Drones and Arms Control

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The unmanned aerial vehicles (UAVs) or the unmanned aircrafts, commonly called 'drones', have emerged as the new face of a technologically oriented warfare today. They provide the state with the technological capabilities to strike with utmost accuracy without the risk of endangering human lives of the armed forces. Today, drones have become the strategic weapons of choice for most of the states, including India. However, as the military technologies keep advancing and proliferation methods become more sophisticated (the case of UAVs illustrates this point), there is a challenge to the effectiveness of the existing arms control and export control regimes, like the Missile Technology Control Regime (MTCR), Wassenaar Arrangement, the Arms Trade Treaty. Indeed, one would wonder if the current international control measures are enough to prevent the proliferation of drones. This article aims to investigate some of these issues and answer whether proliferation of drones challenge the existing arms control regimes, and if so, how states should establish or modify the drones/arms control regimes to limit the proliferation of drones without endangering national security.

Keywords: *Unmanned Aerial Vehicles (UAVs); Arms Control; Drones; Missile Technology Control Regime (MTCR), Wassenaar Arrangement, Arms Trade Treaty*

Introduction

Unmanned Aerial Vehicles (UAVs), commonly called 'drones', have emerged as the new face of a technologically oriented warfare today. It provides the state with the technological capability to strike with utmost

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accuracy without the risk of endangering human lives of the armed forces. Today, drones have become the strategic weapon of choice for many countries, including India. Although acquisition of drones is a costly business, more and more countries are investing in them because of their utility. The term 'drones' is usually used to refer to any aerial vehicle that receives remote commands from a pilot or software that is situated far. Most of the drones have features such as cameras to collect data and stabilising propellers. They are used in a wide range of domains such as videography, search and rescue missions, farming and disaster management besides military operations.

Drones can be classified into different levels based on its autonomy ranging from piloted remotely by a pilot controlling its movements to advanced autonomy where it relies on sensors and LiDAR detectors to calculate the movements.[1] They usually come with varying capabilities of travelling heights and distances. Short-range drones are used for spying and intelligence gathering, while mid-range UAVs can be used for intelligence gathering and scientific and meteorological research. The longest-range UAVs with a range of over 400 miles are often used in assisting search missions for survivors in natural disasters, for military purposes, to keep watch over terrorist activities and to advance scientific research in extremes of climate.

As military technologies keep advancing and proliferation methods become more sophisticated (the case of UAVs illustrates this point), the international community must revisit the arms and export control regimes to gauge their effectiveness. With more and more states involved in the procurement of drones, one wonders whether the current international control measures are enough. This article aims to answer whether proliferation of drones challenge the existing arms control regimes, and if so, then how states should establish or modify the drones/arms control regimes to limit their proliferation without endangering national security. For the purpose of this article, the term 'drone(s)' will be used broadly or rather interchangeably for all categories: the unmanned aircraft, unmanned aerial vehicle(s) or UAVs.

Modern Warfare: The Role of Drones

Drones have already been established as an integral part of the military's arsenal, especially for superpowers, while others are following the same path. In the last couple of years, we have seen how drones have transformed geopolitics; for example in the incident of a drone attack on

Saudi oil installations, or elimination of serving Iranian military officer General Qasem Soleimani in 2020, and more recently of Al-Qaeda leader Ayman Al-Zawahiri. During the recent standoff between India and China in Ladakh, the Chinese have regularly used drones for aerial surveillance in the region. The United States has been using drones in Afghanistan and Iraq to eliminate terrorists while Turkey-supported Azerbaijani forces have also used drones against the Armenians in Nagorno-Karabakh.

