



A GLOBAL BATTLEFIELD?

**RISING DRONE CAPABILITIES OF NON-STATE
ARMED GROUPS AND TERRORIST ORGANIZATIONS**

SERKAN BALKAN

SETA | REPORT

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SIYASET, EKONOMI VE TOPLUM ARAŐTIRMALARI VAKFI
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FORWARD

Technological developments in both civilian and military fields have had a significant impact on the operational capabilities of terrorist organizations and on the increase of terrorist attacks. Technology is considered as an element that facilitates human life, yet it is also seen that developing technologies create security gaps. This vicious cycle is an ongoing competition between terror and counterterrorism technologies. One of the most distinguishing features of “innovative terrorism” is that terrorist organizations, particularly in the defense sector, identify the vulnerabilities in new technologies and use them for their own tactical attacks. Adaptation and imitation have become terrorist organizations’ new skills.

On the other hand, the process of transition to a new technology can yield different results. While some firms improve new technology further and increase its effectiveness, some others fail. This is valid for terrorist organizations and non-state actors as well. Commercial unmanned aerial vehicles (UAVs or drones) manufactured for commercial purposes should be considered from this perspective. Drones are offered to the service of humanity as a new technological opportunity, but their security flaws have been immediately identified by terrorist organizations. The use of drone systems among non-state actors and terrorist organizations has rapidly increased in the last two years. Some groups have quickly adapted to the use of drones, have increased their capacity, and organized sophisticated attacks. The reason for this widespread usage is the low cost of the UAV technology and

the failure to develop a comprehensive anti-UAV technology for a full-blown and effective fight against them.

This report focuses on the adaptation processes of non-state actors and terrorist organizations to new defense technologies and in particular on their way of using drones. The report scrutinizes the use of drones on a global scale and demonstrates the striking spread of the use of UAVs by non-state actors in the Middle East after the Arab Spring.

SETA General Coordinator
Professor Burhanettin Duran

ABSTRACT

New security threats have come into existence due to the rapid adaptation capabilities of Non-State Armed Actors (NSAA) and terrorist organizations to technology. Drones take the lead in the fields that such groups successfully demonstrate their adaptation capabilities. Drones are frequently used by states in the fight against terrorism and at the same time they have recently become the newest attack technique by NSAAs and terrorist organizations. In this aspect, commercial drones, for the first time, have been used by DAESH in an environment of conflict within a certain strategic framework. After it was seen in its propaganda videos that DAESH was successfully using this new technology, other armed groups started to imitate DAESH's methods of using drones. Particularly in the last two years –since DAESH has begun to use drones systematically in 2016– drones have been used in many regions from South America to Africa and Asia, for propaganda purposes in the following activities:

- To collect information through reconnaissance/surveillance
- To steer bomb-laden suicide vehicles to the target
- To direct rocket launchers and artillery shootings to the target
- To commit direct IED attacks
- The following parameters have played a critical role in the widespread use of drones:
 - The Effective use of drones by DAESH
 - Payload capacity that enables IED-laden drones

- The capability for long-distance use
- Inexpensive and easy procurement
- The facilitation of drone modification by militant groups using cameras, sensors, etc.
- The simplification of the operator's job by smartphone technology and its applications
- The failure to develop a clear-cut anti-UAV technology

DAESH's method of using drones is mimicked by other NSAs – a fact that indicates how fast the process of technology adoption takes place. As is the case with firms, the transition process to a new technology can yield different results. Some firms carry new technology forward and increase its effectiveness, yet others may fail to do so. The same situation applies to terrorist organizations and NSAs: some terrorist groups have completed the adaptation process, while others have failed.

This report focuses on NSAs and terrorist organizations' adaptation to new defense technologies and their way of using drones. The use of drone systems among non-state actors and terrorist organizations has rapidly increased in the last two years. Some groups have quickly adapted to the use of drones, have increased their capacity, and organized sophisticated attacks. As long as NSAs remain successful in this field, new terrorist organizations will seek to take advantage of this technology, and transition to new imitation and adaptation processes will likely increase. In this regard, it is evaluated that NSAs that employ drones for reconnaissance/surveillance or propaganda activities but have not previously committed drone attacks will be able to complete their adaptation processes in the near future. In the face of this increasing threat, developing an anti-UAV technology to fight changing UAV types and to counter attack techniques is a priority.

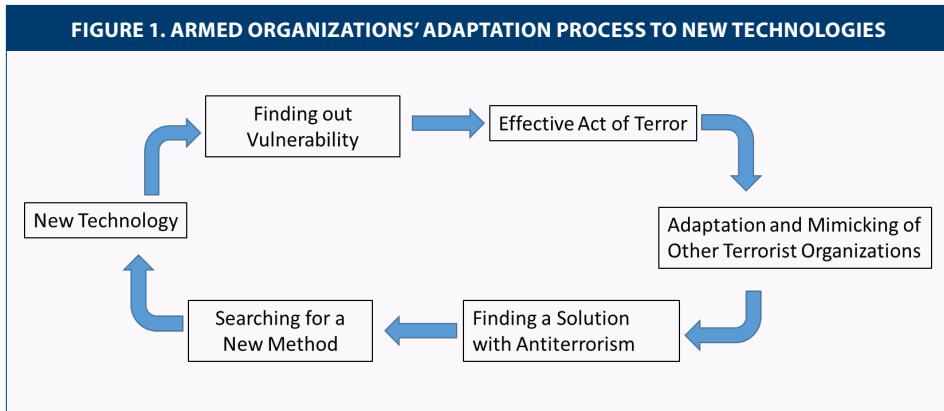
INTRODUCTION

Technological developments in both civilian and military fields have had a significant impact on the operational capabilities of terrorist organizations and on the increase of terrorist attacks. In fact, technology is what allows a terrorist to inflict great casualties. Many technologies that increase and facilitate quality of life have security vulnerabilities. The abuse of these vulnerabilities by terrorists brings about the need for counterterrorism technology to fight this threat. This vicious circle is an ongoing race between terrorism and antiterrorism technologies.¹ NSAAs had no capability for air power previously, but this situation has begun to change with the emergence of commercial drones. Their rising popularity, easy procurement, and low cost have increased the use of commercial drones by terrorist organizations.

From Continental America to Asia, many NSAAs and terrorist organizations use drones today at least to collect information about their targets. This has led to the emergence of drones as a new intelligence tool for such groups to develop their capabilities. However, the use of drones by NSAAs is not limited to reconnaissance and surveillance. Some of these actors prefer drones for attacks – this is a more sophisticated way of drone use. In the aftermath of the Arab Spring, in particular, the number of various kinds of armed factions and their capacity to use drones for

1. Brian A. Jackson, “Technology Acquisition by Terrorist Groups: Threat Assessment Informed by Lessons from Private Sector Technology Adoption”, *Studies in Conflict and Terrorism*, Vol: 24, Issue: 3, (2010), p. 4.

different purposes have dramatically increased in the Middle East.² This is a reflection of NSAAs' and terrorist organizations' process of mimicking and of adaptation to new technologies, and is also indicative of the speed of their learning curve and adaptation processes.³



One of the most distinguishing features of innovative terrorism is that terrorist organizations, particularly in the defense sector, identify the vulnerabilities in new technologies and use them for their own tactical attacks. Adaptation and imitation – as states do – have emerged as terrorist organizations' new talents as well.⁴ Innovative terrorism, in this context, means the dissemination of new technologies or techniques among terrorist organizations. It also includes the implementation and adaptation of previous acts of terror by increasing violence.⁵

As in companies, transition to a new technology can yield different results. Some firms carry new technology forward and increase its effectiveness, while others may fail to do so. This also applies to terrorist organizations and NSAAs. The transition

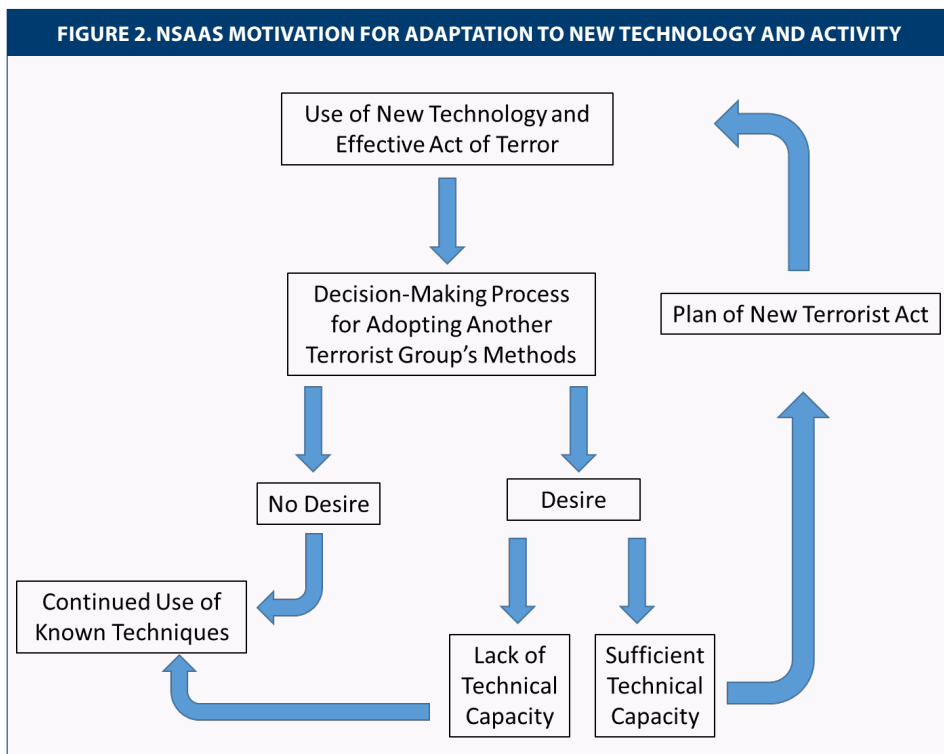
2. For the nature of NSAAs in the Middle East and their impact on the security of the Middle East, see Murat Yeşiltaş and Tuncay Kardaş, *Non-State Armed Groups in the Middle East: Geopolitics, Ideology and Strategy*, (Palgrave MacMillan, London: 2018).

3. Bryan A. Card, "Terror from Above: How the Commercial Unmanned Aerial Vehicle Revolution Threatens the US Threshold", *Air & Space Power Journal*, Vol: 32, Issue: 1, (Spring 2018); Michael D. Shear and Michael S. Schmidt, "White House Drone Crash Described as a U.S. Worker's Drunken Lark", *New York Times*, January 27, 2015; "Paris Has a Drone Problem", *The Verge*, January 26, 2015, www.theverge.com/2015/2/26/8113291/paris-drone-uav-eiffel-tower-charlie-hebdo, (Retrieved on: September 27, 2018).

4. Adam Dolnik, *Understanding Terrorist Innovation: Technology, Tactics and Global Trends*, (Routledge, New York: 2007), pp. 4-21.

5. Maria J. Rasmussen and Mohammed M. Hafez, *Terrorist Innovations in Weapons of Mass Effect: Preconditions, Causes and Predictive Indicators*, (Defense Threat Reduction Agency Advanced Systems and Concepts Office Report, Washington DC: 2010), pp. 2-10.

to new technology can be called a process of adaptation of terrorist organizations to new technologies. The inclusion of innovative terrorism in the attack strategies by other NSAAAs is not an easy process. Two main factors determine this process: first, a terrorist group, or a NSAA, should have the desire to transition to tactical arms that are proven to be successful by another terrorist group, and should decide accordingly. This is called “desire for innovation.” If the group is unwilling to adopt a new technology, it will most likely fail to use it. The second important factor is the capability. Even if the group has decided to adopt a new technology, the adaptation process will fail if technical infrastructure and R&D opportunities do not exist.⁶



There are subfactors that affect the adaptation process. A firm’s decision on the extent to which new technology will be approved and purchased by the market affects the adaptation process. Similarly, terrorist organizations make their final decision according to the success and effectiveness of a new technology. In this regard, subfactors of the adaptation process are as follows:

6. Jackson, “Technology Acquisition by Terrorist Groups”, p. 10.

Technological Awareness: If a NSAA is not open to the outside world and new developments, it will most likely not even be aware of such a technology. At this point, the Internet comes into play. Attacks of terrorist organizations such as DAESH by using new technologies and broadcasting them on the Internet as propaganda tools help other terrorist organizations become aware of this technology with the least amount of risk.⁷

Openness to New Ideas: Is a terrorist organization in search of new ideas or content with the status quo? If a NSAA is not willing to explore new ideas or has reservations in adopting new technology, its awareness of innovations will not be sufficient for the organization. Determinant factors here are the perspective of the organization's leadership, and the group's internal dynamics. A NSAA that has a historical background in using technology and that is open to new technologies will be willing to experience this adaptation process.⁸

Assessment of Risk Factors: If a NSAA intends to use a technology, how long does it take to adopt it? The following can be described as risk factors: financial difficulty in the procurement of new technological material, budget restrictions, factors that require technical know-how, such as making IEDs, and any element that causes the group to lose members. Such factors cause unwillingness in the group's decision-making process.

