



High-level regulatory framework for the U-space

RMT.0230

EXECUTIVE SUMMARY

The objective of this Opinion is to create and harmonise the necessary conditions for manned and unmanned aircraft to operate safely in the U-space airspace, to prevent collisions between aircraft and to mitigate the air and ground risks. Therefore, the U-space regulatory framework, supported by clear and simple rules, should permit safe aircraft operations in all areas and for all types of unmanned operations.

This Opinion proposes an effective and enforceable regulatory framework to support and enable operational, technical and business developments, and provide fair access to all airspace users, so that the market can drive the delivery of the U-space services to cater for airspace users' needs.

This Opinion is, therefore, a first regulatory step to allow immediate implementation of the U-space after the entry into force of the Regulation and to let the unmanned aircraft systems and U-space technologies evolve.

Action area:	Unmanned aircraft systems		
Affected rules:	n/a		
Affected stakeholders:	Member States, unmanned aircraft system operators, manned aviation community, U-space service providers, air navigation services providers, all airspace users		
Driver:	Safety	Rulemaking group:	No — instead, a working group has been involved
Impact assessment:	Full	Rulemaking Procedure:	Accelerated

EASA special rulemaking procedure milestones

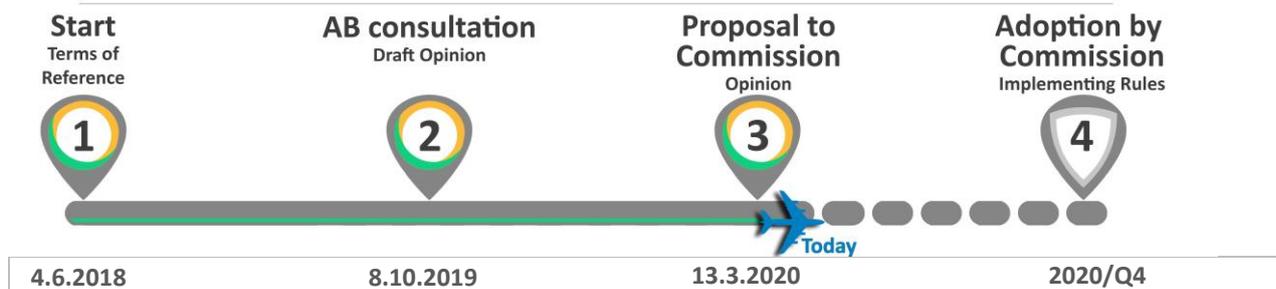


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1. About this Opinion

1.1. How this Opinion was developed

The European Union Aviation Safety Agency (EASA) developed this Opinion in line with Regulation (EU) 2018/1139¹ ('Basic Regulation') and the Rulemaking Procedure².

This rulemaking activity is included in the European Plan for Aviation Safety (EPAS) [2020-2024](#) under rulemaking task (RMT).0230. The scope and timescales of the task were defined in the related ToR³.

The *draft* text of this Opinion has been developed by EASA in discussions with the responsible services of the European Commission⁴ based on the input of a working group composed of representatives of Member States as well as experts from EUROCONTROL and the SESAR Joint Undertaking. The working group held eight meetings, from January 2019 till September 2019.

All interested parties were consulted through the Advisory Bodies (ABs) in accordance with Article 16 'Special rulemaking procedure: accelerated procedure' of MB Decision No 18-2015. Before the AB consultation, EASA organised, in July 2019, a focused consultation to receive feedback on its very first draft regulation. More than 1 000 comments were received from the drone and U-space stakeholders as well as from the authorities and the aviation industry. Furthermore, a dedicated workshop was held on 11 October 2019 with the drone community to discuss the draft regulation. More than 2 500 comments were received on the draft Opinion from interested parties, including industry, national aviation authorities (NAAs), local authorities and aviation associations.

EASA reviewed the comments received during the AB consultation. The main comments received and EASA's responses to them are presented in the Appendix to this Opinion.

The *final* text of this Opinion and the draft regulation have been developed by EASA in discussions with the responsible services of the European Commission based on the input received from the AB consultation and the workshop of 11 October 2019. The draft rule text proposed by EASA is published on the EASA website⁵.

The major milestones of this rulemaking activity are presented on the title page.

