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New (legal) challenges for future UAS/RPAS being launched at sea by the Belgian navy[1]

Walter VERSTREPEN

Commander s.g. (OF-4) in the Belgian navy reserve. Walter VERSTREPEN studied law at the KU Leuven, obtained a Master of Laws in Admiralty at Tulane University, New Orleans, USA, and is PhD candidate in Law at the Ghent University. He is a member of the Brussels Bar and a practising solicitor (England and Wales). Initially trained as a mine countermeasures officer, he took part in two military operations and was legal adviser (LEGAD) during the latest operation. He is currently LEGAD at the Belgian navy policy staff.

Le déploiement des drones marins par la marine belge risque d'être contrarié par le cadre légal. Les avions d'État ainsi que les drones militaires sont exclus de ce cadre légal, même si les États l'appliquent. Le droit international et européen est en cours d'évolution pour s'adapter à ces nouveaux défis. L'utilisation de ces drones (autonomes ou pilotés à distance) est juridiquement très complexe en raison des multiples possibilités de pilotage ou de contrôle selon la localisation de ces drones et la nationalité des contrôleurs ou pilotes à distance qui peuvent transférer le contrôle ou le pilotage. La gestion du trafic aérien en mer, la sécurité de la navigation aérienne, la navigabilité, l'équipage et la vie privée requièrent une attention particulière.

Het wettelijk kader voorziet in beperkingen voor de inzet van zeedrones door de Marinecomponent. De staatsluchtvaartuigen en militaire drones vallen buiten dit wettelijk kader, hoewel staten zich er toch aan houden. Het internationaal en Europees recht zijn volop in ontwikkeling om te kunnen inspelen op deze nieuwe uitdagingen. Het aanwenden van deze (autonome of vanop afstand bestuurde) drones is juridisch gezien zeer ingewikkeld omwille van de talrijke mogelijkheden op het gebied van de besturing of controle afhankelijk van de lokalisatie van deze drones en de nationaliteit van de bestuurders of afstandspiloten die de controle of de besturing kunnen overdragen. Het beheer van het luchtverkeer over zee, de veiligheid van de luchtvaart, de luchtwaardigheid, het personeel en het privéleven vragen de nodige aandacht.

[1] This brief article covers a tiny part of the author's PhD research study on the legal consequences of UXV

Belgium published on 29 June 2016 The strategic vision for Defence (2016-2030), in which the "capability dimension maritime" was determined and which encompasses amongst other mentioned future investments' contents the envisaged "surface combatant capability" and the "mine countermeasures capability".[2] The ministers of Defence of Belgium and the Netherlands signed a letter of intent on 30 November 2016 in order to replace their current multipurpose frigates and mine countermeasures vessels.[3] This letter of intent is the first formal step towards the implementation of some of the intended investments determined in the aforementioned strategic vision for the Belgian navy.

The Belgian and Dutch navies plan to acquire unmanned aircraft systems (UAS) for their future joint procurement of M-class frigates and mine countermeasures vessels. The Belgian navy intends to test an unmanned aircraft vehicle from aboard its current frigates and from ashore in order to make a full operational capability assessment.

For such assessment, a clear understanding of UAS is required. Unmanned aircraft are understood as "pilotless aircraft" in a subparagraph of article 15 of the Protocol of 15 June 1929 amending the Paris Convention of 13 October 1919. This Convention was replaced with the Chicago Convention of 7 December 1944 on international civil aviation, of which article 8 is entitled "pilotless aircraft". Based on the intent of the drafters of this article 8, the notion of "aircraft flown without a pilot" refers to the situation where the aircraft lacks a pilot aboard. Remotely controlled and uncontrolled (autonomous) aircraft are not a novelty as they already existed during the First World War, operated by both civil and military entities.[4]

According to the ICAO Manual on RPAS, unmanned aircraft encompass remotely piloted aircraft (RPA), autonomous aircraft and model aircraft, the latter falling however outside the scope of this article. Remotely piloted aircraft can conduct autonomous flights or segments thereof, whereas autonomous aircraft can also conduct remotely piloted flight segments. In case of flights with autonomous aircraft, the "remote pilot"[5] acts as a "flight operational controller".[6]

UAS entail much more than just the unmanned aircraft vehicle and is normally a "system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft".[7] Another term being used is "remotely piloted aircraft systems" (RPAS), which is similarly described as: "a set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required, at any point during flight operation".[8] The various components of UAS/RPAS are interconnected and essential for the sound and successful unmanned aircraft vehicle operation.