Environment: The environment in which any given terrorist group operates is one of the most important factors influencing both the group's incentive and its capacity to learn. The environment defines the group's operational opportunities and advantages. An environment of intense conflict creates an opportunity for the group to learn and adapt to new technology while rivals' pressure or the group's success in using new technology compels competitor groups to adapt this technology. On the other hand, intense operations and pressure of law enforcement forces may hinder the group's technology adoption process.⁹

Human Resources: Human resources are a key component of all organizations' memories. The expertise and knowledge held in the minds of the group members increase their learning speed. Loss of members who hold key knowledge can be a major blow to a group's ability to learn.¹⁰

7. Afzal Ashraf and Anastasia Filippidou, "Terrorism and Technology", Center of Excellence Defence against Terrorism, (2017), p. 17.

8. Ibid., p. 15.

9. Brian A. Jackson et al., *Aptitude for Destruction: Organizational Learning in Terrorist Groups and Its Implications for Combating Terrorism*, (RAND, Santa Monica: 2005), p. 43.

10. Ibid., p. 42.

Once a group decides to learn a new technology, the group moves into planning as a second stage, brings in its resources, and launches R&D. The technical knowledge of the organization comes into play here. A terrorist group organizing a certain type of an attack creates less impact in comparison to another group that commits the same type of attack in a sophisticated way by better calculating where to put or leave the explosive and thus creates a far better impact than the first group. Therefore, technological developments embedded with complex and technical information are not generally preferred by terrorist organizations.

When all these parameters are kept in mind, the use of drones is one of the methods that have the capacity to cause maximum loss with minimum risk and cost given that an anti-UAV technology has not yet been developed to fight drones fully and effectively. Thus, many terrorist groups, or NSAAs, tend to use drones. This report scrutinizes the adaptation process of NSAAs and terrorist organizations to UAV innovation,¹¹ first adopted by DAESH. In this regard, the first part of the report concentrates on the Middle East as the use of drones is a method often used by the states fighting against terrorist organizations in the Middle East and because the Middle East tops the regions in which armed groups and terrorist organizations rapidly adapt to this technology. In the second part of the current report, the UAV experience of armed groups in Africa is discussed. In the third part, Eurasia and Asia are addressed, and in the last part, Mexico and South America are examined.

11. For further information on the UAV use and strategy of DAESH, see Serkan Balkan, *DAESH's Drone Strategy Technology and the Rise of Innovative Terrorism*, (SETA Report : 88, Istanbul: 2017).

USE OF DRONES IN THE MIDDLE EAST

DAESH (IRAQ AND SYRIA)

Considering terrorism's changing character and the opportunities terrorist organizations have, DAESH's character and its way of using innovative terrorism have made it the most dangerous organization to international stability and the one that organizes the most unpredictable attacks. DAESH has increased the impact of its attacks by taking advantage of the opportunities presented to the public benefit by technology, globalization, and the liberal global markets. In this respect, DAESH has caused the emergence of a new threat through its UAV program. Owing to drones, DAESH's capabilities have increased and it has become a serious threat not only to security forces but also to civilians. In particular, the damage caused by bomb attacks recently committed through drones loaded with IEDs demonstrates that the group uses drones as an effective tool for attacks.¹²

After detecting the security vulnerability in commercial drones and deciding to use this new technology, DAESH activated the Mujahedeen drones program which organizes its drone attacks. The program appears to have been started by two Bangladeshi brothers who have established companies in the UK, Spain, and Bangladesh through which they move parts and other dual-use components to modify drones.¹³ DAESH has established a broad supply chain network, leading

12. Andrea Beccaro, "Modern Irregular Warfare: The ISIS Case Study", *Small Wars & Insurgencies*, Vol: 29, Issue: 2, (2018), pp. 207-228.

13. Don Rassler, "The Islamic State and Drones: Supply, Scale, and Future Threats", West Point Combating Terrorism Center, (July 2018), p. IV.

to the advancement of the UAV program. In this context, the group has started to purchase drones through 16 different companies in more than seven countries. One of the Bangladeshi brothers, Siful Haque Sujan, was a computer hacker behind DAESH's hacking efforts and was responsible for the development of anti-surveillance technology and weapons.¹⁴ Although he was killed in an airstrike in Raqqa in 2015, the drone program he developed has been further advanced by other technical personnel in the organization.

With its supply chain, technical human resources, and R&D activities, DAESH has modified commercial UAVs for its own purposes. Direct attack methods via drones started with the release of a 40 mm IED. However, the tactics developed over time and the methods of attack by using drones have developed and diversified. In this context, UAV attacks with a 40 mm IED reached the capacity to release four 40 mm IED at the same time. DAESH also conducted some combined attacks by vectoring suicide bombers during the chaos that resulted after an IED attack. DAESH generally uses drones for:

- Intelligence gathering by reconnaissance/surveillance
- Vectoring a suicide vehicle-borne improvised explosive device (SVBIED) to the target
- Vectoring rocket and cannon launches to the target
- Direct attack with IEDs
- Propaganda by recording all these activities

DAESH coordinates all of these activities with UAV monitoring centers.

FIGURE 3. SCREENSHOT OF A DAESH VIDEO



14. "IS Computer Hacker Siful Haque Sujan Killed in Air Strike", BBC, December 31, 2015.

Discovery and capture of documents during the Mosul operation demonstrate that DAESH has connections with a large administrative network for drone-related issues and had formed its procurement network before the operation.¹⁵ The UAV workshops seized during and after the operation show again that the group was involved in an intensive production and modernization of UAVs.¹⁶

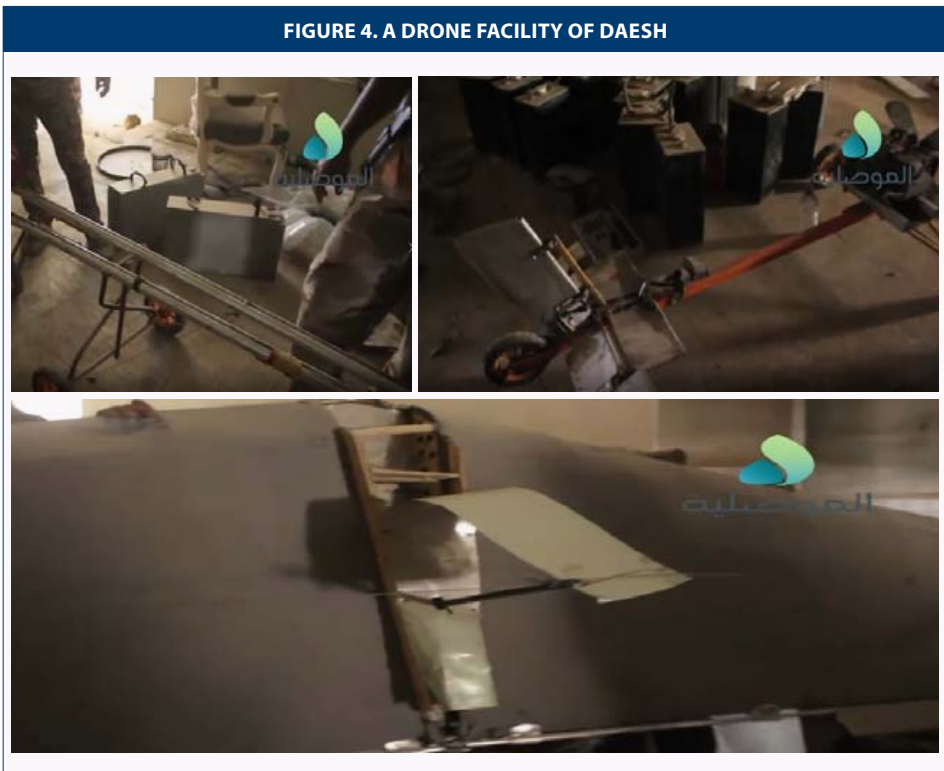
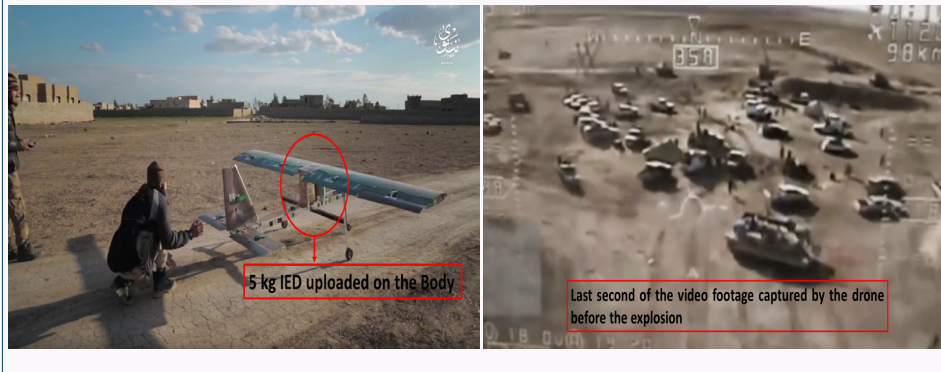


Figure 4 depicts handmade drones by DAESH. At the end of the UAV program launched by DAESH, the organization was able to make its own drones. DAESH committed a kamikaze attack on the Iraqi Security Forces (ISF) units in Mosul by loading an approximately 5-kilogram IED on a fixed-wing handmade drone (Figure 5).

15. Don Rassler, Muhammad Ubaydi and Vera Mironova, "CTC Perspectives-The Islamic State's Drone Documents: Management, Acquisitions, and DIY Tradecraft", West Point Combating Terrorism Center, January 31, 2017.

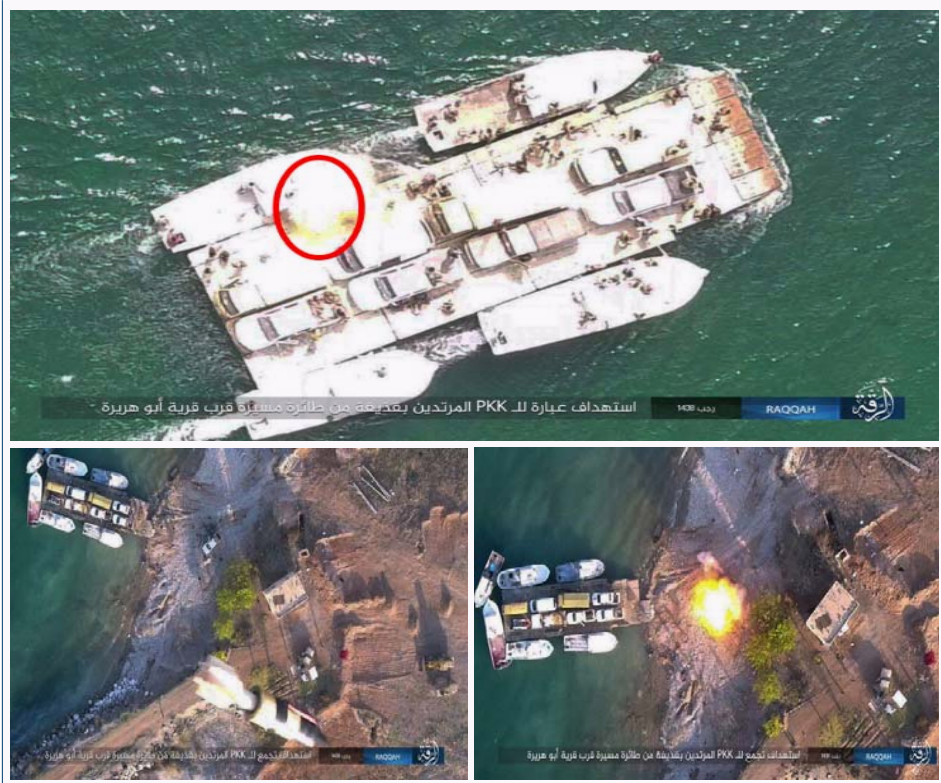
16. Nick Enoch, "ISIS Drone Factory Seized by Iraqi Forces", *Daily Mail*, June 30, 2017.

