INTEGRATING UNMANNED AIRCRAFT VEHICLES IN THE ROMANIAN NATIONAL AIRSPACE

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Abstract

The use of unmanned aerial vehicles in the Romanian civil airspace brings us back to the 1920's, when the first aircraft started to fly over the Romanian sky. Little did the legislators at that time know how to create the proper legal framework for the use of such machines so that all aspects related to their use be covered, as well as identify all potential risks and effects. Nowadays, UAVs are the new aircraft and it is a challenge for the legislators to properly identify the legal framework so that the safety and security of civil aviation are not affected. The paper will address the challenges the regulator faces in the integration of the UAVs in the Romanian civil airspace, developments and issues raised by the current regulation, as well as aspects related to the national regulations expected to enter into force at the end of 2015, beginning of 2016.

Keywords: *UAV, RPAS, unamanned, vehicles, integration.*

1. Short history of the Unmanned Aircraft Systems

The necessary technology for remote control of vehicles has been used since the nineteenth century, when the concept was first applied to torpedoes. Thus, since 1870 torpedoes began to be controlled remotely using various methods invented by John Ericsson (control of the vehicle by using pneumatic systems), John Louis Lay and Victor von Scheliha (control of the vehicle by using electrical systems).

The first technical developments towards radio control or wireless routing, as known today, have been made since 1898 when Nikola Tesla presented to the public his invention in the hope that it will be purchased by the US Army: radio-controlled torpedo.

Government representatives took in derision Tesla's project, considering it another project with no future.

However, on the other side of the Atlantic studies on the possible military applications of radio-guided systems were taken seriously. Thus, the work conducted by the pioneer in the field, Archibald Low, with regard to radio guided missiles, torpedoes and planes during the First World War pioneering work of in radio, brought him the title of "father of the radio-guided systems".

Starting with 1934, Reginald Denny, a former pilot of the Royal Air Force in World War I, opens his first store for radio controlled aircraft produced under Reginald Denny Industries (RDI). In 1940 RDI wins a contract for providing US military with target aircraft.

Returning to the fronts of the First World War, we must remember that the war of attrition that followed the German offensive of 1914-1915 was the perfect stage for the launch of "radio controlled military equipment". Some of them quite notable and very ingenious for their time: guided trolleys to target with light beams and small aircraft equipped with barometer / altimeter, and gyro mechanical counter designed to collapse on predetermine targets. These devices were designed to "deliver" cargo in the enemy trenches. Although there were many brilliant ideas at that time, Germany was the only country that succeeded in using a controlled radio device in its military actions: in 1917 the boat FL 7 was used successfully against British ships which were bombing Oostende and Zeebrugge German bases.

Again, in World War II, Germany was the only country to produce and use military equipment controlled by cable or radio controlled, as follows:

- **Goliath**: a tracked military vehicle capable of carrying a load of 50kg of explosives under enemy tanks. For the movement of the vehicle, two electric motors were initially used, replaced later by an internal combustion engine. These vehicles were used on the Eastern Front, on the beaches of Normandy and in the fight for the suppression of the uprising Warsaw ghetto. Their effectiveness was limited by low clearance, reduced speed and vulnerability to small arms;

- **V1 flying bomb**: the first operational jet missile of the German army. It could carry a 850-pound bomb and had a flight range of around 200 kilometers. The launch could be done with the aid of fixed ground bombers or directly from the bomber aircraft. Although there was a standalone version designed for kamikaze type attacks, it has not been activated again. About 10,000 flying bombs V1 type were manufactured at that time. Around 9521 bombs

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were launched over Great British, of which 2419 have reached London. Antwerp was hit by 2448 bombs V1, during October 1944 and March 1945;

- **Cruise missile V2**: first operational ballistic missile in military arsenals of states was guided by advanced gyroscopic system and powered with a diluted mixture of alcohol and liquid oxygen. To obtain liquid oxygen, two auxiliary fuels were used: hydrogen peroxide and a mixture of sodium permanganate and water. The missile had a range of 362 kilometers an explosive load of 975 kilograms and reached the target at a speed of about 4,000 km / h, that made it almost impossible to be detected by radar surveillance. Over 900 V2 type missiles were launched at the end of 1944 to targets located in Belgium (Antwerp), United Kingdom (Ipswich, Norwich), France, the Netherlands and at the end of the war, even in Germany.

