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Commercial UASs as a New Component of Modern Warfare

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Key Points

- Commercial Unmanned Aircraft Systems (UAS) possess the capability to reach the most remote areas with minimal effort, time, and energy.
- Historically, the IED's impact on the conflict demanded significant effort from the US military to develop aggressive counter-IED objectives.
- One of the reasons that small drones have proliferated across the battlespace is that they are easy to obtain and use.
- Counteracting small UAVs is extremely difficult due to size, material of construction, and flight altitude.
- Implementation of new US Counter-Small UAS strategy, along with establishing a Joint C-UAS Office, will allow the Department of Defense to regain the initiative in the fight against adversaries.

"The growing threat posed by UASs, coupled with our lack of dependable network capabilities to counter them, is the most concerning tactical development since the rise of the IED in Iraq."

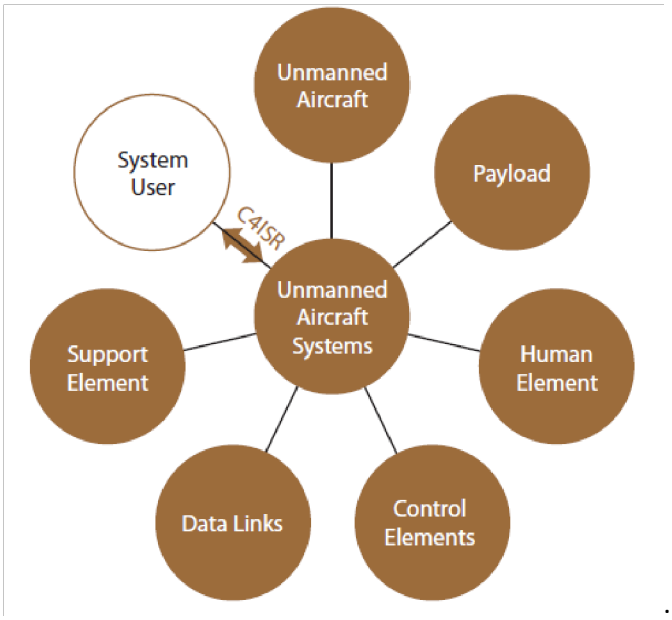
-General K. McKenzie, CENTCOM Commander

Definitions / Introduction

Since the end of the Cold War, unconventional asymmetric warfare has become the primary means of military conflict by the enemies of the US. Armed civilian and paramilitary forces have become more prominent than regular armies. In this type of irregular warfare, unconventional weapons are the weapons of choice. In recent military conflicts in the Middle East and South Asia, the evolution of unconventional warfare has created a serious threat to US Forces, the coalition, and allies.

After the conventional Iraq war in 2003, the US-led coalition suffered Improvised Explosive Devise (IED) attacks, which were difficult to predict and defend against. Later, the battlefield environment got even more dangerous for the coalition when IEDs (as two-dimensional space) were joined by the use of UASs as (three-dimensional space), which was another innovation and development. The use of drones created a dilemma for the military as well as international organizations. It can be predicted that cyber (as four-dimensional space) will play a bigger role in asymmetric warfare in the future.

According to the International Trade Administration of the US Department of Commerce, UASs are air vehicles and associated equipment that do not carry a human operator, but instead are either remotely piloted or fly autonomously. UASs are commonly referred to as Unmanned Aerial Systems (UAS), Unmanned Aerial Vehicles (UAV), Remotely Piloted Aircraft Systems (RPAS), and drones.[1]



Unmanned Aircraft System Components

The use of commercial UASs seems to have become the primary method of warfare. UAS have a wide spectrum; from home-made and civilian models to military drones, carrying hundreds of kilograms of load, operating at high altitudes and capable of operating for hours at long distances deep into hostile territories. The global commercial UAS market value in 2020 was $13.5 B. The revenue forecast for 2025 is $129 B.[2]

Whether these commercial UASs are controlled by a remote or a smart phone app, they require the least amount of effort, time, and energy. This is why they are being adopted by different terrorist organizations in all parts of the world.[3]

Past: Development since the rise of the IED in Iraq

Despite the implementation of the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines, IEDs have posed a lethal threat in many parts of the world. The US, as the head of the international coalition, witnessed wide use of IEDs during the Iraqi campaign from 2003 to 2011. The rapid defeat of Saddam's Armed Forces resulted in guerrilla warfare resistance due to dissatisfaction with the presence of

[1] "Unmanned Aircraft Systems," US Department of Commerce, https://www.trade.gov/unmanned-aircraft-systems (accessed Mar 20, 2021).
[2] *Grand View Research*, "Commercial Drone Market Size, Share & Trends Analysis Report," https://www.grandviewresearch.com/industryanalysis/global-commercial-drones-market (accessed Mar 25, 2021).
[3] *Business Insider*, "Drone technology uses and applications for commercial, industrial and military drones in 2021 and the future," Jan 12, 2021, https://www.businessinsider.com/drone-technology-uses-applications (accessed Mar 25, 2021).

foreign troops, as well as dissatisfaction with the policies of the new Iraqi administration. The great advantage in numbers and weapons used by the US/Coalition was effectively met with the rebel's use of IEDs.