FIGURE 5. SCREENSHOT OF A DAESH VIDEO (KAMIKAZE ATTACK)



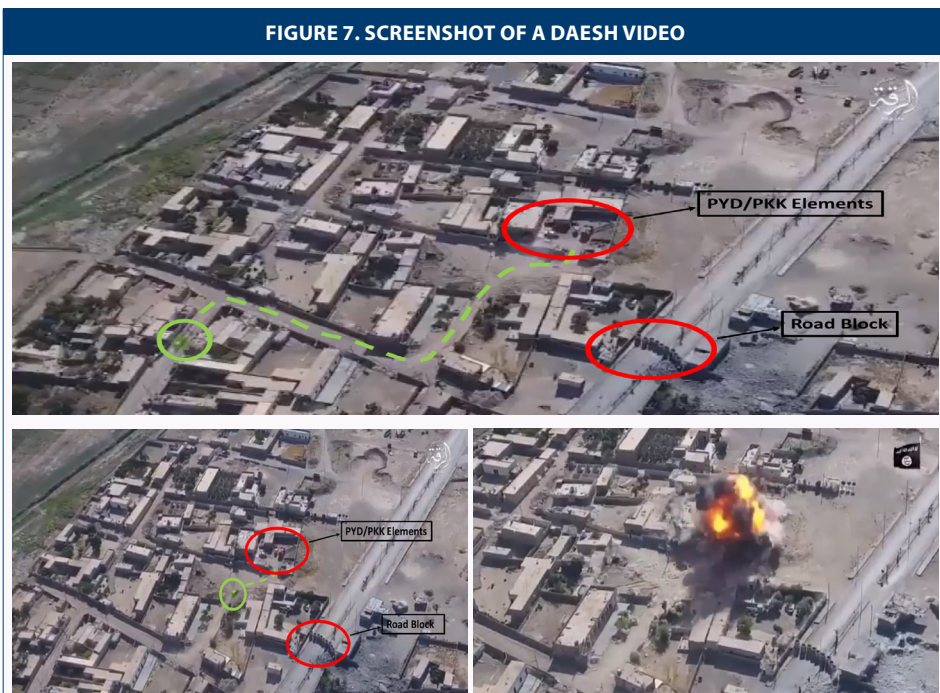
The extent of the casualties inflicted on the other party is not known due to the fact that the IED exploded at the end of the video. After the completion of the Mosul operation and the seizure of the UAV workshops, DAESH has not organized kamikaze attacks.

FIGURE 6. SCREENSHOT OF A DAESH VIDEO



DAESH continued to use drones in the Raqqa operation in Syria, as in Mosul. Figure 6 depicts the attacks against the PYD/PKK elements trying to remove DAESH from the Tabqa Dam during the Raqqa operation. The UAV program effectively implemented in Mosul was used against the PYD/PKK terrorist organization in Raqqa. Despite all logistic support by the United States, DAESH could not be prevented from using drones as weapons.

As the PYD/PKK elements were moving forward to Raqqa, DAESH taking benefit of the open terrain, used drones for the purpose of reconnaissance/surveillance and dropping IEDs. When the PYD/PKK reached Raqqa city center, DAESH started to organize SVBIED attacks which were vectored by drones and the number of drone attacks increased. However, these attacks were not as intense as in Iraq. During the Battle of Mosul, over 160 videos or pictures were released showing SVBIED attacks - compared to the 26 in Raqqa.¹⁷ Iraqi Counter-terrorism Service (CTS) units recorded 52 DAESH drone sorties in just one day.¹⁸ The group, however, failed to score that number in Syria. The reasons are the decrease in the organization's supply chain and in technical capability, as it loses territory and personnel respectively.



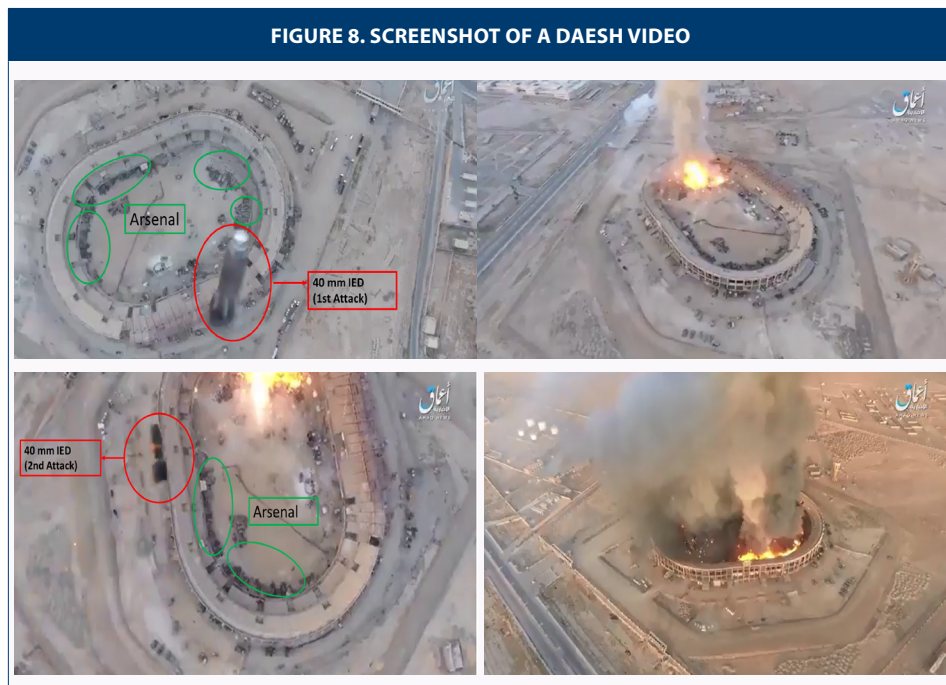
17. Robert Postings, "An Analysis of the Islamic State's SVBIED Use in Raqqa", *International Review*, May 11, 2018, international-review.org/an-analysis-of-islamic-states-svbied-use-in-raqqa, (Retrieved on: September 19, 2018).

18. Dod Buzz, "Iraqis Use Drones to Turn Tables on ISIS", *Military*, April 27, 2017, www.military.com/dodbuzz/2017/04/27/iraqis-use-drones-turn-tables-isis, (Retrieved on: September 14, 2018).

Although the number of attacks decreased, the tactics used in Iraq were successfully transferred to the Syrian battleground. In order to vector the bomb-laden SVBIED to the target, drones were used in Raqqa as well. Figure 7 depicts an example of this type of attack.

Examining Figure 7 reveals that the road to the PYD/ PKK positions is closed with barricades. With the help of a drone, however, DAESH easily plotted a route to the PKK/PYD site and detonated a bomb-laden vehicle in the middle of its target. Owing to the natural camouflage provided by the city center, the suicide attack vehicle in the UAV-coordinated attacks could not be recognized until the last moment, and thus the Raqqa operation was slowed down, and in parallel, the casualties of the PYD/PKK increased.

DAESH also continued to use drones against the regime elements in Syria. Especially by conducting point attacks, the impact of the attacks was far greater than the impact created by 40 mm munitions under normal circumstances. Figure 8 depicts how a huge regime munitions depot in Deir al Zor was rendered useless by the use of a drone and two 40 mm IEDs. As a result of the attack in October 2017, the explosions and fire at the depot lasted over a day.



As seen, drones for air-borne attacks have been effectively used by DAESH both in Syria and Iraq. In some cases, DAESH held attacks with a fleet of drones, consisting

of five UAVs.¹⁹ The U.S. military units observe how DAESH uses drones, learn lessons and also meticulously transfer relevant issues to the asymmetric warfare doctrine. Against DAESH's drone technology, the U.S. has begun to install anti-UAV systems on some tactical vehicles used on the ground.²⁰

Thanks to this new opportunity, DAESH has gained the ability to perform attacks from the air even though it does not have planes. With this, DAESH made progress from camouflaged IED attacks to UAV-guided VBIED attacks, that followed a new dimension with airdrop IEDs causing security forces to reciprocate.

Figure 9 shows the position of the U.S. soldiers on guard during the Mosul operation. When the image is examined, it is seen that the net and the concrete block above the soldiers are to protect them against air-dropped IEDs. The DroneDefender that can be seen behind them will be used to electronically jam any approaching drones.²¹



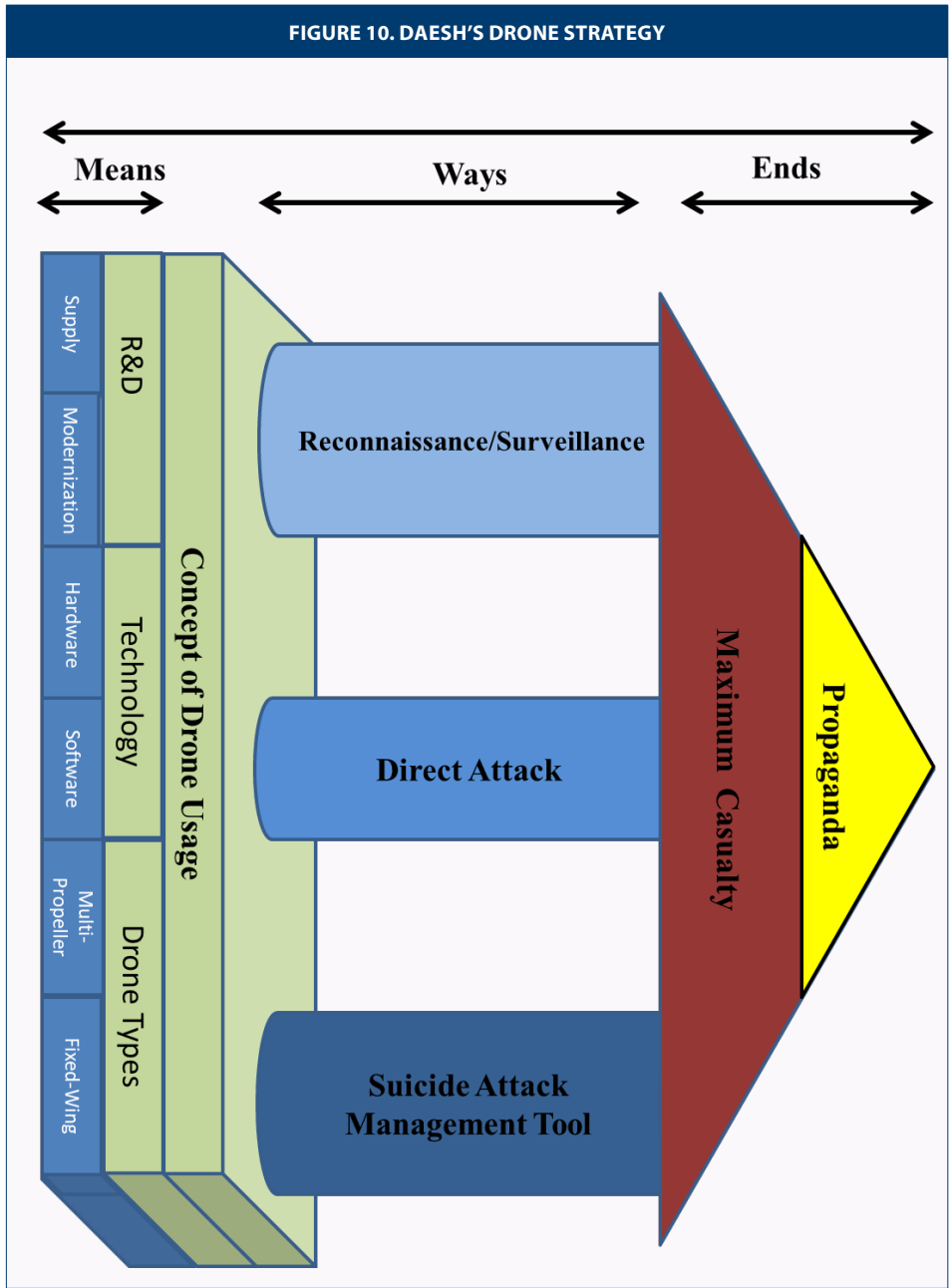
With all these examples, it is seen that DAESH uses UAV technology in a strategic framework rather than a tactical one. Figure 10 shows DAESH's drone

19. David Marchin, "ISIS Drones Disrupt US-Backed Iraqis' Fight for Mosul", CBS News, February 25, 2017.

20. Jen Judson, "DRONE Warfare in Mosul Shapes US Army Training to Defeat Airborne Threats", Defense News, March 14, 2017, www.defensenewp.com/articles/drone-warfare-in-mosul-shaping-us-army-training-to-defeat-airborne-threats, (Retrieved on: July 14, 2018).