¹ Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139>).

² EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (<http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure>).

³ <https://www.easa.europa.eu/sites/default/files/dfu/ToR%20RMT.0230%20%E2%80%93%20Issue%202.pdf>

⁴ In accordance with the Basic Regulation, EASA provides its Opinion to the European Commission. The reason for the in-depth discussions with the responsible services of the European Commission is that the proposed Regulation on U-space also contains the market and financial provisions that are typically outside the scope of EASA's mandate.

⁵ <http://easa.europa.eu/document-library/opinions>



1.2. The next steps

This Opinion contains a draft regulation and is submitted to the European Commission, which will use it as a technical basis in order to prepare an EU regulation.

For information, EASA published the draft text for the related EASA decision that contains acceptable means of compliance (AMC) and guidance material (GM). The final decision that issues the AMC & GM will be published by EASA once the European Commission has adopted the regulation and once the necessary consultation with the affected stakeholders has been performed.



2. In summary — why and what

2.1. Why we need a regulatory framework for the U-space

Unmanned aircraft — commonly called drones — are a promising source for delivering innovative services. Yet, these emerging technologies also present a challenge. The rising number of unmanned aircraft system (UAS) operations in the European airspace poses safety, security and airspace integration issues. To ensure on the one hand, safe UAS traffic management and on the other hand, that unmanned aircraft can safely operate within the existing air traffic environment in a harmonised manner across the European airspace, there is a need to develop a robust regulatory framework.

In perspective of the foreseen increase of manned air traffic in the years to come and the proliferation of unmanned aircraft operations, with both types of aircraft sometimes sharing the same airspace, hazard to air traffic, persons and property will also increase if not addressed through appropriate mitigating measures.

The establishment of the U-space airspace and the provisions for U-space services are considered essential to respond to such growth of UAS operations — especially today in low-level airspace — which is expected to outnumber the volume of traffic currently seen with manned aircraft. Because today's air traffic management (ATM) system is already reaching its limits and as the expected UAS traffic and flying characteristics of the unmanned aircraft (the pilot is not on board and the level of automation is higher) are different from those of manned aircraft, ATM cannot be seen as the only appropriate means to safely and efficiently manage the upcoming UAS traffic. Consequently, there is a need to complement the existing European Regulations for UAS operations in the 'open' and 'specific' categories with a European regulatory framework that enables harmonised implementation of U-space and is adapted to the task of ensuring safe management of UAS traffic.

Indeed, U-space is the enabler to manage more complex and longer-distance operations, and to ensure that operations such as beyond visual line of sight (BVLOS) operations or urban air mobility (UAM) are supported with services that enhance safety, security, privacy and efficiency of these operations. Given the increase of UAS traffic and UAS traffic complexity, the need for U-space airspace and U-space services is expected to increase and may cover the entire airspace in which BVLOS and operations of UAS with higher level of autonomy are conducted.

The U-space airspace and U-space services are also needed to ensure fair access of UAS operators to the airspace in a cost-effective manner through a competitive U-space services market. The European approach will facilitate this competitive model by providing the basis for common data exchange protocols, establishing a cooperative environment where all the necessary information is available and transmitted to those who need it, in order to ensure seamless exchange of aircraft operators' positions and UAS operators' intent, operational constraints and other data critical for safety and security purposes.

The absence of a European-wide approach could result in non-harmonised implementation of U-space or in application of non-interoperable national rules, having a potential safety impact on the integration of UAS operations into the airspace due to the use of different operational procedures and technical solutions. Moreover, a European regulatory approach for U-space can provide the safety risk mitigation means through a common approach to effective implementation of UAS traffic management by having the same rules and procedures for all UAS operators across the EU. The



regulatory framework proposed in this Opinion contains the first step of U-space regulation, but EASA will set up a process to enhance the regulation, as more U-space services will be developed, mature and gradually be rolled out. These future U-space services will need to be defined as the wider drone industry matures to fulfil the needs of new and future types of operations.

2.2. What we want to achieve — objectives

The main objective of this proposal is to develop the first building block of a European regulatory framework that can ensure that unmanned aircraft operations operate in a safe, secure, manageable, connected environment while keeping all aircraft safe in the U-space airspace. This building block will complement the existing ATM environment of ‘traditional’ manned aviation and will evolve along with the growing density and complexity of the air traffic.