Technically, drones have been a part of warfare since 19th century when the Austrians used pilotless hot-air balloons to bomb Venice. First pilotless vehicles were developed in Britain and the US during World War I. Britain's Aerial Target (radio-controlled aircraft) was tested in March 1917, American aerial torpedo known as 'Kettering Bug' first flew in October 1918. However, neither was used operationally during the war. In the inter-war period, the development and testing of unmanned aircraft continued. In 1935, the British produced a number of radio-controlled aircraft to be used as targets for training—the name 'drones' came into vogue around this time, inspired by one of these models DH.82B Queen Bee (Imperial War Museum). Radio-controlled drones were also manufactured in the US and used for target practice and training. On the other hand, reconnaissance UAVs were first deployed on a large scale during the Vietnam War by the US. At the peak of the Cold War, drones like Firebee were used in Vietnam for intelligence, surveillance and reconnaissance (ISR) missions. The endurance of Firebee was 75 minutes. After the Vietnam War, many other countries started exploring the unmanned aerial vehicles technology. Gradually, drones came to be used in various other roles such as in acting as decoys in combat, launching missiles against fixed targets and dropping leaflets as a means of psychological operations.

Modern drones can remain in the sky for long hours and perform tasks that a manned military aircraft can do.[2] Drones like Harop are designed to perform Kamikaze (suicide) missions. It can loiter over targets for hours and provide intelligence before performing offensive action. The MQ-1 Predator UAV became the iconic weapon in the counter-insurgency warfare waged by the US in Afghanistan, Iraq and elsewhere. The drones' symbolic status only grew when Predator—originally conceived for aerial reconnaissance—was armed with Hellfire missiles. Its successor, the Reaper, was specifically designed as a hunter-killer, with greater range than its predecessor and ability to carry a larger weight of munitions.[3]

For a brief period of time, it was largely the US and Israel who were able to carry out drone operations. However, today a new era of drone warfare has arrived involving many more players. Also, the use of UAVs has moved from counter-terrorism or counter-insurgency warfare into full-scale conventional combat. Indeed, up ahead, a new third age of drone warfare beckons as technology becomes even more sophisticated and gets integrated with artificial intelligence. The US gained experience in UAVs through its operations in Kosovo in 1999. Currently, the US Department of Defense is in the process of building military systems, including UAVs, which would conduct military operations without human intervention.

Drone strikes have played a key role in conflicts, for instance in bolstering the Addis Ababa government's position in the face of attacks from TPLF (Tigray People's Liberation Front) rebels.[4] The Ethiopian government has purchased armed drones from Turkey and Iran. It is also reported to have got access to Chinese Wing Loong II UAVs via the United Arab Emirates (UAE). The UAE similarly supplied Chinese-built drones to its ally General Khalifa Haftar during Libya's brutal civil war.[5] In many cases armed drones have had a decisive impact, for example in contributing to the survival of Libya's internationally recognised government in Tripoli. During the Nagorno-Karabakh conflict in 2020, drones supplied by Turkey played a potent role in enabling Azerbaijan's forces to wrest control of the disputed enclave from Armenia.

Drones usually fly so near to the ground that many air defence systems are not optimised to shoot them down and many countries are working to develop counter-measures to dismantle threats posed by drones. One challenge, though, will be in countering mass drone attack, since low-cost drones can be built in large numbers. There has been a lot of talk about futuristic, so-called "drone swarms" where a large number of drones can operate without any human involvement.[6]

The most well-known and controversial use of UAVs is by the military for reconnaissance, surveillance and targeted attacks. Since the 9/11 terrorist attacks, the US in particular has significantly increased its use of drones. They are mostly used for surveillance in areas and terrains where troops are unable to go safely. But they are also used as weapons and have been credited with killing suspected militants. Their use in current conflicts has raised questions about the ethics of this kind of weaponry, especially when it results in civilian deaths, either due to inaccurate data or because of their proximity to a target.

Since the 1950s, the US has been invested in unmanned, remotely piloted aircraft as spy planes. Radio-controlled and fitted with film cameras, the small drones flew over China and North Vietnam gathering imagery intelligence while not risking the lives of pilots. Nonetheless, drones were still only a niche technology during the Cold War. They were unreliable, small yet expensive, and pilots had to be within range of their analogue radio signals, often having to fly their drones while sitting in a nearby manned aircraft.

A country-wise list of drones is given in Table 1.