21. Ben Sullivan, "The Islamic State Is Pioneering a New Type of Drone Warfare", Motherboard, February 2, 2017, https://motherboard.vice.com/en_us/article/nzd3x8/the-islamic-state-is-pioneering-a-new-type-of-dro-ne-warfare, (Retrieved on: June 4, 2018).

strategy.²² After DAESH, other NSAAs, as well, have started to use drones in the scope of DAESH’s drone strategy, in general.



22. Balkan, *DAESH’s Drone Strategy Technology and the Rise of Innovative Terrorism*, p. 24.

HTS (SYRIA)

Commercial drones have been also used by Hayat Tahrir al Sham (HTS)²³ in Syria. In a propaganda video, HTS showed that they took advantage of drones in order to break the Maliha siege in 2014. This was the first known drone use by HTS. A screenshot of the video, which displays the region and was recorded during the siege of Maliha in Syria, can be seen in Figure 11.



HTS, then, started to organize attacks with IED-loaded drones. Thus, it has been determined that HTS, as DAESH, uses drones as an attack tool by loading them with IEDs. In this context, although there were attacks on an individual basis previously, the first comprehensive attack was held on December 31, 2017 targeting Khmeimim Air Base and Tartus Naval Base. On January 5, 2018, HTS organized its first multi-drone attack with a group of 13 UAVs. The Russian Ministry of Defense claimed that all 13 drones were downed.²⁴

Russia, later on, shared the images of the fixed-wing drones used in the attacks.²⁵ After technical examination of the images, it was considered that the multi-drone

23. For a detailed report on the emergence and transformation of HTS see Can Acun, Bilal Salaymeh and Bünyamin Keskin, *El-Kadide'den HTŞ'ye Nusra Cephesi*, (SETA Rapor, Istanbul: 2017).

24. Alexander Harper, "Drones Level the Battlefield for Extremists", Lowy Institute, September 17, 2018, www.lowyinstitute.org/the-interpreter/drones-level-battlefield-extremists, (Retrieved on: November 14, 2018).

25. Vladimir Isachenkov, "Whose Drones Did the Russian Military Capture in Syria?", Military Times, January 11, 2018, www.militarytimes.com/flashpoints/2018/01/11/whose-drones-did-the-russian-military-capture-in-syria, (Retrieved on: January 14, 2018).

might have been launched with the help of a catapult launcher. It is also seen through the images that the drones are similar to the UAVs that DAESH used previously and that they have many tapes on their wings just as with the fixed-wing drones used in Mosul. Considering basic aviation and aerodynamic information, this indicates that the configuration change was conscious. Thanks to these tapes, the drones saved on fuel by decreasing the friction rate in the air, and therefore, increased their capacity to fly farther. Furthermore, it becomes more difficult to catch them because the area that the drones cover in the radar cross section area is reduced.

Thanks to the fuel tank installed in its body, drones are capable of covering a much greater distance than other commercial UAVs. It is seen that 10 IEDs can be placed under the fixed wings and that all the IEDs, which are secured to this strut by some kind of mechanism that is controlled by the servo motor, can be released at the end at the same time (burst-fire type).²⁶

FIGURE 12. MULTI-DRONE ATTACK AGAINST KHMEIMIM AIR BASE AND TARTUS NAVAL BASE



26. Nick Waters, "The Poor Man's Air Force? Rebel Drones Attack Russia's Airbase in Syria", Bellingcat, January 12, 2018, www.bellingcat.com/news/mena/2018/01/12/the_poor_mans_airforce, (Retrieved on: January 21, 2018).

The absence of landing gears on the drones indicates that they were designed for single use and the absence of a camera indicates that there was no propaganda purpose. The selection of high-value targets (e.g. airplanes) for the attack and the use of multi-drones hint at good advance planning. But all were rendered inoperable after the attack.²⁷ According to some sources, four SU-24s, two SU-35s, and one AN-72 fighter jet were damaged,²⁸ but the images shared by the Russian soldiers on social media demonstrate only 2 SU-24s were damaged. The reason for the damage seen in the shared photos was announced by Russian sources as a mortar attack. However, doubts remain whether the aircrafts were actually damaged by 40 mm IEDs. All this sets forth that drone attacks are moving from a technical to a tactical level and that their operative impact increases with asymmetric use.

Considering that they have a GPS system although there is no additional equipment, such as a camera, sensor, or antenna, it seems that HTS drones are autonomous UAVs which can be preprogrammed. Autonomous drones have the capability to release the IEDs secured on them, after following a certain route and reaching a certain coordinate with the assistance of GPS. Since these UAVs are preprogrammed, they do not emit any radio signals.

In the east of Ukraine, Russians have gained a great deal of experience in jamming and preventing drone activity. However, the Russian electronic jamming devices were not as effective as they were in Ukraine against autonomous drones that do not emit radio signals. As a result, HTS continued its attacks. In response, Russians have started to work on special ammunition –30 mm and 57 mm shrapnel ammunition in particular– to be used against drones. This way, Russians aim to deal with drones not only via the electronic jamming method but also by kinetic kill method. However, these munitions have not yet been authorized for official use.²⁹ For this reason, Russia had to increase the number of air defense systems in the region. Therefore, in particular, Pantsir S1 short missile air defense systems were deployed against drones and rockets in the region.³⁰ In July 2018 only, Russians were attacked by drones loaded with

27. "Russia Takes Aim at US over Series of Syria Drone Attacks," US News, January 9, 2018.

28. Tyler Rogoway, "Report Says Multiple Aircraft at Russia's Air Base in Syria Destroyed in Attack," The Drive, January 3, 2018, www.thedrive.com/the-war-zone/17350/report-says-multiple-aircraft-at-russias-air-base-in-syria-destroyed-in-attack, (Retrieved on: January 21, 2018).

29. Vladimir Smirnov, "Russia to Develop Anti-Drone Shrapnel Ammunition," TASS, April 18, 2017, tasp.com/defense/941885, (Retrieved on: July 25, 2018).

30. Peter Beaumont and Andrew Roth, "Russia Claims Syria Air Defences Shot down 71 of 103 Missiles," *Guardian*, April 14, 2018.

45 IEDs at Khmeimim Base. Russian Defense Ministry Spokesperson Major General Igor Konashenkov said in a statement that the UAV technology has gradually become more sophisticated.³¹ However, the attacks were thwarted by the air defense systems in the region.

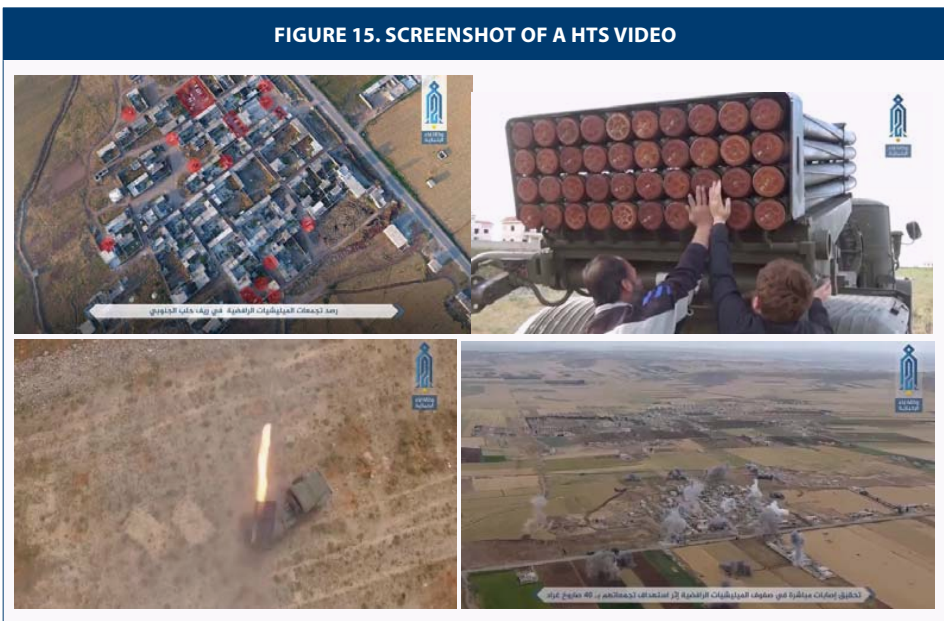
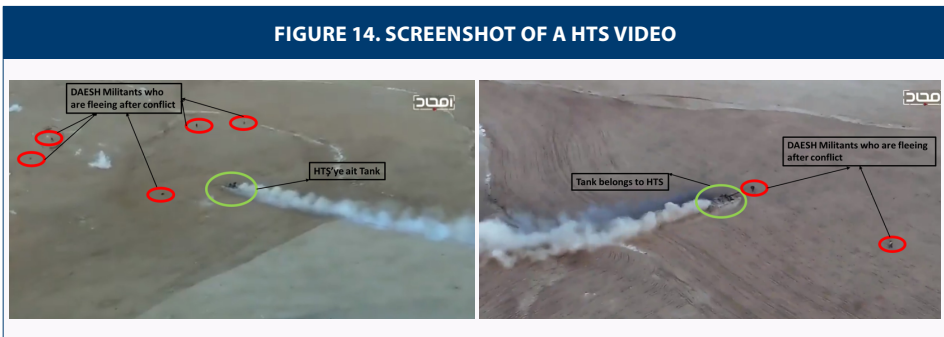
HTS has also used drones to coordinate suicide attacks with SVBIEDs and to vector vehicles to the target. Figure 13 depicts three different types of SVBIEDs controlled by the HTS militants.



Like DAESH, HTS coats suicide vehicles with armor. However, differently from the attacks that were committed so far, Figure 13 indicates the use of tablets in vehicles used by HTS. Drones used during the suicide attacks of DAESH were guided by an operator, the information received at a video-watch center was instantly transferred to the suicide attacker through radio, and the attack was accurately guided to the target. On the other hand, HTS seems to have developed the following method of attack: The driver had live streaming from the drone's camera and was able to commit the attacks with greater precision.

31. Fred Pleitgen, "Russian Airbase Attacked by Drones in Syria", CNN, August 5, 2018.

Another indication that HTS has taken UAVs to a different level –as opposed to other NSAA– is presented in Figure 14. The images from a HTS video broadcast for propaganda in January 2018 show the group engaged in combat with DAESH in East Hama. It appears from the video that with the use of drones HTS elements discovered the location of DAESH militants who had escaped after the fight and located their escape route. With the guidance of the UAV images, HTS militants with a tank captured the runaway DAESH militants and neutralized them.



Apparently, HTS uses drones in an effective way for vectoring mortar attacks to target. Figure 15 shows 40 rockets, guided by a drone, that were launched into the Shiite militia region and the regime units. Thanks to prior

planning and the guidance by the drone, the targets of the attack in Aleppo were hit more accurately, causing more casualties among the Shiite militia and regime elements.³² Meanwhile, the images captured by the drone were used for propaganda purposes.

When HTS's use of drones is examined in general, it is seen that the group has completed the adaptation process and by using DAESH's methods of attack, it has carried drone employment and attack tactics even further. Human resources equipped with technical know-how and the environmental factors of an intense conflict environment have played a role in this development.

