

DRONE WARS

The Next Generation

An overview of new armed drone operators

Note: The term 'drone' is used interchangeably with 'Unmanned Aerial Vehicle (UAV)'

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Drone Wars UK is a small British NGO established in 2010 to undertake research and advocacy around the use of armed drones. We believe that the growing use of remotely-controlled, armed unmanned systems is encouraging and enabling a lowering of the threshold for the use of lethal force as well as eroding well established human rights norms. While some argue that the technology itself is neutral, we believe that drones are a danger to global peace and security. We have seen over the past decade that once these systems are in the armoury, the temptation to use them becomes great, even beyond the constraints of international law. As more countries develop or acquire this technology, the danger to global peace and security grows.

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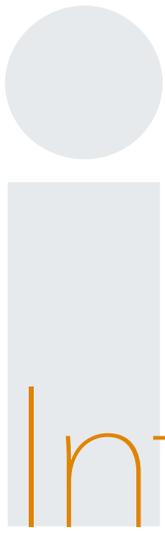
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Drone Wars: The Next Generation

An overview of current operators of armed drones

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Introduction

The rise in the military use of remote-controlled unmanned aerial vehicles (UAVs), commonly called drones, has been astonishing. From an obscure technology originally used for target practice, drones have become almost central to the way in which armed forces fight wars and project power in the early twenty-first century.

The US and Israel have played a leading role in the development and use of unmanned systems, with both countries manufacturing and operating unarmed and armed systems since the early 2000s. While these two giants of drone production monopolised the field for more than a decade, today an increasing number of countries now manufacture a startling array of military remote-controlled drones, from giant systems that fly at vast heights to tiny hand-held devices designed to investigate the interiors of buildings.

Although the development of drone technology as a whole is an important area of study, this report focuses specifically on a smaller subset: the development and use of armed military drones, primarily the larger versions (as typified by the Predator and Reaper) but also other smaller armed drones.

A second generation

Today, there are a number of countries that make up a 'second generation' of armed drone producers and operators. While there has been much speculation about the armed drone programmes of countries such as Russia, China, Iran and India, some of this has been inaccurate. This report attempts to detail, as accurately as possible, which countries today are producing and using armed UAVs or have acquired such technology from other countries. To do this we have sifted through much rumour, hearsay, hype and propaganda, and some may be surprised by our findings. Inevitably, due to the secrecy surrounding the use of military systems, as well as the fast-changing pace of drone wars, it is difficult to be sure we have captured a complete picture. Nevertheless, we believe this report gives a clear snapshot of the current operators of armed drone users.

While there are some countries on the verge of bringing armed drones into service, either through development programmes or through acquisitions, our research shows this second generation (beyond the US, UK and Israel) currently

consists of nine state operators and several non-state actors (NSAs) and we outline the development programmes, acquisitions, deployment and export of armed drones for this group.

Although some may be surprised at the absence of Russia and India from our list of active operators of armed drones, their development programmes have not yet resulted in the production of a fully functional system. Iran and Turkey have had more success in their programmes and are already using several models of armed drone in combat situations. China has an extensive development programme of unmanned systems with several companies working on development programmes in this area. Moreover, there are also a number of countries actively using armed drones that they have acquired from China.

While different in significant ways, we have also included 'non-state actors' as an operator of armed drones, as some, at least, have developed fairly sophisticated armed drones beyond the commercial off-the-shelf 'IED' type device.

By way of completeness, we also examine in brief those countries likely to join the second wave in the near future, as advanced drone programmes are on-going and likely to come to fruition soon.

The report demonstrates that at least four countries of this second generation have developed armed UAVs and six (including one of those who have developed their own) are using imported UAVs. In total twelve states and a number of NSAs are actively using armed drones. There are at least five other countries with development programmes underway, and six more are in the process of acquiring Chinese drones. As well as China, Iran and now Turkey are exporting their armed drones. The most prolific users of armed drones in this 'second generation', including Turkey, Iraq and Nigeria, have carried out strikes within their own territory but a growing number of countries are using drones in extraterritorial conflicts, such as Iran, Saudi Arabia and the UAE.

In summary, after the US, UK and Israel, the ten operators that we cover (nine states plus NSAs) who are actively using armed drones are soon to be added to by a further eleven states that are developing or acquiring armed drones. This will almost double the number of current operators of armed drones and makes ever more urgent the need for controls on use and proliferation.

Urgent need for international controls on armed drone use

The growing number of operators, alongside the complex legal and ethical issues raised by the use of armed drones, highlights the urgent need for clear international controls. The increasing export of armed drones by this second generation (China in particular) also calls into question whether current international proliferation controls are fit for purpose. Since China began exporting armed drones, the US drone lobby in particular has been pushing hard for international and domestic controls to be 'relaxed.' In April 2018, the US published a new domestic arms export policy which eased some restrictions on US government controls on the export of armed drones but did not go as far as the drone industry wanted. Trump administration officials, however, indicated they would continue to work to amend international controls to further reduce restrictions on the export of armed drones.

After the US, UK and Israel, the ten operators that we cover (nine states plus NSAs) who are actively using armed drones are soon to be added to by a further eleven states that are developing or acquiring armed drones. This will almost double the number of current operators of armed drones and makes ever more urgent the need for controls on use and proliferation.

The latter part of our report is a review of current export control mechanisms including the Missile Technology Control Regime (MTCR), the Wassenaar Arrangement (WA), and the Arms Trade Treaty (ATT). We then examine some new initiatives for international controls over the use of armed drones.

With the numbers of states using armed UAVs likely to double in the near future and with more drones available for export, the need for effective control on the proliferation of armed drones, as well as the need for an ethical and legal framework for use, is more important now than ever.

Table 1: The Second Generation at the beginning of 2018

Operator	Armed UAVs development programme	Has Imported armed UAVs	Armed UAVs in service	Strikes in own territory from UAVs	Launch strikes extra-territorially from UAVs	Exported armed UAVs
China						
Iran						
Turkey						
Pakistan						
Iraq						
Saudi Arabia						
UAE						
Egypt						
Nigeria						
'Non-state-actor'						

Imminent Operators

Operator	Armed UAVs development programme	Has Imported armed UAVs	Armed UAVs in service	Strikes in own territory from UAVs	Launch strikes extra-territorially from UAVs	Exported armed UAVs
India						
Russia						
European Projects						
France						
Germany						
Italy						
Kazakhstan						
Myanmar						
South Korea						
Turkmenistan						
Ukraine						



Operators

CHINA

Over the past five years, China has risen to become one of the foremost producers and exporters of armed unmanned aerial systems. Its armed drones, which many experts suggest are copies of the US Predator and Reaper UAVs, sell for a fraction of the price of US systems. While China has said in the past it abides by the Missile Technology Control Regime (MTCR) – the main international control regime on exporting UAV systems – its actual application to join in 2004 was rejected. A UK Foreign and Commonwealth Office briefing paper from 2012 states:

There is a general sense that China remains committed to joining the international standards on export control, but MTCR remains a looming hurdle. The rejection of China's 2004 application has been a frustrating process for both sides, and in particular, Chinese officials express a sense of irony that Beijing's gesture of goodwill to apply for and sign up to the regime has not been reciprocated. Since 2004, China's export control lists have also broadened to include and reflect most of the standards upheld by the international regimes and agreements.... However, it appears that MTCR-China dialogue for membership remains stalled.¹

While many assume that China is now flouting MTCR rules by exporting its armed UAVs, in fact the systems that it has sold appear limited to ones that fall into the less sensitive Category II status (see page 35) and are therefore ones that individual states have much more leeway in exporting.

Development Programmes

The most prevalent drones are the CH, or Rainbow, series built by China Aerospace Science and Technology Corporation (CASC). The most recent model, the CH-5, was displayed at the China Air Show in November 2016.

¹ Chin-Hao Huang, *Bridging the gap: Analysis of China's export controls against international standards*, FCO Research Briefing, 25 May 2012, www.gov.uk/government/publications/analysis-of-chinas-export-controls-against-international-standards/bridging-the-gap-analysis-of-chinas-export-controls-against-international-standards.

According to defence press reports, this latest version in the CH series can be armed with up to 16 missiles (underwing and internally), and has a huge estimated combat range of 1,000km when controlled via satellite communication.² The CH-4B (armed variant of the CH-4 model) is also a MALE UAV but is smaller and has less capacity than the CH-5 in all aspects. The first armed drones of the CH series were the, smaller still, tactical Ch-3 and CH-3A.³

CH Series of armed UAVs⁴

Drone	Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions
CH-3 and 3A	5m	7.9m	250km/hr	3,000m	6-12hrs depending on payload	200km combat radius (1,000km range)	2 small precision guided bombs totalling 100kg (3A 180kg), underwing
CH4-B	8.5m	18m	210km/hr	5,000m	30hrs	210km combat radius	4 ATS missiles or precision guided bombs
CH-5	11m	21m	300km/hr	7,000m	39 or 60hrs (petrol or heavy fuel engines)	1,000km combat radius	16 ATS missiles, underwing and internally, weighing up to 1000kg and 200kg respectively

Alongside the CH series of armed drones, Aviation Industry Corporation of China (AVIC) has produced another family of MALE UAVs, called the Wing Loong (also known as Pterodactyl), a reported clone of the MQ-1 Predator. The Wing Loong I, I-D and II are all strike capable, advertised as able to hit 'small agile targets', and can carry anti-armour missiles, small-diameter bombs and air-to-surface missiles. The Wing Loong II is much larger than the I or I-D and is operated via satellite, increasing the operating range from 200km to 1,500km, whereas the smaller versions are only equipped with radio communications.⁵ AVIC have also manufactured an armed high-altitude, long-endurance (HALE) UAV called the Cloud Shadow, which was on display at the Dubai air show in November 2017 as China seeks an export market for its new product.⁶

Wing Loong/Pterodactyl Series armed MALE UAVs⁷

Drone	Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions
WLI	9m	14m	280km/hr	7,500m	20hrs	200km combat radius	2 ATS missiles or bombs
WLI-D	8.7m	17.6m	280km/hr	7,500m	32hrs	200km combat radius	4 ATS missiles or bombs
WLI II	11m	20.5m	370km/hr	9,000m	35hrs	200km (radar) or 1,500km (satellite)range	12 ATS missiles or bombs

2 *Jane's Unmanned Aerial Vehicles and Targets* (Jane's Information Group, 2016-17), p. 21; 'New CH-5 Drone Can Carry 8 AvR-1 Missiles and FT-7 Bombs', Defence Aerospace, 07 Sept 2015, www.defense-aerospace.com/articles-view/release/3/166724/china%E2%80%99s-new-ch_5-drone-can-carry-missiles%2C-bombs.html, last accessed 15 Feb 2018.

3 *Jane's Unmanned* (2016-17), p. 20.

4 *Jane's Unmanned Aerial Vehicles and Targets* (Jane's Information Group, 2017-18), pp. 19-21.

5 *Jane's Unmanned* (2016-17), p. 20; 'Chinese drone's maiden flight', UAS Vision, 02 Mar 2017, www.uasvision.com/2017/03/02/chinese-drones-maiden-flight, last accessed 10 Jan 2018.

6 *Jane's Unmanned* (2016-17), p. 23; Ellis Taylor, 'DUBAI: China's Cloud Shadow emerges seeking sales', Flight Global, 12 Nov 2017, <https://www.flightglobal.com/news/articles/dubai-chinas-cloud-shadow-emerges-seeking-sales-443167/>, last accessed 24 Nov 17.

7 *Jane's Unmanned* (2017-18), p. 26.

Cloud Shadow armed HALE UAV⁸

Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions
9m	18m	550km/hr	14,000m when armed	6hrs	290km range	6 ATS missiles or small munitions

Another Chinese armed drone, built by company China Aerospace Science and Industry Corporation (CASIC), the WJ-600, is reported to have been first shown in 2010 and said to be “in service and operational.” However, there is little detail available other than that. It is said to have a payload capacity of 130kg, altitude of 10,000m and a max speed of 600km/h.⁹

While the CH and Wing Loong drones are reportedly modelled on the US Reaper and Predator respectively, aviation experts believe that the components are not of such high specification (such as better engine power giving longer range and endurance) as their US counterparts, but are much cheaper.¹⁰

Deployment

As a large military and economic power, China has the ability to use its armed drones widely across Asia. However, there is no indication that China has launched any strikes from its own armed drones. In one widely reported incident, Chinese authorities used a drone to track a known drug trafficker, but the decision was taken to capture rather than kill. Some analysts suggested this was a kind of regional ‘norm setting’, contrasting with the Israeli and US policy of targeted killings.¹¹

Export

China has been actively exporting armed drones, with over half a dozen states now operating strike-capable Chinese drones. In 2015, Shi Wen, chief drone designer at the Chinese Academy of Aerospace Aerodynamics, stated that Chinese-made drones (both armed and ISR) are with “twenty military users from more than ten foreign countries” and that the value of contracts signed in 2015 alone was worth “hundreds of millions of US dollars.”¹²

According to the Stockholm International Peace Research Institute (SIPRI) database¹³, ten countries have purchased or at least signed deals for the purchase of Chinese-made armed UAVs. These transfers are detailed throughout Part 1 of the report, either under the active operators or those states which we class as ‘imminent operators’. Transfers to Egypt, Iraq, Nigeria, Pakistan, Saudi Arabia and UAE have all been confirmed by sightings and/or reports of strikes. However, there is little confirmation that Jordan, Kazakhstan, Myanmar and Turkmenistan can operate, or even possess, the drones they are assumed to have acquired.¹⁴

8 *Jane’s Unmanned (2017-18)*, pp. 22-3.

9 *Jane’s Unmanned (2016-17)*, p. 28.

10 Adam Rawnsley, ‘Meet China’s Killer Drones’, *Foreign Policy*, 14 Jan 2016, www.foreignpolicy.com/2016/01/14/meet-chinas-killer-drones, last accessed 10 Jan 2018.

11 Tobias Burgers and Scott N. Romaniuk, ‘Is China Establishing a Norm Prohibiting Lethal Drone Strikes in Asia?’, *The Diplomat*, 12 Aug 2016, www.thediplomat.com/2016/08/is-china-establishing-a-norm-prohibiting-lethal-drone-strikes-in-asia, last accessed 24 Nov 11.

12 Wendell Minnick, ‘Report: Chinese UAVs in Demand’, *Defense News*, 05 Feb 16, p. AO11.

13 The Stockholm International Peace Research Institute (SIPRI) holds a database of arms transfers that is updated annually. See www.sipri.org/databases/armstransfers

14 Many press reports state that the above countries have the Wing Loong or CH-4 but there is no verification that this is actually the case. See, for example, David Donald, ‘Chinese UAV Spreads its Wings’, *AIN online*, 17 Jun 2017, www.ainonline.com/aviation-news/defense/2017-06-17/chinese-uav-spreads-its-wings, last accessed 19 Feb 2018.

In sum, the SIPRI database includes transfers (with the number of UAVs sold in brackets) to active operators: Egypt (3), Iraq (4), Nigeria (5), Pakistan (20), Saudi Arabia (2) and UAE (10). And several imminent operators: Jordan (2), Kazakhstan (2), Myanmar (12) and Turkmenistan (2). The database also states that Indonesia has signed a deal for four Wing Loong but these are yet to be delivered.¹⁵ It has also been rumoured in the defence press that Uzbekistan is in discussion with China over the sale of the Wing Loong, with some press asserting that the sale has taken place.¹⁶

IRAN

Iranian armed drone developments over the past decade have been shrouded in much mystery and propaganda. Separating actual and on-going UAV programmes from rumoured capabilities and stalled or failed prototypes is very difficult. In addition, those wishing to over or underplay Iranian competence in this area for various reasons have added to the confusion. *Jane's Unmanned Yearbook*, for example, often seen as the authoritative source on unmanned systems, does not list or even mention the armed Shahed-129.¹⁷ Yet other reputable sources cite detailed specifications for the aircraft and there are eye-witness accounts of its presence in Syria where it is reported to have conducted strikes.