Table 1 List of UAVs (country-wise)

Countries	*UAVs*
USA	RQ 11 Ravens, WASP-III, RQ-20 PUMA, RQ-16 T-Hawks, MQ-1 Predators, MQ-1C Grey Eagles, mq-9 Reapers, RQ-9 Shadows, RQ-4 Global Hawk Large
Israel	Scout, Mastiff, Hermes 450, Hermes 900, Heron, Heron TP
Turkey	Bayraktar TB2
China	AEE F50, F100, AFT Free Bird, AFT Single Soldier 1, Aisheng ASN, Hexiang, HLKX Hawk Eye
Russia	Kamov Ka-137, GLL 8, Yakovlev Pchela, Zala Lancet
India	ADE Nishant, DRDO Abhyas, DRDO Ghatak, India-US Joint ALUAV target drone, Trinetra, RUAV 200

Proliferation of Drones and Arms Control

A principal reason that propelled the development of UAVs was the intent to reduce the risk to humans in combat, while also performing military missions in a more efficient and less costly fashion than has historically been the case with manned vehicles. It was expected that unmanned aerial vehicles would be less expensive to develop and manufacture than manned aircraft, and that UAVs will reduce the demand for supporting facilities and manpower that modern aircraft require. As a result of technological advances in flight control, data and signal processing, offboard sensors, communications links, and integrated avionics, UAVs have thus become a serious option.[7] The hope, as yet unconfirmed, is that uninhabited aerial vehicles may be able to perform the most dangerous military missions, including attacking chemical or biological facilities, fixed and mobile targets, and other aircraft, which would represent a revolution in military capabilities.

This hope raises significant questions about the nature of military operations in the future and how these technologies will influence international security. When the United States Air Force Scientific Advisory Board (SAB) conducted a study in 1996 on the role of UAV technologies in military operations, its principal conclusion was that UAVs would enhance the ability of the US to project military power.[8] Another equally important conclusion was that these vehicles could perform the tasks that pose increasing difficulties for manned aircraft, of which attacking chemical warfare/biological warfare (CW/BW) facilities and suppressing enemy air defences are the most important examples. The SAB study concluded that because UAVs are more survivable than manned aircraft, this technological development has profound implications for the military forces that the US will design and deploy in the future.[9] There was a wider agreement that the development of UAVs could potentially revolutionise how military force is used in the future. It was clear that these technologies will enable military forces to use aerospace power more efficiently, at lower cost and with less risk to the humans who pilot aircraft.

However, with the current drone revolution, countries across the world are struggling to keep up with its uses through available regulatory mechanisms. Different countries have different sets of regulatory mechanisms. Yet, the uniformity in these mechanisms is about putting restrictions on drone mass, drone altitude and pilot licence. Regulations in a country are often governed by the question whether the country favours the promotion of new technology or a safety-first approach.[10] The International Civil Aviation Organization (ICAO), the United Nations' aviation agency is the lead platform in the international sphere of governance of drones. In 2011, the ICAO issued Circular 328 and subsequently developed the Manual on Remotely Piloted Aircraft Systems (RPAS).[11] In Circular 328, the ICAO called upon countries to give their comments on drone applications and usefulness of developing a fundamental and uniform international regulatory framework through Standards and Recommended Practices (SARPs) with supporting Procedures for Air Navigation Services (PANS) and guidance material to underpin the routine operation of Unmanned Aerial Systems (UASs) throughout the world in a safe, harmonised and seamless manner comparable to that of manned operations.[12] Along with this, the Missile Technology Control Regime (MTCR), the Wassenaar Arrangement (WA), and the Arms Trade Treaty (ATT) are some of the international

instruments that could govern the export and regulation of drones. These are discussed next.