HEZBOLLAH

Hezbollah has completed its own process of adaptation to UAV technology. Many Hezbollah drones fly to Israel through the Baqa Valley. Hezbollah is thought to have a small swarm of drones consisting of about 200 UAVs of different types and sizes. The increasing risk of Hamas's using drones and rockets and Hezbollah's increasing drone capacity aggrandized Israel's perception of threat, and led Israel to improve its capacity to detect, diagnose, and destroy threats through the Iron Dome.³³

Although the U.S. has added two Chinese companies selling drones to Hezbollah to the sanction list as of November 2015, and Israel tried to hinder Hezbollah's drone capacity, the group seems to manage using both small and large drones and has improved its capabilities in the environment of the Syrian conflict even further. For instance, Hezbollah broadcast a video of a drone used to coordinate an artillery shooting against HTS during a combat in the Kalamun enclave, Syria. Another Hezbollah video shows an attack against DAESH by an IED-loaded drone.

The attack of an IED-loaded drone in Figure 16 shows that for the first time, Hezbollah used a commercial type drone for offensive purposes.³⁴ It is apparent that the measures taken by Israel directly influenced Hamas's learning process, but this was not the case for Hezbollah. In fact, Hezbollah improved in this area as a result of the environment in Syria where intense conflict exists.

32. Muhammed Bedr, "الجيش النصر : خروج مطار حماة العسكري عن الخدمة لاستهدافه بعشرات الصواريخ", Smart News, April 16, 2017, goo.gl/6jAhzD, (Retrieved on: November 20, 2018).

33. Avery Plaw and Elizabeth Santoro, "Reaping the Whirlwind: Drones Flown by Non-State Actors Now Pose a Lethal Threat", *Terrorism Monitor*, Vol: 15, Issue: 17, (2017).

34. "Hezbollah Uses Drones against ISIS in Syria", Reuters, August 21, 2017.

FIGURE 16. SCREENSHOT OF A HEZBOLLAH VIDEO



THE HOUTHY MOVEMENT

It can be said that the Houthis are more advanced in using autonomous technologies than other non-state actors. Iran's support of the Houthis, in this regard, is an effective factor in self-development. The Houthis seized Yemen's coastal missile batteries and the sea mines and sea surface missiles in the Yemen arsenals in 2015. All of these systems are included in their modernization program with the support of Tehran and are integrated with the Iranian systems. After this integration, the Houthis have begun to use the autonomous systems for both air and sea attacks. Sea-surface missiles were mounted on Houthi boats. In addition, by establishing close to 30 coastwatcher stations, the Houthis have the opportunity to determine their attacks and coordinate them on the sea.³⁵

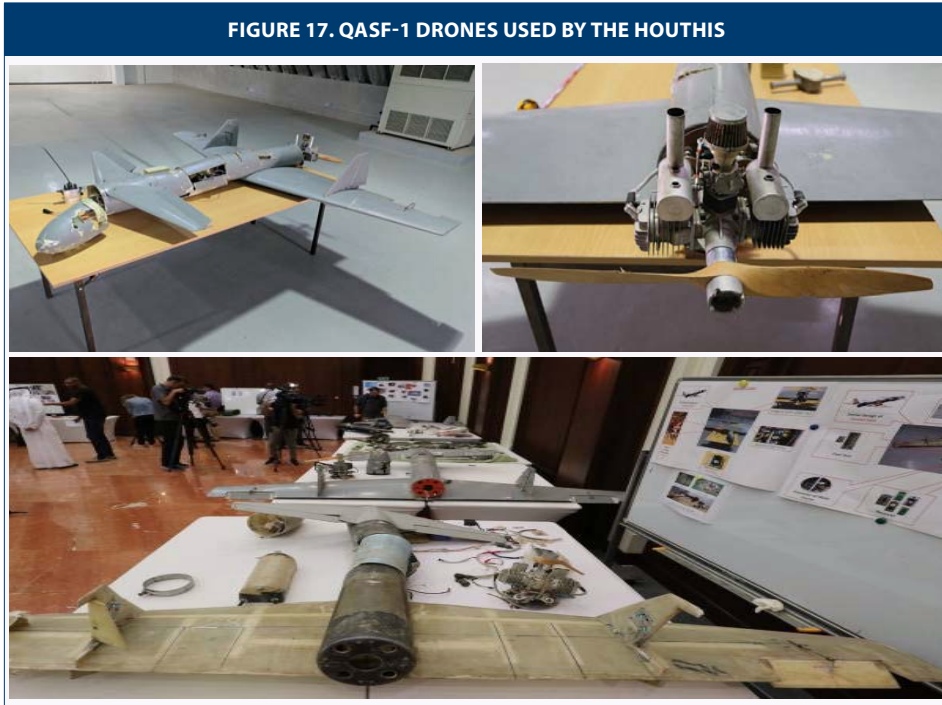
The Houthis have reached the level to be able to threaten the coastal forces of the coalition forces in the Bab-el-Mandeb strait and the oil trade of the coalition countries by self-guiding boats named "Shark-33". A *Shark-33* was used in an attack on a Saudi Arabian frigate on January 30, 2017 that killed three Saudi sailors.³⁶ In another attack in July 2018, Saudi oil tankers suffered damages in the Bab-el-Mandeb strait. Following this, the Saudis announced the suspension of all oil shipments until further notice.³⁷

35. Michael Knights, "The Houthi War Machine: From Guerrilla War to State Capture", *CTC Sentinel*, Vol: 11, Issue: 8, (2018), pp. 20-21.

36. Rifat Süleyman, "فرقاطة سعودية تتعرض لهجوم من قبل زوارق يقودها انتحاريون غرب ميناء الحديدة", Arabic RT, January 30, 2017, <https://goo.gl/ZOapLk>, (Retrieved on: May 24, 2017).

37. Ellen R Wald, "Attack on Saudi Oil Tanker in Red Sea Prompts Halt to Oil Shipments", *Forbes*, July 25, 2018.

The IEDs mounted inside the *Shark-33* boats are camouflaged by being loaded with fish. Thus, boats look like fishermen's boats and cannot be perceived as a threat until last minute. The boats reach a 35-40 knot speed and owing to GPS they can be guided to the target from a nearby ship. Again, the attack is recorded from another ship or boat nearby for propaganda purposes.³⁸



In addition to self-guiding systems in the sea, the Houthis seem to benefit from airborne drones. These are the type of Ababil drones that Tehran provides to Hamas and, again, they are transferred to the Houthis by Iran. The drones redubbed “Qasf-1” (aerial bombardment) by the Houthis are used for Kamikaze attacks on the Saudi Patriot surface-to-air missile system.³⁹ Both Saudi Arabia and the UAE use the surface-to-air MIM-104 Patriot missile launchers. These ramps are for detecting and destroying ballistic missiles launched by the Houthis into Saudi Arabia. With the onset of the conflicts in Yemen, these ramps have successfully performed their duties

38. Knights, “The Houthi War Machine: From Guerrilla War to State Capture”, pp. 20-21.

39. “Iranian Technology Transfers to Yemen”, Conflict Armament Research Perspective, (March 2017), pp. 2-5.

for nearly two years.⁴⁰ However, the Iranian-backed kamikaze drone attacks on these ramps have added a burden of cost to the coalition. Because even if a kamikaze drone attack is unsuccessful, a drone manufactured by spending a couple of thousands of dollars has to be downed by a million-dollar SAM missile. Figure 17 shows the Qasf-1 drones used by the Houthis, which were seized by the coalition forces and presented in an exhibition on June 19, 2018 in the UAE.

Other than kamikaze attacks, the Houthis also use IED-laden drones for assaults. According to Al-Masirah television channel, three attacks were committed by the Sammad-3 drone after 1,500 kilometers of flight to Abu Dhabi Airport in the UAE. Although the UAE denied the news, explosions were heard from the airport.⁴¹ Again, in another incident, the Houthis announced their attack on the King Khalid Air Base in the province of Khamis Mushait, Saudi Arabia.⁴² No video footage of these attacks has been provided, however. Figure 18 depicts another attack recorded and uploaded to the Internet by the Houthis for propaganda purposes. This attack was against the coalition forces located 45 kilometers south of the port of Al-Hudaydah in Yemen. Again, there is no video footage of the moment of explosion.



40. Tyler Rogoway, "Suicide Drones Have Migrated to the Conflict in Yemen," The Drive, March 24, 2017, www.thedrive.com/the-war-zone/8586/suicide-drones-have-migrated-to-the-conflict-in-yemen, (Retrieved on: September 1, 2018).

41. "Yemen's Rebels 'Attack' Abu Dhabi Airport Using a Drone," Aljazeera, July 27, 2018.

42. "الحوثيون يستهدفون قاعدة جوية سعودية بطائرة مسيرة"، Aljazeera, August 4, 2018.

It has also been observed that the Houthis have committed artillery shootings vectored by drones - another way of using UAVs. On September 11, 2018, four different points, including the coalition elements about 2.5 kilometers south of Al-Hudaydah, were hit with precision through drone-guided artillery shooting. The Houthis afterwards published the drone images of this attack.⁴³ Figure 19 depicts a screenshot of video footage of the moment of attack. Similar types of attacks prove drone-guided artillery shootings seem much more effective. It is believed that only regular armies have the capability to determine fully coordinates of a chosen target and destroy it. However, this perception has changed with the use of commercial drones by NSAAs. Now, NSAAs are capable of detecting and shooting targets with the help of drones, and correcting detected target deviations (if any), thus hitting the target with full precision.

FIGURE 19. SCREENSHOT OF VIDEO FOOTAGE BY HOUTHIS



Another attack guided by a drone was carried out on November 3, 2018 in Al-Hudaydah against a coalition convoy out on an operation. The convoy was hit by the Houthis' drone-guided Bedr-1P missile and the images of the attack were captured instantaneously.⁴⁴ It was announced by the Houthi Missile Unit on October 28, 2018 that the short-range Bedr-1P missile is the advanced form of the Bedr-1 manufactured after many successful tests.⁴⁵ The drone-guided missile was successfully used against the coalition elements only a few days after the announcement of its successful manufacturing. Figure 20 depicts an image of the attack.

43. Jeremy Binnie, "Yemeni Rebels Use UAVs for Artillery Spotting", *Jane's 360*, September 12, 2018, www.janep.com/article/82920/yemeni-rebels-use-uavs-for-artillery-spotting?from_rss=1, (Retrieved on: September 16, 2018).

44. "شاهد لحظة استهداف أرتال الغزاة بصاروخ باليستي في الساحل الغربي", *Almasirah*, November 3, 2018.

45. "جماعة الحوثي تدعو التحالف لتصفير عداد الصواريخ", *Almawqea*, October 29, 2018, almawqea.net/news/35243#W97ezJMza70, (Retrieved on: November 5, 2018).

The Houthis seem to have completed the adaptation process to autonomous systems, both in sea and air, with the support of Iran. Thus, the group poses a threat against the existence of the coalition elements in the Red Sea and the energy supply of the coalition countries via the sea. The Houthis have become the second NSAA to take advantage of the autonomous marine systems after the use of autonomous submarines in South America for drug trafficking purpose. But they are the first in using autonomous marine systems for attack purposes. The completion of the Houthis' technology adoption process has been made possible by the intense-conflict environment and Iran's support.



PYD/PKK

Outside its territory, DAESH has used drones against the Peshmerga, Hashd al-Shaabi, and the PYD/PKK. Therefore, these groups are among the first to have learned the use of drones. Rather than completing their own adaptation processes, they preferred to use ready-to-attack drones seized directly from DAESH. In this context, the PYD/PKK attempted several bomb attacks against the Turkish Armed Forces (TAF) with IED-loaded drones which were seized from DAESH during the Raqqa operation. Turkish forces downed an IED-laden PKK drone targeting

a military unit in downtown Hakkari.⁴⁶ Another IED-loaded drone was destroyed during an operation in November 2017.⁴⁷ In addition, on May 3, 2018, the TAF using anti-drone elements thwarted an attempted drone attack in the region of Mount Güven Military Base in Zap, north of Iraq.⁴⁸

FIGURE 21. A PYD/PKK DRONE



In the meantime, however, the PYD/PKK has continued to develop its abilities to use drones. To this end, the terrorist organization organized the most sophisticated attack on November 10, 2018 in Şırnak, east of Turkey. Instead of having multiple attacks on a single point, the terrorists sent a total of eight UAVs loaded with nail-enforced plastic explosives to multiple military points targeting military personnel outside during a commemoration ceremony.⁴⁹ The assault targeted military personnel who were in the open due to the commemorative ceremony for Atatürk on November 10. Some of the drones were halted with direct gunshots and some crashed on their own. The remaining UAVs were used for kamikaze attacks to hit the ceremony area, but the explosives on the drones were neutralized with electronic jammers. Figure 22 depicts the drones confiscated following the attack.