- Anti ship missile FX 1400 "Fritz": flying bomb having a maximum mass of 1400 kg payload 700 kg, 4 small wings, control surfaces and radio controlled rocket motor. They were transported to the target attached by Dornier Do 217 bombers. During the war, about 2000 units were built.

Design, construction, testing and development of remotely controlled or autonomous equipment entered into obscurity after the end of World War II. However, the only one who have campaigned for further research, especially aircraft design and testing of autonomous / remote controlled systems, was the US Air Force. The ultimate goal of its research was to develop military systems, complementary to the manned military aircraft.

In this context, in 1962 the aircraft Model 147 "Lightning Bug" appeared, produced by Ryan Aeronautical products. Between 1962-1975 these aircraft were used in the airspace of countries in Southeast Asia for flying missions at low and medium altitude for activities such as: aerial photography, aircraft targeting, launch of antiradar ribbons, radar jamming, launch of propaganda materials.

Given that the use of such equipment were exclusively for military purposes, the information resulting from the completion of the various research programs in the field of autonomous and remotely controlled systems, was classified or less accessible to the public.

The first information on the use of radio controlled aerial systems for the management and adjustment of artillery shooting became public in 1982 after the end of the military conflict between Israel and Lebanon. Israel conflict sought solutions to neutralize their priority, before planning any air offensive, that being possible also given the experience of Yom Kippur (1973) when antiaircraft systems provided by the former USSR Arab allies (Egypt and Syria) have caused significant damage to the Jew military aviation,. The use of unmanned aircraft to locate the positions of Egypt and Syria's air defense systems and their subsequent destruction by conventional means (artillery attacks, air strikes, the use of special forces etc.) resulted in decrease of aircraft destroyed by soil-aircraft missiles.

Following the completion of the "Cold War" Conflicts and the use of increasingly wider "Global Positioning System", autonomous military and remote control systems were brought to the public's attention. The first use of the above mentioned equipment occurred during the first Gulf War (War of 1991 which opposed the military forces of Iraq and the US-led multinational coalition) and had the "star" subsonic cruise missiles BGM-109 Tomahawk.

Subsequently, new systems were designed and developed, some of which we mention: General Atomics RQ-1 Predator and Northrop Grumman RQ-4 Global Hawk, used in the NATO air operations in Serbia. On this occasion the two air systems have been successfully used to collect real-time information on the movements of Serb forces, air defense systems, refugee flows etc.

The beginning of the new century has seen a technological leap, new autonomous or remotely controlled systems with a smaller design-manufacturing cycle are easier to purchase and use. The terrorist attacks of September 11 and the invasion of Iraq and Afghanistan by the US military and its allies led to an explosion of robotic systems used in both civil and military activities.

Autonomous or remotely controlled systems and the importance attached to them is illustrated by the fact that, for example, the US military inventory currently includes about 12,000 robotic systems that can be used in land missions and 7,000 unmanned aircraft that can be used in armed conflicts. In addition to the US military interest in developing new military systems based on new technologies, other 44 countries are engaged in the design, testing, production and use of military unmanned aerial systems on board.

2. International and regional context

The evolution of technology is more rapid than the ability of the rule-maker. Always ahead with at least one step, technology does not cease to amaze us and to challenge our minds so that ways and means are identified so that activities undertaken are conducted in a safe manner.

