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REGULAR PAPER

Legal Regulation of the Use of Unmanned Aircraft Vehicles in the Russian Federation

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Abstract
The subject of this article is the issue of the legal regulation of civil unmanned aircraft vehicles (UAVs) in the Russian Federation (RF). Currently, there is an active discussion in the RF and, as a result, the adoption of regulations to manage issues related to the use of UAVs. This article deals with the definition of the concept of an unmanned aircraft, and the gradation of UAVs and their legal regulation depending on the assignment to particular categories, such as military or civil groups, weight class, etc. State accounting and state registration of UAVs issues are scrutinized in this article, as well as the organization of flights. The article also presents comparisons with the legislation of other countries, primarily Poland, as a member of the European Union, as well as the USA, Australia. In addition, the article contains regulations that are not currently being enforced, but will be in the near future and the themes of legislation that will be the subject of consideration among business community representatives, and the state regulator for the subsequent introduction of draft laws up for deliberation. Thus, the article is not only an analysis of the current legislation, but also an exploration of the trends on the issue of upcoming UAV regulations in the RF. This will be of interest to UAV owners and to lawyers to analyze the matter of using UAVs under Russian law.

Keywords Unmanned aircraft vehicles (UAVs) · Aviation · Use of airspace · Conducting flights · Law

1 Introduction

Despite the fact that unmanned aircraft vehicles (UAVs) appeared several decades ago, we can say that the issues of their legal regulation in the world has been dealt with over the last 15 years. The starting point can be considered the holding of the first introductory meeting of ICAO on UAVs [1]. Russia is no exception in this regard. Active regulation of the sphere of unmanned aviation in the Russian Federation began 5 years ago with the approval of [2]. The specified "Roadmap" is a list of the main issues that must be resolved through the adoption of a document (regulatory legal act, standard) indicating the deadline for the implementation of the event, and the person responsible for the implementation of the event.

The main problem of the development of the unmanned aviation market was the lack of the possibility of legal commercial use of UAVs, due to the absence of procedures regulating the actions of persons operating unmanned aircraft systems and their elements, which must be carried out to fulfill the obligation to comply with the requirements of the legislation of the RF. It is precisely to solve this problem that the Russian unmanned aviation community has had in their sights for the last few years.

This article will use the documents obtained of the results of the working group of the National Technological Initiative at the direction of Aeronet, which implements the activities of the Roadmap in terms of regulating air legislation in the field of UAVs.

2 Relevance

The market of services with the use of UAVs has a great potential for development. It is expected that in 2025 the market size will be over 42.8 billion dollars [3]. According to experts, the Russian potential for the use of drones is more than $ 1 billion a year. Today, Russia's share in the world market is 2%. Unmanned aircraft vehicles are

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used in the following sectors of economy: energy, construction, transport and agriculture. Depending on the size and design, certain types of UAVs are used. So, UAVs with a maximum take-off weight of 30 kg and above are mainly used in the military. Civilian application of such sized unmanned aircraft vehicles includes monitoring and aerial photography of extended engineering objects such as pipelines and power lines. Since solutions based on small-sized unmanned aircraft vehicles (UAVs) are not effective due to their low productivity and the lack of the possibility of using several aircraft photography tools [4]. UAVs with a maximum take-off weight of up to 30 kg are also used for aerial photography, cargo delivery, as well as for private and amateur applications.

The industry is facing new challenges and regulatory obstacles for the commerce and industrial sectors. Currently there are either no regulations for unmanned aviation, or manned aircraft laws are applied, which may not always apply to UAVs. Only 30% of currently existing regulations in the field of aviation safety are fully applicable to unmanned aircraft, that 54% are partially applicable once necessary changes have been made, and that 16% are not applicable at all [5]. Of course, the development of unmanned aviation will lead to an increase in the scope of its use in the future and, accordingly, the need for operators to know the legal regulation of the use of UAVs, because one of the main problems that need to be solved in order for Russian companies to intensively develop the field of unmanned aircraft systems, develop the domestic market and enter the international market is a low legal culture and poor awareness of the owners of unmanned civil aircraft about the rules of preparation and execution of flights, as well as the rules for the use of airspace [6].

3 The Definition of an Unmanned Aircraft Vehicle and the Definition of Other Terms Used in the Legislation on Unmanned Aircraft Vehicles

The legislative definition of an unmanned aircraft vehicle is contained in the Air Code of the Russian Federation. Given that it is defined through the concept of "aircraft", the term "aircraft" should first be defined.

An aircraft is a vehicle maintained in the atmosphere by interacting with air, other than interacting with air reflected from the surface of the earth or water [7].

An unmanned aircraft vehicle (UAV) is an aircraft operated, controlled in flight by a pilot who is outside of such an aircraft (an external pilot) [7].

Interestingly in the previous edition of the code, the UAV was understood as an aircraft only operated, but not controlled in flight by the pilot. In my opinion, this was done in connection with the development of the use of more autonomous UAVs.