Development Programmes

Despite these conflicting reports and regardless of trade sanctions from the international community for a number of years, our conclusion is that Iran has indeed developed and manufactured armed drones, although there is less capability than has been projected by Iran through ceremonial unveilings and TV reports.

Initial development programmes began in the 1980s during the first Gulf War and Iran has slowly but surely increased its capacity, latterly relying heavily on reverse engineering.¹⁸ Exact capability is still difficult to ascertain, but it is clear that Iran has at least one operable armed MALE drone, and at least two smaller 'drones', properly called loitering munitions.¹⁹

The Shahed-129, a MALE armed drone said to be based on the Israeli Hermes 450, was first unveiled in 2012 and then said to be entering mass production in 2013.²⁰ The Islamic Revolutionary Guard Corps (IRGC) is thought to have placed an initial order for a fleet of forty, with nineteen in service by July 2017.²¹

Iran has indeed developed and manufactured armed drones, although there is less capability than has been projected by Iran through ceremonial unveilings and TV reports.

15 Trade register of Chinese exports of major weapons from 2010 - 17, Arms Transfer Database, SIPRI, http://armstrade.sipri.org/armstrade/page/trade_register.php, last accessed 21 Mar 2018.

16 Franz Stefan-Gady, 'China Scores Biggest Military Export Order for Killer Drones', *The Diplomat*, 02 March 2017, www.thediplomat.com/2017/03/china-scores-biggest-military-export-order-for-killer-drones, last accessed 19 Feb 2018.

17 *Jane's Unmanned* (2017-18), pp. 77-81.

18 *The Military Balance*, p. 362.

19 Drone Wars maintains a distinction between 'loitering munitions' and 'drones' which some others do not. Armed drones, properly called, have separate munitions and the drones themselves are recoverable after missions. Loitering munitions, although operated using similar technology, have the warhead integrated within the system and are therefore destroyed when used.

20 Tamir Eshel, 'Iran's Shahed-219 Combat Drone to Enter Serial Production', *Defense Update*, 28 Sep 2013, http://defense-update.com/20130928_irans-shahed-129-combat-drone-to-enter-serial-production.html, last accessed 06 Dec 2017.

21 Babak Taghvaei, 'Shahed 129 Heads Iran's Armed UAV Force', *Aviation Week and Space Technology*, 27 Jul 2017, <http://aviationweek.com/defense/shahed-129-heads-iran-s-armed-uav-force>, last accessed 29 Nov 2017; 'Iranian Aircraft Manufacturing Industrial (HESA) Shahed-129', *UAV Global*, <http://www.uavglobal.com/shahed-129/>, last accessed 29 Nov 2017.

Shahed-129 armed MALE UAV²²

Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions
8m	16m	175km/hr	5,485m	24hrs	300km range	4 ATS missiles

In October 2016, Iran unveiled the batwing Saeqeh UAV, said to be modelled on the US RQ-170 Sentinel which crashed or was brought down in Iran in 2011.²³ Various iterations of the drone, some powered by jet engines and some propeller driven, have appeared in photos and video footage since then.²⁴ In February 2018, Israel released footage of one of its helicopters shooting down what it said was a Saeqeh UAV over Israel.²⁵

Saeqeh

Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions
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The specifications for this drone are unknown but it is thought to have a wingspan of around 6-7m.²⁶

Many of Iran's claims to have other operational armed drones in production have been met with scepticism in the defence press, even where models have been displayed.²⁷ The Sarir-H110, Fotros, Simorgh and Hamaseh have all been unveiled but not seen in use, so are likely to have been abandoned prototypes.

Older Iranian drones which have been updated to become strike capable include the Karrar and Ababil-T, although the status of the Karrar is 'unknown'.²⁸ Both these drones become more akin to loitering munitions once strike enabled. The Karrar, a small, turbojet powered UAV, capable, according to Iran, of carrying a single bomb or two missiles is a single-shot system, which cannot be reused.²⁹ Although the ISR variants of the Ababil are recoverable, the Ababil-T, the armed variant, is fired straight at a target resulting in its destruction.³⁰

On 5th February 2018, Iranian Defence Minister Hossein Dehghan, announced that the armed drone prototype Mohajer-6 would be entering mass

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- 22 'HESA Shahed 129 (Eye-Witness) Medium-Altitude, Long Endurance (MALE) Reconnaissance/Light Attack Drone', Military Factory, 18 Nov 2017, https://www.militaryfactory.com/aircraft/detail.asp?aircraft_id=1330; 'Description: HESA - Shahed 129', Dragon Drones, 11 Apr 2017, <https://dragonsdrones.com/2017/04/11/description-hesa-shahed-129/>, last accessed 29 Nov 2017.
- 23 David Cenciotti, 'Iran unveils new UCAV modeled on captured U.S. RQ-170 stealth drone', 2 October, 2016 <https://theaviationist.com/2016/10/02/iran-unveils-new-ucav-modeled-on-captured-u-s-rq-170-stealth-drone/>.
- 24 Wim Zwijnenburg, 'Sentinels, Saeqehs and Simorghs: An Open Source Survey of Iran's New Drone in Syria', Bellingcat, 13 February 2018, <https://www.bellingcat.com/news/mena/2018/02/13/sentinels-saeqehs-simorghs-open-source-information-irans-new-drone-syria/>, last accessed 28 Mar 2018.
- 25 Jamie Taraby, Oren Liebermann and Ian Lee, 'Israel: Iranian drone was based on captured US drone', CNN, 12 Feb 2018, <https://edition.cnn.com/2018/02/12/middleeast/israel-iran-drone-intl/index.html>, last accessed 14 Feb 2018.
- 26 Zwijnenburg, 'Sentinels, Saeqehs and Simorghs'.
- 27 The Sarir was displayed on National Army Day in 2013. Arthur Holland Michel, 'Iran's Many Drones', Centre for the Study of the Drone, Bard College, 25 Nov 2013, <http://dronecenter.bard.edu/irans-drones/>, last accessed 29 Nov 2017; 'Iranian Stealth UAV Test Site Identified', Jane's Defence Weekly, <http://www.janes.com/article/64435/iranian-stealth-uav-test-site-identified>, 25 Nov 2017; *Jane's Unmanned (2016-17)*, pp. 77-81; Stephen Trimble, 'Iran puts Hamaseh UAV on export market', *Flight Global*, 18 Jul 2017, <https://www.flightglobal.com/news/articles/iran-puts-hamaseh-uav-on-export-market-439414/>, last accessed 29 Nov 17.
- 28 *Jane's Unmanned (2016-17)*, pp. 79.
- 29 'Karrar - Iran's New Jet-Powered Recce and Attack Drone', Defense Update Online Defense Magazine, 28 Aug 2010, http://defense-update.com/products/k/karrar_jet_powered_drone_24082010.html, last accessed 11 Feb 2018.
- 30 'GhodsAbabil (Swallow) - Iran (1995)', Military Factory, 07 June 2017, https://www.militaryfactory.com/aircraft/detail.asp?aircraft_id=710, last accessed 14 Feb 2017.

production.³¹ Footage was also released of demonstration flights, showing the drone firing missiles at floating targets in the sea.³²

Mohajer-6

Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions
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There are no specifications available for the Mohajer-6, but its earlier ISR versions have a 5m wingspan and can travel at 165km/h over a range of 100km.

Deployment

The Shahed-129 is currently deployed in Syria but it is not clear if it is being operated by Iranian or Syrian forces. It was initially reported in Syria in 2014, operating in an unarmed surveillance role over Damascus.³³ The first indication that Shahed-129 was being used to carry out strikes came in February 2016 with Iranian TV broadcasting footage of the drone launching a strike near Aleppo which was subsequently geolocated to the area.³⁴ Footage released by rebel groups in the area appeared to corroborate that a Shahed-129 had indeed carried out the strike.³⁵

Since then, several Shahed-129's have been shot down by US forces in Syria, two in June 2017 alone.³⁶ A US spokesperson for the Coalition stated that it had brought down the Iranian drones after they had shown "hostile intent" towards Coalition forces in the region.³⁷

Another area in which Iranian drones have come into conflict with the US is in the Persian Gulf. On several occasions in 2017 the US claimed Iranian drones made "unsafe and unprofessional" approaches to their aircraft carriers or aircraft in the Gulf. Iran insisted that the manoeuvres were not unsafe, and that it was simply keeping up its daily ISR drone patrols in its Air Defence Identification Zone (ADIZ).³⁸

The Shahed-129 has also been deployed to the Iranian border with Pakistan to monitor drug smuggling and armed groups. One crashed in the border area in August 2015 and in June 2017 Pakistan officials stated that they

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- 31 Joanna Stocker, 'Iran begins mass production of Mohajer-6 combat drones', *The Defence Post*, 05 Feb 2018, <https://thedefensepost.com/2018/02/05/iran-mohajer-6-drone-mass-production/>, last accessed 11 Feb 2018.
- 32 IRIB News Broadcast, 'Iran Mass Production Mohajer 6 UCAV&Qaem 1 smart guided bomb', published Persian Boy on www.youtube.com, 05 Feb 2018, <https://www.youtube.com/watch?v=A-jc7WqimgkU>, last accessed 21 Mar 2018.
- 33 David Cenciotti, 'Iranian Shahed 129 Drone Appears Over Damascus', *Aviation Week and Space Technology*, 20 Apr 2014, <https://theaviationist.com/2014/04/10/shahed-drone-over-syria/>, last accessed 29 Nov 2017.
- 34 Galen Wright, 'Examining Iranian Drone Strikes in Syria', 29 February, 2016, *Offiziere*, <https://www.offiziere.ch/?p=26604>.
- 35 Jeremy Binnie, 'Analysis: Syrian rebel video corroborates UAV strike claims', *Jane's Defence Weekly*, 12 Feb 2017, <http://www.janes.com/article/57968/analysis-syrian-rebel-video-corroborates-iranian-uav-strike-claims>, last accessed 29 Nov 2017.
- 36 Zachary Fryer-Briggs, 'US aircraft shoots down another UAV in Syria', *Jane's Defence Weekly*, 22 Jun 2017, <http://www.janes.com/article/71622/us-aircraft-shoots-down-another-uav-in-syria>, last accessed 29 Nov 2017; Babak Taghvaei, 'Shahed 129 Heads Iran's Armed UAV Force', *Aviation Week and Space Technology*, 27 Jul 2017, <http://aviationweek.com/defense/shahed-129-heads-iran-s-armed-uav-force>, last accessed 29 Nov 2017; 'Iranian Aircraft Manufacturing Industrial (HESA) Shahed-129', *UAV Global*, <http://www.uavglobal.com/shahed-129/>, last accessed 29 Nov 2107.
- 37 Ryan Browne and Barbara Starr, 'US shoots down another pro-regime drone in Syria', *CNN*, 20 June 2017, <https://edition.cnn.com/2017/06/20/politics/us-syria-shoots-down-pro-regime-drone/index.html>
- 38 'Iran says its drones near US vessels are safe, following rules', *Reuters*, 15 Aug 2017, <https://www.reuters.com/article/us-usa-iran-drones/iran-says-its-drones-near-u-s-vessels-are-safe-following-rules-idUSKCN1AV11Z>, last accessed 01 Dec 2017.

had shot down a Shahed-129 after it flew 4km into Pakistani airspace.³⁹ It is believed that Iran started to send drones into Pakistani air space four months prior to this incident, arguing that separatist groups in the Sistan and Baluchistan regions (who are pushing for independence from both Pakistan and Iran) were not being dealt with sufficiently by Pakistan.⁴⁰

Exports

Iran is reported to have transferred unarmed surveillance drones, such as the Ababil-3 and Mohajer, to Syria and Sudan.⁴¹ As for armed versions, Iranian drones of varying sizes have reportedly been used in Syria, possibly by Assad's forces, and several non-state actors; the Houthi in Yemen, Hezbollah and Hamas.⁴² This information has been confirmed by sightings and interceptions and is expanded upon in the 'Non-State Actors' section of the report.

TURKEY

Turkey's development and use of armed drones is an important illustration of the way nations today can quickly develop and deploy armed drones. The growing tensions between Turkey and its allies also pose questions about the proliferation of drone technology and the way in which capabilities can be cloned and adapted beyond the scope of any bi- or multi-lateral agreement. Finally, while Turkey's rapid development of armed drones was purportedly to support the war against ISIS, Turkey has seemingly been much more interested in carrying out strikes against citizens in its own state in the ongoing conflict with separatist Kurds.⁴³

Acquisitions

Turkey first purchased two Israeli unmanned systems - the Heron surveillance drone and the Harpy 2, or Harop, a loitering munition.⁴⁴ In 2008 it also sought to purchase Predator drones from the US but the deal did not gain approval from Congress due to MTCR restrictions.⁴⁵ This rejection, says Turkey, pushed them towards creating their own armed drone industry, as well as missiles to accompany them and indigenous operating systems.

39 Aaron Mehta, 'INTERCEPTS: Check out a crashed Iranian drone', Defense News, 13 Aug 2015, <https://www.defensenews.com/opinion/intercepts/2015/08/13/intercepts-check-out-a-crashed-iranian-drone/>, last accessed 21 Mar 2018; Khalil Dewan, 'Why are Iran's drones crossing into Pakistani airspace?', Middle East Monitor, 11 Jul 2017, <https://www.middleeastmonitor.com/20170711-why-are-irans-drones-crossing-into-pakistani-airspace/>, last accessed 29 Nov 2017; 'Pakistan's Foreign Ministry confirms downing of Iran drone', Arab News, 21 Jun 2017, <http://www.arabnews.com/node/1118466/world>, last accessed 21 Mar 2018; Taghvaei, 'Shahed 129'.

40 Dewan, 'Why are Iran's drones crossing into Pakistani airspace?'

41 Trade register of Iranian exports of major weapons 2008 - 2016, Arms Transfer Database, SIPRI, http://armstrade.sipri.org/armstrade/page/trade_register.php, last accessed 15 Feb 2018.

42 'Hezbollah admits launching drone over Israel', BBC News, 11 Oct 2012, <http://www.bbc.co.uk/news/world-middle-east-19914441>, last accessed 14 Feb 2018.

43 Frank Slijper, *Power Projection: Turkey's Military Build-Up: Arms Transfers and an Emerging Military Industry*, (Utrecht: Pax, 2017). This report gives in depth analyses of the development of Turkey's growing indigenous industry, arms transfers to Turkey, its push to be self-sufficient by 2023 and the reasons behind this.

44 'Harpy', Israeli Weapons Ltd, undated, <http://www.israeli-weapons.com/weapons/aircraft/uav/harpy/HARPY.html>, last accessed 10 Jan 2018.

45 MetinGurcan, 'Turkey goes all in on drones', Al-Monitor, 28 Dec 2015, <https://www.al-monitor.com/pulse/originals/2015/12/turkey-drones-what-is-ankaras-hurry.html>, last accessed 10 Jan 2018.