The rebels did not have a difficult time finding ammunition for their IEDs, because it could be found in abundance in abandoned Iraqi Army positions and warehouses. In addition to the manufacture of IEDs, rebels were engaged in the manufacture of explosives based on ammonium nitrate and a number of other chemical compounds. IEDs began to be installed in motor vehicles. Suicide IEDs became a separate type of controlled IED. Whether you measure in blood or treasure, the IED proved the costliest feature of the wars in Iraq and Afghanistan for American forces. Sixty percent of all-American fatalities in Iraq and 50% in Afghanistan, more than 3,500 in total, were caused by IEDs. The same proportion held for American military that were wounded, which totaled more than 30,000 service members.[4] With the beginning of guerrilla warfare in Iraq, the American command discovered that they were unprepared to defend against IEDs. In particular, the lack of widespread use of mines in conflicts of the 20th century and the end of the Cold War contributed to a sharp reduction in the number of specialists capable of defending against IEDs. There simply were not countermeasures to defeat IEDs yet.

The IED's impact on the conflict demanded significant effort from the US military to develop aggressive counterIED measures. In 2006, the Department of Defense established the Joint IED Defeat Organization (JIEDDO) to oversee its counter-IED efforts. JIEDDO's lofty mission was to defeat IEDs "as weapons of strategic influence." This never meant eliminating IEDs entirely, but rather raising the cost and risk of IED use by insurgents to such a level that the enemy "would move on to something else," according to former JIEDDO Director Lt. Gen. Thomas Metz.[5] Also, based on the experience gained in Iraq, the US Army adopted new doctrine FM 3-90.119 "Combined Arms Improvised Explosive Device Defeat Operations," which determined the procedure for conducting operations against the use of IEDs by the adversaries.

Present: Changing the operational environment by using commercial UASs

> *"[The] most daunting problem [of 2016] was an adaptive enemy who, for a time, enjoyed tactical superiority in the airspace under our conventional air superiority in the form of commercially available drones and fuel-expedient weapons systems, and our only available response was small arms fire."*[6]
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> —General Raymond A. Thomas III May 2017

Informed by military research and development over the previous 150 years, the first use of drones for nonmilitary ventures started in 2006, the same year the Federal Aviation Administration issued its first commercial drone permit.[7] The conflicts in Syria and Iraq have seen a proliferation of drones throughout the battlespace where UASs replaced IEDs as the major concern. Whether used for filming propaganda, as an intelligence, surveillance, target

[4] Jason Shell, "How the IED won: Dispelling the myth of tactical success and innovation," *War on the Rocks*, May 1, 2017, https://warontherocks.com/2017/05/how-the-ied-won-dispelling-the-myth-of-tactical-success-and-innovation/ (accessed Mar 25, 2021).
[5] Ibid.
[6] David Larter, "SOCOM Commander: Armed ISIS Drones Were 2016's 'Most Daunting Problem," *Defense News*, May 16, 2017.
[7] *Drone enthusiast*, "The History Of Drones," https://www.dronethusiast.com/history-of-drones/ (accessed Mar 25, 2021).

acquisition and reconnaissance (ISTAR) asset, or for command and control, drones are being used by a multitude of groups for a wide variety of missions.

The uniqueness of the Islamic State (IS) is derived from its history of being the first to develop new tactics for engaging the enemy. For example, in October 2016, the IS was the first to use a bomb-laden drone. The explosive hidden within the drone killed two Kurdish Peshmerga soldiers who were investigating the device. Another event happened in January 2017 when the IS released a video that showed nearly a dozen examples of modified quadcopter drones releasing munitions on its enemies from the air with a fair degree of accuracy. It wasn't long before the group's bomb-drop capable drones were used to kill.[8]

One of the reasons that small drones have proliferated across the battlespace is that they are easy to obtain and easy to use. Although the IS was not the first group to weaponize drones, they have been the most prolific users of them, releasing hundreds of images and videos showing drone strikes. The IS is the first to use improvised attack drones on such a scale. Currently it appears IS is modifying their existing ammunition on a significant scale specifically for drone warfare.[9]

Compared to suicide vehicle-borne improvised explosive devices (SVBIEDs), these weapon systems have a relatively small physical effect on targets. However, they do transform the battlespace from 2D to 3D, giving IS the capability to drop a small bomb, without warning and with surprising accuracy, at a place of their choosing. The IS has used these kinds of drones to directly influence the tactical situation on the ground.