In addition, the Air Code of the Russian Federation, as well as other acts, use the term Unmanned Aircraft System (UAS), which means a complex of interrelated elements, including one or more unmanned aircraft, take-off and landing facilities, flight controls for one or more unmanned aircraft vehicles and flight control for one or more unmanned aircraft vehicles [8].

Operator is the next concept that is often used in regulatory acts. It is defined as a citizen or a legal entity that has the ownership rights to an aircraft, on lease terms or on another legal basis, using the specified aircraft for flights and having an operator's certificate (certificate) [9].

When determining the requirements for the operation of the UAV, the purpose of its use is important, in particular, whether the operator performs aviation works. Therefore, it is necessary to define aviation works, which, according to [10], are works performed using civil aircraft flights in agriculture, construction, environmental protection, medical care and other purposes, the list of which is established by the authorized body in the field of civil aviation. In particular, in [11] aviation works include (here are the most common):

Aviation and chemical works (protection of plants from pests, diseases and weeds; extinguishing fires of forests, pastures);
Aircraft surveys (aircraft photography);
Search and rescue operations;
Aerovisual flights (aerial surveillance; aerial patrolling: pipelines, power lines).

3.1 Types of Aviation

Aviation is divided into civil, state and experimental [12].

Experimental aviation is used for carrying out development, experimental, scientific research, as well as testing of aviation and other equipment [13].

State aviation is used to solve problems in the field of defense of the Russian Federation, the protection of public order, ensuring public safety and combating crime, protecting the population and territories from natural and man-made emergencies and other tasks [14].

Aviation used to meet the needs of citizens and the economy belongs to civil aviation [15].

Within the framework of this article, the issue of legal regulation of the UAVs of civil aviation is considered. State regulation of activities in the field of civil aviation is carried out by the Ministry of Transport of the Russian Federation.

After defining the terms, let's move on to the question of the requirements imposed on the UAV.

The maximum take-off weight of the UAV is important for determining the features of the legal regime [16]:

1) from 30 kg and more—UAVs are subject to state accounting.
2) from 250 g to 30 kg—UAVs are subject to state registration;
3) up to 250 g—UAVs are not subject to state registration or accounting.

4 State Accounting and State Registration of Unmanned Aircraft Vehicle

An UAV by its nature provides its pilot with anonymity. This poses multiple issues where a drone can be used for illegal purposes. States increasingly demand mandatory registration requirements, in part, to ensure accountability [17]. Registration generally involves registering a drone through an official record which enables the owner to be identified, in particular: China, the United States of America [18]. The United States requires all small UAVs to be registered. For example, in China since 2017 all civil UAVs weighing more than 250 g must be registered under real names to improve civil aviation safety.

Other jurisdictions have less onerous registration regimes. The approach is either no registration at all or only registration only for certain types of UAVs. Australia only requires UAVs weighing over 150 kg to be registered.

4.1 State Accounting of Unmanned Aircraft Vehicle (Unmanned Aircraft Vehicle Registration Under 30 kg)

First, let's consider the issue of state accounting.

The procedure for state accounting UAVs is determined by [19] (hereinafter—the State Accounting Rules). UAVs imported into the Russian Federation or manufactured in the Russian Federation are subject to accounting. UAVs temporarily imported by foreign citizens into the Russian Federation for aircraft model do not have to go through accounting.

The state accounting of the UAV is carried out by the Federal Air Transport Agency (Rosaviation), on the basis of [20] (hereinafter—the Administrative Regulations on State Accounting).

The application for accounting of the UAV is submitted by the owner of the UAV to the Federal Air Transport Agency within 10 working days from the date of purchase on the territory of the Russian Federation or import into the Russian Federation, and in the case of self-manufacture of the UAV—before its use for flights in airspace.

The list of required information and documents is defined in [21, 22].

To accounting the UAV on the state accounting, the applicant must provide:

a) a statement in which information about the UAV and its technical characteristics should be indicated (type of UAV, serial (identification) number of UAV; number of engines installed on the UAV and their type; maximum take-off weight of the UAV; information about the manufacturer of the UAV; information about the owner of the UAV)
b) a photo of the UAV.

If the application is approved, the information is entered into the database, and a registration number is created. The registration number of the UAV is to be applied to the elements of the UAV design before the start of its flights. The applicant receives a notification of the state accounting of the UAV.

The removal of an unmanned aircraft from the register is carried out in case of destruction of the UAV or at the request of the owner of the UAV (in case of its loss / theft).

Accounting of the UAV, making changes to the UAV account, de-accounting of the UAV is carried out by the Federal Air Transport Agency within no more than ten working days from the date of receipt of the relevant application.

4.2 State Registration of Unmanned Aircraft Vehicle (Unmanned Aircraft Vehicle Registration Over 30 kg)

Next, we turn to the issue of considering the procedure for state registration of UAVs.

According to [23], unmanned aircraft, with the exception of unmanned civilian aircraft with a maximum take-off weight of 30 kg or less, are subject to registration with the Russian Federation Civil Aircraft State Register.