The Missile Technology Control Regime

The Missile Technology Control Regime (MTCR) is recognised as the first multilateral regime that aims to regulate, if not restrict, the proliferation of missiles and UAS. However, the MTCR is now being put to test by competing interests of non-proliferation and commerce. Amended from its original form, the MTCR is now the primary tool used by the US to restrict the proliferation of armed drones. However, there has been a debate regarding which UAVs produced in the US can legally be exported. The MTCR places restrictions on the export of Category 1 UAVs, which are characterised as drones that have a range of more than 300 kms and can carry a payload of more than 500 kgs. Category 2 UAVs, on the other hand, are not subject to any export restrictions.

The proliferation issue is at the forefront of the debate since there is concern that proliferation of armed drones can result in a rise in armed conflict as well as the possibility that drones could end up in the wrong hands.[13] The sheer scale of the drone industry and the related commerce is one of the factors that either has an impact on the MTCR or represents a challenge for it in relation to the proliferation of drones. For example, in 2013, the global market for high- and medium-altitude UAVs (which include Category 1 drones) was worth US$2.2 billion, and it was predicted that these types of drones would generate US$24.9 billion in business over the next 10years.[14] The global civil drone market, which was valued at US$6.56 billion in 2019, is expected to grow to US$21.61 billion by 2027.

In addition, the MTCR is challenged by the increasing number of countries that are developing armed drones, including China, Israel, and numerous European nations. The UAVs of the current generation have proliferated over the course of time. According to the Centre for the Study of Drones, the number of countries having active military drone programmes has increased from 60 in 2010 to around 120 in 2020.[15]

The fact that the MTCR is a club with only a selected number of members presents a significant challenge. In spite of the fact that its primary objective is to limit the spread of high-tech weapon systems, it has been dubbed a technology trade cartel since its members restrict access to technology in order to keep their dominant position in the market and protect their economic and security interests. This has

prompted other countries to either develop their own drone programmes or look for other sellers. Countries like Algeria, Iraq, Jordan, Saudi Arabia, Egypt, UAE, Pakistan, Kazakhstan, and many more are buying drones developed by China, Iran, and Turkey. One of the most glaring examples is proliferation of drones by China. China is not a member of the MTCR, and activelyundermines it by encouraging exportof its drones.[16] In fact, many nations that manufacture drones are not members of the MTCR, making it a difficult challenge confronting the control regime.[17]

The Wassenaar Arrangement

The Wassenaar Arrangement, an informal export control regime established in 1996, is another document that can be applied to armed drones. The agreement comprises 42 participant states that have agreed to work together to prevent unauthorised transfers or re-transfers of the Wassenaar Arrangement items. Theoretically, the answer to the question of whether the Wassenaar Arrangement covers drones is affirmative. Each of the two lists of weapons in the Wassenaar Arrangement comprises armed drones. However, its significance is diminished by the fact that it is not legally binding and, like previously stated arrangements, many states, including China and Israel, are not members. The Wassenaar Arrangement relies mostly on voluntary information exchanges, which significantly weakens its capacity to regulate exports of armed drones. Its restricted membership is another factor that limits its efficacy.[18]

It is alleged that the Wassenaar Arrangement suffers from club culture and prohibitive entry requirements, hence excluding the states most susceptible to proliferation. Unlike the relatively successful Chemical Weapons Convention (CWC), the Wassenaar Arrangement consists of a very small number of states that control highly valued materials to prevent proliferation. Another reason for its ineffectiveness is the absence of transparent and inclusive amendments.[19] These flaws are attributed to Cold War-era thinking, such as an over-emphasis on *weapons of mass destruction* (WMD) and ballistic missile systems, antiquated range and payload constraints, a lack of uniform definitions and enforcement mechanisms, and bipolar export schemes. The path forward entails addressing these loopholes, implementing inclusive proliferation models, and adhering to regulations incentivising participation.[20]

The goal of export controls on defence technology is to balance between directly suppressing its harmful proliferation on one hand and

encouraging the global competitiveness and technological edge of the defence industrial base on the other. UAV technology and its military and civilian applications have greatly evolved in recent years and will continue to do so, perhaps dramatically. The changes taking place in the UAV market makes it necessary for policymakers to continually evaluate international agreements and domestic export controls applicable to UAVs to ensure that nations and international controls best protect national security interests.