Development Programmes

Today, Turkey has two types of indigenously manufactured armed drones in operation, the Bayraktar TB-2 and the Anka-S. The Bayraktar was designed by Kale-Baykar, a company owned by the family of President Erdogan's son-in-law.⁴⁶ The first batch of six Bayraktar were delivered to the army in March 2016, tested over the summer and by September of that year were in use against the PKK.⁴⁷

It is difficult to assess when the Anka-S actually became operational. Reports in early 2017 stated that Turkish Aerospace Industries (TAI), who manufacture the Anka, were contracted to produce ten, six of which were to be delivered in 2017, with the remaining four to be delivered in 2018.⁴⁸ However, even before they were fully operational, the Turkish army pressed the drone into early use with one used to launch a strike in July 2017.⁴⁹ Since then, it is clear that the Anka-S has become fully operational with the Turkish Air Force (see below in 'Deployment'). The Turkish government has claimed it will increase its fleet of armed drones to 120 over the next four years, and the pro-government news service, *Daily Sabah*, reports that more armed UAVs are being delivered to the armed forces regularly.⁵⁰

An armed version of an existing surveillance drone, the Karayel, has also been displayed and is thought to be under development but there is no verification that it is yet in production.⁵¹

Bayraktar-TB2 tactical armed MALE UAV⁵²

Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions
6.5m	12m	130km/hr	Tested at 6,860m	24hr	150km range	2 underwing hardpoints for mini smart munitions

Anka-S armed MALE UAV⁵³

Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions
8m	17.3m	259 km/hr	9,145m	24hr	At present an LOS range of 200km. In future, BLOS range of thousands of km ² ⁵⁴	250kg payload capacity for either laser guided bombs, missiles or smart munitions.

46 Turkey paid \$36 million to Erdoğan's son-in-law's company for 6 UAVs, *Turkish Minute*, 16, December 2016, <https://www.turkishminute.com/2016/12/16/turkey-paid-36-million-dollar-erdogans-son-laws-company-6-uavs/>

47 BurakEgeBekdil, 'Turkey's increasing reliance on drone systems', *Defense News*, 03 Jul 2017, <https://www.defensenews.com/air/2017/07/03/turkey-s-increasing-reliance-on-drone-systems/>, last accessed 05 Dec 2017; Turnbull, 'IDEF 2017: Turkish industry pushes armed drones'.

48 BurakEgeBekdil, 'Turkey's First Armed Anka Drone To Be Delivered 2017', *Defense News*, 17 Jan 2017, <https://www.defensenews.com/air/2017/01/17/turkeys-first-armed-anka-drone-to-be-delivered-in-2017/>, last accessed 05 Dec 2017.

49 'Two New UAVs Delivered to Turkish Air Force', *Daily Sabah*, 04 Feb 2018, <https://www.dailysabah.com/defense/2018/02/05/two-new-uavs-delivered-to-turkish-air-forces>, last accessed 22 Feb 2018; LalezarSariibrahimoglu, 'Turkey's Anka armed UAV conducts first strike', 14 Jul 2017, <http://www.janes.com/article/72308/turkey-s-anka-armed-uav-conducts-first-strike>, last accessed 01 Dec 2017.

50 Gurcan 'Turkey-PKK 'drone wars' escalate'; 'New drones to be delivered for counterterrorism ops', *Daily Sabah*, 14 Jan 2018, <https://www.dailysabah.com/war-on-terror/2018/01/15/new-drones-to-be-delivered-for-counterterrorism-ops>, last accessed 21 Mar 2018; 'Turkish army reinforces air support capability with 8 new armed drones', *Daily Sabah*, 21 Mar 2018, <https://www.dailysabah.com/defense/2018/03/22/turkish-army-reinforces-air-support-capability-with-8-new-armed-drones>, last accessed 21 Mar 2018.

51 *Military Unmanned Systems*, Shephard Media Annual Handbook, 25, April 2017, p. 90.

52 *Jane's Unmanned*, 2017-18, p. 187

53 *Jane's Unmanned* (2017-18), pp. 187-8; TolgaOzbek, 'Turkey in talks for 10 Anka UAVs', *Flight Global*, 06 Sep 2012, <https://www.flightglobal.com/news/articles/turkey-in-talks-for-10-anka-uavs-370435/> last accessed 10 Jan 2018.

54 Kerry Herschelmann, 'Turkey to start testing satcom control of Anka-S', 24 Oct 2017, <http://www.janes.com/article/75160/turkey-to-start-testing-satcom-control-of-anka-s-uav>, last accessed 01 Dec 2017.

Export

It was reported in early 2018 that Qatar is to become the first country to buy armed drones from Turkey. A deal was signed on 13th March 2018 covering military vehicles, ships and six Bayraktar TB-2 armed drones.⁵⁵

Deployment

As part of conflict with PKK

Kurdish separatists have been engaged in a political and armed battle for independence since 1978. This conflict has claimed the lives of thousands of people, mainly in the Kurdish south eastern regions of Turkey where the PKK are active. A two-and-a-half year truce collapsed in mid-2015 and from the resumption of armed hostilities until July 2017, almost 3,000 people were killed.⁵⁶ Armed drones have become increasingly important for Turkey in its war against the PKK and armed groups that Turkey associates with them. It has been recorded that 88 people were killed in drone strikes in 2016.⁵⁷ In 2017, the Turkish press reported that 64 people were killed by armed drones but that 405 were killed in 'UAV operations', presumably referring to people targeted with the use of drones. Moreover, the flight hours of UAVs in 2017 increased fourteen-fold from 2016, up from 1,180 hours to 15,786 hours.⁵⁸

Deployment in Syria and Iraq

Part of the reason that the Turkish government was keen to speed up its drone programme was the threat of ISIS, who attacked across the border with rocket fire in early 2016.⁵⁹ ISIS and affiliated groups operate both in Iraq and Syria on Turkey's borders. However, it seems that much of Turkey's drone activity outside its borders has, again, been directed against separatist Kurds.⁶⁰

Furthermore, on January 20th 2018, Turkey launched 'Operation Olive Branch', a major offensive in Afrin, Northern Syria (close to the Turkish border), where the US said they were amassing a 30,000-strong force to support the Syrian Democratic Forces against ISIS. Turkey see this as a threat as the forces include the YPG group, linked to the PKK, who have been using Afrin and surrounding region as a base since 2012.⁶¹ Turkish Prime Minister, Binali Yıldırım, said that drones had changed the course of Operation Olive Branch in Afrin.⁶² A report released by the Turkish

55 Bilal Khan, 'Qatar Will Buy Turkish Drones, Ships and Armoured Vehicles', Quwa Defence News and Analysis Group, 21 Mar 2018, <https://quwa.org/2018/03/21/qatar-will-buy-turkish-drones-ships-and-armoured-vehicles/>, last accessed 29 Mar 2018.

56 Berkay Mandiraci, 'Turkey's PKK Conflict Kills almost 3,000 in Two Years', International Crisis Group, 20 Jul 2017, <https://www.crisisgroup.org/europe-central-asia/western-europemediterranean/turkey/turkeys-pkk-conflict-kills-almost-3000-two-years>, last accessed 05 Apr 2018.

57 Cemal, 'Turkish Armed #UAV operation list wich [sic] carried our against #PKK #terror group since the delivering of the indigenous armed UAVs to #TSK', @Acemal71 on Twitter.com, <https://twitter.com/Acemal71/status/905152999265357825>, last accessed 01 Dec 2017 (This is corroborated by Merve Aydogan, 'Tureky's UAV control center expected to boost success rate in counterterrorism operations', *Daily Sabah*, 18 Nov 2016, <https://www.dailysabah.com/war-on-terror/2016/11/19/turkeys-uav-control-center-expected-to-boost-success-rate-in-counterterrorism-operations>, last accessed 05 Dec 2017, which gives the same figures for the first two months of drone operations in 2016).

58 'New Drones to be Delivered for Counter-terrorism ops', *Daily Sabah*, 14 Jan 2018, <https://www.dailysabah.com/war-on-terror/2018/01/15/new-drones-to-be-delivered-for-counterterrorism-ops>

59 BurakEgeBekdil, 'Turkey Rushes Armed Drones After Increased ISIS Threat', 05 May 2016, <http://www.defensenews.com/air/2016/05/05/turkey-rushes-armed-drones-after-increased-isis-threat/>, last accessed 05 Dec 2017.

60 Bekdil, 'Turkey Rushes Armed Drones'.

61 'Turkish war planes "neutralise" 38 PKK members in Northern Iraq: Report', Press TV, 21 Mar 2018, <http://www.presstv.com/Detail/2018/03/21/556130/turkey-iraq-PKK-Kurds>, last accessed 21 Mar 2018.

62 'Drones turned fortune of Afrin operation, prime minister says', *Daily Sabah*, 22 Mar 2018, <https://www.dailysabah.com/defense/2018/03/23/drones-turned-fortune-of-afrin-operation-prime-minister-says>, last accessed 05 Apr 2018.

government on 19 April 2018, after the end of the operation, stated that during the operation, drones aided in the “neutralizing” of 1,129 terrorists; 449 directly and 680 with the assistance of drones.⁶³ However, given that Erdogan announced in February 2018 that 1,369 “terrorists” had been killed since the beginning of Operation Olive Branch, it is unclear what the actual figure is.⁶⁴ Moreover, the Syrian Observatory of Human Rights stated that 280 civilians had also lost their lives, while Turkey have not admitted to any civilian casualties.⁶⁵ As in other conflicts where armed drones are used, it is very difficult to corroborate the extent of casualties from drone strikes, but suffice to say, it is clear that armed drone capability has become a significant tool in Turkey’s arsenal.

On the ground in Afrin, a TB2 was spotted in February 2018 and allegedly shot down by YPG and Syrian Defence Forces (SDF), although some analysts think the drone malfunctioned and crashed. This particular drone was not thought to be armed.⁶⁶

PAKISTAN

Pakistan’s experience of armed drones is a troubled one and deserves a fuller introduction. Since 2004, the US has been carrying out targeted killings in the Federally Administered Tribal Area (FATA) in the north of the country using its fleet of armed drones based in Afghanistan. Several thousand people have been killed in drone strikes, many of them suspected militants, but hundreds of innocent civilians have also been killed.⁶⁷ Thousands of Pakistani citizens protested against this US drone war, and the Pakistani government and courts have condemned the strikes as illegal and a violation of Pakistan’s sovereignty. Pakistan has taken these concerns to the UN, which confirmed the violation of sovereignty,⁶⁸ yet the US argues that its strikes are consistent with international law and its inherent right of self-defence. In 2018 it was reported that the Trump administration told Pakistani officials that the strikes would continue until the US was “satisfied” that Pakistan was dealing with terrorist networks inside its territory.⁶⁹

Despite publicly opposing the US strikes within its territory, there is, however, some indication that elements of Pakistan’s government gave at least tacit support for particular US strikes to take place.⁷⁰ A rise in the number of domestic terror attacks recently softened public opinion against drone strikes and this has coincided with Pakistan developing and beginning to use its own armed drone.⁷¹

A rise in the number of domestic terror attacks recently softened public opinion against drone strikes and this has coincided with Pakistan developing and beginning to use its own armed drone

63 ‘Turkey’s Bayraktar TB2 drones enables victory against YPG/PKK in Syria’s Afrin’, Daily Sabah, 19 Apr 2018, <https://www.dailysabah.com/war-on-terror/2018/04/19/turkeys-bayraktar-tb2-drones-enable-swift-precise-victory-against-ypgpkk-in-syrias-afrin>, last accessed 25 Apr 2018.

64 Turkish Operation Olive Branch in Afrin: 1369 Killed Kurds’, Front News International, 12 Feb 2018, <<https://frontnews.eu/news/en/23427/Turkish-Operation-Olive-Branch-in-Afrin-1369-Killed-Kurds>>, last accessed 28 Mar 2018.

65 ‘Turkish war planes “neutralise” 38 PKK’

66 Fergus Kelly, ‘SDF claims it shot down a Turkish Bayraktar drone that crashed in Efrin’, The Defence Post, 12 Feb 2018, <https://thedefensepost.com/2018/02/12/turkey-drone-crash-afrin-bayraktar-sdf>, last accessed 17 Feb 2018.

67 Drone Strikes in Pakistan, Drone Wars: The Full Data, Bureau of Investigative Journalism (TBIJ), last updated 08 Feb 2018, <https://www.thebureauinvestigates.com/projects/drone-war/pakistan>, last accessed 29 Mar 2018.

68 Drone Strikes in Pakistan, Drone Wars: The Full Data, Bureau of Investigative Journalism (TBIJ), last updated 08 Feb 2018, <https://www.thebureauinvestigates.com/projects/drone-war/pakistan>, last accessed 29 Mar 2018.

69 Shafqat Ali, ‘Washington tells Islamabad: drone strikes to continue until Pakistan “satisfies” US’, The Nation, 29 Jan 2018, <https://nation.com.pk/29-Jan-2018/washington-tells-islamabad-drone-attacks-to-continue-until-pakistan-satisfies-us>, last accessed 07 Feb 2018.

70 ‘Secret memos “show Pakistan endorsed US drone strikes”’, BBC News, 24 Oct 2013, <http://www.bbc.co.uk/news/world-asia-24649840>, last accessed 01 Dec 2017.

71 Jon Boone, ‘Pakistani army claims it has killed three militants using its Burraq drone’, The Guardian, 07 Sep 2015, <https://www.theguardian.com/world/2015/sep/07/pakistan-army-burraq-drone-strike-kills-three-militants-shawal-reports>, last accessed 05 Dec 2018.

Development Programme

Pakistan's indigenous armed drone, the Burraq, was first developed in 2013. It is based on the Chinese CH-3 drone and analysts suspect it was produced under licence. A total of 35 were reported to be in production for the Pakistani military in 2015.⁷²

Burraq armed tactical UAV⁷³

Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions capacity
7m	9m	215km/hr	7,500m	unknown	1,000km range	1x Barq ATS laser guided missile.

Acquisition

There was some speculation in the defence press in 2016 that Pakistan was preparing to buy a Wing Loong from China after one crashed in June of that year just 4 miles from an airbase in Pakistan on an "experimental flight."⁷⁴ Subsequently, in November 2017, satellite imagery interrogated by the Bard Centre for the Study of the Drone revealed the presence of a Wing Loong at Pakistan's Mianwali air base. However, the drone was white rather than battlefield grey, suggesting it may also have been on a test flight and that Pakistan are not yet operating their own Wing Loong.⁷⁵ The SIPRI Arms Transfer Database records a total of 20 CH-3 as having been purchased by Pakistan and delivered by China in 2016, as well as two Wing Loong in 2015.⁷⁶

Deployment

Getting a clear picture of how and whether Pakistan is using its armed drones has been very difficult. In September 2015 the Pakistan's chief military spokesperson announced the first strike from a Burraq, in Shawal Valley, North Waziristan. The strike, he said, killed three "high profile terrorists" and destroyed a compound.⁷⁷ A month later, Pakistan reported that the Burraq had again hit terrorist targets in the Waziristan region, claiming it was the Burraq's first night-time strike, accomplished with "pinpoint accuracy."⁷⁸ Since then there has been little public information about the use of the Burraq.

IRAQ

The Iraqi military, shakily rebuilt after the US-led invasion and the defeat of Saddam Hussein, struggled to contain the ISIS insurgency in 2014, ceding

72 'NESCOM Burraq Unmanned Combat Aerial Vehicle (UCAV)', Military Factory, 21 Jun 2017, https://www.militaryfactory.com/aircraft/detail.asp?aircraft_id=1377, last accessed 13 Dec 2017.

73 'NESCOM Burraq', *ibid*.

74 Kelsey D. Atherton, 'Chinese-Made Drone Crashed In Pakistan', *Popular Science*, 22 Jul 2016, <https://www.popsci.com/chinese-made-drone-crashes-in-pakistan>, last accessed 05 Dec 2017; Bilal Khan, 'Update: Crashed UAV in Pakistan was undergoing flight tests', Quwa: Defence News & Analysis Group, 21 Jul 2016, <https://quwa.org/2016/06/21/crashed-pakistani-drone-chinas-wing-loong-uav/>, last accessed 05 Dec 2017.

75 Dan Gettinger, 'Mianwali, Pakistan', Drone Bases Updates, Centre for the Study of the Drone, Bard College, 05 Jan 2018, <http://dronecenter.bard.edu/drone-bases-updates/>, last accessed 19 Feb 2018.