UAVs today are one of the most intriguing challenges aviation deals with currently, especially from the legal perspective. We are living history by creating the legal framework for the proper integration of remotely piloted aircraft systems into civil airspace. Even though the year is 2015, we are back at the beginning of the 1900 when the aviation legal framework was barely developing and legislators little did they know about all potential risks and situations that needed to be covered from

the rulemaking point of view so that activities were conducted in a safe and secure manner.

The use of UAVs in the civil airspace definitely brings a wide series of benefits. From photogrammetry to search and rescue activities, UAVs are useful systems that assure rapid and efficient solutions for various necessities.

However, their interference is not lacking risks and the civil society is exposed to accidents and violent actions. There were several incidents reported to date, most of them resulted in little or no harm: BBC 2011 in the UK; Mortimer 2012 in New Zealand, LL 2013 in Australia etc.). Some of them on the other hand resulted in death such as the crash-landing of a drone in Congo in 2006[1] and another death from an accident caused by a pilot error and loss of GPS data-feed in Korea in 2012[2].

According to Brownsword, it is of extreme importance to analyze the regulatory connection when it comes to developing a legal framework in a certain context while accommodating new forms of activities.[3] This means that the current legal framework needs to be constantly reconnected to the evolution of technology. In the process of achieving such balance, the analysis of some elements could benefit the course of development:

- new rules to deal with the new situation;
- dealing with the uncertainty of how to handle new activities and how to regulate them;
- identification of potential hazards;
- in which category does the new activity fit, how should it be defined; make sure there is no conflict of laws;
- is it cost-effective;
- does it allow for the activity to develop in a safe and secure manner for civil aviation.

After thorough consideration over these aspects, the characteristics of a solid legal framework should be: oversight (monitoring activities of the regulated acts), enforceability (regulated activities are subject to enforcement), enforcement (the agency with enforcement powers has appropriate resources and uses them), review (constantly reviewed so that it corresponds with the envisaged aims).

On all three layers of regulatory systems, international, regional and national, legislators are in the process of analyzing the elements that lead to a strong legal system that will permit the accommodation of UAVs in the civil airspace.

2.1. Legal framework and future perspectives at international level – ICAO

The International Civil Aviation Organization (ICAO) is a UN specialized agency having its headquarters in Montreal, Canada. ICAO is the organization that sets out the context for regulation[4] in its Member States. Through the publication of standards and recommended practices (SARPs), ICAO seeks the harmonization of aviation legal regimes around the world by promoting the safe and orderly development of international civil aviation.[5] Member States, according to the Chicago Convention[6], may apply different rules from the ones established by SARPs, but doing so, they are required to notify ICAO with regard to such rules that are different from the standards. Failing to notify ICAO, it is presumed that the Member States complies with the SARPs. Thus being said, unless otherwise, States are obliged to comply with the standards and recommended practices developed and adopted by ICAO.

Until now, the organization has been mainly preoccupied with regulating activities in which piloted civilian aircraft are involved. Generally, it covered issues related to aircraft of a given size and operating above a given height and in sectors adjacent to airports. The attention was concentrated on flights that would cross borders and on issues of safety and security raised by such flights.

The scenario more or less involves the following elements:

a. Control – exercised through air navigation service providers, controllers (one or a team) that have responsibility for the design of airspace, have authority over pilots within determined airspace, have a system of communication with the pilot and benefit of sufficient capacity to properly accommodate all aircraft that are present at the same time in that given airspace and last but not least, that have a significant contribution to the conduct of flight activities in a safe manner.

b. Pilot – is on board the aircraft and has ultimate responsibility for the safety and security of the airplane, is in contact with the controller and follows its instructions, is able to analyze the situations and decide accordingly.