The operational use of UAS/RPAS will undoubtedly open a new era entailing a wide range of opportunities and provide added values in the light of a whole area of maritime operations. This type of use envisages for instance intelligence, surveillance and reconnaissance (ISR), combat operations (CO), security operations (SO), and maritime assistance (MA). These opportunities present new (legal) challenges, though, of which a few will be

[2] http://www.vandeput.belgium.be/sites/default/files/articles/The%20strategic%20vision%20for%20Defence.pdf
[3] https://www.mil.be/nl/artikel/belgie-en-nederland-willen-marinevloot-vernieuwen
[4] Manual on remotely piloted aircraft systems (Manual), Doc 10019, ICAO, 2015, p. 1-1, para. 1.2.4. The Manual provides guidelines on RPAS. State aircraft and autonomous unmanned aircraft are not within the scope of this Manual
[5] "Remote pilot" means "a person charged by the operator with duties essential to the operation of a remotely piloted aircraft and who manipulates the flight controls, as appropriate, during flight time". Manual RPAS, p. xviii.
[6] "Operational control" means "the exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight". Manual, p. xvii.
[7] Unmanned Systems Integrated Roadmap FY2013-2038, United States DoD, 2013, 3
[8] Unmanned Aircraft Systems (UAS) (Cir 328), ICAO, 2011, (x)

briefly presented hereafter: airspace, air traffic management (ATM) (i.e. air safety, airworthiness), manning, or privacy.

AIRSPACE

The airspace within which those UAS/RPAS are permitted to operate at sea is determined by the Chicago Convention. The airspace above the seas is divided into the "territorial waters" or "territorial sea" of the coastal state on the one hand and the high seas on the other hand. The Chicago Convention determines "that every [contracting] State has complete and exclusive sovereignty over the airspace above its territory" (art. 1), which "shall be deemed to be the land areas and territorial waters adjacent thereto under the sovereignty, suzerainty, protection or mandate of such State" (art. 2).

The United Nations Convention on the Law of the Sea of 10 December 1982 (UNCLOS) applies more or less a similar description, but is more precise with regard to delimitation of the sovereignty and the airspace over the different sea areas being hereafter referred to as "territorial waters": the "territorial sea" (art. 2(2)), the "waters forming straits used for international navigation" (art. 34(1)) and the "archipelagic waters" (art. 49(2)).

Any aircraft, not engaged in scheduled international air services, shall have the right to fly across the "territorial waters" subject to the applicable regulations of that coastal state (art. 5 Chicago Convention read in conjunction with art. 2(2); 34(1) and 49(2) UNCLOS), except for reasons of safety of flight, in which case the coastal state can require aircraft "desiring to proceed over regions which are inaccessible or without adequate air navigation facilities to follow prescribed routes, or to obtain special permission for such flights" (art. 5 Chicago Convention).

However, contrary to manned aircraft, no autonomous aircraft/remotely piloted aircraft (AA/RPA) "shall be flown without a pilot over the territory of a [coastal] State without special authorization by that State and in accordance with the terms of such authorization" (art. 8 Chicago Convention). Each contracting state to the Chicago Convention "undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft" (art. 8). Therefore, any flights with AA/RPA across the Belgian or other "territorial waters" shall be controlled and shall be subject to the terms of any such authorization of the competent Civil Aviation Authority (CAA).

Military or state aircraft do not fall under the scope of the Chicago Convention: "this Convention shall be applicable only to civil aircraft, and shall not be applicable to state aircraft" (art. 3(a)). The common definition of state aircraft is the following: "[a]ircraft used in military […] services shall be deemed to be state aircraft" (art. 3(b)). However, the "contracting States undertake, when issuing regulations for their state aircraft, that they will have due regard for the safety of navigation of civil aircraft." In essence, they undertook to maintain, at exclusive national level, the competency to regulate the operations of state aircraft. Consequently, Belgian military air traffic management provided by military air navigation service providers (ANSP) during peace time is almost exclusively oriented towards safety and conform to the rules and regulations as defined in Belgian military Aeronautical information publication (AIP), Belgian air traffic management instructions, STANAGs and ICAO regulations. Notwithstanding crises or conflicts, ensuring air safety remains the main objective, by observing ICAO as well as national and NATO regulations.