The State Register of Civil Aircraft of the Russian Federation UAV Registration (hereinafter—the State Register) is carried out by the Federal Air Transport Agency (Rosaviation), on the basis of [24] (hereinafter—the Administrative Regulations on Registration). State Register entries centralize information about civil aircraft in state bodies, which greatly facilitates control of UAVs technical operation and condition.

The owner of the UAV or his representative submits the application to the Russian Federation Civil Aircraft State Register.

The list of required information and documents is defined in [25].

For the state registration of the UAV, the applicant must provide:

a) a statement in which information about the UAV and its technical characteristics should be indicated (type of UAV, serial (identification) number of UAV; date of manufacture; manufacturer's name; maximum take-off

weight of UAV; type and number of installed engines; engine power; information about the owner of the UAV);
b) documents confirming the ownership of the UAV;
c) a document confirming the exclusion from the register of civil aircraft of a foreign state, or an export certificate of airworthiness.

If the application is approved, information about the UAV is entered into the State Register and state and registration identification marks are assigned. The applicant receives a certificate of state registration of the aircraft.

The Federal Air Transport Agency registers, modifies and excludes state register applications within no more than ten working days from the date of receipt of the relevant application.

It should be said that the acts specified in this section [24, 26] are the result of the implementation of the measures provided for by the Roadmap indicated in the introduction to this article.

4.3 Insurance

Ref. [27] provides for mandatory liability insurance of the owner of the aircraft to third parties. In addition, mandatory types of insurance include:

- liability insurance to the cargo owner or shipper for loss, shortage or damage of the cargo [28];
- liability insurance for damages that may have been caused by aviation operations by operators [29].

The minimum amount of the insured sum is established in the amount of at least two minimum wages for each kilogram of cargo (for cargo insurance) or for each kilogram of the maximum take-off weight of the aircraft (in other cases). At the moment, the minimum wage used to calculate the sum insured is 100 rubles.

An analysis of the regulations concerning the insurance of operations related to the use of unmanned aerial vehicles shows a variety of solutions in different countries. According to [30] liability insurance for UAV operators with drones weighing less than 20 kg is voluntary. However most of EASA Member States mandate a third party insurance also if you are operating a lighter drone. For example, in Poland. owners of unmanned aerial vehicles are required to purchase civil liability insurance with an insurance amount of 3000 SDRs. This applies to unmanned aerial vehicles weighing from 5 to 20 kg. However, there are exceptions, depending on the purpose of use and the weight of the drone. The operator may not purchase civil liability insurance if the weight of the drone does not exceed 5 kg and is used only for sports or entertainment purposes [31].

4.4 Crew

The UAV crew consists of one or more external pilots, one of whom the owner of the UAV appoints as the commander of the aircraft. At the same time, according to [32], a UAV commander with a maximum weight of more than 30 kg must have an external pilot's certificate, as well as have the training and experience to independently control a certain type of UAV.

Requirements for aviation personnel are defined in [33], as well as in [34].

The certificate of an external pilot is issued by the Federal Air Transport Agency. Currently there is also a reasonable opinion in the business community to require an external pilot's certificate (or other similar document) for a UAV which has a take-off weight of less than 30 kg.

4.5 Operator's Certificate

A UAV operator's certificate is also required to pilot a UAV. Requirements for persons planning to obtain an operator's certificate, as well as the procedure for obtaining it, are defined in [35]. The procedure for suspending, putting restrictions into effect and revoking the operator's certificate approved by [36]. In particular, in order to obtain an operator's certificate, it is necessary to provide the documents specified in the article earlier, such as, a notice of registration of a UAV or a certificate of state registration of a UAV, a certificate of airworthiness, insurance policies and other documents.

In addition, on March 01, 2022, the requirement came into force, according to which an operator performing aviation work on a UAV, including with a maximum take-off weight of 30 kg or less, must hire or engage persons who have been trained (trained) under training programs approved by the Federal Air Transport Agency to perform work under a civil contract.

4.6 Airworthiness Certificate

Flight safety regulations for civil aircraft operations are very important. The most common approach is to require only larger drones to be certified. For example, in Australia, UAVs weighing more than 150 kg require of an airworthiness certificate to qualify for operation [17].

In Russia UAVs of 30 kg or more are allowed to operate with an airworthiness certificate.

Federal Aviation Regulations determine the airworthiness certificate.

This article will not dwell in detail on how to obtain an airworthiness certificate and other documents. It is only necessary to indicate that the following chain is valid: the certificate of airworthiness is issued on the basis of a type

certificate; a type certificate is issued based on the results of certification.

Mandatory certification is completed with the issuance of a type certificate if, during certification, it is established that civil aircraft, aircraft engines and propellers of a new type, unmanned aircraft systems and (or) their elements meet the requirements for airworthiness and environmental protection and the design of civil aircraft, aircraft engines and propellers of a new type is recognized as standard.

From September 01, 2022 Russian Federation Air Code amendments came into force for the above-mentioned aircraft. UAS and their elements will have to meet the requirements of the "certification basis", which means a set of requirements necessary to ensure the safe operation of unmanned aircraft systems and (or) their elements, civil aircraft, aircraft engines, propellers and environmental protection from the effects of aviation activities. The certification basis is developed by a legal entity engaged in the development of UAS and (or) its element, a civil aircraft based on the requirements for airworthiness and environmental protection.