The Arms Trade Treaty

The Arms Trade Treaty (ATT) is a legally binding treaty for the regulation of global trade in conventional weapons. After seven years of negotiations, the ATT was finally ratified in April 2013 by the United Nations General Assembly. This treaty promises greater transparency in terms of international arms transfer decisions, including drones. The scope of the treaty extends to at least eight categories of conventional weapons. This is defined in Article 2.1 of the treaty as: battle tanks, armoured combat vehicles, large calibre artillery systems, combat aircraft, attack helicopters, warships, missiles and missile launchers, and small arms and light weapons. The treaty does not define these categories of weapons, but Article 5.3 of the treaty does require national definitions provided by the United Nations Register of Conventional Arms (UNROCA) of these weapons at the time of the treaty coming into force. However, it was faced with fierce opposition from some major arms exporting countries. While the ATT does not explicitly identify drones as falling under its purview, the UN Register's 'combat aircraft category' nevertheless implicitly applies to drones.[21]

Since 2009, there have been discussions and initiatives aimed at extending the scope of the UNROCA to include armed drones as a new category. Nonetheless, what has been a hurdle for the ATT is the lacklustre reporting by governments in their annual report to UNROCA regarding their export of armed drones. In addition, reporting of export of armed drones by states is limited. States are obliged to furnish the ATT Secretariat with their annual reports and disclose any arms transfers involving any listed conventional weapons. This obligation extends to armed drones that are either exported or acquired during that time period. However, as was previously mentioned, there is a possibility that state reports of exporting or acquiring are false, therefore, supplying scant or incomplete details concerning drone transfers. In

fact, the US, China and Israel do not comply with the ATT as non-state parties and thus never submit annual reports to the treaty. This possibility of misreporting is also attributable to the absence of sanctions for non-compliance. Consequently, since the reporting is left up to the good faith of each state party, this presents a significant challenge for ATT.[22]

The proliferation of drones poses another difficulty for the ATT. There is no mechanism to verify the information presented in the yearly reports by the states and the ATT Secretariat is not mandated to analyse the reports. Similar to the MTCR, the problem with the ATT is its membership; as of 25 June 2020, 56 states had not signed, and 32 signatory states had not ratified the treaty, leaving many states with no legal obligation to comply with the treaty's detailed provisions. Therefore, the proliferation of drones becomes a challenge for the ATT. Similar to the case of MTCR, China has not been a party to the treaty, and appears determined to fully expand its arms production industry by selling cheap arms, including UAVs to poor nations. The absence of Asian states inATT affectsits effectiveness since many Asian regions are among the largest arms-importing regions. Although ATT's ability to regulate armed drones should not be underestimated, it is evident that the treaty has not been entirely successful due to its lack of universal participation.[23]

Indian Scenario

India, like every other nation aspiring to step up its power aspirations has been obtaining UAVs. India is now recognised as one of the largest importers of drones worldwide. Initially to protect India's long coastal line and maritime sphere, it obtained armed UAVs from the US. From the late 1990s, Indian Army began to acquire UAVs from Israel and slowly Indian Navy and Air Force followed suit.[24] In recent years, the US approved the sale of unarmed Guardian reconnaissance drones to India, although New Delhi still seeks to acquire General Atomics' Avenger Predator armed drones. India has relied heavily on Israel, obtaining their unarmed Harpy UAV and, recently, the Heron TP-armed drones. Despite initial struggles, India was able to become the 35th nation to join the MTCR in 2016, providing it with greater access to surveillance drones and potential armed drones available in the foreign market.[25]

India first used military drones during the 1999 Kargil War against Pakistan for photoreconnaissance along the Line of Control (LOC).