Therefore, military or State aircraft shall only fly over the "territorial waters" of another coastal state on the basis of an authorization by special agreement or another mechanism (diplomatic clearance), and in accordance with the

terms and procedures thereof (art. 3(c) Chicago Convention).[9] Consequently, such special agreement shall also foresee additional requirements for any flights with military AA/RPA in accordance with article 8 of the Chicago Convention. It should not be forgotten that the coastal state is "entitled, in certain circumstances, to require civil [or military] aircraft flying above their territory to land at designated aerodromes, per article 3 bis (b) and (c) [of the Chicago Convention]. Therefore, the pilot of the RPA will have to be able to comply with instructions provided by the State, including through electronic or visual means, and have the ability to divert to the specified airport at the State's request. The requirement to respond to instructions based on such visual means may place significant requirements on certification of RPA detect and avoid (DAA) systems for international flight operations".[10]

The strict conditions being imposed to military aircraft and, in particular to AA/RPA should force national navies to anticipate the time-critical resolution for these diplomatic and administrative requirements well before any combined naval exercises or operations in the "territorial waters" of other NATO or EU member states. Standardisation of autonomous aircraft systems/remotely piloted aircraft systems (AAS/RPAS) and harmonization of the applicable airworthiness directives (AD) or regulations (AR) among the member states would be an important advantage for future interoperability, at least for the military AA/RPA and AAS/RPAS being part of the Standing NATO Maritime Group (SNMG) and Standing NATO Mine Countermeasures Group (SNMCMG). In addition, AAS/RPAS give also rise to various scenarios for consideration when the AA/RPA only, the AAS/RPAS only or both AA/RPA and AAS/RPAS are operated from a naval vessel or a shore-based control station and in the airspace over "territorial waters" or high seas other than the territory of the State of the military authority acting as the AAS/RPAS "operator",[11] which will present legal issues on responsibility, liability, diplomatic clearance, airworthiness, accident investigation, etc.

The freedom of the high seas encompasses the freedom of overflight that is imbedded in article 87(1) of the UNCLOS. In other words, states can only prohibit or restrict flights over their territory over which they have sovereignty by virtue of article 9 of the Chicago Convention, but not over the high seas, although these claims exist, e.g. in the South China Sea.[12] Any flights over the high seas, which can be in non-controlled airspace, fall under the relevant authority of the state of registry of the military AA/RPA and are regulated according to the rules in force, established under the Chicago Convention (art. 3 and 12) as well as according to the Belgian military Aeronautical information publication, Belgian air traffic management instructions and STANAGs for the Belgian AA/RPA and AAS/RPAS.

AIR TRAFFIC MANAGEMENT – AIR SAFETY

Each State "shall ensure that the level of air traffic services (ATS) and communications, navigation and surveillance, as well as the ATS procedures applicable to the airspace or aerodrome concerned, are appropriate and adequate for maintaining an acceptable level of safety in the provision of ATS".[13]

The military air traffic management is intended, for instance, to provide air traffic services in order to enable operational air traffic (OAT) to naval helicopters and AA/RPA from ships. The air traffic control (ATC) is aimed to uphold a safe, orderly and expeditious flow of traffic, which can be achieved by dividing the airspace in different

[9] See also ICAO Annex 2, Appendix 4, and Manual, p. 3-1 – 3-2, para. 3.2
[10] Manual, p. 1-5, para. 1.3.2.
[11] "Operator" means "a person, organization or enterprise engaged in or offering to engage in an aircraft operation", Manual, p. xviii.
[12] The Permanent Court of Arbitration at The Hague ruled on 12 July 2016 in the Case Nº 2013-19: The South China Sea Arbitration (The Republic of Philippines v. The People's Republic of China)
[13] Procedures for Air Navigation Services – Air Traffic Management, Doc 4444, ICAO, 2016, p. 2-1, para. 2.1.1.

areas with their own specific rules. Flight rules deal with, for example, "instrument flight rules" (IFR) / "visual flight rules" (VFR) operations,[14] right-of-way,[15] AAS/RPAS performance requirements, air traffic management procedures,[16] and flight plans. Special attention should be given to the training of the "flight operational controller" to ensure the safe integration of AA/RPA into the air traffic management system.[17]

Autonomous aircraft/remotely piloted aircraft are intended to operate in any given airspace so that IFR, VFR, "visual line-of-sight" (VLOS) and "beyond visual line-of-sight" (BVLOS)[18] apply to AA/RPA. To this end, a measure of control has to apply to them in relation to a so-called "due regard" obligation, similar to that of state aircraft.[19] The "detect and avoid" technology has "the capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action", which aims to ensure the safe execution of an AA/RPA flight and to enable full integration in all airspace classes with all airspace users.[20]

Autonomous aircraft/remotely piloted aircraft can be piloted from any approved autonomous aircraft control station (AACS) or remote pilot station (RPS). If one or more AACS/RPS collocated or spread across the globe are used for a flight, in each case, the safe and effective handover of (piloting) control from one station to another must be assured, planned and coordinated, and a handover briefing must be conducted between the transferring and receiving controllers/remote pilots.[21] The whole handover holds various legal pitfalls, especially where AAS/RPAS from different states are involved.