From September 01, 2022, the unmanned aircraft airworthiness of a system and (or) its element was introduced. This means the state of an unmanned aircraft system and (or) its element, in which they correspond to the standard design or characteristics established by the aircraft assessment act for its compliance with airworthiness requirements and environmental protection requirements from the effects of aviation activities, and are able to ensure their safe operation.

So, let's summarize the part of the documents that may be required for UAV operation:

- state accounting notification of the UAV or UAV certificate state registration;
- civil liability insurance policy;
- certificate of an external pilot;
- operator's certificate;
- airworthiness certificate.

Of course, in itself, the existence of an obligation for the owner of the UAV to issue the above documents should be supported by the threat of punishment in case of violation of such an obligation. According to [37] manage of an aircraft that has not passed state registration, or has not been put on state registration, or does not have state and registration identification marks or registration identification mark, or has knowingly forged state and registration identification marks or knowingly forged registration identification mark, entails the imposition of an administrative fine on the commander of the aircraft in the amount of two thousand to two thousand five hundred rubles or deprivation of the right to control the aircraft for up to one year.

5 USE of Airspace. The Procedure for Conducting Flights

Airspace is regulated by States through laws and regulations. A State can take a liberal approach and allow increased access to its airspace, or a conservative approach and restrict access. Examples of a liberal approach can be Australia, the United States, Canada. The Russian Federation is a representative of the conservative approach [17].

The use of airspace is an activity in which various material objects (aircraft, missiles and other objects) are moved in the airspace, as well as others activities (construction of high-rise structures, activities during which electromagnetic and other radiation occurs, the release into the atmosphere of substances that impair visibility, blasting, etc.), which may pose a threat to the safety of air traffic.

Thus, flights are one of the types of use of airspace.

Ref. [38] determines that "the safety of UAV flights is as important as the safety of aircraft flights with a pilot on board."

The organization of UAV flights is carried out under the requirements in [39].

There are two modes of use of airspace—notification and permissive. In UAV flights, a permissive procedure for the use of airspace has been established, regardless of the class of airspace in which the flight is performed.

The permissive procedure for the use of airspace is the procedure for the use of airspace, in which users of airspace carry out their activities on the basis of plans (schedules, schedules) for the use of airspace if there is a permit for the use of airspace.

At the same time, the Federal Aviation rules haves the following exception (simplified procedure): there is no need to obtain permission to use the airspace in the case of visual UAV flights with a maximum take-off weight of up to 30 kg, carried out within the line of sight during daylight hours at altitudes less than 150 m from the ground or water surface:

a) outside the control zones of civil aviation airfields, areas of airfields (heliports) of state and experimental aviation, restricted zones, restricted flight zones, special zones, airspace over public events, official sports competitions, as well as security measures conducted in accordance with the Federal Law "On State Protection";
b) at a distance of at least 5 km from the control points of uncontrolled airfields and landing sites.

As for the procedure for the use of airspace abroad, we can give an example of the legislation of EU countries.

Since on 31 December 2020 apply common rules drones in the countries of the European Union, Liechtenstein and Norway, which have been defined on the basis of [40, 41].

According to these documents, the use of airspace depends on the selected category (operation).

An open category is a low-risk category. In this category, operations can be performed within the pilot's line of sight or with the help of an observer (VLOS) using unmanned aerial vehicles weighing less than 25 kg at a distance of no more than 120 m from the nearest point on the ground surface.

In this category operator doesn't need to make a declaration or obtain permission from the Civil Aviation Authority.

Specific Category is intended for operations of medium risk, whose flight parameters go beyond the "open" category. In some cases, performing the operation will approval of the Civil Aviation Authority. This authorization can either concerns a single operation or a series of operations specified by time or place. Operation authorization must contain a relevant detailed list of risk mitigation measures [42]. Certified Category is a high risk category, operations require UAS certification under [40]. Certification of the operator and the obtaining of a license by the pilot of the UAS may also be required, as appropriate, based on a risk assessment by the competent authority.

5.1 The General Procedure for the Use Airspace by the Unmanned Aircraft Vehicles

UAV airspace use in the airspace classes A, C and G is allowed with an aircraft flight plan and permission to use the airspace. UAV airspace use is by the establishment of temporary and local regimes, as well as short-term restrictions in the interests of airspace users organizing UAV flights.

So, in order to obtain a permit, it is necessary to submit a UAV flight plan to the Russian Federation Unified Air Traffic Management System operational centers (hereinafter referred to as the EU ATM). It is mandatory to indicate: the airfield and departure time; route; destination airfield, as well as other data. The message about the submitted UAV flight plan is transmitted no more than 5 days and no less than 1 h before the estimated departure time. Upon flight plan approval by the relevant EU ATM center, a permit for the use of airspace is issued, which indicates the next information: flight number; departure airfield and estimated departure time; flight route and profile; alternate airfields; destination airfield; other necessary data (air traffic service (flight control) bodies of airspace users involved in air traffic control, transmission and reception control boundaries, main and spare control frequencies);

So, the presence of an EU ATM permit is the minimum necessary document for conducting flights.