76 Register of Chinese exports, SIPRI.

77 Mateen Haider, 'Three killed in military's first drone strike in North Waziristan', Dawn, 07 Sep 2015, <https://www.dawn.com/news/1205455>, last accessed 05 Dec 2015.

78 'Pakistani-made 'Burraq' drone kills several militants, destroys hideouts in NWA', Geo TV, 22 Oct 2015, <https://www.geo.tv/latest/6982-pakistani-made-burraq-drone-kills-several-militants-destroys-hideouts-in-nwa>, last accessed 05 Dec 2015.

large swaths of territory to the Jihadist group. While receiving large amounts of conventional weaponry from the US, Iraq turned to China to purchase armed drones. Sources suggest that between four and eight CH-4 were delivered to the Pakistan military at the beginning of 2015. The SIPRI register of arms transfers shows that Iraq ordered four CH-4B drones which were delivered in 2015.⁷⁹

In October 2015, the Iraqi military put their armed drones on show at a press event⁸⁰ and then in December 2015, released a video showing the first strike from the drone. The strike, on December 6th, targeted an ISIS position on the outskirts of Ramadi.⁸¹ Since then there have been sporadic press reports and videos released by the Iraqi military detailing strikes from Iraqi drones.⁸²

In January 2017, nine anti-ISIS Shi'ite militia fighters were killed in a 'friendly fire' incident when an Iraqi drone targeted them by mistake. Iraqi military sources later told Reuters that the drone was given the wrong co-ordinates.⁸³

The Iraqi military has also adapted small commercial drones for use against ISIS inside cities, such as Mosul. These small drones are fitted with a grenade or small bomb, to create an 'IED', that is then dropped on enemy positions, a strategy adopted by several non-state actors, including ISIS (see below).⁸⁴

SAUDI ARABIA

Saudi Arabia has been, for some time, the biggest spender on, and importer of, defence equipment in the Middle East North Africa (MENA) region. Yet until its involvement in the current war in Yemen, it had not been engaged in any sustained, multi-force engagements beyond its own borders since the First Gulf War.⁸⁵

In 2014, the Saudi military ordered two CH-4 and potentially up to five Wing Loong armed drones from China.⁸⁶ Delivery began in 2015 and by October 2016, two Wing Loong drones had been deployed to the Sharurah Regional Airport in Najran Province, near the border with Yemen, where, almost immediately, one was seen downed inside Yemen.⁸⁷

Subsequently, in 2017, it was reported that Saudi Arabia ordered 300 Wing

79 Register of Chinese exports, SIPRI.

80 Beth Stevenson, 'Iraq debuts new Chinese CH-4', 13 Oct 2015, Flight Global, <https://www.flight-global.com/news/articles/iraq-debuts-new-chinese-ch-4-uav-417682/>, last accessed 01 Dec 2017.

81 Jeffrey Lin and P.W. Singer, 'Iraq's New Chinese Drone Draws First Blood', Popular Science, 15 December 2015, <https://www.popsoci.com/iraqs-new-chinese-armed-drone-draws-first-blood>, last accessed 28 Mar 2018.

82 David Hambling, 'The Iraqi Army Is Flying Chinese-Made Killer Drones', Popular Mechanics, 06 Jun 2017, <http://www.popularmechanics.com/military/a21197/the-iraqi-army-is-flying-chinese-made-killer-drones/>, last accessed 13 Dec 2017. The footage was posted on youtube.com but has been deleted for 'violent or graphic content', <https://www.youtube.com/watch?v=8fwhJan1dPU>, last accessed 30 Oct 2017. '20 Daesh militants killed in Iraqi drone strike in Mosul', The Baghdad Post, 01 Jan 2017, <http://www.thebaghdadpost.com/en/story/4575/20-Daesh-militants-killed-in-iraqi-drone-strike-in-Mosul>, last accessed 13 Dec 2017.

83 "'Friendly fire" by Iraqi drone kills nine anti-IS fighters', Reuters, 10 Jan 2016, <https://uk.reuters.com/article/uk-mideast-crisis-iraq-military/friendly-fire-by-iraqi-drone-kills-nine-anti-is-fighters-idUKKC-N0U00OK20160110>, last accessed 01 Dec 2017.

84 Jim Michaels, 'Iraqi forces now attacking ISIS militants with drones in Mosul', USA Today, 25 Apr 2017, <https://www.usatoday.com/story/news/world/2017/04/25/united-states-technology-isis-drones-iraqi-forces-mosul/100851612/>, last accessed 01 Dec 2017.

85 The Military Balance, p. 363.

86 Register of Chinese exports, SIPRI.

87 Dan Gettinger, 'Drone Bases Update: Sharurah, Saudi Arabia', Center for the Study of the Drone, Bard College, 04 Sep 2017, <http://dronecenter.bard.edu/drone-bases-updates/>, last accessed 05 Dec 2017; Henri Kenhmann, 'Un drone Wing Loong ecrase au Yemen', East Pendulum, 02 Oct 2016, <http://www.eastpendulum.com/drone-wing-loong-ecrase-yemen>, last accessed 05 Dec 2017.

Working out which air force has carried out what strikes is one of the inherent problems of drone technology and is likely to cause further accountability problems in the future.

Loongs from China and that a manufacturing plant would be opened in Saudi Arabia to facilitate this sale. There is speculation that the plant may also produce the CH-5, China's most heavily armed drone.⁸⁸

Saudi Arabia's Wing Loongs have been deployed to the Sharurah and Jizan Regional airports near the border with Yemen. It is extremely likely that their presence indicates they are being used against Houthi forces in Yemen.⁸⁹

While we believe Saudi Arabia has used its armed drones to carry out strikes in Yemen, there has been no direct confirmation from Saudi Arabia. It is difficult to find independent verification since Saudi Arabia is also using manned aircraft to attack Yemen. In addition, US drones based in Saudi Arabia may be among those launching strikes in to Yemen, further complicating attribution.⁹⁰ Working out which air force has carried out what strikes is one of the inherent problems of drone technology and is likely to cause further accountability problems in the future.

UAE

Development Programmes

After UAE's request to purchase Predator drones from General Atomics was rejected by US Congress in 2002, UAE began developing its own UAVs. UAE-based Adcom Systems developed a number of prototypes which eventually led to its Yabhon United Block-40 drone. The drone has been displayed at several defence exhibitions, but it appears that it is still undergoing tests and is not yet in production.⁹¹ Specifications for the test drones say this MALE UAV will have an endurance of 25hrs and be able to carry 4 Namrood missiles.⁹²

Acquisitions

In 2015, UAE signed a deal with General Atomics for an unknown number of unarmed Predator XPs. General Atomics confirmed in 2017 that deliveries had been completed and the UAE included a 'fly-past' by the new drone during an air show in March 2018.⁹³ UAE continues to lobby Congress to be able to purchase armed drones from the US, so far without success.⁹⁴

88 Chen Chuanren and Chris Pocock, 'Saudi Arabia Buying and Building Chinese Armed Drones', AIN Online, 12 Apr 2017, <http://www.ainonline.com/aviation-news/defense/2017-04-12/saudi-arabia-buying-and-building-chinese-armed-drones>, last accessed 05 Dec 2017

89 Gettinger, 'Drone Bases Update: Sharurah, Saudi Arabia'.

90 'CIA operating drone base in Saudi Arabia, US media reveal', BBC News, 6 February 2016, <http://www.bbc.co.uk/news/world-middle-east-21350437>. TBIJ maintain a database of all US drone strikes in Yemen. This is, as far as possible, an accurate record of USA actions but it is impossible to know if there are other covert US actions. Yemen: Reported Covert Actions in 2017, TBIJ, <https://www.thebureauinvestigates.com/drone-war/data/yemen-reported-us-covert-actions-2017>, last accessed 28 Mar 2018.

91 Biggers, 'UAE United 40 Block 5 at test airfield'; *Jane's Unmanned (2017-18)*, p. 198; *The Military Balance*, p. 362.

92 Shephard Media, *Military Unmanned Systems, Annual Handbook*, 25, 2017, p. 90.

93 Ed Clowes, General Atomics completes delivery of Predator drones to UAE, Gulf News, 22 February 2017, <http://gulfnews.com/business/sectors/manufacturing/general-atomics-completes-delivery-of-predator-drones-to-uae-1.1982936>. See Predator XP/RQ-1E Part of "Live-Fly" Airshow at UMEX, Business Wire, 2 March 2018, <https://www.businesswire.com/news/home/20180302005812/en/Predator-XPRQ-1E-Part-%E2%80%9CLive-Fly%E2%8>.

94 Rob Crilly and Taimur Khan, 'US lawmakers ask Trump to approve armed drone sales to UAE and Jordan', *The National*, 19 Apr 2017, <https://www.thenational.ae/world/us-lawmakers-ask-trump-to-approve-armed-drone-sales-to-uae-and-jordan-1.47368>, last accessed 05 Dec 2017.

Several sources detail that the UAE acquired armed Wing Loong I drones in 2015 and there were confirmed sightings of two Wing Loong II armed drones at the UAE's Qusahwurah Air Base in October 2017.⁹⁵ The SIPRI register of arms transfers records that UAE possess five Wing Loong I and five Wing Loong II.⁹⁶

Deployment of Systems

Since 2015, UAE has been a "willing partner" with Saudi Arabia in the ongoing armed conflict in Yemen.⁹⁷ UAE aircraft have been undertaking airstrikes against Houthi positions since September 2015 at least.⁹⁸ Although hard to confirm, the Wall Street Journal and other sources report that the UAE and Saudi Arabia have undertaken armed strikes from their Wing Loong drones in Yemen.⁹⁹ In September 2015, an unarmed Seeker UAV, believed to be operated by UAE, was shot down in Yemen.¹⁰⁰

Although the UAE has denied involvement in strikes in Libya, it is believed that both manned aircraft and armed drones have been active in the ongoing conflict there. *Jane's Defence*, in October 2016, published images of an air base roughly 50 miles south of Benghazi on which the UAE had stationed eight jets and two Wing Loong drones.¹⁰¹ In September 2016, the Shura Council of Benghazi Revolutionaries (SCBR) published an infographic showing the types of aircraft that had been attacking them in Benghazi. It included missions thought to have been performed by MQ-9 Reaper drones, but some defence analysts think that these were actually misidentified Wing Loong drones belonging to the UAE.¹⁰² Moreover, a UN report published in June 2017 accused the UAE of breaching the international arms embargo on transfers of weapons to Libya, stating that it was providing "material and direct support," including aircraft and drones, to the Libyan National Army based in the east.¹⁰³

NIGERIA

Acquisitions

Nigeria's purchase of armed Chinese drones first came to light in January 2015 when photos of a crashed CH-3A UAV appeared on social media.¹⁰⁴ In July 2015, the Nigerian Air Force (NAF) posted official photos showing the armed drones as senior air force officers toured a base in Northern Nigeria. However,

95 Christopher Biggers, 'UAE revealed as Wing Loong II launch customer', *Jane's Defence Weekly*, 26 Jan 2018, <http://www.janes.com/article/77379/uae-revealed-as-wing-loong-ii-launch-customer>, last accessed 18 Feb 2018.

96 Register of Chinese exports, SIPRI.

97 The Military Balance, p. 356.

98 AFP, 'UAE forces bomb Yemen rebels after coalition troop death', *The Guardian*, 5 Sep 2015, <https://www.theguardian.com/world/2015/sep/05/uae-forces-retaliate-50-coalition-troops-yemen-mis-sile-attack>.

99 Jeremy Page and Paul Sonne, 'Unable to Buy U.S. Military Drones, Allies Place Orders With China', *Wall Street Journal*, 17 Jul 2017, <https://www.wsj.com/articles/unable-to-buy-u-s-military-drones-allies-place-orders-with-china-1500301716>.

100 'Seeker II UAV shot down in Yemen', *Defence Web*, 8 Jul 2015, http://www.defenceweb.co.za/index.php?option=com_content&view=article&id=39813&catid=74&Itemid=30.

101 'UAE established military base in eastern Libya', *Libyan Express*, 28 Oct 2016, <http://www.libyanexpress.com/uae-has-established-military-base-in-eastern-libya-to-fight-alongside-haftars-forces/>, last accessed 05 Dec 2017.

102 'UAE ops using Wing Loong drones', *Arabian Aerospace Online News Service*, 29 Mar 2017, <http://arabianaerospace.aero/uae-ops-using-wing-loong-drones.html>, last accessed 05 Dec 2017.

103 Aidan Lewis, 'Covert Emirati support gave East Libyan air power key boost: U.N. report', *Reuters*, 9 Jun 2017, <https://www.reuters.com/article/us-libya-security/covert-emirati-support-gave-east-libyan-air-power-key-boost-u-n-report-idUSKBN1902K0>, last accessed 28 Mar 2018.

104 Jeffery Lin and P.W. Singer (Popular Science), 'It Looks Like An Armed Chinese-Made Drone Crashed In Nigeria', *Business Insider UK*, 29 Jan 2015, <http://uk.businessinsider.com/it-looks-like-an-armed-chinese-made-drone-crashed-in-nigeria-2015-1?r=US&IR=T>, last accessed 01 Dec 2017.

it appears that five CH-3A drones were purchased from China in 2014. It seems there were some difficulties in maintaining drone operations and, according to defence press reports, there was a possibility that they would be replaced.¹⁰⁵ However, since late 2017, the CH-3As have been regularly used in operations against Boko Haram.

Deployment of Systems

Prior to taking delivery of the CH-3s in 2014, the Nigerian military had been using Israeli and indigenous surveillance drones for intelligence gathering. In February 2016, the Associated Press reported a statement from the Nigerian air force describing the first strike carried out by a Nigerian drone, which targeted a Boko Haram ammunition and fuel dump.¹⁰⁶ The next strike did not occur until 18 months later in December 2017, when the NAF released a video of a strike against a logistics base.¹⁰⁷ In the first six weeks of 2018, amidst an intensified air campaign in the north east, four Nigerian drone strikes were reported:

- On 15 Jan 2018 the NAF struck a Boko Haram vehicle workshop in the Sambisa area with a missile fired from a drone, “killing many insurgents.”¹⁰⁸
- On 29 Jan 2018, the Nigerian Air Force released footage of a CH-3 carrying out a strike two days previously, on another Boko Haram vehicle workshop in Sambisa Forest, “neutralising many insurgents.”¹⁰⁹
- On 30th Jan the NAF again released footage showing a strike on what it said was a Boko Haram gun truck 30 Jan 2018.¹¹⁰
- A fourth video was released by the NAF of another CH-3 strike on 6 Feb 2018, claiming that it hit a Boko Haram artillery piece.¹¹¹

EGYPT

Acquisition

It is not clear exactly when Egypt took delivery of Chinese Wing Loong drones, but several were sighted at Egyptian airbases in 2016 and 2017, with photos