On the other hand, the use of UAVs represents a challenge from both pilot and controller perspective, as well as national authorities. First of all, the pilot is not on board aircraft but operates the UAV remotely from a station. This situation decreases the pilots appreciation of the aircrafts surroundings and also weakens the communication

[1] La Franchi P. (2006) "Kinshasa UAV accident highlights need for standards development", Flight Global, 9 October 2009.
[2] Marks P. (2012) "GPS loss kicked off fatal drone crash", New Scientist, 18 May 2012.
[3] Brownsword R. (2008) "Rights, Regulation and the Technological Revolution", Oxford University Press, 2008.
[4] Roger Clarke and Lyria Bennett Moses, "The Regulation of Civilian Drones' Impact on Public Safety", Computer Law and Security Review, 2014, pag. 279 [Roger&Moses].
[5] Idem.
[6] Convention on International Civil Aviation, signed at Chicago on 7 December 1944, art. 38.

channel with the controller and has an impact on the way the aircraft behaves. UAVs are smaller than regular aircrafts thus increasing the potential of not identifying properly or timely. Hence, the potential of a collision between a UAV and an aircraft is increased, as well as the possibility of a technical congestion threatening data quality and risk information[7] in the air navigation services field.

According to the Chicago Convention, the regulation of UAVs is left to national laws.[8] It was not until recently that words such as pilotless aircrafts, UAVs, unmanned aircraft started to be used in the ICAO terminology and SARPs. The absence of specific UAV related rules at international level is most probably due to the activities limited to civilian aircraft with a pilot on board.

In 2007, ICAO established the Unmanned Aircraft System Study Group (UASSC) which brought together experts from Member States, stakeholder groups and industry. The Group developed the Unmanned Aircraft System (UAS) Circular 328, published in 2011 which provided an initial step toward the elaboration of an international regulatory framework for RPAS. The Circular is superseded by the Manual on Remotely Piloted Aircraft Systems produced by the study group, now replaced by the ICAO RPAS Panel.

The Manual shows how the existing regulatory framework that was developed for aircraft with pilots on board applies to unmanned aircraft. It gives insight into the changes that will take place in the RPAS domain. It also offers an outline of the ICAO SARPs to be developed on the subject. The Manual is a useful tool for states, industry, service providers and other stakeholders on what the regulatory framework dedicated to UAVs should comprise.[9]

It is expected that standards and recommended practices for air traffic management to be developed by 2020. The process of developing standards and guidance material in the field is only at its beginning and it is expected to continue for 10+ years.

Apart from the development of new SARPs, ICAO has amended 3 of its 19 Annexes to the Chicago Convention in order to accommodate RPAS. Annexes 2 – Rules of the Air, Annex 7 – Aircraft Nationality and Registration Marks and Annex 13 – Aircraft Accident and Incident Investigation have been revised. Throughout the novelties of these amendments we mention:

a. A remotely piloted aircraft system (RPAS) engaged in international air navigation shall not be operated without appropriate authorization from the State from which the take-off of the remotely piloted aircraft (RPA) is made.

b. RPAS shall meet the performance and equipment carriage requirements for the specific airspace in which the flight is to operate.

c. An RPAS shall be approved.

d. An operator shall have an RPAS operator certificate.

e. Remote pilot shall be licensed.

As it can be observed, the international legal framework for UAVs is currently incomplete and immature. Throughout the sections of this paper, regional regime will be analyzed as well as national regulations on order to establish the current modalities and conditions a=in which UAVs can be used.

2.2. Legal framework and future perspectives at regional level

At European level, UAVs utilization is subject to national laws of the States. For these reasons, the European Commission desires a basic regulatory framework in the field by the end of 2015.

Taking a look at the current legal regimes, it can be observed for example that in France, flights over Paris without approval from aviation authorities are illegal and there were incidents reported where UAVs flown over objectives such as the Eiffel Tower or the US Embassy in Paris triggered alarms. In Germany, UAVs must weight no more than 25 kg, while in UK, UAVs above 20 kg are subject to the same regulations as manned aircraft.

