of modern combat, the convergence of "find and



In recent years, the Harop loitering munition has proved its lethal combat effectiveness in conflicts in Libya, Syria and Nagorno-Karabakh. The Harop is produced by Israel Aerospace Industries and was one of the most successful loitering munitions used by Azerbaijan during the Second Nagorno-Karabakh War. Israel Aerospace Industries is Israel's major aerospace and aviation manufacturer, producing aerial and astronautic systems for both military and civilian usage. It is completely state-owned by the government of Israel. (IAI image)

strike" provides smaller forces with an important combat multiplier. This capability is particularly useful for expeditionary units. Due to its well-publicized success during the Second Nagorno-Karabakh War, the Harop has become a best-selling system and has been added to the arsenals of Azerbaijan, China, India, South Korea and Turkey. In February 2020, IAI announced it had sold a naval version of the system in three separate deals to an undisclosed customer in Asia for US\$100 million. This maritime version has an extended range and will provide a combined ISR and lethal strike capability to a wide variety of naval platforms. It could even be installed on a cargo ship.

The Orbiter 1K

The Aeronautics Orbiter 1K loitering munition, manufactured by the Israel's Aeronautics Defense Systems (aeronautics-sys.com), is also a "kamikaze drone" that was used extensively by Azerbaijan during the Second Nagorno-Karabakh

War. According to Aeronautics, the Orbiter 1K is a lightweight LM designed for missions against non-armored vehicles, equipment and human targets. The Orbiter 1K carries a 3-kilogram (6.6lb) warhead with advanced guidance capabilities, to ensure high precision, lethality and low collateral effects. The Orbiter 1K LM has an endurance of 2.5 hours and a range of 100 kilometers (62 miles). When the Orbiter detects a target, it can autonomously dive to strike the target, self-detonating upon impact. Once launched, it can abort the mission and recover safely to preserve the UAV and avoid expending it unnecessarily. The advanced autonomous mode, and the ability to share real-time intelligence information, made the Orbiter an exceptionally effective LM system during the war.⁷

Implications of UAS, UCAVs and LMs for the future of warfare

With accelerated technological change, the methods of war are evolving, and so are the means to conduct ISR and strike missions. In the decade to come, many ISR systems already fielded will continue in the traditional mode of providing ISR information for other munitions, but an ever-increasing number of platforms will combine ISR and attack. Merging both capabilities into one system creates a powerful combination and this points to a trend for smaller, unmanned platforms with multiple roles. UAVs, which were primarily ISR platforms in the past, are now less expensive, more available, and capable of performing both ISR and strike roles. As we connect more projectiles to a networked "internet of battlespace things," sensors embedded in projectiles will "light up" the surrounding battlespace as they fly to their targets, identifying enemy systems along their route. When this occurs, the battlespace will become transparent.

The battlespace of the next conflict

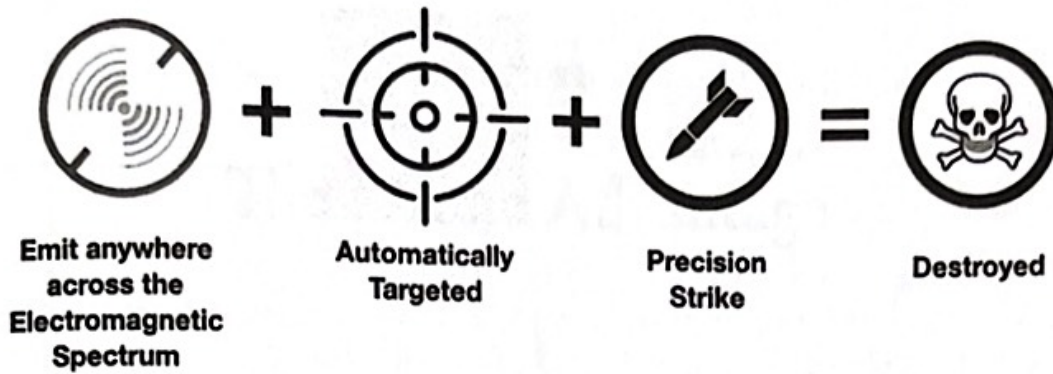
Warfare is hyper-accelerated. If you move or emit any signal along the electromagnetic spectrum without being hidden, you will be detected in real-time, located precisely, targeted, and killed.