This proposal intends to create the conditions for manned and unmanned aircraft to operate safely in the airspace (controlled and uncontrolled airspace) where U-space services are provided. To achieve this, there is a need to have an appropriate common information service (CIS)⁶ that will enable the exchange of essential information between the U-space service providers (USSPs), the UAS operators, the air navigation service providers (ANSPs) and all other participants in the U-space airspace.

The ultimate objective of U-space in its final stage⁷ is to prevent collisions between manned and unmanned aircraft and mitigate the air and ground risks. Today’s proposal contributes to this objective as it contains all the necessary building blocks and mitigation layers to safely manage the forecasted UAS operations in the upcoming years.

Another key objective of this proposal is to create a competitive U-space services market that leads to safe and sustainable operations in the U-space airspace. Only a clear EU regulatory framework can establish a competitive European U-space services market to attract the necessary business investments in both the UAS and U-space services markets. An effective and enforceable regulatory framework should support and enable operational, technical and business developments, and provide fair access to all airspace users, so that the market can drive the delivery of the U-space services to cater for UAS operators’ needs.

This proposal also intends to support a level of environmental protection, security and privacy that is acceptable to the public. In particular, privacy is considered a major threat for the development of the UAS market as UAS operations are and can be conducted closer to the ground and therefore closer to people. At the same time, it should provide enough flexibility for the drone industry to evolve, innovate and mature as many of the technical solutions and U-space services are still under development and demonstration phases.

Therefore, the U-space regulation should be performance- and risk-based. It should ensure interoperability and consistency with the existing Commission Implementing Regulation (EU)

⁶ Which is the single point of truth and therefore it can only be one per U-space airspace implementation.

⁷ The final stage of U-space is when all the necessary U-space services are defined, developed, demonstrated, validated and available/deployed. This is not the case today as not all the necessary U-space services are mature.



2019/947⁸ and Commission Delegated Regulation (EU) 2019/945⁹ and provide the necessary flexibility to allow for local implementation at the level of the Member State or even at regional/local level that is suitable for and adapted to the local UAS traffic and traffic complexity. Still, the implementation should be sufficiently harmonised across the EU.

2.3. Rule structure

Chapter I — Principles and general requirements

- Article 1 Subject matter and scope
- Article 2 Objectives
- Article 3 Definitions

Chapter II — Establishment of the U-space

- Article 4 Designation of U-space airspace
- Article 5 Common information service

Chapter III — General requirements for aircraft operators and U-space service providers

- Article 6 UAS operators
- Article 7 Obligation for operators of manned aircraft operating in U-space airspace
- Article 8 U-space service providers
- Article 9 Occurrence reporting

Chapter IV — U-space services

- Article 10 Network identification service
- Article 11 Geo-awareness service
- Article 12 Flight authorisation service
- Article 13 Traffic information service
- Article 14 Tracking service
- Article 15 Weather information service
- Article 16 Conformance monitoring service

Chapter V — CIS providers and U-space service providers certification

- Article 17 Application for a CIS provider and U-space service provider certificate
- Article 18 Conditions for obtaining a certificate
- Article 19 Validity of the certificate

Chapter VI — Competent authorities

- Article 20 Competent authority
- Article 21 Tasks of the competent authorities
- Article 22 Exchange of safety information and safety measures

Chapter VII — Pricing of CIS

- Article 23 Pricing of common information service

Chapter VIII — Final provisions

- Article 24 Amendments to Commission Implementing Regulation (EU) 2017/373
- Article 25 Entry into force and applicability

⁸ Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (OJ L 152, 11.6.2019, p. 45) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1582472736888&uri=CELEX:32019R0947>).

⁹ Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1582472840147&uri=CELEX:32019R0945>).