For these reasons, the European Commission underlines the necessity of having a harmonized legal framework in the field of unmanned aircraft systems. In this sense, the European Aviation Safety Agency (EASA), the responsible institution for the civil aviation safety in EU, is to develop the specific regulations for UAVs and in particular for RPAS when used in civil application and with an operating mass of 150 kg or more.[10]

Agency is supporting the European Commission to progress the „roadmap" presented by the European RPAS Steering Group (ERSG) on 20 June 2013 and covering the development and integration into non-segregated airspace of civil RPAS in the next 15 years. The roadmap is articulated in three pillars: research and development; safety regulation and technical standardisation; and complementary measures including privacy and data protection, insurance and liability.[11]

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[7] Roger&Moses pag. 280.

[8] Chicago Convention, art. 8 – "No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State 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."

[9] Leslie Cary, ICAO RPAS programme manager, RPAS Panel Secretary, declaration on the release of the Manual on Remotely Piloted Aircraft Systems.

[10] EASA website – www.easa.europa.eu/unmanned-aircrfat -systems-uas-and-remotely-piloted-aircraft-systems-rpas

[11] Idem.

EASA is also a member of the Joint Authorities for Rulemaking on Unmanned Systems (JARUS), a group open for civil national aviation authorities and regional organisations active in the field of aviation safety regulation. The group is not limited to European countries an organisations. The focus of EASA in this group is on developing recommended requirements for:

- Licensing of remote pilots;
- RPAS operations in Visual Line-of-Sight (VLOS) and beyond (BVLOS);
- Civil RPAS operators and Approved Training Organisations for remote pilots (JARUS-ORG);
- Certification specifications for light unmanned rotorcraft (CS-LURS) and aeroplanes (CS-LURS) below 600 Kg;
- Performance requirements for 'detect and avoid' to maintain the risk of mid-aid collision below a tolerable level of safety (TLS) and taking into account all actors in the total aviation system;
- Performance requirements for command and control data link, whether in direct radio line-of-sight (RLOS) or beyond (BRLOS) and in the latter case supported by a Communication Service Provider (COM SP);
- Safety objectives for airworthiness of RPAS ('1309') to minimize the risk of injuries to people on the ground; and
- Processes for airworthiness.

Recently, EASA released its proposal for a UAV regulation. EASA envisages the creation of three categories of civil drones in order to proper regulate unamnned aerial vehicles used nowadays in activities such as filming, farming, parcel deliveries etc. The aim of the regulation is to promote technological development and at the same time to protect people and goods.[12]

Under the rules suggested by EASA, the lower risk category would cover cover low-energy aircrfat, including model planes and would not require any license. These type of UAVs shall be flown line of sight and away from corwded ares, airports or nature reserves.

In the case where operations of UAVs presume more contact with people or share airspace with other aircrafts, then it would be required that a risk assessment and mitigation to be carried out before the use of the UAV and that permission for use is granted by the competent authority.

The last of three categories envisaged by EASA would make the object of the current regulations for manned aircraft, requiering certain certifications to be obtained before the begining of operations.

There are still certain aspects that such a legal framework will not cover and that pose a serious threat towards private life especially. The use of UAVs raises concerns with regard to intrusion of drones in the private life of persons and in collecting data. They present a threat from the perspective of the illegal use of such aircraft for unlawful interference acts. Another issue raised by the use of UAVs is the liability regime. These aspects are to be dealt by states at national level.

The first draft of the regulation is expected to be presented by December 2015.

3. Legal requirements for UAV operation in Romania

The Romanian legal framework in the field of unmanned aircraft systems is yet to be developed. Until the finalization of the regulation dedicated to remotely piloted aircraft systems, the general legal framework applies, that is the Civil Air Code, Government Decision no. 912/2010 for the approval of the procedure to authorize flights within the national airspace and of the conditions in which takeoff and landing procedures can be undertaken of surfaces of land or water, other than certified aerodromes and Order of the Ministry of Transport no. 8/2014 establishing the condition under which UAVs can be operated in the national airspace.