After India lost an aircraft to a Pakistani infrared homing missile due to an inefficient and strategically weak drone system, Israel discreetly supplied the Indian Air Force Searcher drones enabling India to acquire target information along the LOC.[26]

India has also advanced its indigenous UAV programme, led largely by Defence Research and Development Organisation (DRDO), which has partnered with private national companies and technical universities to develop new technology. A year after Pakistan unveiled its homemade Burraq UAV in 2015, India managed to develop its own Rustom II MALE (Medium-Altitude, Long-Endurance) combat drone.[27] India has operated UAVs on its borders, into Pakistan airspace, near the Line of Actual Control (LoAC) between India and China, and domestically for disaster response and terrorist activity monitoring.[28]

In India, the use of all (manned or automated) aerial vehicles is governed by the Directorate General of Civil Aviation (DGCA). Though UAVs were originally developed for the military and aerospace industries, theyhave found their way into the mainstream because of the enhanced levels of safety and efficiency they bring.Lately, drones are also being used for medical supply in somestates with the assistance of the Ministry of Civil Aviation for delivering vaccines/medicine to the desired Community Health Centres (CHCs) and Primary Health Centre (PHCs).[29] Similar permission was granted to deploy drones for agricultural research activities and is expected to drive a wave of technology in the agriculture sector. 'Kisan Drones' are already being used for crop assessments, land records, and spraying of insecticides and nutrients. Drones were also used by law enforcement agencies for real-time monitoring of COVID-19 hotspots and containment zones to ensure strict compliance with lockdown guidelines.[30] From SVAMITVA (Survey of villages and mapping with improvised technology in village areas) scheme of mapping out the 'Abadi' areas to get residents' property cards to drone-based surveillance system for railway security, drones are extensively used in India for civilian purposes as well.

The Indian Navy had leased two MQ-9B Sea Guardian UAVs from the US to bolster its maritime surveillance capabilities under Drones Rules. To keep a hawk's eye on Chinese activities in the region, the Indian Army has now received 'more advanced versions of Israeli Heron UAV' for deployment in eastern Ladakh.[31] Developed by Israel Aerospace Industry (IAI), the Heron-TP, is an upgrade from the existing Heron UAVs, expanding its versatility as a platform to cater to the demands of

international customers. It can perform surveillance, target acquisition, intelligence gathering and with some modifications even strike capability can be added. The Heron-TP can accommodate a variety of sensors and payloads according to mission requirements. The new Heron has been exported to countries including Greece and Germany, and its original variant is being operated by more than 10 countries.

India is a member ofnon-proliferation initiatives such as MTCR and the Wassenaar Arrangement. For the first decade and a half after independence, India was part of the global consensus that non-proliferation and disarmament were desirable objectives and needed to be achieved in tandem. Some of India's early disarmament initiatives at the United Nations, include the call for a "nuclear stand-still accord" and a ban on nuclear testing.[32] At the 1965 session of the UN General Assembly, India, as the lead co-sponsor, introduced the resolution A/RES/2028(XX), on 19 November 1965, calling upon the "Conference of the Eighteen-Nation Committee on Disarmament" to give urgent consideration to the negotiation of an international treaty to prevent proliferation of nuclear weapons. Among the principles was one calling for "an acceptable balance of mutual responsibilities and obligations of the nuclear and non-nuclear Powers".[33] However, India came face-to-face with two harsh realities. The first was the 1962 India–China War, where India suffered a humiliating defeat. The second was the nuclear test by the People's Republic of China in 1964 and its acceptance as a de jure nuclear weapon state in the context of the NPT (the NPT defines a nuclear weapon state as one that tested a device before January 1967), though at that point, the People's Republic of China neither occupied the Chinese seat in the UN nor was it a party to the NPT.

In 1983, India announced its Integrated Guided Missile Development Programme (IGMDP). The same year, the G-7 countries began talks about controlling missile proliferation and the MTCR was launched in 1987 with the purpose of controlling proliferation of missile systems capable of delivering nuclear payloads. Significantly, the MTCR made no distinction between military and civilian space launch activities. As a result, international cooperation with many of Indian Space Research Organisation's (ISRO)civilian space programmes were curtailed even though the IGMDP was managed by DRDO, an agency under the Ministry of Defence.[34] New Delhi has of late been able to balance arms control and national security concerns, prioritising national security as key to its joining of any arms control arrangement.