Over the last two years there has been a large increase in the use of commercial UASs in conflict by both state and non-state actors across the world. Israel has recently joined other state actors in using commercial UASs. Israel is using its commercial UASs for deploying tear gas, disabling fire kites sent aloft by Palestinian protestors, and as an observation platform. The Israeli Defense Forces (IDF) has long been a user of military drones, in 2017 they appear to have purchased "hundreds" of commercial DJI Matrice and Mavic drones, some of which allegedly were allocated to the Border Defense Force. Since March 2018 there has been a surge in reports and examples of the IDF using commercial drones for military purposes.[10]

IDF commercial drones have been deployed on a wide scale and have been using relatively novel tactics. Although the idea of using drones to deploy tear gas is not new, Israel appears to have been the first country to use it on a wide scale during protests.[11] The proliferation of commercially available small UASs is a concern for long-term stability according to the US military leadership. These UASs represent a growing threat to the US, its regional allies and partners. Therefore, the US must protect its service members against the UAS threat by implementing new tactics and developing new systems.

As the Commander of US CENTCOM General McKenzie said, "these systems [commercial UASs] are inexpensive, easy to modify and weaponize, and easy to proliferate. They provide adversaries the operational ability to surveil and target US and partner facilities while affording plausible deniability, a disproportionate return on the

[8] Don Rassler, "The Islamic State and drones: supply, scale, and future threats," Jul 11, 2018, https://ctc.usma.edu/islamic-state-dronessupply-scale-future-threats/ (accessed Mar 22, 2021).
[9] Nick Waters, "Iraqi federal police using weaponised drones," *Bellingcat*, March 2, 2017, https://www.bellingcat.com/news/mena/2017/03/02/iraqi-federal-police-using-weaponised-drones/ (accessed Mar 22, 2021).
[10] Nick Waters, "First ISIS, then Iraq, now Israel: IDF use of commercial drones," *Bellingcat*, June 18, 2018, https://www.bellingcat.com/news/mena/2018/06/18/first-isis-iraq-now-israel-idf-use-commercial-drones/ (accessed Mar 22, 2021).
[11] Ibid.

investment, all in our adversary's favor."[12] CENTCOM was the only Combat Command which took the initiative to prioritize the threat of commercial UASs in the Commander's 4-th priority, Counter-UAS capabilities. On the other hand, successful use of commercial UASs by America's adversaries in the CENTCOM's area of responsibility and / or on partner nation's territories, casts doubt on the successful countering of UASs.

UASs (along with IEDs) are a means of warfare, so this comparison contributed to the fact that the American military was able to apply its anti-IED doctrine so seamlessly to UASs. In January 2021, the US Department of Defense approved a new strategy to lead and direct Counter-Small UASs. The document provides the framework for addressing UAS hazards and threats in a variety of operating environments, including the US homeland, host nations, and contingency locations.

The strategy is based on three lines of effort:

1) Ready the Force: Focuses on the development of innovative solutions using a risk-based approach to guide investment in C-UAS capabilities.
2) Defend the Force: Emphasizes the provision of mission-ready forces that are able to deter and defeat UAS threats.
3) Build the Team: Stresses partnership with the national security innovation base, federal and non-federal entities, allies, and partners, to facilitate rapid development and deployment of effective C-UAS solutions while maximizing interoperability.[13]

By the implementation of this strategy, the Department will successfully address the challenge posed by both the hazard and threat of UASs operating within the US homeland, host nations, and contingency locations. Commanders in all of these varied operating environments will have the solutions they need to protect DOD personnel, facilities, assets, and missions from both current or future UAS threats. In addition, the DoD plans to allocate $404 M in FY2021 on counter-UAS research and development with at least $83 M on C-UAS procurement.[14]

Proliferation of commercial UASs

In regard to proliferation, General McKenzie said anyone can "go out and buy [small drones] at Costco right now in the United States for a thousand dollars." Drones can also be easily purchased online (Amazon and eBay) and from stores (Walmart and Target). This uncontrolled availability of commercial drones poses a potential threat, for terrorist use.[14] Compared to military UASs, commercial drones are economical and are widely available on the civilian world market. This ready availability favors the adversaries.

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[12] Gina Harkins, "Tiny drones are the biggest threat in the Middle East since IEDs, top general says," *Military.com*, Feb 8, 2021, https://www.military.com/daily-news/2021/02/08/tiny-drones-are-biggest-threat-middle-east-ieds-top-generalsays.html#:~:text=Kenneth%20McKenzie%20Jr.%2C%20the%20head,by%20the%20Middle%20East%20Institute.&text=McKenzie%20said %20adversaries%20can%20use,target%20U.S.%20and%20partner%20facilities (accessed Mar 22, 2021).