3.1. The Civil Air Code

Amended at the end of 2014 so that it can properly accommodate UAVs and determine the general conditions under which drones can be operated, the Civil Air Code still has a long way to go, being under a new process of revision.

The recent changes of the Code envisage aspects related to the definition of the drones, the establishment of conditions to be fulfilled by the personnel operating such aircraft and specific sanctions for lack of fulfillment of the enshrined obligations.

Resuming the changes brought to the Civil Air Code it can be observed that art. 3, point 3.8 defines "state aircraft" as those aircraft belonging to state institutions and used for activities in fields such as defense, public order, national security and customs. Article 3 is completed by the definition of "unmanned aircraft", in point 3.8^1 as those aircraft piloted by an automated pilot on board the aircraft, by remote from a remote station on the ground or by another aircraft with a human aircrew on board. The definition is quite broad, trying to cover all possible situations in which an UAV can be activated. However, the definition will have to be adjusted accordingly or removed from the Code once the European Regulation in the specific field enters into force.

Furthermore, the code identifies an obligation for the person in command of the unmanned aircraft to have along the registration certificate for the entire period of the operation of the aircraft. The pilot of an unmanned aircraft is considered to be

[12] Reuters News – EASA Sets Out Drone Proposal for Europe -http://news.airwise.com/story/view/1426206846.html

aircrew and is subject to proper training and licensing.

By analogy with the powers of the captain in command for manned aircraft, the pilot of an unmanned aircraft has full command and responsibility for the aircraft during its operation and is obliged to take all necessary measures to assure that the operation is conducted in a safe manner for both the aircraft and flight.

In terms of applicable sanctions, in case the pilot in command of the unmanned aircraft refuses to present to the empowered persons, the requested documents, especially those which are mandatory to have when operating such an aircraft, are subject to fines.

It can be observed that the Civil Air Code establishes the general principles for the operation of UAVs. However, there are no specific provision related to the illegal use of drones, applicable sanctions as well as means and methods to identify persons using drones in activities without having fulfilled the requested obligations, that is to say, a proper instrument to control abuse. There need to be stringent, clear and easily accessible guidelines about how and when drones can be deployed.

In developing such regulation, there are several principles that need to be followed in order to have fruitful provisions. These principles are a must when it comes to achieving public safety. First, a proper Evaluation of the context, situation and implication needs to be conducted. After the evaluation has taken place, the second step is to develop the draft regulation and submit it for Consultation with the interested stakeholders. The process needs to be Transparent so that its main objectives are achieved. Justification for the form and content of the provision is also needed in order to allow the user to properly understand the intentions of the legislator. Last but not least, oversight is required for the users of the regulation to establish the level of implementation, necessary measures to be taken if the obligations are not fulfilled accordingly, as well as a good source of information for improvement of the regulation.

In the specific context of UAVs, three principles need to be applied to the design of drones as well, which are proportionality, mitigation and controls. The application of such a framework, combined with risk assessment techniques, is likely to identify various segments of national airspace in which congestion occurs and the conclusion might lead to the necessity of some form of air traffic control and that rules need to be developed for three dimensional space rather than two.[13]

3.2. Government Decision no. 912/2010

Government Decision no. 912/2010 establishes the conditions and related procedures for authorization of flights in the national airspace, as well as the conditions to be fulfilled for taking off or landing from a surface (land/water), other than certified airports.

According to the above mentioned decision, flights over Bucharest at a height of less than 3.000 meters can only performed if there is an overflight authorization form the Ministry of Defense. Thus, it can be observed that, in the absence of such an authorization, flight over Bucharest is forbidden. Furthermore, UAVs may take off or land from surfaces other than certified aerodromes if the surface is located outside the city/village and the operator obtained the authorization of the mayor of that city/village for such an operation. If the surface is considered to be public domain, than, the operator needs to have an authorization from the owner of the land. In any situation, the land needs to have the proper characteristics to be used for taking off and landing activities.