When these systems are connected into a network and form a multi-domain strike capability that leverages the synchronization in time, space and effect

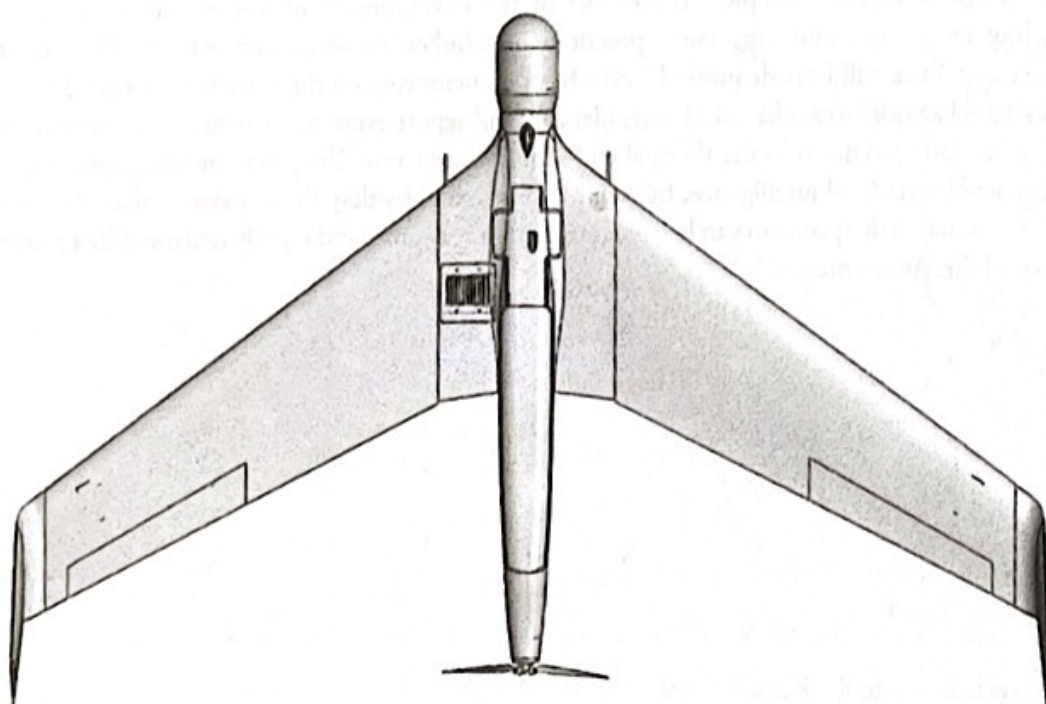
with artificial intelligence (AI), the ability for anyone or anything to hide in the battlespace will become much harder, if not impossible. To counter this, new combat systems must be built from the ground up, using passive and active means to mask themselves from these ubiquitous sensors. The merging of ISR and strike capability, when sensors are shooters, represents a capability tested in recent combat and foretells the evolution of the next generation of ISR systems.