A closer look at the image reveals that X-UAV Talon type drones were used and an IED release mechanism was not installed, but instead, plastic explosives were wrapped around the drone. That led to the drone's failure to be used for a kamikaze attack because of the electronic jammers. Considering that all of the drones were

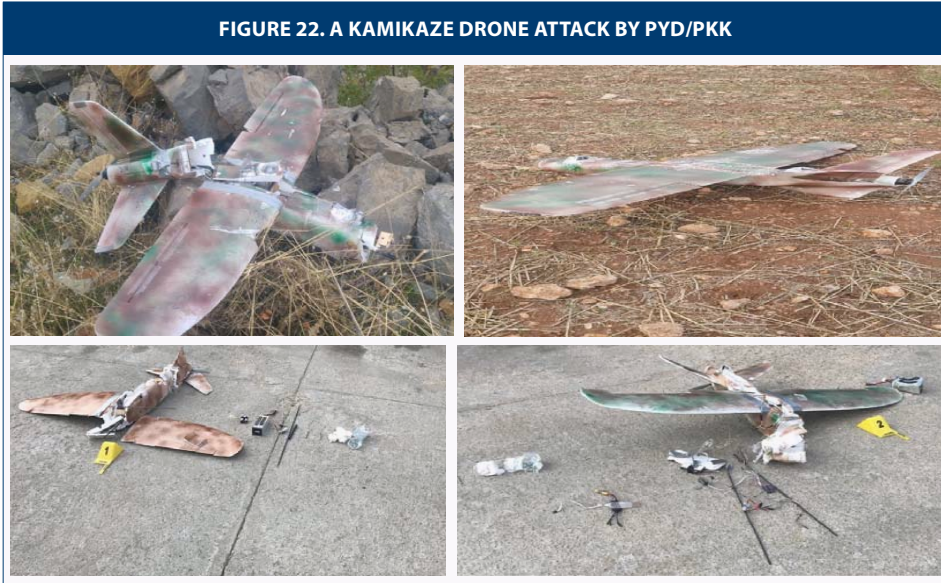
46. "Hakkari'de PKK'lı Teröristlerin Kullandığı Drone Düşürüldü", *Türkiye*, October 13, 2016.

47. "Ağrı'da Bombalı PKK Drone'u Düşürüldü", *NTV*, November 12, 2017.

48. "Teröristlere Ait Drone Düşürüldü", *Anadolu Ajansı*, May 3, 2018.

49. "Teröristler Şırnak'ta 8 Model Uçakla Saldırı Düzenledi", *Habertürk*, November 11, 2018.

camouflaged and an attempt was made to attack eight different points at the same time, it is thought that the terrorist organization was trying to create the impression that they have regular air capability.



With regard to this newly developed tactic, a new attack using three nail-reinforced, C4 plastic explosive-loaded drones was carried out by the PKK/PYD on January 1, 2019. Two of the drones used in the attack targeted the Martyr Ercüment Türkmen Barracks in the town of Silopi, and one the District Gendarmerie Command in the town of Cizre.⁵⁰ As can be observed in the footage recorded during the attack, attempts were made to neutralize the drones by direct shooting. This is the most ineffective counteraction against drones. Indeed, although the drones were taken under heavy fire, only one of the drones used in the attack could be neutralized. The other two exploded on the ground where they crashed as kamikaze drones.⁵¹ Figure 23 shows the drone pieces seized after the attack.

An examination of Figure 23 shows the numbers on the wings. Similarly, there were numbers on the drones used in the attack on November 10, 2018. Also, C4 explosives reinforced with nails were used in both of the attacks and both took place in the region of Şırnak. Thus, it is thought that the drones were manufactured at the same place, which is in close proximity to Şırnak and somewhere beyond the Syrian border.

50. "Hain Saldırı Son Anda Engellendi", Haber 7, January 1, 2019.

51. Sertaç Aksan, "Şırnak'ta Uç Model Uçak Düşürüldü", *Yeni Şafak*, January 1, 2019.

FIGURE 23. A KAMIKAZE DRONE ATTACK BY PYD/PKK



When the attacks of the PYD/PKK for the last two years are examined, it becomes clear that the terrorist organization has used drones both for the purpose of kamikaze attacks and for dropping the IEDs installed on them. However, the PKK/PYD has not been able to use drones as efficiently as DAESH and there have not been any casualties or injuries in drone attacks by the PKK/PYD to date. Yet, it is evaluated that the PYD/PKK can increase the number of drone attacks and diversify its drone attack methods against the TAF in the upcoming period.⁵² The terrorist organization has preferred to attack multiple targets at the same time in its drone attacks. However, it is likely that given the lack of an anti-drone system, difficulty will arise if a swarm of drones attack on a single point. For this reason, it is necessary to be prepared against drone attacks in critical areas, especially in regions close to Syria, since the drone workshops captured by the PKK/PYD from DAESH are there. It should be kept in mind that the deactivation of drones by direct shooting is difficult and that neutralizing preprogrammed drones, the coordinates of which are sent to carry out attacks on certain points, may not be possible by using electronic jammers given that they are autonomous.

52. Arda Mevlütoğlu, "10 Kasım Bombalı İHA Saldırıları Üzerine Bazı Notlar", Siyah Gri Beyaz, November 26, 2018, www.siyahgribeyaz.com/2018/11/10-kasm-bombal-ih-saldrilar-uzerine-baz.html, (Retrieved on: November 29, 2018).

THE USE OF DRONES IN AFRICA

GENERAL HAFTAR SUPPORTERS (LIBYA)

In North Africa, many NSAAs and terrorist organizations are located in Libya. Although the environmental conditions are appropriate, the systematic use of UAVs has not been detected in Libya. The first use of drones was by DAESH in 2016 and the group shared images of a conflict which had been recorded by a drone in Benghazi.⁵³ The first use of an IED-laden drone for attack purposes took place in Derna by pro-General Haftar forces.



53. "Binghazi: The Meaning of Stability # 2", Wilayat Bargah, January 16, 2016.

Figure 24 shows a drone attack by the pro-Haftar groups on April 23, 2018 and the images of a drone downed after the attack. Apparently, a DJI Matrice-type drone was modernized and loaded with two IEDs. It was shot down and seized by the Mujahedeen Shura Council in Derna.



A video released by DAESH in July 2018 included the images of a SVBIED. When the photographs depicted in Figure 25 are examined, it becomes clear that the IEDs and blasting mechanisms used by DAESH in Iraq and Syria are also used in Libya. Considering that DAESH used drones for propaganda purposes in Libya in 2016 and has already transferred its methods from Iraq and Syria to Libya, it is considered that in the near future drones could be used more systematically and for attacking purposes. It is noteworthy that drones are used less in Libya despite the environment of intense conflict. One of the main reasons for this is the lack of technical capacity on the side of the NSAAs or the technical deficiencies in the use of this new technology.

BOKO HARAM

DAESH is described as an international terrorist organization based on its self-proclaimed historical heritage. Boko Haram, on the other hand, is considered a local one. After changing its leadership structure in 2009, Boko Haram initiated a tactical adaptation process by copying the tactics of international extremist organizations. Abubakar Shekau took the helm of the organization and tactically copied other organizations, carrying the ideological perspective of the organization to a Salafi position. He applied the tactics of DAESH and set their activities as an example. Immediately after DAESH announced the caliphate, Boko Haram declared its caliphate in its own territory. Similarly to DAESH, Boko Haram

organized assassinations, abducted people, kidnapped and sold women as slaves, and used them as suicide bombers.⁵⁴ As a result of this tactical and ideological rapprochement, Boko Haram declared subordination to DAESH and changed its name to “West African Islamic State” soon thereafter.⁵⁵

Boko Haram committed a SVBIED attack against the United Nations building on August 26, 2011. After this date, the group carried out suicide attacks with several bomb-laden vehicles by using female suicide bombers.⁵⁶ Boko Haram by closely following all of DAESH’s acts of terror has started to utilize drones as well. The first use of drones by Boko Haram was reported by the newspaper *L’Oeil du Sahel* on September 4, 2017. The relevant news read that Boko Haram utilizes drones in Cameroon and Nigeria for reconnaissance, surveillance, and attack.⁵⁷

Boko Haram released a 16-minute propaganda video in January 2018. The seventh minute shows the use of drones for reconnaissance/surveillance over the areas where security forces are deployed.⁵⁸ However, no IED-loaded drone attack has been carried out so far. The vehicles used by this terrorist group in suicide attacks are similar to the up-armored SVBIEDs employed by DAESH. On July 11, 2018, Boko Haram released a video titled “Tribulations and Blessings” showing the group’s use of up-armored vehicles in suicide attacks for the first time.⁵⁹ The video also shows a SVBIED-manufacturing facility where these vehicles are prepared.

54. Jacob Zenn, “Boko Haram beyond the Headlines: Analyses of Africa’s Enduring Insurgency”, West Point Combating Terrorism Center, (May 2018), pp. 3-110.

55. Abubakar Yahaya, “Boko Haram and Islamic State of Iraq and Syria: The Nexus”, *Polac International Journal of Humanities and Security Studies*, Vol: 2, Issue: 1, (2016), pp. 299-312.

56. “Threat Tactics Report: Boko Haram”, United States Army Training and Doctrine Command, (January 2015), p. 12.

57. “Boko Haram Utilise les Drones”, *L’Oeil du Sahel*, September 4, 2017.

58. “Boko Haram Released Video Showing ‘Gunned down Aircraft’, Drone and Other Military Assets in Sambisa”, Salkida, January 14, 2018, <https://salkida.com/boko-haram-released-video-showing-gunned-down-aircraft-drone-and-other-military-assets-in-sambisa>, (Retrieved on: January 17, 2018).

59. John Campbell, “Up-Armored SVBIEDs Make Their Way to Nigeria”, CFR, July 26, 2018.



Figure 26 indicates that Boko Haram's preparation for a suicide attack and its method of attack are the same as those of DAESH. This means that Boko Haram continues to copy DAESH tactics. For this reason, although it has been determined that the terror group has used drones only in reconnaissance/surveillance activities until now, it is pointed out that, in the near future, the group will be able to complete its process of adopting IED-laden drone attacks and vectoring SVBIEDs by drones.

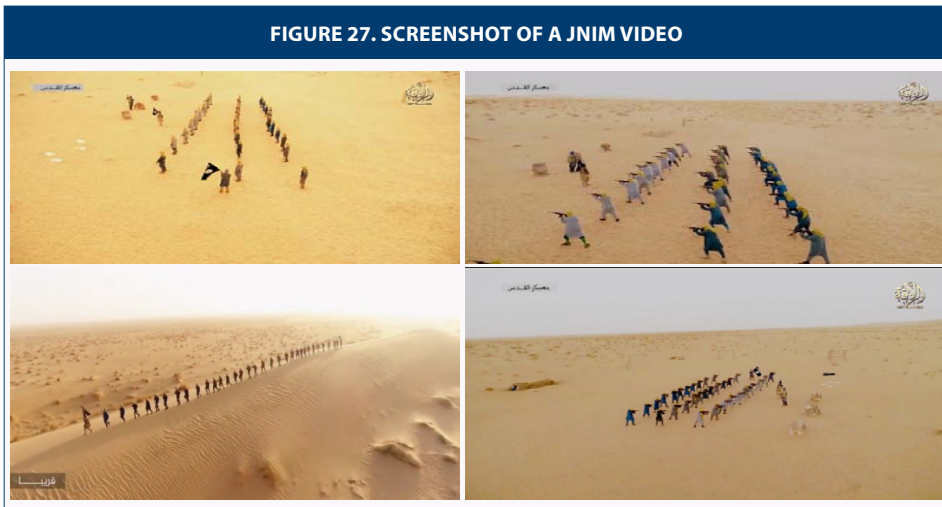
JAMA'AT NUSRAT AL-ISLAM WAL-MUSLIMIN (JNIM)

Another NSAA in Africa using drones is Jama'at Nasrat al-Islam wal-Muslimin (JNIM). In September 2018, the U.S. State Department designated JNIM as a foreign terrorist organization.⁶⁰ Since its formation in March 2017, JNIM, al Qaeda's affiliate in Mali and West Africa, has been responsible for numerous attacks against both non-Muslims and regional security forces. The group is specifically opposed to France, which has maintained a military presence in Mali since 2012. For this reason, JNIM conducted a major attack on France's embassy in Ouagadougou, Burkina Faso on March 3, 2018. It also orchestrated an attack in April 2018 on a French military base and UN mission in Timbuktu, Mali, and injured seven French soldiers. The group used a SVBIED to breach the base and organized another attack against

60. "State Department Terrorist Designation of Jama'at Nusrat al-Islam wal-Muslimin (JNIM)", United States Department of State, September 5, 2018, www.state.gov/r/pa/prs/ps/2018/09/285705.htm, (Retrieved on: September 10, 2018).