2.4. Overview of the proposals

LEGAL BASIS

- Article 43(1)(a) of the Basic Regulation contains the mandate for the European Commission to adopt implementing acts with specific rules and procedures for the provision of air traffic management (ATM)/air navigation services (ANS) in the Single European Sky airspace and the design, production, maintenance and operation of systems and constituents used in the provision of those ATM/ANS in compliance with the essential requirements.
- Article 44(1)(a) of the Basic Regulation contains the mandate for the European Commission to adopt implementing acts containing detailed provisions on the operating rules for the use of airspace, aircraft equipment and ATM/ANS systems and ATM/ANS constituents required for the use of airspace.
- In addition, in accordance with Article 55 of the Basic Regulation, the design, production, maintenance and operation of aircraft referred to in points (a) and (b) of Article 2(1), where it concerns unmanned aircraft, and their engines, propellers, parts, non-installed equipment and equipment to control them remotely, as well as the personnel, including remote pilots, and organisations involved in those activities, shall comply with the essential requirements set out in Annex IX to said Regulation.
- In Annex IX, points 2.2 and 2.4.4 contain essential requirements, which specifically apply also to organisations involved in unmanned aircraft operations and related services.
- CIS providers and USSPs are organisations involved in unmanned aircraft operations that will provide services necessary for the intended operations.
- In this context, the European Commission has been empowered to adopt implementing acts laying down detailed provisions concerning, among others:
 - (a) the specific rules and procedures for the operation of unmanned aircraft as well as for the personnel, including remote pilots, and organisations involved in those operations;
 - (b) the rules and procedures for issuing, maintaining, amending, limiting, suspending, or revoking the certificates, or for making declarations, for the operation of unmanned aircraft as well as for personnel, including remote pilots, and organisations involved in those activities, and for the situations in which such certificates or declarations are to be required; the rules and procedures for issuing those certificates and for making those declarations may be based on, or consist of, the detailed requirements referred to in Sections I, II and III; and
 - (c) the privileges and responsibilities of the holders of certificates and of natural and legal persons making declarations.
- Therefore, the legal basis for this Opinion is Articles 43(1)(a), 44(1)(a) and 57, of the Basic Regulation, in particular points (a), (b) and (c) referred to above, and Article 76(1) containing the mandate for EASA to submit proposals for implementing acts in the form of opinions.



INTRODUCTION

This Opinion has been developed in a very short time frame (15 months). Taking into account the importance of the timely delivery of a first set of implementing rules on U-space, this Opinion lays down the first building block for the establishment of the U-space. This first building block will be complemented and enhanced as U-space services mature and in-service experience is gained through the implementation of this first set of requirements.

This Opinion has been developed applying the following leading principles:

- a risk-based approach;
- fair and equal access to the airspace and the services to be provided in that airspace;
- fostering the development of the UAS market in the EU through ensuring a level playing field and a competitive market;
- accommodating initial BVLOS UAS operations and initial UAS operations in an urban environment or UAM in the short term;
- recognising and respecting the existence of today's airspace structures and rules-of-the-air principles which are applicable to manned aircraft operators; and
- fostering further development of U-space's implementation architectures and services, thus enabling more complex UAS operations in the future (e.g. advanced UAM operations, more complex airspace structure and management).

Therefore, this Opinion proposes a first set of what are considered by EASA as the minimum necessary rules, which are to be complemented later with further provisions enabling a more mature state of airspace integration. ***The proposed high-level regulatory framework intends to allow immediate implementation of the U-space after the entry into force of the Regulation.*** It provides the means to mitigate the risk of collisions by requiring adapted services and sharing essential traffic information. Until further development of detect and avoid (DAA) or sense and avoid (SAA) systems, the only way to ensure safe operations in the U-space airspace, in particular when UAS conduct BVLOS operations, is to ensure that U-space participants are cooperative, i.e. they share real-time information regarding their actual position in the U-space airspace. When this cannot be achieved, then the only possibility to ensure safe operations is segregation.

It is acknowledged that full integration of the airspace used by manned and unmanned aircraft should be aimed at in the future as a viable solution to accommodate ATM as a whole, but today the technologies and the maturity of the U-space services and DAA systems do not allow for such a level of integration. This is why this proposal focuses on how to mitigate the air and ground risks by using today's airspace management techniques such as dynamic segregation and use of restricted and dangerous areas, as they are necessary for safety. Very important is to note that the regulation proposed with EASA's Opinion respects today's roles and responsibilities as foreseen by the International Civil Aviation Organization (ICAO) and the EASA and SES Basic Regulations. This means that ANSPs provide air traffic services to manned aircraft as they do today, while the proposed regulation establishes U-space airspace in which USSPs provide new types of services to unmanned aircraft.