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- 105 Oscar Nkala, ‘Nigerian Air Force reaps rewards of aircraft refurbishment programme’, Defence Web, 14 Jul 2017, http://www.defencenews.co.za/index.php?option=com_content&view=article&id=48568:nigerian-air-force-reaps-rewards-of-aircraft-refurbishment-programme&catid=35:Aerospace&Itemid=107, last accessed 08 Jan 2017.
- 106 ‘The Nigerian Air Force says a drone bombed a Boko Haram logistics base in the northeast, possibly hitting an ammunition depot and scoring a “major setback” for the Islamic extremists’, US News, 03 Feb 2016, <https://www.usnews.com/news/world/articles/2016-02-03/nigerian-air-force-drone-bombs-boko-haram-base>, last accessed 01 Dec 2017; Atherton, ‘Watch Nigeria’s First Confirmed Drone Strike’; ‘Nigerian Air Force Drone Strike Boko Haram Terrorist - 02152015’, posted to youtube.com by Dr Baba Adam, 01 Mar 2015, https://www.youtube.com/watch?v=mNPV-csA7Y-w&has_verified=1, last accessed 01 Dec 2017.
- 107 Kelsey D. Atherton, ‘Watch Nigeria’s First Confirmed Drone Strike - Against Boko Haram’, Popular Science, 03 Feb 2016, <https://www.popsci.com/watch-nigerias-first-confirmed-drone-strike>, last accessed 01 Dec 2017.
- 108 Joseph Erunke, ‘NAF aircraft destroys Boko Haram vehicle workshop, kills many’, Vanguard, 17 Jan 2018, <https://www.vanguardngr.com/2018/01/naf-aircraft-destroys-boko-haram-vehicle-workshop-kills-many/>, last accessed 18 Feb 2018.
- 109 Nigerian Air Force Press Release, ‘NAF Remotely Piloted Aircraft Destroys BHT Artillery Gun, Neutralises Many Militants’, Nigerian Air Force channel, www.youtube.com, 29 Jan 2018, https://www.youtube.com/watch?time_continue=56&v=_hlgpevtlao, last accessed 08 Feb 2017; Joseph Erunke, ‘NAF remote-controlled aircraft hits Boko Haram settlement, kills many’, Vanguard, 29 Jan 2018, <https://www.vanguardngr.com/2018/01/naf-remote-controlled-aircraft-hits-boko-haram-settlement-kills-many/>, last accessed 18 Feb 2018.
- 110 ‘Nigerian Air Force Remotely Piloted Aircraft Destroys Boko Haram Gun Truck’, www.youtube.com, 01 Feb 2018, <https://www.youtube.com/watch?v=084MBjPqCxs>, last accessed 18 Feb 2018.
- 111 ‘Nigerian Air Force Remotely Piloted Aircraft Destroys Another Boko Haram Terrorists Artillery Gun’, www.youtube.com, 07 Feb 2018, last accessed 19 Feb 2018.

appearing on social media from late 2016.¹¹² Four were seen in Bir Gigafa (in the Sinai) in November 2016, and three in Utham (near Libya) in February 2017.¹¹³

Deployment

Reports of drone strikes in Egypt's Sinai peninsula go back at least as far as 2013.¹¹⁴ In March 2015, over a period of several weeks in the South Zuweid and Rafah areas, nine members of one family, including two women and five children, were reported killed and seventeen people injured in drone strikes.¹¹⁵ However, a former senior Israel official told Bloomberg News in 2016 that Israel had conducted numerous drone attacks on militants in Sinai with Egypt's blessing and so it remains difficult to determine which country is carrying out which drone strikes.¹¹⁶ A New York Times report in February 2018 confirmed Israeli strikes were continuing inside Egypt with US officials telling reporters that aircraft flew "circuitous routes to create the impression that they are based in the Egyptian mainland."¹¹⁷

Local reports say Egypt has used its armed drones to launch strikes against Jihadist groups as well as to search for smuggling tunnels in to Gaza.¹¹⁸ Strikes against Sinai Province militants continue, some of these reportedly carried out by Israeli drones, with cooperation from the Egyptian military and intelligence services. The reported strikes by Egypt at the time of writing are:

- Five members of Sinai Province, an armed group affiliated with ISIS, were killed on 1 May 2016.¹¹⁹
- Salaama Baraq, a leader of Sinai Province, was killed in a drone strike on 31 August 2016.¹²⁰
- Another militant was killed in April 2017, reportedly by Israeli drones, although Egypt denied that there were other forces involved in this operation.¹²¹
- On 03 Nov 2017, it was reported that "several" IS militants were killed by Egyptian drone strike.¹²²

112 Bassem El-Telawy, '#Egypt: An Egyptian Pilot with a Wing Loong UAV', @BTelawy on Twitter.com, 04 Nov 2016, <https://twitter.com/BTelawy/status/794648123314409472>, last accessed 29 Mar 2018.

113 Dan Gettinger, 'Utham, Egypt', Drone Bases Updates, Center for the Study of the Drone, Bard College, 31 Mar 2017, <http://dronecenter.bard.edu/drone-bases-updates/>, last accessed 01 Dec 2017;

114 Israeli drone strike kills suspected Islamic militants in Egypt, Associated Press, 9 August 2013, <https://www.theguardian.com/world/2013/aug/09/israeli-drone-strike-suspected-militants-egypt>

115 'Sinai drone strike kills family of nine', Al-Alraby, 16 Mar 2015, <https://www.alaraby.co.uk/english/news/2015/3/16/sinai-drone-strike-kills-family-of-nine>, last accessed 13 Dec 2017.

116 David Wainer, Jonathan Ferziger and Ahmed Feteiha, 'Old Mideast Foes Unite Over Gas Deals and Fighting Militants', Bloomberg, 11 Jul 2016, www.bloomberg.com/news/articles/2016-07-10/old-middle-east-foes-unite-over-gas-deals-and-fighting-militants.

117 Khaled al-Gayoushi, 'Leader of Daesh-linked group reportedly killed in Sinai', Anadolu Agency, 30 Aug 2016, <https://aa.com.tr/en/middle-east/leader-of-daesh-linked-group-reportedly-killed-in-sinai/638154?amp=1>, last accessed 28 Mar 2018.

118 'The Story of the Wing Loong drone and the Egyptian battle against ISIS in Sinai', Alarabiya, 27 Feb 2017, <http://english.alarabiya.net/en/features/2017/02/27/The-story-of-the-Wing-Loong-drone-and-the-Egyptian-battle-against-ISIS-in-Sinai.html>, last accessed 01 Dec 2017.

119 Bassem El-Telawy, '#Report An Egyptian drone strike killed at least five terrorists of "Wilaya Sinai" in CheikhZweid, UAVs are now better used. #Sinai', @BTelawy on Twitter.com, 01 May 2016, <https://twitter.com/BTelawy/status/726724118129811456>, last accessed 12 Dec 2017.

120 Khaled al-Gayoushi, 'Leader of Daesh-linked group reportedly killed in Sinai', Anadolu Agency, 30 Aug 2016, <https://aa.com.tr/en/middle-east/leader-of-daesh-linked-group-reportedly-killed-in-sinai/638154?amp=1>, last accessed 29 Mar 2018.

121 'Israeli drone strikes Sinai, kills one', Middle East Monitor, 12 Apr 2017, <https://www.middleeast-monitor.com/20170412-israeli-drone-strikes-sinai-kills-one/>, last accessed 01 Dec 2017.

122 Chris Kitching, 'Five ISIS militants killed in air strike as dramatic video shows fighter jet obliterating jihadis and their hideout', Daily Mirror, 04 Nov 2017, <http://www.mirror.co.uk/news/world-news/five-isis-militants-killed-air-11469123>, last accessed 12 Dec 2017.

- After a deadly attack on a Sufi mosque in November 2017, which killed 305 worshippers, the Egyptian military used fighter jets and a drone to find the perpetrators. It was reported that the drone killed five of the attackers.¹²³
- In February 2018, Egypt announced an intensification of its operation against terror groups in the north-eastern Sinai region. According to one press report, the deployment included Wing Loong and Ch-5 drones. Within two weeks, it was announced that over 60 targets had been hit but it was not specified whether drones had carried out any of the strikes.¹²⁴

It has also been reported in the defence press that Egypt's air mission in Yemen has been extended, but as yet it is unknown whether or not any of Egypt's drones are part of that mission.¹²⁵

NON-STATE ACTORS

It has long been predicted that adapted small drones would become part of the arsenal of non-state actors (NSAs) and tactics such as swarming and kamikaze drones would become a familiar and uncontrollable part of modern warfare. As noted in the Iraq and Turkey sections above, ISIS and the PKK have begun to arm small drones, although the fears of mass swarms have yet to be realised. Other non-state actors, it has been reported, have been provided with larger drones by supportive regimes. For example, Hamas, Hezbollah and the Houthi forces are all said to have acquired armed unmanned systems (of varying sizes) from Iran. This section gives a picture of the active use of armed drones by NSAs, but given the smaller size and expendable nature of some of these drones, it should not be assumed that current or past capabilities are indicative of long-term capacity in this field.

ISIS

ISIS was particularly prolific in adapting small drones in the battle for Mosul, with several factories set up to adapt quadcopters. As well as being used as surveillance tools, the quadcopters and others were modified to include self-releasing parts that could drop small munitions or grenades on Iraqi and Coalition forces in the city or become 'kamikaze drones'. US Central Command reported that in the last two months of 2016, ISIS drones were seen every day in Mosul.¹²⁶ By February 2017 this had risen to 10-15 ISIS drones every day.¹²⁷ Relatively few of these small drones had a lethal impact and were regularly shot down by Iraqi and US forces.¹²⁸ However, this represents a significant use of drones by a non-state actor, where 'neutral' technology has been purchased off the shelf and adapted for use in guerrilla war.

Bellingcat reported in May 2017 that it had identified 121 'drone strike' videos released by ISIS. In the second half of 2017, US army commanders said that

It has long been predicted that adapted small drones would become part of the arsenal of non-state actors (NSAs) and tactics such as swarming and kamikaze drones would become a familiar and uncontrollable part of modern warfare.

123 Chris Kitching, 'Egypt mosque terror attack death toll rises to 305 after "militants detonate explosives and shoot victims with machine guns"', *Daily Mirror*, 25 Nov 2017, <http://www.mirror.co.uk/news/world-news/dozens-dead-after-horror-terror-11578644>, last accessed 13 Dec 2017.

124 'Egypt Launches Major Offensive Against Islamic State: Don't Expect Terrorists to Surrender', *War is Boring*, 14 Feb 2018, <https://warisboring.com/egypt-launches-a-major-offensive-against-islamic-state/>, last accessed 17 Feb 2018.

125 'Egypt extends Yemen military participation, amid reports of first Trump drone strike', *Deutsche Welle*, 22 Jan 2017, <http://www.dw.com/en/egypt-extends-yemen-military-participation-amid-reports-of-first-trump-drone-strike/a-37232135>, last accessed 12 Dec 2017.

126 Ben Watson, 'The Drones of ISIS', *Defense One*, 12 Jan 2017, <http://www.defenseone.com/technology/2017/01/drones-isis/134542/>, last accessed 05 Dec 2017.

127 Michaels, 'Iraqi forces now attacking ISIS militants with drones in Mosul'.

128 Ben Watson, 'The Drones of ISIS'.

they sometimes saw as many as 70 drones in one day, although it is unknown how many of these multiple sightings resulted in 'strikes.'¹²⁹

In one incident in October 2016 a "crashed" drone detonated when Kurdish Peshmerga soldiers began to take it apart. The explosion killed the two Peshmerga personnel and wounded two French special forces.¹³⁰

PKK

The PKK - who have been on the receiving end of Turkey's increasingly hi-tech and drone-centric tactics - are themselves beginning to use drones, albeit of the small, irrecoverable IED type. In the only confirmed strike thus far, two Turkish soldiers were wounded at the end of August 2017 when a drone was adapted to carry a modified AGS-17 grenade launcher.¹³¹ There have been reports of three other instances of Turkish troops being fired at by drones on the Turkey-Iraq border.¹³²

HEZBOLLAH

Hezbollah's armed drone use also began with small IED drones in 2006, when several off-the-shelf drones were flown into Israel, one carrying explosives.¹³³ Since then, Iranian support for Hezbollah has enabled the Lebanese-based group to employ the use of the surveillance Abail-3 drone and the strike-capable Shahed-129.¹³⁴ In 2012 a suspected Shahed-129 was flown in to Israeli airspace and subsequently shot down by the IDF.¹³⁵ Israel has reported shooting down a number of drones they say have been launched by Hezbollah from Lebanon before the drones were able to fire. In September 2017, the IDF shot down a drone they had been tracking from its launch in Damascus, stating it was an Iranian drone launched by Hezbollah that entered a demilitarised zone on the Israeli-Syrian border.¹³⁶

The extent of Hezbollah's drone acquisition is unknown but it is claimed that Hezbollah has had the opportunity to develop its capabilities beyond those of many other NSAs via its involvement in the Syrian war; the support of Iran; and the freedom to operate in Lebanon, where *Jane's Defence* located a suspected Hezbollah air-strip for drones in Beqaa Valley.¹³⁷ Although many Hezbollah drones have been shot down by Israeli or Coalition forces in Syria, confirmed strikes include:

- Hezbollah's first deadly strike came in September 2014 on the Lebanon-Syria border against al-Nusra. It was reported that Hezbollah killed "at least" 23 al-Nusra fighters in western Syria.¹³⁸

129 Nick Waters, 'Types of Islamic State Drone Bombs and Where to Find Them', Bellingcat, 24 May 2017, <https://www.bellingcat.com/news/mena/2017/05/24/types-islamic-state-drone-bombs-find/>, last accessed 13 Dec 2017.

130 Watson, 'The Drones of ISIS'.

131 MetinGurcan, 'Turkey-PKK 'drone-wars' escalate', Al-Monitor, 18 Sep 2017, <http://www.al-monitor.com/pulse/originals/2017/09/turkey-pkk-drone-conflict-escalates.html>, last accessed 10 Jan 2018.

132 Gurcan, 'Turkey-PKK 'drone-wars' escalate'.

133 Mona Alami, 'ANALYSIS: Hezbollah enters drone age with bombing raids in Syria', Middle East Eye, 20 Mar 2017, <http://www.middleeasteye.net/news/analysis-hezbollah-enters-new-war-use-armed-drones-syria-11412100>, last accessed 05 Dec 2017.

134 Alami, *ibid.*

135 Alami, *ibid.*

136 Yaakov Lappin, 'Israel shoots down UAV', 19 Sep 2017, <http://www.janes.com/article/74201/israel-shoots-down-uav>, last accessed 29 Nov 2017.

137 Alami, 'ANALYSIS: Hezbollah enters drone age'.

138 Alami, *ibid.*; Avid Sterman, 'Hezbollah wreak havoc on Syrian rebel bases', *The Times of Israel*, 21 Sep 2014, <http://www.timesofisrael.com/hezbollah-drones-wreak-havoc-on-syrian-rebel-bases/>, last accessed 20 Dec 2017.

- On 09 Aug 2016, Hezbollah posted videos on line of an attack by three adapted quadcopters on Syrian rebel bases. It is not known if anyone was killed or injured.¹³⁹
- On 21 Aug 2017, Hezbollah publicly declared, for the first time, that it had carried out a drone strike and released footage of the attack on ISIS in Syria.¹⁴⁰
- On 28 Aug 2017, Hezbollah again hit an ISIS position on the Lebanon-Syria border.¹⁴¹

HAMAS

Hamas has also flown drones towards Israel on several occasions. As early as 2014, Hamas released video footage of its fighters flying an armed drone over the Gaza Strip.¹⁴² There are at least four reported incidences of the IDF shooting down Hamas drones between 2014 and 2017.¹⁴³ It seems that Israel believes this development represents a significant threat and it was suspected that Mossad were behind the shooting of Tunisian Mohammed al-Zawahari, a member of Hamas and suspected to be their principal drone engineer, in December 2016.¹⁴⁴

YEMENI HOUTHIS

In October 2016, the Conflict Armament Research (CAR) group investigated the six Houthi UAVs that were intercepted on a known smuggling route from Iran, and another UAV engine recovered after a Houthi attack near Aden in Yemen. CAR say these are almost identical to the Iranian Ababil-CH and Ababil-T. Houthi leaders have also openly displayed drones which look like the Ababil but say they are the Qasef-1, designed and built in Yemen. It is thought that the captured drones were intended to operate as kamikaze drones, to destroy the radar sets that are used to guide Saudi-led coalition's Patriot missiles.¹⁴⁵ This use of what is more properly called a loitering munition represents an increasing use in sophisticated unmanned systems by NSAs. The UAE also claimed it destroyed an 'Iranian military drone' on a mobile launch platform in the Yemeni Red Sea port of Al-Mukha.¹⁴⁶

139 David Axe, 'Hezbollah Drone Is a Warning to the U.S.', 17 Aug 2016, The Daily Beast, <https://www.thedailybeast.com/hezbollah-drone-is-a-warning-to-the-us>, last accessed 13 Dec 2017.