Unmanned systems can be designed to help mask forces in the battlespace. Such unmanned systems could jam enemy sensors, send false electromagnetic, acoustic, thermal, and visual signals to multi-domain sensors, act as decoys, and show so many "false positive" indicators that the combination across multiple domains confuses and confounds the enemy's ability to sense and strike. Such a masked force would be nearly invisible to the enemy's high-tech sensors. Masking using unmanned systems may provide the ideal form of one of the extraordinary forces in war that Sun Tzu described in his *Art of War*: "Rushing like the wind; slow-stirring like the forest; consuming like fire; immobile like a mountain. They are as hard to know as shadows. They move like rolling thunder ..." (US Army Research Laboratory image)



This symbolic equation depicts the trends in the development of unmanned aerial systems, loitering munitions, and long-range precision fires linked to ubiquitous sensors. The union of these capabilities will impede ground forces from maneuvering on the battlefield. Ground, air, and space-based sensor networks will detect, identify, and report every movement, electronic emission, and significant variations in the thermal and acoustic spectrum. The precision-strike system will be automated by artificial intelligence. In such a "transparent" battlespace, any system that emits across the electromagnetic spectrum can be seen, targeted in real-time, and rapidly destroyed in a precision strike. (John Antal image)



The Orbiter 1K munition unmanned aerial system loitering munition is a "kamikaze" 3-kilogram (6.6lb) fragmentation flying bomb. Azerbaijan purchased Orbiters from Israel's Aeronautics Defense Systems and they performed with devastating effect during the Second Nagorno-Karabakh War. It has a stabilized mini-dual electro-optical and infrared camera that transmits full-motion video. (Aeronautics Group image)

CHAPTER 4

The Drone Advantage

"In the development of air power, one has to look ahead and not backwards and figure out what is going to happen, not too much what has happened."

GENERAL BILLY MITCHELL, IN *WINGED DEFENSE*, 1925

When Azerbaijan attacked on September 27, 2020, both its use of high-technology systems and innovative tactics provided a glimpse of wars to come. The Azerbaijanis executed their version of cross-domain maneuver to win a rapid and decisive victory against a defending and determined adversary. The effective use of unmanned aerial vehicles (UAVs) and loitering munitions (LMs), following Azerbaijan's extensive investment in the latest Turkish and Israeli systems, was stunning. The unrelenting tempo, precision, and lethality of the aerial attacks devastated and demoralized the Armenians and played a definitive role in Azerbaijan's victory. Hikmet Hajiyev, foreign policy adviser to Azerbaijan's President Ilham Aliyev, reported in an interview to the *Financial Times* on October 26, 2020:

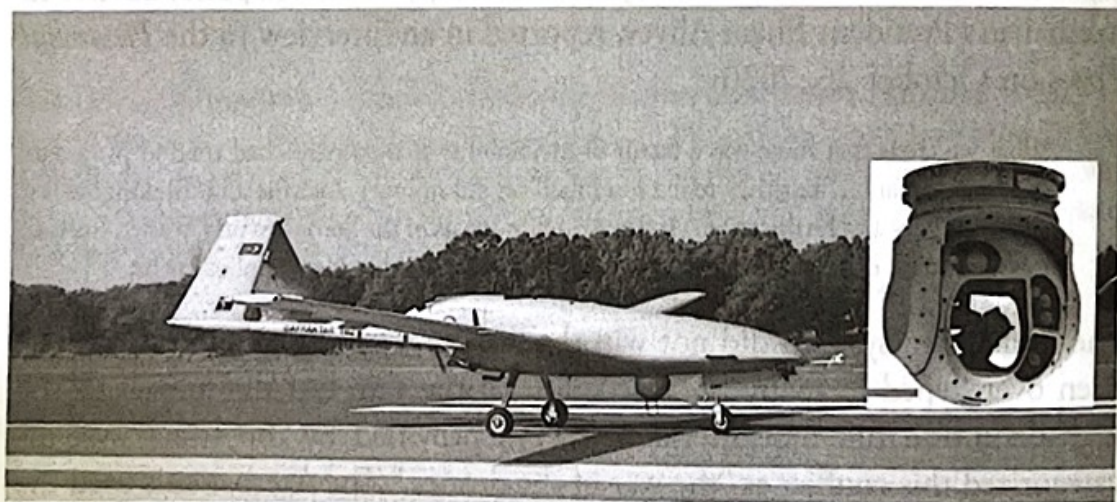
What we see is that there was a factor of invincibility that Armenia had tried to propagate over many years ... but they relied too much on old military doctrine and thinking: tanks, heavy artillery and fortifications. It simply reminded us of the Second World War ... Instead, mobile forces, drone technology and a modern approach has been applied by us.