In summary, this is a first regulatory phase that is due to support operations as soon as the regulation is adopted and in the near future. It is focused on the principles of strategic and pre-



tactical traffic management techniques (strategic because of the use of airspace management techniques to manage the U-space airspace, and pre-tactical because it is based on sharing information prior to and during flight).

This section provides the rationale behind each of the provisions with the intention of facilitating understanding of the provisions. This section only provides the reader with the explanation and rationale behind the drafting of each provision as they are currently proposed.

EXPLANATORY NOTE TO THE ARTICLES

CHAPTER I

PRINCIPLES AND GENERAL REQUIREMENTS

ARTICLE 1 — SUBJECT MATTER AND SCOPE

This article describes the general subject matter of the regulation and refers to the categories of persons or organisations to which the rules applies.

It also exonerates some UAS operations from the application of the rules. The rules shall not apply to drones that are either toys, model aircraft within clubs and associations that receive an authorisation in accordance with Article 16 of Commission Implementing Regulation (EU) 2019/947 or limited in their weight and speed (the UAS within the ‘open’ subcategory A1). Such types of operations are not considered to be high-risk and therefore they are exempted from the application of this regulation.

ARTICLE 2 — OBJECTIVES

This article includes a list of the objectives that this regulation is aiming to meet. Beyond the safety aspects which is the primary objective for EASA with this regulation, this regulation is considered a key enabler in opening the drones service market by allowing the conduct of more complex operations in a safe manner and granting fair access to certain volumes of airspace which are designated as U-space airspace. Moreover, the opening of a competitive market creates jobs and fosters positive economic growth. Because of the impact that drones have on society today, this regulation needs to take into consideration the concerns of the citizens in terms of security, environment and privacy.

ARTICLE 3 — DEFINITIONS

This article specifies only those terms that are necessary to understand the provisions of the regulation. As this regulation is closely linked to the two existing regulations on drones (Regulations (EU) Nos 2019/945 and 2019/947), the definitions included in those regulations are considered also to apply to this regulation and are not repeated here. Well-established terms are not included either.



CHAPTER II
ESTABLISHMENT OF THE U-SPACE

ARTICLE 4 — DESIGNATION OF U-SPACE AIRSPACE

This article is the ‘starting point’ for the management of air traffic in the U-space airspace, and therefore it is important to define the roles and responsibilities of all organisations that are involved in the U-space airspace.

The Member States have full authority on the designation of the U-space airspace, and therefore have the power to decide how their airspace is designed, accessed, restricted, etc. As the U-space airspace can be established in either controlled or uncontrolled airspace, there is a need to take into account that there is already an organisation being designated to provide ATS services on an exclusive basis based on the Single European Sky (SES) regulation¹⁰ and ICAO Standards and Recommended Practices (SARPs). Therefore, air traffic services (ATS) providers are designated to provide air traffic control (ATC) services in controlled airspace and flight information services (FIS) providers are providing FIS and alerting services in many parts of uncontrolled airspace. When designating U-space airspace and integrating USSPs to provide U-space services to UAS within controlled and uncontrolled airspace, the already established principles need to be considered and respected. Therefore, this article clarifies who is responsible for what kind of operators and how they should ensure their respective obligations. Finally, this article defines the specific coordination procedures between ANSPs and USSPs.

The principle is that ANSPs provide air navigation services (ANS) to manned aircraft while USSPs provide U-space services to UAS operators. Both ANSPs and USSPs are certified to provide their respective services in a safe, secure and continuous manner. Within controlled airspace, U-space airspace is designated by the Member States and is dynamically managed by the ANSP. The safety of operations is guaranteed by the fact that manned and unmanned traffic will not mix with each other as they are dynamically segregated and ANS and U-space services are not provided at the same time in the same volume of airspace.