At the same time, when organizing flights, the flight area is also important. If it is necessary to use the airspace of restricted zones and restricted flight zones, airspace users are required to obtain permission from persons in whose interests such zones are established.

In addition, if it is necessary to use the UAV airspace over a locality, the airspace user also needs to obtain permission from the local government body. In the case of Moscow, St. Petersburg and Sevastopol—permits from the relevant executive authorities of these cities.

So, to summarize, in order to conduct a flight, it is necessary to obtain the permits of the following persons and organizations:

1) The EU ATM Center;
2) a local government body (an executive authority of a city of federal significance) when using airspace over a specific locality;
3) a person in whose interests a zone with a special status (restrictions) has been established for flying over (in) such a zone.

Persons interested in conducting UAV flights, in addition to the rules and procedures established by the air legislation of the Russian Federation in the use of airspace, should also know the liability measures that can be applied to them in the event they commit an illegal act in this area. It should be noted that liability for such persons is provided for both within the framework of administrative and criminal legislation.

Thus, violation by the user of the airspace of the federal rules for the use of airspace, if this action does not contain a criminally punishable act, entails the imposition of an administrative fine on citizens in the amount of twenty thousand to fifty thousand rubles; on officials—from one hundred thousand to one hundred and fifty thousand rubles; on legal entities—from two hundred and fifty thousand to three hundred thousand rubles or administrative suspension of activities for up to ninety days [37], and if the specified act caused serious injury to health or death of a person by negligence, then liability in this case is provided for by [43] and the person is punished by imprisonment for up to five years with deprivation of the right to hold certain positions or engage in certain activities for up to three years, or a more severe penalty is applied in the form of imprisonment for up to seven years with deprivation of the right to hold certain positions or engage in certain activities for up to three years, if the specified act caused the death of two or more persons by negligence.

6 Legislation Trends on Unmanned Aircraft Vehicles

At the end of the article, I would like to talk about trends and plans for further development of legislation in the field of unmanned aviation in Russia. And they are connected primarily with the integration of the UAV into the non-segregated airspace of the Russian Federation. Of course, interest

in integration issues is growing all over the world, including in Russia. And this is no coincidence, since the lack of legal regulation, excessive restrictions do not allow the owners of UAVs to be equal market participants. And if there are significant advantages in using solutions through the use of UAVs, for example, in the delivery of small loads, monitoring, etc., service customers are forced to turn to manned aviation or use other means to implement the required tasks.

In 2011 the ICAO published [38], which is the basis for further work on UAS integration in the single sky. In accordance with [38] "[a]ll UA whether remotely-piloted fully autonomous or a combination thereof are subject to the provisions of Article 8. Only the remotely-piloted aircraft (RPA) however will be able to integrate into the international civil aviation system in the foreseeable future." This means that the Chicago Convention applies to all UAS but the integration of unmanned aircraft is being considered only in the context of RPAS [44].

On October 5, 2021, the Concept of Integrating Unmanned Aircraft into a Single Airspace in the Russian Federation was approved [45]. The Ministry of Transport of the Russian Federation is responsible for the implementation of the Concept. The improvement of the regulatory and regulatory and technical base of the Russian Federation in the field of the use of unmanned aircraft in order to integrate unmanned aircraft into the unified airspace of the Russian Federation will be carried out within the framework of the previously mentioned Roadmap.

The integration of unmanned aircraft into the unified airspace of the Russian Federation should be understood as the process of improving the legislation of the Russian Federation, the development and implementation of air traffic service technologies (flight control), the successful completion of which will ensure the safe flight of manned and unmanned aircraft in Russian Federation airspace.

One of the basic principles of the Concept is that unmanned and manned aviation have equal access to the airspace of the Russian Federation, taking into account the implementation of flight safety requirements, since the provision of UAV flights through the establishment of prohibitions and restrictions to ensure the safety of manned aviation has increased the number of restrictions established in the airspace. ICAO's main goal in the area of unmanned aviation is to provide the fundamental regulatory framework though Standards and Recommended Practices (SARPs), with supporting Procedures for Air Navigation Services (PANS) and guidance material, to underpin routine international operation of unmanned aircraft systems (UAS) throughout the world in a safe, harmonized and seamless manner comparable to that of manned operations. In other words, the introduction of remotely piloted aircraft into non-segregated airspace and at aerodromes should not degrade the safety of manned aviation [46].