French and UN forces in July 2018.⁶¹ Moreover, JNIM released a video entitled “And the Battle Continues” on September 2018 and announced its intention to continue attacks against the French military presence in Mali.

JNIM released yet another video entitled “Deterring the Tyrants: 2” in March 2018 showcasing a military camp called “Jerusalem.” When the images are examined, it is apparent that the training taking place in the camp was recorded by a commercial drone. Figure 27 depicts drone footage of the camp Jerusalem.⁶²



Although JNIM is a newly formed terror group, it increases its attacks every passing day. The group has begun to benefit in their attacks from the methods and tactics used by other organizations. In this regard, it is pointed out that JNIM might organize air strikes with IED-loaded drones against the French troops in Burkina Faso.

A systematic use of drones has not yet been identified in Africa although it is expected that it can become the most common place for the use of drones due to its environment of intense conflict. The reason for the lack of systematic drone use is the lack of technical staff or the reluctance of terrorist organizations to move towards new technology.

61. Danika Newlee, “Jamaat Nasr al-Islam wal Muslimin (JNIM)”, CSIS, September 25, 2018.

62. Caleb Weiss, “Al Qaeda Group JNIM Releases High-Level Production Video”, Long War Journal, March 21, 2018.

USE OF DRONES IN EURASIA AND ASIA

RUSSIAN-BACKED SEPARATISTS (UKRAINE)

In the context of the ongoing fights in Ukraine, both Russian-backed separatists and groups participating voluntarily in the Ukrainian army use commercial drones. The first use of drones by pro-Russian separatists was for the purposes of reconnaissance/surveillance in order to determine the location of Ukrainian troops. The process of using drones for attacks was completed rapidly by pro-Russian separatists with the help of Russia. In addition, Ukrainian troops suffered heavy casualties as a result of artillery and rocket shootings which were vectored by drones.⁶³

The casualties caused to the Ukrainian troops by separatists using drones were not limited to this. Just as DAESH caused the explosion of a whole arsenal by dropping a 40 mm IED from a commercial drone in Deir al Zor, Syria, the separatists in Ukraine caused the explosion of an ammunition store in Eastern Ukraine by using a Russian-made Termite grenade-laden drone and caused damages amounting to a billion U.S. dollars.⁶⁴ Figure 28 shows the screenshots of the grenades dropped from the drone by the rebels and the video footage taken after the arsenal exploded. Apparently, however, the video was not recorded with a commercial drone but was taken by a member of the separatist group from a distance.

63. Mary Chastain, "Ukraine Separatists Use Russian Drones to Attack Ukrainian Army", Breitbart, January 31, 2015, www.breitbart.com/national-security/2015/01/31/ukraine-separatists-use-russian-drones-to-attack-ukrainian-army, (Retrieved on: August 15, 2018)

64. Kelsey D. Atherton, "Something Scarier than a Grenade-Toting Drone", *Popular Science*, July 29, 2017.

FIGURE 28. A SCREENSHOT OF A VIDEO TAKEN BY RUSSIAN-BACKED SEPARATISTS



A group called “Aerorozvidka” consisting of volunteers from the Ukrainian army was formed to prevent loss and damage caused by the heavy use of drones by the separatists. The purpose of this group is to employ commercial drones for gathering intelligence on the positions of the rebels and for attacking their positions. As a result, drones reaching a capacity of 4,000 feet altitude, with a capacity for longer flight time, and with the capacity to attack laden with IEDs was developed.⁶⁵ Figure 29 shows the group *Aerorozvidka* experimenting on commercial drones near Kiev before being sent to Eastern Ukraine.

FIGURE 29. USE OF DRONE BY AEROROZVIDKA



Figure 30 reveals two IED-laden drone attacks against the separatists by *Aerorozvidka*. However, as opposed to the separatists, *Aerorozvidka* failed to achieve the desired level of drone competency and could not have the desired effect on the separatists. The reason is that the rebels use advanced electronic jamming technology provided by Russia and easily neutralize the pro-military volunteers’ drones.⁶⁶

65. Christian Borys, “Crowdfunding a War: Ukraine’s DIY Drone-Makers”, *The Guardian*, April 24, 2015.

66. Larry Friese with N. R. Jenzen Jones and Michael Smallwood, “Emerging Unmanned Threats: The Use of Commercially Available UAV’s by Armed Non-state Actors”, ARES, Special Report No: 2, 2016, p. 51.



An evaluation of the case of Ukraine shows that both separatists and pro-military volunteer groups have completed their adaptation process and have used drones against each other. However, thanks to Russia's support to the separatists, casualties caused by drones have increased, and the separatists have gained the capacity to neutralize drones owing to the anti-drone technology provided to them by Russia. Russia has carried its anti-drone experience from Ukraine to Syria and has tried to take measures against the drones of HTS.

MARAWI MILITANTS (THE PHILIPPINES)

The Battle of Marawi brought into the open the connection between militants in the Philippines and DAESH. For about five months in 2017, the militants managed to gain territorial dominance in Marawi. The five-month clashes showed that the militants had undergone a disciplined preparation process. It became clear that the tactics and strategies of DAESH for urban warfare in Iraq and Syria had been transferred to the Philippines. During this time, Marawi militants, from the first week, started to use drones obtained through illegal channels from Hong Kong in the same way as DAESH before the Mosul operation.⁶⁷ Figure 31 shows a drone that was used by bandits in the battle of Marawi but was directly shot down and seized by the Filipino security forces.⁶⁸

In Marawi, drones were used for reconnaissance and surveillance purposes. This way, militants got advance warning of incoming military raids, and a modus operandi was decided accordingly. Footage obtained by the drones was also a boon

67. Thomas Luna, "DJI Drones Are Getting Shot down in the Battle of Marawi", WeTalkUAV, July 17, 2017, www.wetalkuav.com/dji-drones-used-surveillance-battle-marawi, (Retrieved on: August 17, 2018).

68. Joseph Tristan Roxas, "Maute-ISIS Bandits Use Drone in Marawi to Evade Pursuing Soldiers", GMA News, June 19, 2017, www.gmanetwork.com/news/news/nation/615099/maute-isis-bandits-launch-drone-in-marawi-amid-allahu-akbar-chants/story, (Retrieved on: August 17, 2018).

for their propaganda activities and media efforts in the Philippines as seen in the media series released by DAESH on the Internet.⁶⁹



The Marawi operation was completed with the killing of about 1,000 militants since October 2017. DAESH's activity in the country continued but remained limited. The affiliated groups committed nine attacks since January 2018 alone. In the Philippines, the first SVBIED attack took place on July 31, 2018.⁷⁰ The vehicle and IEDs used in the attack are seen in Figure 32.



Figure 32 shows that the IEDs used by DAESH in this attack were the same as those used in Syria and Iraq. This means that the existence of DAESH in the Philippines continues and their terrorist methods are used. Considering the fact that DAESH militants used drones during the Marawi clashes, that the IEDs were manufactured by DAESH, that the methods of SVBIED attacks were identical, and that it is also easy to obtain commercial drones from the Asian markets, such as Hong Kong, an IED-loaded drone attack in the Philippines is highly probable.

69. Joseph Franco, "Preventing Other 'Marawis' in the Southern Philippines", *Asia & the Pacific Policy Studies*, (2018), p. 2.

70. Rita Katz, "ISIS' Suicide Bombing in the Philippines Could Be a Regional Game-Changer", Insite Blog, August 2, 2018, <https://news.siteintelgroup.com/blog/index.php/categories/jihad/entry/435-isis%E2%80%99-suicide-bombing-in-the-philippines-could-be-a-regional-game-changer>, (Retrieved on: August 21, 2018).

DRUG CARTELS IN MEXICO AND SOUTH AMERICA

In Mexico, drones have been extensively used for drug trafficking purposes in the region of the Mexico-U.S. border. The reasons for this are the following:

- The drugs loaded onto the drone are more valuable than the drone.
- The route of the drone is preprogrammed and the coordinates of the delivery point are installed in advance.
- The drone gains autonomous capability and cannot be blocked by electronic jammers at the border.
- The drone lowers the risk of drug traffickers being caught and, therefore, the narcotics are successfully delivered to the desired location.

In August 2017, approximately 6 kilograms of methamphetamine loaded on a DJI Matrice 600 Pro were seized in Tijuana near the U.S. border. The methamphetamine confiscated was worth about \$46,000 while the market value of the drone seized by the border police was about \$5,000.⁷¹ Drone use along the border is highly prevalent as evidenced by the United States' interception of 150 drones carrying an estimated two metric tons of drugs; in 2012, these drugs were primarily marijuana, cocaine, and heroin.⁷² Figure 33 shows that there is no release mechanism on the drone and the drug substance is wrapped around the device by tape.

71. Stephen Dinan, "Drones Become Latest Tool Drug Cartels Use to Smuggle Drugs into US," *The Washington Times*, August 20, 2017.

72. Brenda Fiegel, "Narco-Drones: A New Way to Transport Drugs," *Small Wars Journal*, <http://smallwarsjournal.com/jrnl/art/narco-drones-a-new-way-to-transport-drugs>, (Retrieved on: August 25, 2018).

FIGURE 33. MATRICE 600 PRO SEIZED IN TIJUANA



An AK-47 assault rifle and a bomb-loaded commercial drone were seized in a truck pulled over by police in Mexico on October 20, 2017, indicating that drug cartels tried something new beyond the widespread use of drones. The area where the bomb-laden drone was caught was Guanajuato, the Mexican state with the most famous drug cartels.

The cartels in Mexico have been using so-called potato bombs –hand grenade-sized improvised explosive devices– in attacks on each other. The explosive found by the police alongside the drone in Guanajuato is consistent with a potato bomb. That means drug cartels are now willing to use drones not only for drug transfer and reconnaissance/surveillance but also for the purpose of attacking. In Guanajuato, drug gangs, including Los Zetas, the Sinaloa cartel, and *Cártel Jalisco Nueva Generación*, etc. are also highly likely to use drones for an attack.⁷³ Figure 34 shows the confiscated drone and IEDs.

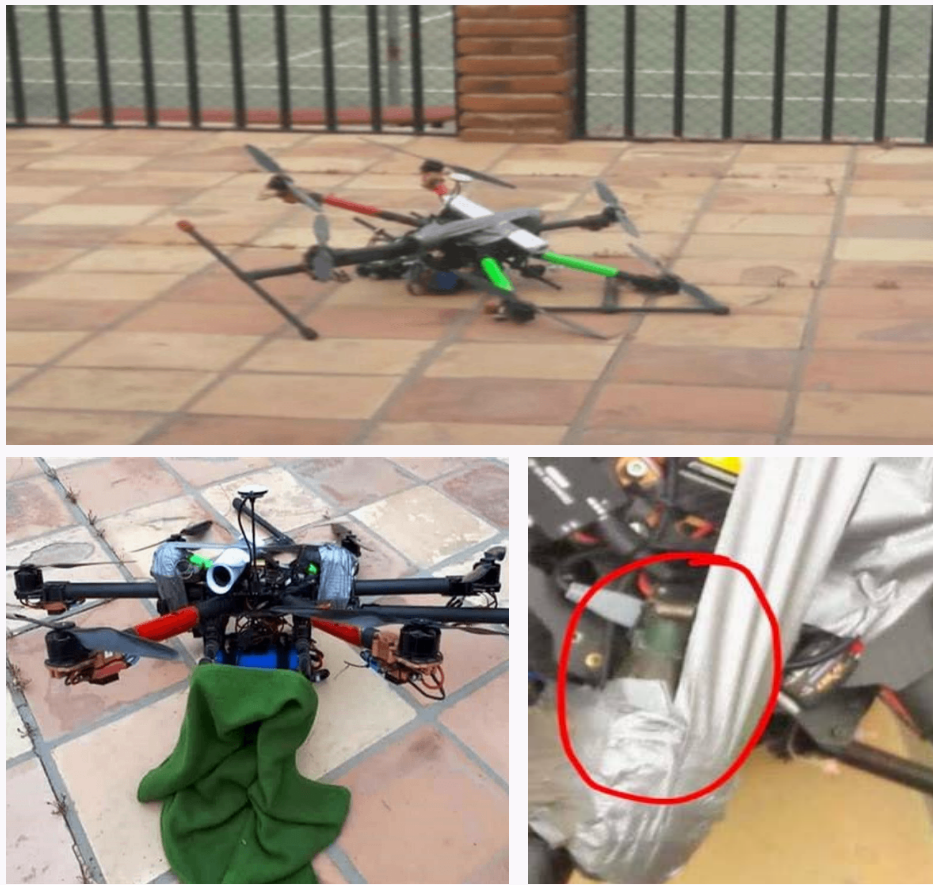
The seized drone, in Figure 34, was a 3DR Solo Quadcopter, easy to find on the Internet for \$250. There is no release mechanism on the drone, unlike the ones used by DAESH, but instead the IED was taped around it. In addition, a remote detonation apparatus reveals that the drone can only be used for a kamikaze attack.