140 'Hezbollah uses drones against IS in Syria - Hezbollah-run media', Reuters, 21 Aug 2017, <http://news.trust.org/item/20170821125359-dbe1a/>, last accessed 13 Dec 2017.

141 'Syria in the Last 24 Hours: Hezbollah - Syria Drone Strikes Daesh Posts on Border with Iraq', syria360.wordpress.com [blog], 28 Oct 2017, <https://syria360.wordpress.com/2017/10/28/syria-in-the-last-24-hours-hezbollah-syria-drone-strikes-daesh-posts-on-border-with-iraq/>, last accessed 13 Dec 2017.

142 David Cenciotti, 'Hamas Flying an Iranian Made Drone over Gaza', 14 Jul 2014, The Aviationist, <https://theaviationist.com/tag/ababil-drone/>, last accessed 29 Nov 2017.

143 Gil Ronen, 'Confirmed: Another Hamas Drone Shot Down', Israeli National News, 17 Jun 2014, <http://www.israelnationalnews.com/News/News.aspx/183025#.U8geCmZwbIU>, last accessed 05 Dec 2017; 'Israeli jet intercepts Hamas drone off Gaza coast', i24News Israel, 20 Sep 2016, <https://www.i24news.tv/en/news/israel/125868-160920-israeli-aircraft-intercepts-hamas-drone-off-gaza-coast>; Yoav Zitun & Reuters, 'Israeli fighter jet shoots down Hamas drone', 23 Feb 2017, <https://www.ynetnews.com/articles/0,7340,L-4926782,00.html>, last accessed 05 Dec 2017.

144 Gregg Carlstrom, 'Tunisia blames 'foreign elements' for assassination linked to Mossad', *The Times*, 20 Dec 2016, <https://www.thetimes.co.uk/article/tunisia-blames-foreign-elements-for-assassination-linked-to-mossad-2fpgwjn7g>, last accessed 05 Dec 2017.

145 Conflict Armament Research, *Iranian Technology Transfers to Yemen* (Conflict Armament Research Ltd: London, March 2017), p. 2.

146 Jeremy Binnie, 'UAE airstrike reportedly destroyed Iranian UAV in Yemen', Jane's Defence Weekly, 03 Feb 2017, <http://www.janes.com/article/67432/uae-airstrike-reportedly-destroyed-iranian-uav-in-yemen>, last accessed 29 Nov 2017.

As for strikes by Houthi forces, there is only one well-reported incident where an “explosive drone boat” attacked a Saudi frigate in the Persian Gulf, killing one.¹⁴⁷

UNKNOWN

Towards the end of December 2017 and into January 2018, the Russian military base in Khmeimim, Syria was targeted a number of times, likely by “weaponised drones”.¹⁴⁸ It is unknown which group carried out these attacks although it is likely to be a NSA given the level of sophistication of the drones shown in images.¹⁴⁹ However, Russia has indirectly blamed the US, claiming that whoever is responsible would need to have used or controlled satellite communications technology.¹⁵⁰

147 Thomas Gibbons-Neff, ‘Houthi forces appear to be using Iranian-made drones to ram Saudi air defences in Yemen, report says’, *The Washington Post*, 22 Mar 17, https://www.washingtonpost.com/news/checkpoint/wp/2017/03/22/houthi-forces-appear-to-be-using-iranian-made-drones-to-ram-saudi-air-defences-in-yemen-report-says/?utm_term=.9781524b11bc, last accessed 20 Dec 17.

148 Nick Waters, ‘The Poor Man’s Air Force? Rebel Drones Attack Russia’s Airbase in Syria’, *Bellingcat*, 12 Jan 2018, https://www.bellingcat.com/news/mena/2018/01/12/the_poor_mans_airforce/, last accessed 10 Apr 2018.

149 Tyler Rogoway, ‘Russia’s Air Base in Syria Seems To Be Under Regular Attack Now’, *The Drive*, 06 Jan 2018, <http://www.thedrive.com/the-war-zone/17433/russias-air-base-in-syria-seems-to-be-under-regular-attack-now>, last accessed 28 Mar 2018.

150 ‘Russia implies US involvement in drone strikes on Syria military base’, *The Guardian*, 09 Jan 2018, <https://www.theguardian.com/world/2018/jan/09/russia-syria-drone-attacks-military-base-us-involvement-accusation>, last accessed 28 Mar 2018.

Imminent Operators

INDIA

Acquisitions

India has operated Israeli ISR drones (the Searcher and Heron) for a number of years and it was reported in August 2017 that the government were negotiating with the US for the possible purchase of 90 Predator C drones, called Avengers. According to press reports, General Atomics, the manufacturers of the Predator, have had difficulty finding buyers for this model and a sale on this scale would be welcome.¹⁵¹ The opportunity for such a deal was made possible in 2016 when India became a signatory to the MTCR.¹⁵²

Development Programmes

It had been reported that India were developing two possible armed drones. In 2015, the Rustom-II was said to be under development and photographs emerged showing two underwing hardpoints on the drone, which analysts say could be configured to carry missiles.¹⁵³ However, although tests continued throughout 2016-17, the most recent reports suggest that the configuration of the Rustom-II, currently being tested, is unarmed.¹⁵⁴ It is said that the main difficulties were the lack of collision avoidance technology and India's limited satellite bandwidth.

There have also been reports of an armed autonomous stealth drone under development. Work on this drone, called the Aura, was reported to have begun in 2007, with a service date of 2020. The manufacturers claimed that the Aura would be capable of selecting targets autonomously and capable of carrying missiles, conventional bombs or nuclear weapons. Yet, it seems

151 'U.S. hints at selling up to 90-100 state-of-the-art Predator Avenger Drones to India', Defence News India, 18 Aug 2017, <http://www.defencenews.in/article.aspx?id=283751>, last accessed 24 Nov 17.

152 After manufacturing a ballistic missile, India was encouraged to join the MTCR. This supposedly contributes to the international community's 'non-proliferation goals' since India will not now be able to export the ballistic missile without following MTCR guidelines.

153 *Jane's Unmanned*, 2017-18, pp.68-9.

154 *Jane's Unmanned*, 2016-17, p. 68; DRDO successfully carries out test flight of Rustom-2 drone', The Economic Times, 25 Feb 2018, <https://economictimes.indiatimes.com/news/defence/drdo-successfully-carries-out-test-flight-of-rustom-2-drone/articleshow/63068375.cms>, last accessed 28 Mar 2018.

again that the lack of associated systems needed to fly the drone have brought this project to a standstill.¹⁵⁵

Despite suggestions to the contrary, it is clear that India does not yet have armed drones and that it is possible that their first armed drone could be the US Avenger.

If armed drones were to be acquired or developed, it is most likely that their use would focus on disputed border territories in the north-west (in the contested Kashmir and Jammu region on the India-Pakistan border) and north-east (China) border regions. Pakistan has shot down several small Indian surveillance drones, which it said crossed in to Pakistani air space, most recently in November 2017.¹⁵⁶ In December 2017, an Indian-owned Heron crashed on the Chinese side of the India-China border, causing protest from the Chinese government about this "invasion."¹⁵⁷ Deployment of armed drones by India in either of these regions would only serve to increase tension and the likelihood of conflict.

RUSSIA

Development Programmes

As with Iran, there has been much speculation and misinformation regarding Russian development of armed drones. A large number of armed UAVs have been designed and prototypes put on display, only for those models never to be heard of again. The Voron, Chirok, Skat, Altius, Inokhodyets, Dozor 600 and Proryv-U were all displayed then disappeared.¹⁵⁸ However, two of these prototypes have resurfaced with different companies.

The original Skat programme - to create a hi-tech stealth drone - was cancelled, but in 2015 it was reported that the work had been transferred to another design company.¹⁵⁹ Similarly, the Voron was taken on by a university start-up who, in 2017, released footage and information claiming that they had completed work on an unmanned attack helicopter called the Voron-777.¹⁶⁰ A completed model, however, does not give the Russian military armed drone capability. A new model is the Orion, a Predator-style

As with Iran, there has been much speculation and misinformation regarding Russian development of armed drones. A large number of armed UAVs have been designed and prototypes put on display, only for those models never to be heard of again.

- 155 Sourabh Jjoyti Sharma, 'AURA - India's First Unmanned Stealth Bomber Revealed', Indian Exponent, 11 Jul 2014, <http://www.indianexponent.com/2014/07/aura-india-first-unmanned-stealth-bomber-revealed.html>, last accessed 24 Nov 17; 'Aura:- India's indigenous Unmanned Combat Aerial Vehicle', Defence Update, 18 Jan 17, <http://defenceupdate.in/aura-indias-indigenous-unmanned-combat-aerial-vehicle>, last accessed 24 Nov 17. There is no mention of the Aura in section covering India in the most recent edition *Jane's Unmanned*. *Jane's Unmanned*, 2017-18, pp. 69-70.
- 156 Gabriel Dominguez and Rahul Bedi, 'Pakistan says it downed Indian surveillance UAV', *Jane's Defence Weekly*, 01 Nov 2017, <http://www.janes.com/article/75380/pakistan-says-it-downed-indian-surveillance-uav>, last accessed 29 Nov 17.
- 157 SutiirhoPatranobis and Rahul Singh, 'China protests drone "invasion", India says issue "under investigation"', *Hindustani Times*, 08 Dec 2017, <http://www.hindustantimes.com/world-news/china-protests-drone-invasion-india-says-issue-under-investigation/story-PzYopj2sc1COJLgOhPte8K.html>, last accessed 13 Dec 2017.
- 158 Alexander Vershinin, 'Eye in the sky: Russian drones join the ranks of the world's unmanned aircraft, Russia Beyond', 30 Nov 2015, https://www.rbth.com/defence/2015/11/30/eye-in-the-sky-russian-drones-join-the-ranks-of-the-worlds-unmanned-craft_546019, last accessed 29 Nov 2017; 'New Russian Reconnaissance-Strike Drone to Be Unveiled at MAKS Airshow', Sputnik News, 06 Aug 2015, <https://sputniknews.com/military/201508061025462501/>; Rob O'Gorman and Chris Abbott, *Remote Control War: Unmanned combat air vehicles in China, India, Israel, Iran and Turkey* (Open Briefing: London, 2013), Annex B, p. 58 ff.
- 159 Stephen Trimble, 'Almost Great: Nine Legendary (but cancelled) Russian Aircraft', Flight Global, 21 Aug 2015, <https://www.flightglobal.com/news/articles/almost-great-nine-legendary-but-cancelled-russian-415954/>, last accessed 29 Nov 2017.
- 160 'Moscow Aviation Institute Startup Develops Electronic Warfare Helicopter Drone', Sputnik News, 16 Jun 2017, <https://sputniknews.com/russia/201706161054686356-russia-drone-mai/>, last accessed 29 Nov 17.

MALE drone, of which official photos were released in March 2018. The current version underdevelopment is unarmed, but the chief executive of the company Kronshtadt, who are designing the drone, said they plan to develop an armed version for export.¹⁶¹

Russia was one of the countries set to purchase two of the UAE's United 40 Block 5 armed drones but that programme has also suffered setbacks and is not yet complete.¹⁶² It is clear that the goal of developing or purchasing an armed drone is still some distance away for Russia.

Recent conflicts, first in Ukraine and Crimea and then in Syria, as well as the build-up of US/NATO forces in Eastern Europe, have suggested to Russia that it needs to upgrade its military capabilities. According to the *Military Balance*, experiences in Syria in particular have shown Russia that it needs to invest in its UAV capability.¹⁶³

Russian participation in the conflict in Syria led Defence Minister Shoigu, to state that the armed forces have a projected goal for procurement of 4,000 UAVs by 2020.¹⁶⁴ Although there is no breakdown available of type of drones sought, it can be assumed that this 4,000 will include some armed drones. With UAV strike capability, there are a number of regions in which Russia could operate beyond its borders. The obvious current examples are Syria and the Crimea, as well as the US Alaskan coast, with the implications that would bring for US-Russian relationships.¹⁶⁵

EUROPE

Somewhat surprisingly, European countries have lagged in the acquisition and development of armed drones. The UK is the only European country currently operating armed drones, but several other European countries have begun plans to arm their ISR drones and multi-national development programmes are also underway. This section briefly covers both these individual European countries and multinational programmes, none of which are yet completed.

Acquisition programmes of individual states

The UK has been using armed Reapers for 10 years, but the US had refused to allow export of armed drones elsewhere. Now, however, this looks set to change.

Italy

As early as 2012, the Obama administration proposed allowing Italy to arm six of its ISR Reaper drones. At the time, this was blocked by the US Congress and it was not until 2015 that Italy was given the all clear to arm its drones.¹⁶⁶ Budgetary problems, however, have apparently delayed Italy taking this forward up till now but this is likely to change in the near future.

161 Dylan Malyasov, 'Russian company release photo of new Orion UAV', Defence Blog, 26 Mar 2018, <http://defence-blog.com/news/russian-company-release-photos-new-orion-uav.html>, last accessed 29 Mar 2018.

162 Chris Biggers, 'UAE United 40 Block 5 at test airfield', Bellingcat, 26 Mar 2015, <https://www.bellingcat.com/news/2015/03/26/uae-united-40-block-5-at-test-airfield/>, last accessed 29 Nov 17.

163 The Military Balance, p. 183.

164 The Military Balance, p. 195.

165 Damien Sharkov, 'Russia to open Arctic military drone base 420 miles off the Alaskan coast', Newsweek, 13 Nov 2014, <http://www.newsweek.com/russia-open-arctic-military-drone-base-420-miles-alaskan-coast-284240>, last accessed 29 Nov 17.

166 Andrea Shalal, 'U.S. government approves Italy's request to arm its drones', Reuters, 04 Nov 2015, <https://www.reuters.com/article/us-italy-usa-drones/u-s-government-approves-italys-request-to-arm-its-drones-idUSKCN0ST1V120151104>, last accessed 05 Dec 2017.

Italian civil society is concerned that the sudden acquisition of strike capable drones would pose a problem in Italy since there has been no discussion or development of policy and protocol for the circumstances under which armed drones could be used to carry out strikes. A report by a group of Italian NGOs notes that current military doctrine does not specifically cover drone use. Thus, despite the distinctive character of armed drones, they could currently be used in any mission carried out by the Italian air force.¹⁶⁷

France

The French government announced in September 2017 that it is also seeking to arm its ISR Reapers.¹⁶⁸ In March 2018, French defence officials told a parliamentary committee that its Reaper will be armed with US-made Hellfire missiles from mid-2019.¹⁶⁹ It is likely, however, that MBDA will arm the drones with other missiles in the future.¹⁷⁰ France currently has six Reapers and is due to take delivery of another six in 2019. It is expected that the 'Block 5' models, to be delivered in 2019, will be armed and that the current 'Block 1' will be upgraded.¹⁷¹ Although military and air force personnel, as well as some politicians, have argued that arming the Reapers is a necessary and logical step, it has taken some time for the French government to do so because other politicians and civil society groups have been more critical of such a move. The defence minister, Florence Parly, has insisted that there will be strict rules of engagement and that the priority for use is the protection of troops in the Sahel, where France has 4,000 personnel stationed in its 'war on terror'.¹⁷²

Germany

German public opinion, which, similarly to France, has been against the use of armed drones (in response to the USA's practice of targeted killing), has helped to delay the arrival of armed drones in Germany.¹⁷³ Yet, in recent years, the defence minister has sought a deal to lease armed Herons from Israel until such as time as a European armed drone is operable.¹⁷⁴

A potential deal with Israel has been beset with difficulties, however. Firstly, US drone giant, General Atomics, sued the German government under competition rules, claiming their Predators are a cheaper option than Israeli Herons. The court found in Germany's favour and throw out a subsequent appeal from General Atomics in June 2017.¹⁷⁵ Moreover, the Social Democrat

167 Instituto di Ricerche Internazionali Archivio Disarmo, *Military Drones: Proliferation of Control?* [English summary], (Rome: April, 2017), p. 7.