6.1 Stages of the Concept

The Concept provides for the phased integration of drones by 2030. It will be implemented in three stages:

The first stage (to 2023) will be organizational. Measures will be developed to simplify procedures and remove restrictions for UAV flights. Also at this stage, special services for electronic registration and accounting of UAVS will be introduced, rules for the preparation and execution of such flights will be established, control of the import of foreign-made UAS will be provided. In addition, within the framework of this stage, it is planned to perform UAV flights in controlled airspace and uncontrolled airspace of Class G, provided that the applicable requirements established during this period for manned aviation are met.
The second stage (from 2023 to 2027) provides for the development and implementation of new technologies to ensure the safety of UAV flights. Legislative work will be carried out in parallel. Technical requirements for new systems and equipment that will ensure flight safety should be approved, the procedure for using airspace during joint flights of unmanned and pilot vessels should be adopted. At the same stage, their trial flights will begin in a single airspace.
At the third stage (from 2027 to 2030), it is planned to complete the creation of a technical infrastructure to ensure the safety of UAV flights. Digital technologies will be introduce for unmanned and manned aircraft flight control in a single space. Also regulatory legal acts that will regulate the integration of UAVs into a single airspace will be adopted.

6.2 The Main Directions of the Concept

The main directions of implementation of the Concept are:

- establishment of criteria for categorization of unmanned aircraft and unmanned aircraft systems;
- establishing requirements for aviation personnel and training of aviation personnel specialists, UAV airworthiness, for UAV developers and manufacturers, UAV in accordance with established criteria and classification of air traffic;
- improving flight rules regarding the implementation of joint flights of unmanned aircraft and manned aircraft in a single airspace;
- developing certification requirements for systems that prevent collisions in the air with other UAVs and with manned aircraft;
- ensuring public safety, countering the illegal use of unmanned aircraft, controlling the import and distribution of unmanned aircraft. In order to prevent and suppress

illegal actions using unmanned aircraft, technologies will be created and implemented to prevent (predictive interception and destruction) unauthorized presence of unmanned aircraft in airspace ("antidrone"). In order to implement this direction, it is planned to legislate a norm providing for the assignment of personal identification numbers of UAVs at enterprises of the Russian Federation during their production, as well as foreign-made UAVs during customs procedures, as well as the creation of a database of such identification numbers.

Of course, this Concept is not final and will be adjusted in the process of its implementation. At the same time, the main objective of the Concept will remain unchanged – to ensure the highest possible level of security during integration.

7 Conclusion

So, this article surveys current UAV legal regulation. At the same time, drone legislation is following a global trend. If before the main task was how to legally lift a drone into the air, now the main task is to ensure both legal and technical, from the point of view of flight safety, the possibility of using UAVs in non-segregated airspace together with manned aircraft. In order to enable the integration of RPAS (UAVs) into the present system, it is necessary to define the rules for licensing operators, evaluating aircraft airworthiness, as well as necessary procedures (with regard to operation, communication and identification) [44]. According to [47]: "[t]he operations of RPAS itself have to comply with existing and future regulations and procedures of manned aviation as feasible. A general concept of RPAS integration is that RPAS shall pose no greater risk than manned aviation". And this is the main world trend and direction to which regulatory regulation will be devoted in the next few years in Russia, too.

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Declarations

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Consent for Publication Authors declare the consent to Publish this manuscript.

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References

1. On May 23–24, 2006, the first ICAO familiarization meeting on UAVs was held in Montreal. ICAO Circular 328 "Unmanned Aircraft Systems (UAS)".Article 1.2. https://www.icao.int/meetings/uas/documents/circular%20328_en.pdf. Accessed 2022/01/11
2. Action plan ("Roadmap") to improve legislation and eliminate administrative barriers in order to ensure the implementation of the action plan ("roadmap") National Technological Initiative in the Aeronet direction, approved by Government Decree No. 576-r dated 03.04.2018. http://static.government.ru/media/files/fAyGCWyUi7kdfKfdIvA40ioDsh3AbZuv.pdf. Accessed 2022/01/11
3. Unmanned Aerial Vehicles Market 2020–2025: 5 key features. https://skymec.ru/blog/drone-use-cases/5-osobennostey-rynka-2020-2025/. Accessed 2022/01/22
4. Fedulin, A.M., Dryagin D. M.: Prospects of male-class UAVs using for the huge territories aerial survey // IzvestiyaSFedU. Eng. Sci. (1), 271–281 (2021) https://doi.org/10.18522/2311-3103-2021-1-271-281
5. Valavanis, K.P., Vachtsevanos G.J. (eds.): Handbook of Unmanned Aerial Vehicles. Springer International Publishing (2018)
6. Action plan ("Roadmap") to improve legislation and eliminate administrative barriers in order to ensure the implementation of the action plan ("roadmap") National Technological Initiative in the Aeronet direction, approved by Government Decree No. 576-r dated 03.04.2018.Article 2. http://static.government.ru/media/files/fAyGCWyUi7kdfKfdIvA40ioDsh3AbZuv.pdf. Accessed 2022/01/11
7. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation".-24.03.1997-No. 12-Article 32
8. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation".-24.03.1997-No. 12-Article 21
9. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation"-24.03.1997-No. 12-Article 61
10. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation"-24.03.1997-No. 12-Article 114
11. The Order of the Ministry of Transport of the Russian Federation dated 19.11.2020 N 494 "On Approval of Federal Aviation Regulations "Requirements for legal entities, individual entrepreneurs performing aviation works included in the list of aviation works providing for obtaining a document confirming compliance with the requirements of federal aviation regulations of a legal entity, individual entrepreneur. The form and procedure for issuing a document (operator's certificate) confirming the compliance of a legal entity, an individual entrepreneur with the requirements of federal aviation regulations. The procedure for suspending, imposing restrictions and revoking the operator's certificate". "Official Internet portal of legal information" https://www.pravo.gov.ru, Accessed 2022/01/11
12. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation".-24.03.1997-No. 12-Article 20
13. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation".-24.03.1997-No. 12-Article 23
14. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation"-24.03.1997-No. 12-Article 22
15. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation".-24.03.1997-No. 12-Article 21

16. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation"-24.03.1997-No. 12-Article 33
17. Hodgkinson, D., Johnston, R.: Aviation Law and Drones: Unmanned Aircraft and the Future of Aviation (2018) https://doi.org/10.4324/9781351332323. ISBN: 9781351332323
18. Cerna, I.: The unmanned aerial vehicles in international trade and their regulation. Actual Probl Econ Law **10**(3), 83–91 (2016). https://doi.org/10.21202/1993-047X.10.2016.3.83-100
19. The Decree of the Government of the Russian Federation No. 658 dated 25.05.2019 "About the approval the Rules for Accounting for unmanned civil Aircraft with a maximum take-off weight from 0.25 kilograms to 30 kilograms imported into the Russian Federation or manufactured in the Russian Federation". https://www.pravo.gov.ru. Accessed 2022/01/11
20. The Order of the Federal Air Transport Agency dated 28.10.2019 N 1040-P "On Approval of the Administrative Regulations of the Federal Air Transport Agency for the Provision of State Services for the Registration of Unmanned Civil Aircraft with a maximum take-off Weight from 0.25 kilograms to 30 kilograms Imported into the Russian Federation or Manufactured in the Russian Federation." "Official Internet portal of legal information" https://www.pravo.gov.ru. Accessed 2022/01/11
21. The Decree of the Government of the Russian Federation No. 658 dated 25.05.2019 "About the approval the Rules for Accounting for unmanned civil Aircraft with a maximum take-off weight from 0.25 kilograms to 30 kilograms imported into the Russian Federation or manufactured in the Russian Federation". Clause 8. https://www.pravo.gov.ru, Accessed 2022/01/11
22. The Order of the Federal Air Transport Agency dated 28.10.2019 N 1040-P "On Approval of the Administrative Regulations of the Federal Air Transport Agency for the Provision of State Services for the Registration of Unmanned Civil Aircraft with a maximum take-off Weight from 0.25 kilograms to 30 kilograms Imported into the Russian Federation or Manufactured in the Russian Federation.".Article 15.1. https://www.pravo.gov.ru, Accessed 2022/01/11
23. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation"-24.03.1997-No. 12-Article 33
24. The Order of the Ministry of Transport of the Russian Federation dated 05.12.2013 N 457 "On Approval of the Administrative Regulations of the Federal Air Transport Agency for the Provision of State Services for the State Registration of Civil Aircraft and the Maintenance of the State Register of Civil Aircraft of the Russian Federation". "Official Internet portal of legal information". https://www.pravo.gov.ru. Accessed 2022/01/11
25. The Order of the Ministry of Transport of the Russian Federation dated 05.12.2013 N 457 "On Approval of the Administrative Regulations of the Federal Air Transport Agency for the Provision of State Services for the State Registration of Civil Aircraft and the Maintenance of the State Register of Civil Aircraft of the Russian Federation". Article 17. "Official Internet portal of legal information". https://www.pravo.gov.ru, Accessed 2022/01/11
26. The Decree of the Government of the Russian Federation No. 658 dated 25.05.2019 "About the approval the Rules for Accounting for unmanned civil Aircraft with a maximum take-off weight from 0.25 kilograms to 30 kilograms imported into the Russian Federation or manufactured in the Russian Federation". "Official Internet portal of legal information". https://www.pravo.gov.ru, Accessed 2022/01/11
27. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation"-24.03.1997-No. 12-Article 131
28. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation"-24.03.1997-No. 12-Article 134
29. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation"-24.03.1997-No. 12-Article 135
30. Commission Implementing Regulation (Eu) on the rules and procedures for the operation of unmanned aircraft of 24.05.2019 No 2019/947/ Article 14 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0947&from=EN. Accessed 2022/01/11
31. Konert, A., Kasprzyk, P.: UAS safety operation – legal issues on reporting UAS incidents. J Intell Robot Syst **103**, 51 (2021). https://doi.org/10.1007/s10846-021-01448-5
32. Air Code of the Russian Federation of 19.03.1997 No. 60-FZ (ed. of 02.07.2021)/ / "Collection of Legislation of the Russian Federation"-24.03.1997-No. 12-Article 57
33. The Order of the Ministry of Transport of the Russian Federation dated 12.09.2008 N 147 "On Approval of the Federal Aviation Regulations "Requirements for Aircraft Crew Members, Aircraft Maintenance Specialists and Flight Support Staff (Flight Controllers) of Civil Aviation". "Official Internet portal of legal information" https://www.pravo.gov.ru. Accessed 2022/01/11
34. Resolution of the Government of the Russian Federation of August 6, 2013 N 670 "On Approval of the Rules for Verifying the Compliance of Persons Applying for Certificates that Allow Them to Perform the Functions of Crew Members of a Civil Aircraft, with the Exception of an ultralight manned civil aircraft with a Design Weight of 115 Kilograms or Less, an unmanned civil aircraft with a Maximum Take-Off Weight of 30 kilograms or Less, civil aviation flight support Personnel, aircraft Maintenance Functions and air traffic control, with the Requirements of federal aviation regulations, as well as the issuance of such certificates to persons from among the specialists of the aviation personnel of civil aviation". "Official Internet portal of legal information". https://www.pravo.gov.ru. Accessed 2022/01/11
35. Order of the Ministry of Transport of the Russian Federation No. 429 dated October 21, 2020 "On Approval of Federal Aviation Regulations "Requirements for Legal Entities, Individual Entrepreneurs performing aviation works included in the list of aviation works providing for obtaining a document confirming compliance with the requirements of Federal Aviation Regulations of a legal entity, individual entrepreneur. The form and procedure for issuing a document confirming the compliance of a legal entity, an individual entrepreneur with the requirements of federal aviation regulations." "Official Internet portal of legal information" https://www.pravo.gov.ru. Accessed 2022/01/11
36. Order of the Ministry of Transport of the Russian Federation No. 494 dated 19.11.2020 "On Approval of Federal Aviation Regulations "Requirements for Legal Entities, Individual Entrepreneurs performing aviation works included in the list of aviation Works providing for obtaining a document confirming compliance with the requirements of Federal Aviation Regulations of a legal entity, individual entrepreneur. The form and procedure for issuing a document (operator's certificate) confirming the compliance of a legal entity, an individual entrepreneur with the requirements of federal aviation regulations. The procedure for suspending, imposing restrictions on the operation and revocation of the operator's certificate. " "Official Internet portal of legal information" https://www.pravo.gov.ru. Accessed 2022/01/11
37. The Code of the Russian Federation on Administrative Offenses of 30.12.2001 No. 195-FZ (ed. of 30.12.2021)/ / "Collection of Legislation of the Russian Federation".-07.01.2002-No. 1-Article 1
38. ICAO Circular 328 "Unmanned Aircraft Systems (UAS)". https://www.icao.int/Meetings/UAS/Documents/Circular%20328_en.pdf. Last accessed 2022/01/11
39. The Federal Rules for the Use of the Airspace of the Russian Federation, approved by the Decree of the Government of the Russian Federation dated 11.03.2010 N 138. "Official Internet