The Need for a Stronger Arms Control Regime

With absolute certainty, the military character of some unmanned systems will probably only become apparent through their use and the resulting effects. Such a potential 'military indeterminacy' of unmanned systems confronts the traditional verification approaches of arms control with almost insurmountable obstacles, and an apparently continuous verification of unmanned systems for their civilian or military character by using the existing instruments seems impossible or infeasible. So far, traditional arms control has been based mainly on the numerical, regional, and type-related limitations of clearly defined and unambiguously identifiable weapons categories. In most cases, verification of arms control agreements was performed by detecting and counting weapon systems. By using such traditional instruments of arms control, it will be possible to detect drones today only if they expose unique and unalterable military characteristics, for example, in the case ofmanned tanks, combat aircraft, or warships.

For this reason, arms control of drones has to face new requirements, and thus, is in need of conceptual adaptation. Proven approaches should be adapted to the extent possible, and supplementary instruments should be developed where required. The future of arms control must, on the one hand, cope with the dual-use issue and address the blurred borderline between civilian and military systems, and, on the other hand, must be flexible enough to respond to new technological development trends. It is becoming apparent that in the future, software (e.g., programme codes, algorithms, data) will affect and define the performance of weapon systems far greatly than the hardware. In conjunction with this knowledge, a critical consideration of the potential impact of increasingly software-supported decision-making processes, which will be a consequence of increasing automation, is strongly recommended. In this context, the risk of a possible loss of human control over future UAVs requires special attention, which must be considered with regard to both the provisions of international humanitarian law and the security policy implications of these weapons.

Arms and export control are still limited, particularly regarding the various software components of modern weapons systems. As yet, there is a lack of reliable instruments that can be used to regulate and verify software codes, algorithms and data sets, and that are capable of gaining international consent. Very similar circumstances and also overlaps can be seen with regard to arms control efforts in the cyber domain and

in space. In all these fields, arms control research and the international discourse by experts are only just beginning and have up till this point received too little attention.

Above all, there is still a lack of international awareness of the risks and security policy implications of UAVs. In this regard, the essential lessons from the East-West confrontation era should be recalled: on one hand, the negative lessons learned and hazards that originated from the arms race and the potential for military escalation, and on the other, the stabilising value and mutual benefit of cooperative arms and export controls. Both aspects must be likewise taken into consideration, so that a serious interest by all parties in regulatory measures within the field of UAVs may evolve. In the course of this process, regulatory approaches developed, negotiated and decided on the basis of international discourse must be repeatedly put to test. The leap of faith provided within the scope of arms control agreements must be substantiated by agreed and reliable verification instruments. A mutual understanding of what, on one hand, defines UAVs in a broader sense, and on the other hand, how they might be more easily classified would be an important foundation and pre-condition for a purposeful international discussion on arms control and the non-proliferation of UAVs.

A discourse on the conformity of fully autonomous weapons systems with the international humanitarian law has been ongoing since 2014 within the scope of the UN Convention on Certain Conventional Weapons (CCW). This discourse, however, has also been characterised by the difficulties described earlier. A broader international debate on the peace and security policy implications of these weapon systems is still pending. At the beginning of such a debate, awareness must be raised about issues such as, whether and to what extent, today's and/or future UAVs will impact international security, jeopardise regional and/or strategic stability, and expedite armament dynamics. A comprehensive international consensus on the type and effects of the negative consequences which may be associated with the increasing proliferation and employment of UAVs will be the basic pre-condition and motivation to commence future negotiations on arms and export controls, and to later promote them successfully.

Conclusion

Today, drones are becoming more and more widespread and commonly used throughout the international community as they are setting the pace

for progress. Aside from the military advantages that can be expected, they also raise a number of new issues with regard to the danger of armament dynamics, as well as the destabilising effects of these weapons, and their legitimacy under international law. It is an unfortunate truth that, like UAVs, other military technologies will keep advancing, and proliferation methods will become more sophisticated. With the volatile global political environment, agents of global peace and security must constantly cope, open up discussions, maintain their commitments, and make sure that decisions are institutionalised globally and nationally. Threats to international peace and security will always be present, but with concerted global efforts, we can minimise the risk.