168 Frederic Lert, 'France to arm MQ-9 Reapers', *Jane's Defence Weekly*, 07 Sep 2017, <http://www.janes.com/article/73620/france-to-arm-mq-9-reaper>, last accessed 05 Dec 2017.

169 Helen Chachaty, 'Les Reaper de l'armee de l'air attendent leurs premiers Hellfire', *Le Journal De L'Aviation*, *Aviation Journal*, 7 March 2018, www.journal-aviation.com/actualites/39842-les-reaper-de-l-armee-de-l-air-attendent-leurs-premiers-hellfire.

170 Michel Cabriol, 'MBDA veut armer les drones Reaper français avec une allongée du missile MMP', *La Tribune*, 19 Sep 2017, <https://www.latribune.fr/entreprises-finance/industrie/aeronautique-defense/mbda-veut-armer-les-drones-reaper-francais-avec-une-version-allongee-du-missile-mmp-750858.html>, last accessed 03 Jan 2018.

171 Jean-Baptiste Jeangene Vilmer, 'The French turn to armed drones', *War on the Rocks*, 22 Sep 2017, <https://warontherocks.com/2017/09/the-french-turn-to-armed-drones/>, last accessed 03 Jan 2017.

172 Vilmer, 'The French turn to armed drones'; 'France turns to armed drones in fight against Sahel militants', *Reuters*, 05 Sep 2017, <https://www.reuters.com/article/us-france-drones/france-turns-to-armed-drones-in-fight-against-sahel-militants-idUSKCN1BG2K2>, last accessed 03 Jan 2018.

173 Ben Knight, 'What Germany's first armed drones could do', *Deutsche Welle*, 21 Jun 2017, <http://www.dw.com/en/what-germanys-first-armed-drones-could-do/a-39355009>, last accessed 03 Jan 2017.

174 Lars Hoffman, 'German Armed Forces will Lease Israeli Drones', *Defense News*, 13 Jan 2016, <https://www.defensenews.com/global/europe/2016/01/13/german-armed-forces-will-lease-israeli-drones/>, last accessed 05 Dec 2017.

175 Arie Egozi, 'Germany to advance Heron TP deal after court ruling', *Flight Global*, 02 Jun 2017, <https://www.flightglobal.com/news/articles/germany-to-advance-heron-tp-deal-after-court-ruling-437833/>, last accessed 28 Mar 2018.

Party, the junior partner in the ruling coalition government, stalled progress by objecting to the arrival of armed drones in Germany and blocked the deal in mid-2017. The Social Democrats had agreed to the deal on the understanding that the arming of the Herons would take place at a later date, but when it was discovered that the Herons would come with weapon-ready hardpoints, they withdrew their support for the deal.¹⁷⁶ After negotiations, a compromise was reached in February 2018, stating that any procurement of weapons for the drones would not take place before detailed constitutional, legal and ethical assessments had taken place.¹⁷⁷

European Development Programmes

In the meantime, Germany, France, Italy and Spain have also come together to commission the development of a MALE drone system, known as the European MALE RPAS Project (formerly MALE 2020 Project).¹⁷⁸ The primary aim would be for surveillance and border control but one EU diplomat noted that the drone could also have a military role, with the capacity to carry weapons.¹⁷⁹ A contract was signed with defence firms from each country in August 2016 and it is expected that the first systems will be delivered to air forces in 2025.¹⁸⁰

Another consortium of European defence firms are also developing the nEUROn, a stealth drone demonstrator, which has so far completed flight tests in France, Italy and Sweden. The project is led by French firm Dassault, along with Italian, German, Swedish, Swiss and Greek firms (Alenia Aermacchi, Airbus, Saab, Ruag and HAI respectively).¹⁸¹ Although this is still very much in the testing phase, it is important to note that the European consortium is developing new technology to further upgrade drone capabilities. For example, one analyst in the defence press notes that Dassault are keen “to test the weapon release from the SIWB [smart integrated weapons bay], which imposes stringent timing constraints that require a fast decision loop.”¹⁸² Such developments show how technically-minded firms play a huge part in changing the rules of warfare, when the aim is to increase speed, thereby decreasing decision-making time and increasing the scope for targeting errors.

The UK and France also maintain a ‘Future Combat Air Systems’ agreement to develop an armed drone together. This will be based on lessons learned from the BAE Systems-developed Taranis drone technology demonstrator and the Dassault-led nEUROn.¹⁸³ Some have suggested that Brexit may derail the project,

176 Gili Cohen, ‘German Lawmakers Block Israeli Drone Deal After Discovering They’re Armed’, 29 Jun 2017, Haaretz, https://www.haaretz.com/israel-news/1.798475?utm_source=dlvr.it&utm_medium=twitter, last accessed 03 Jan 2018; From Reuters, ‘Germany Is Delaying a Decision to Lease Israeli Military Drones’, Fortune, 21 Jun 2017, <http://fortune.com/2017/06/21/germany-delay-lease-israeli-military-drones/>, last accessed 03 Jan 2018.

177 Donata Riedel ‘GroKoeinigt sich auf Drohnen für die Bundeswehr’, Handelsblatt, 01 Feb 2018, <https://www.handelsblatt.com/politik/deutschland/koalitionsverhandlungen-groko-einigt-sich-auf-drohnen-fuer-die-bundeswehr/20918014.html>, last accessed 21 Feb 2018.

178 ‘Contract Launches Definition Study of New European Unmanned Aircraft’, Defence News blog, no date given, <http://defensenews-alert.blogspot.co.uk/2016/09/contract-launches-definition-study-of.html>, last accessed 03 Jan 2018.

179 ‘Italy, France, Germany sign European drone project’, Reuters, 18 May 2015, <https://www.reuters.com/article/us-eu-drones/italy-france-germany-sign-european-drone-project-idUSKBN0Q312A20150518>, last accessed 03 Jan 2018.

180 ‘European MALE RPAS (Medium Altitude Long Endurance Remotely Piloted Aircraft System) Programme takes off’, Dassault Aviation [website], 28 Sep 2016, <https://www.dassault-aviation.com/en/group/press/press-kits/european-male-rpas-medium-altitude-long-endurance-remotely-piloted-aircraft-system-programme-takes-off/>, last accessed 03 Jan 2018.

181 Tom Kington, ‘Neuron UCAV Conducts 12 Test Flights’, Defense News, 26 Aug 2015, <https://www.defensenews.com/air/2015/08/26/neuron-ucav-conducts-12-test-flights/>, last accessed 03 Jan 2018.

182 Berenice Baker, ‘Taranis vs. nEUROn – Europe’s combat drone revolution’, Air Force Technology, 05 May 2014, <http://www.airforce-technology.com/features/featuretaranis-neuron-europe-combat-drone-revolution-4220502/>, last accessed 03 Jan 2018.

183 Daniel Garrun, Future Combat Air System: UK and France move ahead, Aviation Technology, 16 May 2016, <https://www.airforce-technology.com/features/featurefuture-combat-air-system-uk-and-france-move-ahead-4893221/>.

a scenario which has been downplayed by BAE Systems, the lead British firm.¹⁸⁴ However, the CEO of Dassault said that “Brexit worries” had become a factor in deciding whether or not to launch a demonstrator.¹⁸⁵ The project is set to be completed by 2025, if it continues to move forward as planned.¹⁸⁶

If the individual and collaborative projects are successful, it would seem that by 2025, five European countries (including the UK) and three partnerships will be operating or providing armed drones.

Others

There are a number of other countries which have purchased armed drones from China or are in the process of developing their own. As noted in the section on Chinese exports, in Part A, sales to Jordan, Kazakhstan, Myanmar and Turkmenistan are thought to have taken place. A deal has been signed with Indonesia, but the transfer not yet made.¹⁸⁷

In the case of Myanmar, speculation began about their acquisition of a dozen CH-3As in 2015, and was confirmed in June 2016.¹⁸⁸ It is unknown whether these have been operated in anything other than an ISR role thus far. Similarly both Kazakhstan and Turkmenistan have displayed their Wing Loong and Ch-3 drones respectively, but it is unknown to what use they have yet been put.¹⁸⁹ That these displays reflect genuine armed UAV capability is somewhat cast in doubt by Turkmenistan’s independence day parades in 2016 and 2017. In 2016 CH-3s were displayed alongside another small armed Chinese-made drone the WJ-600.¹⁹⁰ However, this has been the only sighting of the WJ-600 since 2010, raising questions about its stage of development. Moreover, in 2017, neither drone was displayed, only smaller mock-ups.¹⁹¹ Kazakhstan also displayed its Wing Loong drones in a military parade marking its independence day but assessing actual capability is almost impossible.¹⁹²

As for Jordan, rumours that it was in discussion with China began to surface in the defence press in 2015.¹⁹³ The first sighting of a CH-4 in Jordan was in satellite imagery from October 2016.¹⁹⁴ Yet again, however, there is no clear sign that

If the individual and collaborative projects are successful, it would seem that by 2025, five European countries (including the UK) and three partnerships will be operating or providing armed drones.

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- 184 Dominic Perry, ‘Dassault plays down Brexit fears over Anglo-French UCAV project’, *Flight Global*, 10 Mar 2017, <https://www.flightglobal.com/news/articles/dassault-plays-down-brexit-fears-over-anglo-french-u-435036/>, last accessed 05 Dec 2017; Alan Towey, ‘Brexit won’t harm Anglo-EU defence operations on drones, says BAE’, *The Telegraph*, 10 May 2017, http://www.telegraph.co.uk/business/2017/05/10/brexit-wont-harm-anglo-eu-defence-co-operation-drones-says-bae/?utm_source=dlvr.it&utm_medium=twitter, last accessed 03 Jan 2018.
- 185 Pierre Tran, ‘Brexit, project delays jeopardize combat drone project’, *Defence News*, 08 Mar 2018, <https://www.defensenews.com/industry/techwatch/2018/03/08/brexit-project-delays-jeopardize-combat-drone-project-dassault-ceo-warns/#.WqJ2hqDif-s.twitter>, last accessed 28 Mar 2018.
- 186 Tom Osborne, ‘Engine, Planform Begin Shaping Anglo-French UCAV’, *Aviation Week*, 20 Jun 2017, <http://aviationweek.com/paris-air-show-2017/engine-planform-begin-shaping-anglo-french-ucav>, last accessed 03 Jan 2018.
- 187 Register of Chinese exports, SIPRI.
- 188 Ankit Panda, ‘Is Myanmar Using Armed Chinese Drones For Counterinsurgency?’, *The Diplomat*, 09 Jun 2016, <https://thediplomat.com/2016/06/is-myanmar-using-armed-chinese-drones-for-counterinsurgency/>, last accessed 28 Mar 2018.
- 189 Gabriel Dominguez, ‘Kazakhstan parades newly acquired UAVs’, *Jane’s Defence Weekly*, 10 May 2017, <http://www.janes.com/article/70202/kazakhstan-parades-newly-acquired-uavs>, last accessed 28 Mar 2018.
- 190 Yuri L, ‘Military Parade in #Turkmenistan, #Ashgabat, Chinese UAV WJ600A/D and CH-3’, @imp_navigator on Twitter.com, 28 Oct 2016, https://twitter.com/imp_navigator/status/792250066903982080, last accessed 28 Mar 2018.
- 191 ‘Turkmenistan Is Still Binging On Weapons’, <https://21stcenturyasianarmsrace.com>, 01 Nov 2018, <https://21stcenturyasianarmsrace.com/2017/11/01/turkmenistan-is-still-binging-on-weapons/>, last accessed 28 Mar 2018.
- 192 Dominguez, ‘Kazakhstan parades newly acquired UAVs’.
- 193 Patrick Tucker, ‘China May Be Selling Armed Drones to Jordan’, *Defense One*, 15 May 2015, <http://www.defenseone.com/technology/2015/05/china-may-be-selling-armed-drones-jordan/112876/>, last accessed 28 Mar 2018.
- 194 Dan Gettinger, ‘Zarqa, Jordan’, *Drone Bases Updates*, Center for the Study of Drones, Bard College, 01 Dec 2016. <http://dronecenter.bard.edu/drone-bases-updates/>

Jordan is actively operating the CH-4 drones. It has also been rumoured that Uzbekistan is in discussion with China over sales of the Wing Loong, with some press assuming the sale has taken place, although this is not verifiable.¹⁹⁵

In addition to those that have acquired Chinese drones, there are two further countries that have developed their own armed drones but it is not confirmed whether these are yet operational.

Ukraine

In November 2017, the Ukraine unveiled its first armed drone called the Gorlytsa. The secretary of the National Security Defence Council of Ukraine 'promised better-armed, "strategic" drones next'.¹⁹⁶

Gorlytsa armed tactical UAV¹⁹⁷

Length	Wing	Speed	Alt	Endurance	Range/Radius	Munitions capacity
Unknown but about 3 or 4m	6.7m	230km/hr max, average 150-80km/hr	5000m	7hrs	1,050km range, 80km operating radius	50kg – either 2 ATS missiles or 4 flight bombs

The Ukrainian army has been engaged in hostilities with Russian separatists in its eastern regions after Russia annexed the Crimea in 2014. Surveillance drones have been used throughout but Ukraine's experience has been less than positive. The US provided a set of Raven UAVs (small hand launched surveillance UAVs) but the analogue signals that operated the Ravens were easily jammed by the Russian-backed separatists' equipment and gave away the positions of the Ukrainian army. The Gorlytsa is intended to address such technical issues and is set to enter service in 2018.¹⁹⁸ At the time of writing, therefore, there have been no strikes.

South Korea

South Korea is currently putting an indigenous strike-capable drone through flight trials. The KUS-FS MALE UAV is similar to the MQ-9 Reaper although a representative of the Korean Agency for Defence Development (ADD), who commissioned the development, claimed there was no foreign involvement in the production. The KUS-FS is said to have made its maiden flight in 2012 and development is scheduled to conclude in 2018.¹⁹⁹

KUS-FS MALE²⁰⁰

Length	Wing	Speed	Altitude	Endurance	Range/Radius	Munitions capacity
11m	25m	313km/hr	15,240m	32hrs	1,852km range	4 underwing hardpoints

195 Franz Stefan-Gady, 'China Scores Biggest Military Export Order for Killer Drones', *The Diplomat*, 02 March 2017, <https://thediplomat.com/2017/03/china-scores-biggest-military-export-order-for-killer-drones/>, last accessed 19 Feb 2018.

196 Patrick Tucker, 'Ukraine Fields an Armed Drone for Use Against Pro-Russian Forces', *Defense One*, 17 Nov 2017, <http://www.defenseone.com/technology/2017/11/ukraine-fields-armed-drone-use-against-russia/142651/?oref=d-skybox>, last accessed 06 Dec 2017.

197 'Anatov rolls out new Gorlytsa tactical unmanned aircraft', *Kiev Reporter*, 30 Nov 2017, <http://kievreporter.com/news-ukraine/antonov-rolls-out-new-gorlytsa-tactical-unmanned-aircraft/>, last accessed 15 Dec 2017.

198 Tucker, 'Ukraine Fields Armed Drone'.

199 Gareth Jennings, 'South Korean KUS-FS MALE UAV continues trials as development draws to a close', *Jane's Defence Weekly*, 21 Mar 2018, <http://www.janes.com/article/78734/south-korean-kus-fs-male-uav-continues-flight-trials-as-development-draws-to-a-conclusion>, last accessed 28 Mar 2018.