The Decision forbids the operation of lights over crowded areas of the flight is conducted at a level lower than 300 meters.

Another restriction imposed by the Decision is related to the type of activities undertaken by the operator, photography been strictly restricted and in certain cases forbidden by law.

The Decision, useful and appropriate for activities in which manned aircraft are involved, but less friendly for the unmanned systems. UAVs are used for activities such as photography and their flight autonomy is quite restricted, meaning that for most of the drones used in such type of activity is near impossible to take off from a surface outside the city. The Decision is in the process of being amended, however, the process is slowed down by negotiations with the Ministry of Defense, trying to adjust the requirements in order to bring any prejudice to national security and public safety.

3.3. Order of the Ministry of Transport no. 8/2014

Order no. 8/2014 is the only regulation in the national legislation dedicated to the use of unmanned aircraft systems.

The above mentioned order allows the operation of UAVs only in temporary segregated areas, established according to the specific national regulation. By temporary segregated area it can be understood - a defined volume of airspace normally under the jurisdiction of one aviation authority and temporarily segregated, by common agreement, for the exclusive use by another aviation authority and

[13] Roger&Moses pag. 285.

through which other traffic will not be allowed to transit.[14]

In the circumstances of the above definition of temporary segregated area, UAVs can only be used by authorities in airspaces under the jurisdiction of another authority. That being said, private owners of UAVs are not allowed to conduct any kind of activities. For these reasons it is proposed that the wording of the Order to be changed, in the sense that temporary segregated are to be replaced with "restricted area"- defined as - airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions, which better serves the objectives of the Order.

Order no. 8/2014 sets a limit for its applicability to UAVs with a maximum take off mass of no more than 150 kg. It is also proposed the analysis of the amendment of the maximum take off in order to better cover a larger scale of drone models.

It is also essential for Order no. 8 to make a specific distinction between drones and toys with characteristics similar to UAVs.

The Order is currently in the process of being amended.

4. Integrating UAVs in the Romanian national airspace

A sustainable development of unmanned aircraft domain is subject to the fulfillment of the following conditions:

1. **public acceptance**: changing the current perception created after the intense "advertisment" of the success missions in Yemen, Afghanistan and Iraq, after which drones have come to be regarded by most people as "killing machines";

2. **integration in controlled airspace**: as was the case for the " classic aviation ",the use of these aircraft will be economically efficient only when they will be operated in the airspace in its entirety, without the need to allocate special areas.

For the first condition to be fulfilled, organizations and civil aviation bodies, as well as manufacturers make efforts in order to raise societies awareness of the benefits of new technologies. Filming and aerial photography, monitoring of critical infrastructure elements, monitoring of forests and agricultural crops, search and rescue activities (for people that were involved in accidents for example, or for missing persons), assessing the damage caused by natural disasters or appropriate treatments against pests in orchards and vineyards are just some of the activities successfully conducted with the new type of aircraft.

In order to fulfill the second condition, integration of UAVs in controlled airspace, constitutes the real challenge. For the purpose of illustration of the multitude of legislative and technical problems that need to be solved, we mention here two of them which pose the highest level of risk:

i. ensuring a level of security comparable to that of activities involving "classic" aircraft;

ii. identifing technical solutions enabling operators on ground to keep the aircraft on its intended and indentified flight path and to timely determin the possible "route conflicts" with other aircraft.

Addressing both problems mentioned above will have a major impact on the current legal framework requiering review and massive update. By terms of comparison, it can be affirmed that UAVs have generated a revolution in human society similar to that generated by the emergence and proliferation of the Internet at global level.

In terms of the amendments we consider necessary, we apreciate in firts instance that it s essential to establish requirements for the issuance and maintenance of pilot licenses. Given that the pilot can no longer experience danger himself and that the actual piloting of UAVs can be compared to a video game, initial and recurrent psychological testing of pilots is a crucial stage of the licensing process. Another legislative issue regards the management and security of personal data. Considering the technical possibilities (flight duration of tens of hours, maximum flight range of hundreds or thousands of miles, possibility to access prohibited areas or restricted areas due to its small size) personal privacy issues are the most difficult to manage.