In uncontrolled airspace, the airspace remains uncontrolled for manned aircraft. But when the Member States designate a volume of airspace as U-space airspace, there is a restriction (therefore it could be established as a restricted area): for UAS operators, to use U-space services to fly in that airspace; and for manned aircraft operators, to make available their position at regular intervals to the USSPs. The latter can provide manned traffic information to unmanned aircraft or can geo-fence the unmanned traffic around the manned traffic. The manned aircraft operator will also be informed about the U-space airspace and the unmanned traffic either by the FIS provider or by the USSP, depending on the specific implementation. This principle shall also be applied for uncontrolled traffic within controlled airspace (VFR traffic within class E). EASA considers that U-space and its services can bring added value in terms of safety also to the manned aircraft operations flying in uncontrolled airspace (and also for uncontrolled traffic within controlled airspace), as there will be more sharing of traffic information between manned and unmanned aircraft and also between manned aircraft operations themselves with the use of more affordable conspicuity devices and by sharing existing ground infrastructure. Of course, the way to ensure that there is no conflict between both operations

¹⁰ Article 8 of Regulation (EC) No 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the single European sky (the service provision Regulation) (OJ L 96, 31.03.2004, p. 10) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1582541782395&uri=CELEX:32004R0550>).



is that they mutually share the relevant information (position and possible trajectories and for UAS also planning, etc.).

This article also underlines which U-space services are mandatory in the U-space airspace. Based on the assessment conducted by EASA of existing U-space services and their maturity, the following U-space services are considered necessary and mandatory to ensure safe and efficient operations in each U-space airspace implementation: network identification, geo-awareness, traffic information and UAS flight authorisation. In addition, Member States may decide that additional U-space services are needed to support safe and efficient UAS operations in specific volumes of U-space airspace implementation. They can decide to mandate those based on their risk assessment. This is considered necessary when, for safety reasons, they consider that such operations require more than the mandatory services listed in the regulation. One example could be weather services for operations taking place in a location where the wind or temperature are known to be hazardous factors.

This article further clarifies the obligations of the Member States in the case of cross-border U-space airspace.

ARTICLE 5 — COMMON INFORMATION SERVICE

This article contains the requirements related to the provision of the necessary information for the functioning of U-space. The objective is to ensure that the information comes from trusted sources and that it is of sufficient quality, integrity and accuracy as well as security so that the USSPs and other users such as ANSPs can use this information with full reliability when providing their services.

Based on the comments received during the AB consultation, EASA has reconsidered whether or not an organisation should be certified and designated by Member States as the CIS provider for each U-space airspace implementation in which they will provide the service.

The fact that the Member States designate a CIS provider does not mean that there is only one CIS provider per Member State; it means that there is only one provider per U-space airspace. There could be as many CIS providers as there are designated U-space airspaces. The reason for having one CIS provider per U-space airspace is to ensure that there is one single point of contact, one single point of truth that consolidates all the information necessary for the functioning of the U-space airspace.

The CIS is at the heart of the U-space system. The information will be managed by the CIS provider. This provider ensures that all the information can be exchanged between the various organisations to fulfil their obligations. This article specifies the necessary information that needs to be made available for the U-space and the quality and information security requirements applicable for the service provider.

The CIS works on the basis that the exchange of information is being ensured by application of (open) communication protocols allowing USSPs and ANSPs to exchange information through the appropriate interface. The USSPs shall use the information provided by the CIS provider to provide U-space services to UAS operators.

This article also specifies that the CIS provider cannot be a USSP itself. This is necessary to ensure that there is no conflict of interest when the common information is made available to the different USSPs and that there is fair competition in the U-space services market. This provision is not derived necessarily from a safety point of view but more from a competition and market perspective.



CHAPTER III

GENERAL REQUIREMENTS FOR AIRCRAFT OPERATORS AND U-SPACE SERVICE PROVIDERS

ARTICLE 6 — UAS OPERATORS

This article covers the obligations for UAS operators when they operate in the U-space airspace. The proposed requirements are based on the assumption that UAS operators share the airspace with manned aircraft. To ensure that the risk of mid-air collision is adequately mitigated and an orderly flow of traffic is ensured, UAS operators are obliged to meet a number of requirements. At a strategic level, the UAS operators shall consider where U-space airspace is designated when preparing for their UAS operations in that airspace and establish a contract with one certified USSP of their choice that provides the mandatory set of U-space services in that airspace. At pre-tactical level, they are asked to submit their flight authorisation request form to the USSP they have a contract with if they want to operate in U-space airspace, and to ensure that they do so in accordance with the terms and conditions of the flight authorisation once it is granted by the USSP. Certain conditions need to be met prior to the flight: they are not allowed to commence their flight until they have been granted with a flight authorisation by the USSP and they have to ensure that they are able to comply with the terms and conditions given by the USSP in the granted flight authorisation. In case they cannot comply with the one granted by the USSP, they have to amend their original flight authorisation request.