The unmanned systems did not win the war by themselves, and UAVs have been over-hyped in many press accounts of the war, but the impact of the high-definition full motion video (FMV) provided by top-attack systems categorized this conflict as "the war of the drones." The Azerbaijanis used the secure FMV capabilities of their systems to enhance sensor-shooter integration, to obtain battle damage assessment, and for propaganda to win the information war. In these aspects, especially the use of secure tactical FMV video and data links, the conflict is a harbinger for wars to come.

Sensor-Shooter integration

The first phase of the Azerbaijani effort was to employ their newly acquired high-tech UAVs and LMs, in addition to conventional artillery and rockets, to take down the Armenian air defense and command and control (C2) network. They did this in the first weeks of the war. Armenian air defense, made up of older Russian-made systems, could not stop the UAV and LM attacks. Even when the air defense systems were operating, the aerial top-attack weapons penetrated the airspace and knocked out the defenders. Azerbaijan used a wide variety of UAVs during the war and the most effective and notorious were the Turkish-made Bayraktar TB2, the Israeli-made Harop (see previous chapter for descriptions of both), and the fully autonomous Israeli-made SkyStriker (Elbit Systems). The electro-optical sensors on the most sophisticated UAVs and LMs used by Azerbaijan are state of the art infrared and low-light high-definition television cameras that deliver secure tactical video reconnaissance, surveillance, and targeting data. During the war, the TB2 operated as an attack platform and as the "eye in the sky" for Azerbaijani forces to identify and designate targets for other UAVs, LMs, artillery, rockets, and smart anti-tank guided missiles (ATGM), such as the Israeli-made Spike ATGM system.

While the TB2 identified Armenian forces in the designated strike zone, LMs circled autonomously overhead, automatically verifying their targets and then diving on to their victims to detonate their 23-kilogram (50lb) warheads in a kamikaze-like attack. Prior to launch, the Harops were programmed to



The Bayraktar TB2 uses an Aselsan Common Aperture Targeting system for electro-optical reconnaissance, surveillance, and targeting. Low-light and infrared high-definition cameras generate an unblinking eye of the battlespace. The Azerbaijanis used the full motion video capability of the TB2 to great advantage in the Second Nagorno-Karabakh War. (Wiki Commons, Bayhaluk photo)

autonomously fly to a pre-defined strike zone. Once there, they loitered and the human operator selected one LM for target search and attack, while the others were monitored periodically. The vital component is the HD camera system which allows the operator to gain situation awareness of the battlespace and direct the LM to attack designated targets.

Battle damage assessment

Once Azerbaijan knocked out enough Armenian air defense and C2 to achieve air superiority over designated strike zones, the UAV and LM effort concentrated on targeting artillery, tanks, and infantry units in bloody top-attacks. Since the modern UAVs and LMs contained both situation awareness and weapons capability in the same platforms, the Azerbaijanis could accurately count their kills. Using the FMV from both UAVs and LMs to understand how many Armenian systems were destroyed or disabled helped guide combined arms assaults that led to the capture of terrain that dominated the major highways linking Nagorno-Karabakh through mountain passes to Armenia. Once the Azerbaijanis secured these vital roads, it placed the Armenians in Nagorno-Karabakh on the horns of a dilemma: fight to the death or surrender. Desperate to save their forces, Armenia proposed a ceasefire. Azerbaijan rejected the initial overtures as their ground forces moved to capture the major cities and decisive terrain in Nagorno-Karabakh. Only once its objectives were achieved did Azerbaijan agree to a ceasefire. In a de facto surrender, Armenia accepted Azerbaijan's terms on November 10, 2020, and withdrew from territories surrounding Nagorno-Karabakh. Throughout the war, UAV and LM videos, bolstered by robust and secure tactical video feeds, provided the Azerbaijanis with superior situation awareness.