AIRWORTHINESS – MANNING

Each AA/RPA engaged in international navigation should be issued with a certificate of airworthiness by the state of registry. AA/RPA teams (which conduct their duties with regard to the AA/RPA) should be properly experienced, qualified, trained, and licenced in a manner consistent with ICAO Annex 1.[22]

The AAS/RPAS "operator" has also the responsibility for, inter alia, continuing airworthiness, safety and fatigue management, and the monitoring of the human performance implications for AA/RPA teams.

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[14] The remote pilot or RPAS operator must be able to assess the meteorological conditions throughout the VFR flight. In the event the RPA, on a VFR flight, encounters IMC, appropriate action must be taken. RPAS must be equipped with suitable instruments and with navigation equipment appropriate to the route to be flown in IFR. Manual, p. 14-2, paras. 14.2.7-14.2.8.

[15] The state should consider the implications of RPA operating in such proximity to other aircraft that the right of way rules would need to be applied, particularly if the RPA, due to its small size or other physical characteristics, will not be visually detectable in sufficient time to avoid unsafe proximity. Manual, p. 2-4, para. 2.3.8.

[16] Air traffic management will help mitigate the risk from these hazards (e.g. other aircraft, terrain, weather, wake turbulence, incompatible airspace activity and, when the aircraft is on the ground, surface vehicles and other obstructions on the apron and maneuvering area as well as any condition, event or circumstance that could induce an accident). Manual, p. 10-1 – 10-2, para. 10.2.

[17] Manual, p. 14-3 – 14.7, para. 14.3.

[18] When the remote pilot cannot maintain direct unaided visual contact with the autonomous aircraft/remotely piloted aircraft, the operations are considered BVLOS. The ability to detect conflicting traffic or obstacles and take appropriate action to avoid them is essential for BVLOS. Manual, p. 2-5, para. 2.3.13.

Manual, p. 1-2, para. 1.2.7.

[19] Manual, p. 1-2, para. 1.2.7.

[20] Manual, p. 10-1 – 10-12, Ch. 10.

[21] Manual, p. 2-3, para. 2.2.8 and p. 9-8 – 9-10, para. 9.6.

[22] Manual, p. 8-1 – 8-12, Ch. 8.

PRIVACY

Special attention should be given to the applicable legislation protecting the privacy of individuals and treatment of their personal data depending on the kind of operation (e.g. law enforcement or anti terrorism), the type of sensors and cameras used, and the intended use and storage of the acquired information and footage.[23] In some occasions, prior warrant shall be required from, for instance, the investigation judge or the "BIM-Commission",[24] before AAS/RPAS can be lawfully deployed, at the risk of being prosecuted.

The AAS/RPAS should be properly protected against hacking, as losing control of the AA/RPA might jeopardise the mission but also the collected confidential information. Furthermore, any information and footage gathered has to be properly secured and encrypted when being transmitted from the AA/RPA to the control station, in order to prevent or mitigate any hacking which might compromise the security and confidentiality of those data.

CONCLUSIONS

Deploying military AAS/RPAS entails much more legal issues/pitfalls than for other military aircraft, due to the different areas where they can operate and from where they can be controlled or remotely piloted and where and if the handover implies teams from different states.

Standardisation of AAS/RPAS and harmonisation of the applicable airworthiness directives or regulations among the member states enable future interoperability.

The Belgian navy has an overriding obligation as state operator to be able to operate in any given airspace, to sufficiently man and properly train the AA/RPA teams to be compliant with its due regard obligation for the safety of air navigation, whether in peacetime or wartime, or during crisis or conflict.

Notwithstanding those new legal hurdles, the Belgian navy shall have a novel set of capabilities and sensors at hand, which permits to enhance the conduct of its wide range of missions at sea.

Reageren? Réagir?: **BMT-RMB@mil.be**

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[23] See adv. N° 50/2016, adv. N° 20/2016, adv. N° 57/2015, adv. N° 32/2015, Commission for the protection of privacy.
[24] See Act 30 November 1998 on the regulation of the intelligence and security services, as amended, and art. 259 bis Criminal Code