From a technical standpoint, liaising radio and maintining the integrity of the connection, writing and updating the lines of code related to the software installed on the on-board computers and the establishment and verification of autonomous flight procedures, are other critical elements of the integration of UAVs in the restricted airspace.

For civil aviation bodies and organs these aspects are of serious concern,not only because of the rapid development of technology and the urgent need for intergration, but also because there is a huge amount of pressure from the various players: producers, users, civil society etc.

It is importnat that we mention here the Declaration of the Conference organized in Riga by the European Commission in partnership with the Ministry of Transportation of Latvia on 5-6 March 2015 in order to have a complete picture of how humanity has treated and continues to approach various stages of its development: the emergence and development of the rail (remember that members of the British Academy of Sciences stressed that

[14] EUROCONTROL (2010) EUROCONTROL Guidelines, The ASM Handbook, Airspace Management Handbook for Application of the Concept of the Flexible Use of Airspace, Ed. 3.0

speeding 40km / h will result in sufocating passengers in cars) or the emergence and development of air transport (same members of the British Academy mocked the studies regarding the design and construction of aircraft heavier than air). We find ourselves today in the same specific situation, where technology runs faster than law, where some activties are hard to be perceived and understood by international society and where we need to adapt and learn how to fruitfully use the resources to our benefit. As in many other situations, new technologies invented and developed by mankind, in this specific context, the UAVs, have a dual use: civil and military. It is our choice as an individual and human race how we perceive these technologies and put them in use to our benefit. T We must be aware that the future is here and can no longer be ignored.

The situation of design, manufacture and use of UAVs in the national airspace is no different from what is happening globally. If until January 2014 the UAVs were virtually unknown to civil aviation bodies in Romania, some aspects regarding the security of state officials and flights safety generated the revision of the national legislation and the neccessity to develop a new regulation dedicated to the use of UAVs with a maximum mass of 20 kg. According to the new law, which was approvedin 2014, national aviation authorities have the obligation to develop and approve a legislative package dedicated to UAVs that will contain the following aspects:

- Conditions for approval of air operators using UAVs in aerial work activities and general aviation;
- Requirements for the licensing of UAV operators;
- Requirements for registration / identification of UAVs;
- Requirements for the issuence of airworthiness documents (national flight permit or airworthiness certificate).

It is planned that by July 2015, the new legislative package to be posted on the website of the Ministry of Transport for public consultation.

The purpose of developing and promoting this new legislative package is to allow the safe operation of UAVs in the national airspace, to ensure the safety and security of all airspace users as well as a smooth transition to future European legislative framework, expected to be applicable for the UAV operation in controlled airspace starting with 2028.

5. Conclusions

Under the current national, regional and international regulatory frameworks, drones are subject to a limited regime which is neither effective, from both the point of view of the user as well as the authorities, nor is it enforced. The aims of the regulatory process and expected outcomes seems not to have been cearly expressed. The discussions and attempts conducted up to this point do not present the required level of transparency , hence, there is clear doubt that emerging regulations will properly reflect the interests and needs of stakeholders.

So far, the eductaional process is poor and for these reasons, manufacturers, retailers and commercial users are not aware of the implications and of their obligation to conduct risk assessment, devise and implement appropriate safeguards and establish certain arrangements, including liability insurance.[15]

The analysis presented in this paper give rise to certain concerns and concluds that the framework is not strong and clear enough for fully autonomous aircarft operations as long as the development of regulations is left to the national regimes.

It is of great importance that international and regioanl organizations reach a conclusion sooner and establish a harmonized procedure and requierements for UAV operation. Until then, it is obvious that a considerable risk exists of harm arising from UAV usage.

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