Compliance with the instructions of the USSP is required, as well as ensuring that their UAS are technically capable of receiving the U-space services and of operating in the U-space airspace. The obligations are based on today's technical capability requirements for the 'open' category in the drone regulations but are additionally mandatory for the 'specific' category when flying in the U-space airspace (Regulations (EU) Nos 2019/945 and 2019/947).

ARTICLE 7 — OBLIGATIONS FOR OPERATORS OF MANNED AIRCRAFT OPERATING IN U-SPACE AIRSPACE

This article covers the cases when a manned aircraft operator operates in U-space airspace that is in uncontrolled airspace (and for uncontrolled traffic within controlled airspace such as VFR traffic in class E) and where UAS operate. In order to allow the USSPs to safely manage the unmanned aircraft in that U-space airspace and provide the UAS operator with manned traffic information, they need to know where the manned aircraft will be in the U-space airspace. They will then be able to take the necessary measures to ensure that the air risk is mitigated.

The information that manned aircraft operators need to provide is their position at regular intervals, with the necessary level of performance in terms of integrity, accuracy, continuity and availability as well as security to allow the USSPs to make use of this data for the provision of U-space services. EASA intends to propose some AMC in that regard, to define which means can be used by manned aircraft operators for the purpose of U-space airspace. These AMC will be developed together with the affected manned aviation community (e.g. general aviation, helicopter operators and military/State stakeholders).

ARTICLE 8 — U-SPACE SERVICE PROVIDERS

A USSP is a new entity created by the regulation proposed with this Opinion. It is an organisation that is certified by the relevant competent authority to provide U-space services in U-space airspace(s)



designated by the Member States. When the USSP provides services of a pan-European nature, the certification authority is EASA. USSPs provide services to UAS operators or to other USSPs.

It is important to note that in order to be a USSP, the interested entity needs to demonstrate its capability of providing at least the four mandatory U-space services (network identification, geo-awareness, traffic information and UAS flight authorisation). They can contract out the provision of some or all U-space services to other entities as long as it remains under their management control. There can also be associations of USSPs or equivalent mechanisms as long as it is clear that there is one single entity responsible for providing the minimum set of services towards the UAS operators. In relation to the flight authorisation management, USSPs are required to take actions with regard to the flight authorisation request of the UAS operators (e.g. checking for completeness, plausibility and accuracy, accept it or not, notify the UAS operator, etc.). To provide their services, they have to use the information from the CIS (e.g. airspace restrictions, status of the airspace and available traffic information) and exchange information such as UAS traffic and flight authorisation requests when necessary with ANSPs. They can do this using the relevant technical interface means in order to exchange the information between themselves.

USSPs need to be certified if they want to provide U-space services, but they do not need to be designated for the U-space airspace in which they aim to provide U-space services. Once they are certified, they can provide services in any U-space airspace in the EU. In order to be certified, they need to provide all mandatory U-space services, namely network identification, geo-awareness, traffic information and UAS flight authorisation as listed in Chapter IV.

In the short term, it is not considered that USSPs would provide ATC-like service in controlled airspace. If USSPs would provide ATC-like services (e.g. separation services for manned aircraft) within controlled airspace, they would need to meet the same certification requirements that ATS providers meet today and be designated as stipulated in the SES Regulation. This is not foreseen in the near future but as soon as U-space services similar to tactical separation services are mature (developed and validated), EASA would review the applicable regulations and defined the appropriate regulation proportionate to the safety risks associated with the service providers (e.g. with requirements equivalent to those applicable to ATS providers).

In uncontrolled airspace, USSPs provide services to UAS operators but the airspace being uncontrolled for manned aircraft, the manned aircraft need to be provided with information on where U-space airspace is established so that they can make available their position to the USSPs. This will allow USSPs to provide U-space services to UAS with the view to resolving potential conflict and ultimately avoiding collisions.