Oryx Blog

During the Second Nagorno-Karabakh War, drone footage from Armenian and Azerbaijan systems was catalogued in almost real-time by military analysts Stijn Mitzer and Joost Oliemans on their Oryx blog, which collects very accurate, open-source, intelligence on current military conflicts around the world. During the war they listed destroyed and captured equipment of both sides and corroborated this with images from full-motion video footage from actual drone strikes.

Information war

Azerbaijan, with the aid of Turkey, planned and prepared a high-tech conflict against Armenia for at least a decade prior to September 2020. Part of this strategy involved winning the information war. This effort was designed to confuse and demoralize Armenian forces and break the will of the Armenian population. The high-definition video footage of the precision drone attacks depicted burning tanks and devastating explosions among groups of Armenian soldiers. The Azerbaijanis used these in countless propaganda films on the internet and social media platforms. Armenians viewed this footage and feared for their soldiers. In this propaganda effort, the Azerbaijani message was loud and clear: "We are winning. We will bring you death from above with our drones and you can't stop us." As Armenian losses surged and their lines continued to fall back, morale suffered.



The Harop loitering missile is an electro-optically guided attack weapon. Harops are launched from ground-based launchers and controlled via a two-way data link for "human on the loop" or "human out of the loop" operation, using its anti-radar homing system. It is used to attack high-value targets, including full mission capabilities, from search, through attack and up to battle damage assessment. Combining characteristics of a missile and a UAV, Harop enables effective mission execution without relying on other external systems for targeting and mission intelligence. If a target is not engaged, the drone will return to base. The Harop can be launched from a truck with as many as 12 weapons per vehicle. (IAI image)

Courage is useless in the face of educated bullets, and the Azerbaijani top-attack munitions hit their targets with brilliant accuracy. Leveraging the power of real-time video capture by unmanned systems to win the information war is relatively new and the Azerbaijani's played this hand skillfully.

Learning from History

As the 1973 Yom Kippur War was studied as an example of modern combined arms operations during the late 20th century, the Second Nagorno-Karabakh War holds lessons in the dynamic clash between attack and defense, the use of technology, and conduct of cross-domain maneuver for today. The increasing "democratization of technology," whereby high-tech weaponry such as UAVs and LMs become available to all, and the secure tactical video produced by these weapons used as a powerful propaganda tool, has serious implications for Western military forces. The battlespace is now transparent and there is nowhere to hide. As with the Yom Kippur War, the question on the minds of many Western military leaders should be whether the combat units of NATO would fare any better than the Armenians under the Azerbaijani whirlwind? Has NATO fielded the integrated air defense capability to counter UAV and LM assaults? How many NATO units have recently trained against UAV and LM swarm attacks? How will NATO integrate the command-and-control cross-domain capabilities of 29 multinational, multi-service UAV systems? These questions demand answers.

Tackling this challenge should start with a detailed study of the Second Nagorno-Karabakh War to derive lessons learned, and then transform those lessons into updated doctrine, training, and equipment. One of the key lessons is the use of secure tactical video-equipped UAVs and LMs to enhance sensor-shooter integration, raise situation awareness through battle damage assessment, and to win the information war. When the next conflict between peer-competitors occurs, the side that fails to learn the lessons of the Second Nagorno-Karabakh War will find themselves at a significant strategic and tactical disadvantage they may not be able to overcome.

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Unmanned aerial systems are a growing challenge in today's battlespace. Operating in swarms, these systems can be even more deadly. The US Army has selected Northrop Grumman to develop and integrate a directed energy prototype solution on a Stryker combat vehicle to better protect highly mobile front-line units. (Northrop Grumman image)