73. David Axe, "Great, Mexican Drug Cartels Now Have Weaponized Drones," *Motherboard*, October 25, 2017, https://motherboard.vice.com/en_us/article/j5jmb4/mexican-drug-cartels-have-weaponized-drones, (Retrieved on: August 27, 2018).

FIGURE 34. AN IED-LOADED 3DR SOLO QUADCOPTER



FIGURE 35. KAMIKAZE DRONE USED BY DRUG CARTELS



Another attack using a drone was attempted at Tecate, on the U.S. border. In July 2018, the IED-loaded drone dropped into the garden of the house of Gerardo Manuel Sosa Olachea, the Secretary of Public Security, but the IED did not explode.

Figure 35 shows the drone and the IED. It is seen that the IED was taped around the drone and there was no release mechanism.⁷⁴ The drone was probably intended for a kamikaze attack after the target was detected by a camera on the drone.

In conclusion, it seems that the Mexican drug cartels are about to complete their process of adopting drone use. Considering the violent methods used by the drug gangs, it should be noted that the IED-loaded drones will not be game-changer. However, it is evaluated that the drones used by drug cartels for attacking purposes and for pushing drugs into the U.S. border will applied as tools in the other fields of activity of the cartels such as the use of underground tunnels, cars, and underwater environments for drug trafficking, illegal immigrant trafficking, etc.

FIGURE 36. USE OF DRONE BY MEXICAN POLICE FOR PUBLIC ORDER



As seen in Figure 36, drones are also used by the Mexican police. In addition, drones are used to combat drug trafficking in the countries producing cocaine including Bolivia, Peru, and Colombia. Colombia also plans to use drones in aerial spraying over cocaine plants that are detected from the air.⁷⁵ Brazil uses drones to avoid

74. Cartel Chronicles, "Mexican Cartel Crashes Drone IED into Home of Border State Security Chief", Breitbart, July 11, 2018, www.breitbart.com/texas/2018/07/11/mexican-cartel-crashes-drone-ied-into-home-of-border-state-security-chief/, (Retrieved on: August 15, 2018).

75. Vanda Fellab Brown, "Can Colombia Eradicate Coca by Drones? The Illusion of a Technological Fix", Brookings, July 24, 2018.

smuggling in the Amazon rainforest and to monitor the borders with Colombia and Peru. As violence and smuggling is the most intense in South America, commercial UAVs are preferred both by states and NSAAs.⁷⁶

The use of commercial drones has been witnessed among NSAAs in Venezuela. What differentiates this country from all other countries is that an assassination attempt against a state official of the highest level was made using a drone. In August 2018, an assassination attempt on President Nicolas Maduro of Venezuela took place in the capital, Caracas. Attackers used two DJI M600 drones, each carrying 1 kilogram of C4 explosive.⁷⁷



The attack committed during an official ceremony, was prevented by snipers who shot the drone and caused the explosion of the IED on it. However, this attack is important as it sets an example of assassination for other NSAAs. Explosive-laden drones are likely to easily overcome conventional security measures at sports organizations, political or cultural activities, and public ceremonies. The panic that can ensue in crowded areas will create a much greater impact than the impact of an IED released by a drone.

76. Christopher Woody, "Drones Appear to Be Taking on a Bigger, More Dangerous Role in Mexico's Criminal Warfare", *Business Insider*, October 24, 2017.

77. "Non-State Actors with Drone Capabilities", *New America*, (August 2018), www.newamerica.org/in-depth/world-of-drones/5-non-state-actors-drone-capabilities, (Retrieved on: August 29, 2018).

CONCLUSION

For years, analysts have developed their hypotheses on the possibility and dangers of NSAsAs and terrorist organizations capturing weapons of mass destruction, and biological and chemical weapons. However, none of them made discussion about simple technologies like commercial drones can allow terrorist organizations to increase their capacities in a much simpler way. After the invasion of Afghanistan and Iraq, no U.S. soldier was afraid of a possible attack from the air. The U.S. forces, the Iraqi security forces, and the Peshmerga were shocked when the first drone attack was carried out in Iraq. Even countries with the most advanced weapon technology and military preparedness were vulnerable to this type of attack at first. Although only two years have passed since commercial drones were used for the first time by DAESH to attack⁷⁸ Turkish troops during the Operation Euphrates Shield in Syria in 2016, many regional NSAsAs in the Middle East and later other NSAsAs elsewhere, from South America to Asia, prefer commercial drones. Only the level of using drones varies among these actors. Sometimes an actor takes advantage of a drone for reconnaissance/surveillance to gather intelligence over the enemy, and other times for transferring material such as drugs. Map 1 depicts the countries where the use of drones has been identified.

78. Bleda Kurtardarcan and Barın Kayaoğlu, “Turkey is on the Front Lines against ISIS’s Bomber Drones”, National Interest, October 16, 2016.

Among the reasons for the increasing use of commercial drones among NSAAAs are the following:

- Payload capacity enables IED-laden UAVs
- Capacity of long-distance use
- Inexpensive and easy procurement
- Camera, sensor, etc. materials facilitate the modification of drones by militant groups
- Smartphone technology and applications simplify operator's job
- The failure to develop a clear-cut anti-UAV technology

Table 1 depicts the most preferred commercial UAV models, and the NSAAAs and terrorist organizations using these drones.

The ability of terrorist groups to adapt the most recently available technology develops much faster than domestic and international laws. However, rapid measures taken in both domestic and international law after the threat has been identified will hamper or slow down the adaptation processes of other terrorist organizations to this new technology.⁷⁹ For instance, Egypt, on the grounds that it is likely to be used in a potential terrorist attack, prohibits the use or possession of drones without a license from the Ministry of Defense - especially in the face of the increasing DAESH threat in the Sinai Peninsula.⁸⁰

Drone companies have removed software containing the locations of airports, military zones, and stadiums to reduce such threats. In particular, the drone maker DJI adjusted a large part of Iraq and Syria as a no-fly zone in order to prevent the use of drones by DAESH.⁸¹

However, such measures remain insufficient. Legal loopholes in the use and possession of commercial drones, and the failure of anti-drone technology to identify, detect, and destroy these devices cause the widespread use of drones. In the short term, it seems impossible to prevent NSAAAs from using commercial drones.

79. Jack Karsten, "As Criminals Adapt to New Technology, So Must International Law", Brookings, April 21, 2017.

80. "New Law Prohibits Drone Use without Defense Ministry Approval", *Egypt Independent*, December 6, 2017.

81. Andrew Dalton, "DJI Grounded Its Drones in Iraq and Syria to Lock out Extremists", Engadget, April 26, 2017, www.engadget.com/2017/04/26/dji-no-fly-zones-grounded-drones-iraq-syria, (Retrieved on: October 8, 2018).

TABLE 1. UAV MODELS MOST PREFERRED BY NSAAS AND TERRORIST ORGANIZATIONS				
Most Used UAV Models			Estimated Payload (kg)	Used by
1	DJI Phantom Serisi		1	Middle East: DAESH Syrian Opponents HTS Hezbollah Saraya al Khorasani PYD/PKK Hasd al Shabi Peshmerga Houthis Hamas Africa: JNIM LNA Boko Haram DAESH Asia: DPR/LPR Aerorozvidka Marawi Militants Taliban The Americas: Drug Cartels FARC Patriotic Officers
2	DJI Spreading Wings		5	
3	RVJET		2,5	
4	X-UAV Talon		2,5	
5	Sky Walker X8		5	
6	RC4Y Sky Hunter		5	Purpose of Use 1) Reconnaissance/ Surveillance 2) Vectoring SVBIEDs to target 3) Vectoring missiles and artilleries 4) Direct Attack a) Dropping IEDs b) Kamikaze Attack 6) Propaganda
7	DJI M600		7	
8	3DR Solo Quadcopter		0,5	

Although the use of commercial drones does not guarantee success for NSAAs, the importance of drones cannot be denied in terms of the advantage they provide in conflict zones. In addition, by using UAVs for attacking security forces, terrorist organizations have changed the perception that “no airborne attack can be committed by terrorist organizations” and commercial drones have taken their place in modern warfare. In the upcoming period, the dimension of the danger created by militant groups will increase depending on the development in the commercial UAV market. The size of drones used will vary further. Small drones will be difficult to detect, large drones will fly longer distances, and their payload capacities will increase as well.

In parallel with the developing technology, all drones will be equipped with sensors and cameras to create advantage on the ground for NSAAs and increase their mobility.⁸² World War I witnessed the use of planes for reconnaissance/surveillance while World War II witnessed mass assaults. In this respect, a similar situation may be predicted for UAVs. Furthermore, in the near future, small UAVs will take their place as a standard device in the inventory of states –a position they currently hold in NSAAs. It is believed that they will undertake more complex tasks than they do today and that they will perform the operations of many other manned vehicles.⁸³

As a result, in the last two years worldwide, the use of UAV systems has spread rapidly among NSAAs and terrorist organizations. Certain terrorist groups have learned much faster, have completed their adaptation process, increased their capacity, and carried out sophisticated attacks. As long as NSAAs increase their experience and effectiveness in the use of drones, new terrorist organizations will desire to follow their lead and the likelihood of transition to new imitation and processes of technology adoption will increase. In this regard, it is assessed that in the countries that have not experienced any direct drone attack but have encountered drones employed by NSAAs for reconnaissance/surveillance and propaganda purposes, NSAAs will be able to complete their adaptation processes in the near future. In the face of this increasing threat, the development of an anti-UAV technology to combat changing drone types and attack techniques is a dire priority.

82. Itai Barsade and Michael C. Horowitz, “Militant Groups Have Drones. Now What?”, Perry World House, September 7, 2017, <https://thebulletin.org/2017/09/militant-groups-have-drones-now-what>, (Retrieved on: October 8, 2018).

83. For detailed information on drone systems and their development in the world, see Cengiz Karaağaç, “İHA Sistemleri Yol Haritası: Geleceğin Hava Kuvvetleri 2016-2050”, STM, (2016).

A GLOBAL BATTLEFIELD? RISING DRONE CAPABILITIES OF NON-STATE ARMED GROUPS AND TERRORIST ORGANIZATIONS

SERKAN BALKAN

Technological developments in both civilian and military fields have had a significant impact on the operational capabilities of terrorist organizations and on the increase of terrorist attacks. Many technologies that facilitate and improve the quality of life have security vulnerabilities. Following the introduction of commercial unmanned aerial vehicles (UAVs), terrorist organizations have identified the security deficits of this new technology. Due to the increasing popularity of commercial UAVs, easy accessibility, and low cost, the use of UAVs by many organizations has become increasingly widespread. Drones have emerged as a new intelligence tool to improve the capabilities of terrorist organizations. Today, they are used by many non-state armed actors and terrorist organizations, from the Americas to Asia, to collect intelligence. However, the use of drones is not limited to reconnaissance and surveillance. Some of the aforementioned actors have started to employ drones in a more sophisticated way, namely for attacking purposes. This study examines how terrorist organizations use UAV technology by learning from each other and analyzes their adaptation processes.