Notes

1. Matthew Urwin, 'Drone Technology: What is Drone?', *Builtin*, 28 July 2022, available at https://builtin.com/drones.
2. Gopal Dhok, 'Drone Warfare-Challenges and Opportunities', *FinsIndia*, 9 February 2021, available at https://finsindia.org/drone-warfare-challenges-and-opportunities/.
3. Jonathan Marcus, 'Combat Drones: We are in a new era of warfare-here's why', *BBC News*, 4 February 2022, available at https://www.bbc.com/news/world-60047328.
4. Ibid.
5. Ibid.
6. Ibid.
7. David Glade, 'Unmanned Aerial Vehicles: Implications for Military Operations', Center For Strategy and Technology, Air War College, 2000, pp. 1–39.
8. Ibid.
9. Ibid.
10. Rajeswari Rajesh, 'Regulation of Drones in India-Explained', *Legal Bites*, 17 July 2021, available at https://www.legalbites.in/regulation-of-drones-in-india/.
11. Ibid.
12. Ibid.
13. Jefferson Morley, 'Drone Proliferation Tests Arms Control', Arms Control Association, available at https://www.armscontrol.org/act/2014-04/drone-proliferation-tests-arms-control.
14. Ibid.
15. Ankit Kumar, 'Drone Proliferation and Security Threats: A Critical Analysis', *Indian Journal of Asian Affairs*, Vol. 33, No. 1, 2020.

16. Ibid.
17. Jefferson Morley, 'Drone Proliferation Tests Arms Control', n. 13.
18. Cholpon Orozobekova and Marc Finaud, 'Regulating and Limiting the Proliferation of Armed Drones: Norms and Challenges', Geneva Paper 25/20, Geneva Center for Security Policy, August 2020, available at https://dam.gcsp.ch/files/doc/regulating-and-limiting-the-proliferation-of-armed-drones-norms-and-challenges.
19. C. Michael Cali, 'UAV Proliferation and the Challenge of Change', *Georgetown Journal of International Affairs*, 9 October 2013, available at http://journal.georgetown.edu/uav-proliferation-andchallenge-of-change-by-c-michael-cali/.
20. Ibid.
21. Rachel Stohl and Shannon Dick, 'The Arms Trade Treaty and Drones', Stimson, 2018, available at https://www.stimson.org/wp-content/files/file-attachments/Stimson_The%20Arms%20Trade%20Treaty%20and%20Drones_August%202018.pdf.
22. Cholpon Orozobekova and Marc Finaud, 'Regulating and Limiting the Proliferation of Armed Drones: Norms and Challenges', n. 18.
23. Ibid.
24. Breanne Schneider, 'India's Drones: Assessing the Rationale for Unmanned Aerial Vehicle Acquisition', *The Cornell International Affairs Review*, Vol. 12, No. 1, November 2018.
25. Ibid.
26. Ibid.
27. Ibid.
28. Ibid.
29. Zoya Hussain, 'Explained: The Evolution of India's Drone Sector', *India Times*, 7 July 2022, available at https://www.indiatimes.com/explainers/news/drone-flying-in-india-561007.html.
30. Ibid.
31. 'Keeping An Eye On Chinese PLA, India Deploys "Advanced" Israeli-Origin Heron TP Drones Near Disputed Border', *The Eurasian Times*, 1 December 2021, available at https://eurasiantimes.com/india-deploys-advanced-israeli-origin-heron-tp-drones-near-china/.
32. Rakesh Sood, 'India and Non Proliferation Export Control Regimes', ORF Occasional Paper No. 150, 9 April 2018, available at https://www.orfonline.org/research/india-and-non-proliferation-export-control-regimes/.
33. Ibid.
34. Ibid.