portal of legal information" https://www.pravo.gov.ru. Accessed 2022/01/11/
40. Commission Delegated Regulation (EU) on unmanned aircraft systems and on third-country operators of unmanned aircraft systems of 12.03.2019 No 2019/945. https://eur-lex.europa.eu/eli/reg_del/2019/945/oj. Accessed 2022/01/11
41. Commission Implementing Regulation (Eu) on the rules and procedures for the operation of unmanned aircraft of 24.05.2019 No 2019/947. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0947&from=EN. Accessed 2022/01/11
42. Konert, A., Dunin, T.: A harmonized european drone market? – new EU rules on unmanned aircraft systems. Adv Sci Technol Eng Syst J **5**, 93–99 (2020). https://doi.org/10.25046/aj050312
43. Criminal Code of the Russian Federation of 13.06.1996 No. 63-FZ (ed. of 30.12.2021) // "Collection of Legislation of the Russian Federation",-17.06.1996- No. 25-Article 2954
44. Gregorski, M.: Analysis of International Law on Unmanned Aerial Vehicles Through the Prism of European Union Law, vol. 2018, no. 4. Przegląd Europejski. ORCID ID: 0000-0003-0617-9737
45. Order of the Government of the Russian Federation of 05.10.2021 N 2806-r "On approval of the Concept of Integration of Unmanned Aircraft into the Unified Airspace of the Russian Federation and the plan for the implementation of the Concept in terms of technology development". The Official Internet Portal of Legal Information. http://pravo.gov.ru. 11.10.2021, "Collection of Legislation of the Russian Federation", 18.10.2021, N 42, Article 7159
46. LEGAL COMMITTEE – 37TH SESSION, Agenda Item 2: Consideration of the General Work Programme of the Legal Committee REMOTELY PILOTED AIRCRAFT SYSTEMS LEGAL SURVEY, LC/37-WP/2-1 26/7/18, https://www.icao.int/Meetings/LC37/Documents/LC37%20WP%202-1%20EN%20Remotely%20Piloted%20Aircraft.pdf. Last accessed 2022/01/11
47. Calleja, C.D., De Leon Pablo, M.: Achieving the Single European Sky: Goals and Challenges, p. 258. Kluwer Law International (2011)

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