200 Jennings, *ibid.*

Controlling the proliferation and use of armed drones

This section outlines the main control mechanisms that exist to control proliferation of armed drones and looks at efforts to develop a drone specific control regime. It begins with a summary of current relevant international agreements, and then examines two recent initiatives to develop further controls on proliferation and use of armed drones.

Missile Technology Control Regime (MTCR)

The MTCR is a non-binding, multilateral agreement set up in 1987 that is designed to “address the proliferation of missile launch systems for WMDs”, including missiles and unmanned systems.²⁰¹ It gives these systems a category, either I (sensitive) or II (less sensitive), that should inform member states’ decision to export any categorised technology. States who are party to the agreement should operate a “strong presumption of denial” when considering export licensing for Category I; systems that can travel over 300km and carry a payload of at least 500kg.²⁰²

Wassenaar Arrangement (WA)

The WA is also a non-binding, multilateral agreement designed to complement existing agreements regarding the proliferation of WMDs and their means of delivery.²⁰³ The arrangement covers both ‘munitions’ and ‘dual-use goods and technology’. These two ‘lists’ then allow member states to make risk assessments of likely end use when considering export of related technology. Whilst the US proposed major changes to the lists in 2005 in order to cover technology relating to UAVs or that which could be converted to UAV use, it is still likely that the lists will continue to play catch up with the technology.

The Arms Trade Treaty (ATT)

The ATT entered in to force in December 2014 and is legally binding on

201 Wim Zwijnenburg and Katja van Hoorn, *Unmanned and Uncontrolled: The proliferation of unmanned systems and the need for improved arms export control*, Pax (Netherlands: 2015), p. 25.

202 The MTCR keeps an updated handbook of the Category I and II systems on its website, mtcr.info/mtcr-annex. The latest version from October 2017 can be found at http://mtcr.info/wordpress/wp-content/uploads/2017/10/MTCR-TEM-Technical_Annex_2017-10-19-corr.pdf, last accessed 29 Mar 2018.

203 Zwijnenburg and van Hoorn, *Unmanned and Uncontrolled*, p. 26.

members.²⁰⁴ Its purpose is to stop the transfer of conventional weapons that might be used in contravention of international law. While UAVs are not specifically mentioned in the ATT, many arms control advocates argue that they are implicitly covered.

Joint Declaration for the Export and Subsequent Use of Armed or Strike-Enabled Unmanned Aerial Vehicles (Joint Declaration)

In October 2016 the US issued this joint statement, signed by 53 nations.²⁰⁵ Begun under the Obama administration, and billed as a specific voluntary agreement on the export and use of armed drones, a group of the interested state parties are now undertaking further discussions about developing a more detailed politically binding agreement based on these principles. Civil society groups, however, are very concerned that the declaration falls short of what is needed to address increasing drone proliferation and use, and that a much more robust agreement, which does not water down current international control standards, is needed.²⁰⁶

General Atomics said the company was undertaking a campaign to “educate” the Trump administration on the dangers of strong export controls and is engaged in ongoing lobbying aimed at removing the “strong presumption of denial” for larger UAVs from the MTCR.

Industry lobbying to ‘relax’ restrictions

With the exception of the Joint Declaration, none of the above control agreements are specific to drones, and none, except the ATT, are binding. This presents a number of problems for controlling the proliferation and regulating the use of armed drones.

Whilst the MTCR is currently seen as the main agreement under which the export of armed drone technology is controlled, it is a political rather than legal agreement and is therefore not binding. Moreover, it was developed by the G7 group and today has 34 signatories, mostly western states (North & South America, western and eastern European and Australasia). Notably, Russia and Turkey are also members, and although China and Israel are not formal members, they are considered “informal adherents.”

Despite its voluntary nature, the MTCR has historically acted as a real restraint on the spread of armed drones by signatory states. For example, the agreement has discouraged the US Congress from approving export licences to several countries.

However, there is now a significant push-back from the US defence industry in particular. Linden Blue, the chief executive of US drone manufacturer General Atomics, said the company was undertaking a campaign to “educate” the Trump administration on the dangers of strong export controls and is engaged in ongoing lobbying aimed at removing the “strong presumption of denial” for larger UAVs from the MTCR.²⁰⁷

204 The UN webpage for the ATT is <https://www.un.org/disarmament/att/> and full treaty text in English is at <https://unoda-web.s3-accelerate.amazonaws.com/wp-content/uploads/2013/06/English7.pdf>.

205 ‘Joint Declaration for the Export and Subsequent Use of Armed or Strike-Enabled Unmanned Aerial Vehicles(UAVs)’, US Department of State [www.state.gov], 28 Oct 2016, <https://2009-2017.state.gov/r/pa/prs/ps/2016/10/262811.htm>, last accessed 29 Nov 2017

206 Chris Cole, ‘Joint civil society statement on US led armed drones control process’, Drone Wars UK, 13 Sep 2017, <https://dronewars.net/2017/09/13/joint-civil-society-statement-on-us-led-armed-drones-control-process/>, last accessed 29 Nov 17.

207 Anselmo, ‘Opinion: How Anti-Proliferation Rules Are Helping China, Hurting U.S.’; Grant Turnbull, ‘Armed UAV export reform pressure mounts’, Shephard Media, 03 Feb 2017, <https://www.shephardmedia.com/news/uv-online/pressure-mounts-armed-uav-export-reform/>, last accessed 29 Nov 17.

The Trump administration have attempted to circumvent this restriction by announcing changes which will relax domestic restrictions on arms exports and have promised to seek changes to the MTCR.

Although any formal change in the principles of the MTCR are likely a long way off, lobbyists continue to push MTCR state signatories.²⁰⁸ At the time of writing, the US has initiated discussions within the MTCR on a technical point that will ease export restrictions much more quickly. They wish to see systems that have a speed of less than 650km/hr (as current armed drones do) classed in Category II rather than Category I. Analysts note that a technical change like this is much more likely to succeed “in some form”, possibly in a round of technical discussions, and that US negotiators can achieve their goals in stages, sidestepping any contentious political discussions.²⁰⁹ Advocates of this change say that UAVs are not expendable and should be classed like jets rather than missiles.²¹⁰ Under Category II, criteria for granting export licences is less strict, thus giving companies like General Atomics more room to lobby Congress for the granting of said licences. This would of course open up the same opportunities for arms companies in other signatory countries.

The EU has also worked on a common position on the use of armed drones. The EU parliament adopted resolutions in 2014 and 2016, expressing concern on the use of armed drones outside of legal frameworks.²¹¹ In 2017, a discussion workshop was held and a briefing produced by the European parliament’s policy department on what a common position could look like. It encourages strict application of human rights and humanitarian law, as well as independent monitoring to build transparency, the possibility of judicial review within member states and asks states to publish the way in which they make decisions on strikes.²¹² At present the only EU country to have armed drones is the UK (soon to leave the EU), but others are likely to acquire them in the near future. By attempting to build in standards now, this might ensure that any future use of armed drones has undergone prior scrutiny in terms of policy for use, monitoring and accountability.

Towards a more inclusive control mechanism

The US-led process

As noted above, the US-led ‘Joint Declaration for the Export and Subsequent Use of Armed or Strike-Enabled Unmanned Aerial Vehicles’ (Joint Declaration) was signed by 53 states in 2016. While it is a positive step that this declaration focused specifically on drones, in effect acknowledging specific problems with the technology, the text of the statement itself is problematic, offering only vague and ill-defined language about export controls such as “appropriate voluntary transparency measures” that should be “responsible.”²¹³

208 Chris Cole, ‘Drones Proliferation and the MTCR: US presents discussion paper’, Drone Wars UK, 02 Nov 17, <https://dronewars.net/2017/11/02/drones-proliferation-and-the-mtrc-us-presents-discussion-paper/>, last accessed 02 Nov 17.

209 Valerie Insinna and Aaron Mehta, ‘Here’s how the Trump administration could make it easier to sell military drones’, Defense News, 19 Dec 2017, <https://www.defensenews.com/air/2017/12/19/heres-how-the-trump-administration-could-make-it-easier-to-sell-military-drones/>, last accessed 04 Jan 2018.

210 Insinna and Mehta, ‘Here’s how the Trump administration could make it easier to sell military drones’.

211 Directorate-General for External Policies, Policy Department, *Towards an EU common position on the use of armed drones*, EP/EXPO/B/COMMITTEE/FWC/2013-08/Lot8/11, European Parliament, June 2017, pp. 13, 16

212 Towards an EU common position on the use of armed drones, p. 22

213 ‘Joint Declaration’.

The Joint Declaration was billed as an initial step in a process to develop a more detailed, politically binding, set of international standards that states could join. However, although it is understood that work on this led-by the US State Department and a small 'core group' of states is underway, little detail has so far emerged.

Civil society groups (including Drone Wars UK) have raised concerns regarding the Joint Declaration and have published an open letter regarding its development. They have urged that the discussion on developing the new principles for the export and use of armed drones should be open to all states; that they should meet (at a minimum) current standards of international humanitarian and human rights law; that appropriate measures are put in place for transparency and accountability; and that experts and affected communities are also be included in discussions. They are concerned that the initial declaration fell far short of the language needed to address drone export and use, and that more detailed agreements may not reach the current standards of international control mechanisms.²¹⁴

The UNIDIR Study

Separate from the US-led process, an agency within the auspices of the United Nations has been tasked by the United Nations Office for Disarmament Affairs, pursuant to a recommendation from the Secretary General's Advisory Board, to undertake a study considering how to develop "international measures or mechanisms to improve transparency, accountability and oversight of armed UAVs."²¹⁵

UNIDIR convened several symposia during late 2016 and 2017, inviting government representatives, concerned NGOs and academic experts. These resulted in an important report published in December 2017. The UNIDIR report is insistent that states must move beyond merely considering proliferation and look to other "critical issues" such as use, transparency of use and accountability. The report highlights the ways in which the unique technology of drones can cause a "dangerous expansion in the use of armed force" and notes that there is a "troubling lack of clarity as to how international norms apply" to their use and the transparency of use. The report is clear that, given the US practice of targeted strikes and the way in which the Joint Declaration has been developed, any agreement (and the process of reaching agreement) instead needs a fully international framework that will see principles and agreements that are "uniform and meaningful in [their] application."²¹⁶ This is a hopeful step but one that requires UN members to come together to work on the issue.

The report concludes that "it would be preferable for multilateral discussions aimed at developing standards and principles for use of armed UAVs to take place under the auspices of the United Nations, with a view to involving all concerned States." To this end, several international meetings will take place during 2018 aimed at setting up such a process.

214 Chris Cole, 'Joint civil society statement on US led armed drones control process', Drone Wars UK, 13 Sep 2017, <https://dronewars.net/2017/09/13/joint-civil-society-statement-on-us-led-armed-drones-control-process/>, last accessed 29 Nov 17.

215 John Borrie, Elena Finckh and Kerstin Vingard, *Increasing Transparency, Oversight and Accountability of Unmanned Aerial Vehicles* (UNIDIR, 2017), p. 2.

216 Borrie, Finckh and Vingard, *Increasing Transparency*, p. 1.

The UK Government Position

In the most recent Ministry of Defence (MoD) *Joint Doctrine Paper on Unmanned Aircraft Systems*, published in September 2017, the MoD stated that it regards the MTCR and Wassenaar Agreements are the main mechanisms for controlling UAV proliferation. While the UK does not itself manufacture armed drones and has little to export in the way of drone technology that would meet the Category I criteria, as a significant user of armed drones, the UK is nevertheless an important player in the debate around the proliferation and use of armed drones.

Currently the UK has supported the US-led Joint Declaration on the export and use of armed drones and hopes it "will serve as the basis for discussions on a more detailed set of international standards for the export and subsequent use of armed or strike-enabled UAVs."²¹⁷

However, as outlined above, it is clear that current control mechanisms like the MTCR are coming under pressure due to lobbying by the drone industry. Furthermore, the US-led Joint Declaration may in fact only serve to weaken international standards. Along with a number of other NGOs working in this area, Drone Wars supports the UNIDIR position that a fully international and drone-specific agreement is needed, which will develop robust protocols for the proliferation, use, transparency and monitoring of armed drones.

217 Development Concepts and Doctrine Centre, *Joint Doctrine Publication 0-30.2: Unmanned Aircraft Systems*, Ministry of Defence, Aug 2017, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/640299/20170706_JDP_0-30.2_final_CM_web.pdf, last accessed 29 Nov 2017.

D Conclusion

This report has outlined how, in a relatively short space of time, the number of states operating armed drones has quadrupled from an initial base of three (US, Israel, UK) and that the number is likely to double again in the near future. Most of what we call a 'second generation' of users have acquired armed drones from China. However, some have independently developed and deployed armed drones and are now seeking to capitalize on this by exporting the technology. Others, including Russia, India and several European nations, are on the verge of arming surveillance drones already in operation. Thus, the list of armed drone users is likely to grow exponentially and rapidly over the next few years.

Recognising this as an important issue, some states and international institutions have begun to think about whether current export control mechanisms are fit for purpose in regard to the proliferation of armed drones. In addition, there is growing acceptance that the nature of armed drone technology is changing how states engage in armed conflict, leading to an erosion of compliance with international human rights norms. To counter this, it is argued, principles and standards on the use of armed unmanned systems should be agreed internationally, reiterating the need of for states to ensure that their use of armed drones always complies with international law.

At the same time, the powerful US defence industry, which perceives that it is being penalised by international arms control measures, are lobbying hard to persuade the Trump administration that it should instead push for controls on the proliferation of armed drones to be 'relaxed'. While the Trump administration is likely amenable to such 'America First' arguments, the reality is that breaching a long-standing commitment to an international arms control agreement like the MTCR would do real and lasting damage to international arms control diplomacy.

While the 2016 US-led Joint Declaration on the Export and Use of Armed Drones was significant in that it acknowledged the need for specific international controls on this technology, inherent problems with the language and the secretive nature of the process which is taking this initiative forward suggests that it may not gain widespread state involvement, particularly that of China and Israel who did not sign the original statement.

The separate process arising out of a series of expert meetings convened by UNIDIR, on the other hand, is calling for an open and inclusive multilateral process under the auspices of the United Nations. Such a multilateral process to address concerns about the growing proliferation and use of armed drones and to set standards for use deserves real support. We urge the UK government and all states, as well as all those concerned about the proliferation and use of armed drones, to engage with this process.

Glossary & Notes

ADIZ: Air Defence Identification Zone

ATS: Air-to-Surface missile

ATT: Arms Trade Treaty

FATA: Federally Administered Tribal Area

HALE: High Altitude Long Endurance

IDF: Israeli Defence Force

IRGC: Islamic Revolutionary Guard Corps

ISR: Intelligence, Surveillance and Reconnaissance

LOS/BLOS: Line of Sight/Beyond Line of Sight

MALE: Medium Altitude Long Endurance

MENA: Middle East and North Africa region

MTCR: Missile Technology Control Regime

NAF: Nigerian Air Force

PKK: Kurdish Workers Party

RANGE, RADIUS: The range of a drone is the distance it can fly from point to point. Operating radius, which is more helpful in understanding how a drone can be used, is the distance a drone can travel to carry out a task and then return. This will vary depending on payload and fuel capacity/type of fuel. The specifications given in the tables in this report are for combat or operating radius, where available. Where this information is not available, the range is given. **SCBR:** Shura Council of Benghazi Revolutionary

SDF: Syrian Defence Force

SIGNIT: Signals Intelligence software. Hardware carried by a drone to intercept and record radar signals.

TACTICAL: Tactical drones are smaller, lighter and more flexible than MALE or HALE drones and will normally be with a squadron/battalion/army unit on the ground.

TAI: Turkish Aerospace Industries

UAS: Unmanned Aerial System (aircraft, ground stations, communication systems)

UAV: Unmanned Aerial Vehicle (the aircraft)

UNIDIR: United Nations Institute for Disarmament Research

WA: Wassenaar Agreement