[13] U.S. Army Public Affairs, "Army announces release of DoD Counter-Small UAS Strategy", Jan 7, 2021, https://www.army.mil/article/242241/army_announces_release_of_dod_counter_small_uas_strategy (accessed Mar 22, 2021).

[14] Kelley Sayler, "Department of Defense Counter-Unmanned Aircraft Systems," Congressional Research Service, Jan 11, 2021, https://fas.org/sgp/crs/weapons/IF11426.pdf (accessed Mar 22, 2021).

[14] Gina Harkins, "Tiny drones are the biggest threat in the Middle East since IEDs, top general says."

The IS's high-tech/low-tech approach was made possible by the group's ability to acquire commercial quadcopter drones and related components. The drones were used for defensive and offensive purposes, they were purchased through a global layered supply chain that involved at least 16 different companies that were based in at least seven different countries.[15] The use of a complex supply schemes, the involvement of different people from all over the world, and the use of difficult-to-track financial elements, has allowed the adversaries to remain untouchable.

The West Point Counterterrorism Center has published an analysis of the IS's drone program. According to their analysis, the main buyers of commercial drones were immigrants from Bangladesh living in the UK and Spain. They bought the drones for commercial use in Bangladesh through their firms, and then shipped them to Turkey. Once the drones were in Turkey they were delivered to IS militants. Although experts at the Counterterrorism Center still do not have a complete overview of the supply chain it can be assumed that this complex transnational supply chain could be easily replicated elsewhere if desired. The firms used to procure commercial drones were different from the firms used to purchase nine IS quadcopter drones that were recovered in the field. The recovered drones were retraced by a major professional weapons-tracking non-governmental organization.

At the same time, individual terrorists or small groups of Islamists in the US or Europe can achieve the same results without such complex supply chains. Commercial drones are readily available worldwide. In such circumstances, the issue of controlling the proliferation of commercial UAVs becomes extremely relevant.

Ammunition Supply

At this point, most of the commercial drones are limited by small payloads. Heavy drones, available for commercial sale, are much more expensive and their buyers will face more scrutiny. However, as technology improves and drones become more widespread and economical, it is likely that this category of high payload drones will become more accessible to jihadists.

So far, attacks by jihadists using UASs have involved dropping military ammunition exclusively from commercial models. At the same time, the difficulty of obtaining military ammunition supplies will limit such attacks. As more technically advanced drones become more commercially available, the range of their use by terrorists to launch attacks outside the war zone will grow proportionally. And more importantly, commercial UASs can be used primarily for other purposes such as observation, which allows detecting ambushes, conducting additional reconnaissance of targets, and adjusting fire from portable artillery weapons. Simultaneously, commercial drones could also be used to drop ammunition (excluding the use of radiation, chemical and biological components). In this regard, it is possible that in the near future drones will begin to be used for other applications such as communication repeaters, logistic support, etc.

Conclusion

Availability and the uncontrolled sale of drones have created a steady trend towards the increased use of commercial UASs in armed conflicts, where they have already become an integral part. Implementation of new

[15] Don Rassler, "The Islamic State and drones: supply, scale, and future threats," U.S. Military Academy, Jul 11, 2018, https://ctc.usma.edu/islamic-state-drones-supply-scale-future-threats/ (accessed Mar 22, 2021).

US Counter-Small UASs along with establishing the Joint C-UAS Office has allowed the Department of Defense to regain the initiative in the fight against our adversaries.

In the future, based on the IS's history, UASs could be used in the following ways:

1) different theaters and different types of groups;
2) different tactics and different weapons ammunition;
3) multiple drone attacks, including land and sea drones.

Recently, a bigger role in military conflicts is played by non-state actors such as private military companies who are better trained and more knowledgeable in using commercial UASs. The long range and the ability to link the operator at any convenient location make drones ideal for this.

The growing diversity of improvised threats requires a new mechanism for risk and mission analysis. This analysis should substitute defeating "strategic influence" with distinct, achievable, and outcome-based objectives based on a technical and tactical characterization of new threats. Such analysis is critical to informing how responses are prioritized, operational approaches developed, and resources aligned against threats of varying consequence and construction.[16]

Recommendations for US/USCENTCOM

- Improve host nations capabilities to counter UASs.
- Expand DOD cooperation on C-UAS development and procurement with other departments and organizations, such as the Department of Homeland Security, the Department of Justice, and the Department of Energy.
- Improve/establish DOD coordination with the Federal Aviation Administration and international civil aviation authorities to identify and mitigate C-UAS operational risks to small civil aircrafts.
- Adapt airspace management, operational concepts, rules of war, or tactics to optimize the use of C-UAS systems.

[16] Jason Shell, "How the IED won: Dispelling the myth of tactical success and innovation."