All the requirements in this article are meant to ensure that USSPs can provide services to support the safe and efficient movement of aircraft in the U-space airspace. They are also meant to ensure coordination with the relevant ANSPs so that manned aircraft movements are safe and efficient.

ARTICLE 9 — OCCURRENCE REPORTING

This article requires USSPs to report occurrences, based on the current regulation on the occurrence reporting, analysis and follow-up of occurrences in civil aviation. This is applicable to all aviation actors and domains to which the regulation applies and it is considered important for safety that the occurrences in which U-space activities are involved also need to be reported. It is important to note that the present occurrence reporting regulation does not define all the U-space-related occurrences



but EASA will make proposals to the European Commission on the relevant U-space occurrences in the very near future.

CHAPTER IV U-SPACE SERVICES

This chapter proposes four mandatory U-space services: network identification, geo-awareness, traffic information and UAS flight authorisation. It also describes supporting services that may be required to provide the mandatory ones.

As mentioned in the recitals of the draft Regulation, it is important to underline that the main objectives of the U-space services are to:

- prevent collision between UAS and between UAS and manned aviation;
- expedite and maintain an orderly flow of UAS traffic;
- provide information and instructions relevant for the safe and efficient conduct of UAS operations;
- notify appropriate organisations regarding emergency or abnormal situations with the UAS which may endanger people and goods on the ground or manned aviation; and
- ensure that environmental, security and privacy requirements, applicable in the Member States, are met.

The proposal to mandate those U-space services does not only support safety but also ensures market competitiveness, as UAS operators will be able to receive the same services and therefore have the same interfaces with USSPs to operate in all U-space airspaces across the EU. This approach could also enable having one single interface with one USSP when conducting operations across the EU. This will also enable free movements of USSPs across the EU as the services provided and the certificates received are the same across the EU. If the implementation of U-space is not ensured through commonly agreed and validated standards, it will create dis-harmonisation in the EU, inefficiency and this may have an impact on safety in the long term when more autonomous operations are foreseen. Also, if the U-space services and the way they are implemented are not harmonised, this could lead to having different requirements on UAS equipment and capabilities across the EU for UAS operators.

As soon as more U-space services mature or as soon as additional U-space services are needed for safety (e.g. tactical de-confliction service) or for other reasons, amendments to the regulation will be proposed by EASA to the European Commission based on a validated proof of concept, and harmonised and commonly agreed and validated standards.

The list of services contains a description of the requirements to be met.

ARTICLE 10 — NETWORK IDENTIFICATION SERVICE

This article clarifies that the identification service proposed in the U-space framework is based on the requirements for remote identification contained in Regulation (EU) 2019/945 to avoid requiring additional UAS equipment or capabilities. Nevertheless, the purpose of the service is complementing the original intent of the one in Regulation (EU) 2019/945. Whereas the remote identification in Regulation (EU) 2019/945 supports the authorities in aspects related to security and privacy, the network identification service within U-space airspace operationally supports traffic safety and the



traceability of the unmanned aircraft during its flight. Indeed, based on this information, the USSPs can share UAS traffic information between themselves and therefore provide traffic information to UAS operations. This service meets the objective of providing advice and information useful for the safe and efficient conduct of UAS flights. The content of the information is based on the list included in Regulation (EU) 2019/945 for consistency and in order to avoid additional UAS equipment or capabilities in particular for the 'open' category. In addition, it is now specified that both broadcast and network information shall be received. This is consistent with the upcoming amendment to Regulation (EU) 2019/945 and supports the redundancy under certain use cases, although limited to certain cases of U-space airspace implementation.

ARTICLE 11 — GEO-AWARENESS SERVICE

This article contains the service requirements when USSPs provide geo-awareness service to UAS operators. The geo-awareness contained in Regulation (EU) 2019/945 is related to the UAS capabilities and the requirements for the Member States when they decide to establish geographical zones or for the UAS operators to follow and comply with the specification of these zones. This services aims to support UAS operators in fulfilling these obligations as it provides this information (where it is allowed to fly and where not) with the level of accuracy and other performance for which it has been certified. By using this service in a U-space airspace, the UAS operators can discharge part of their responsibility related to this UAS operator obligation.

ARTICLE 12 — FLIGHT AUTHORISATION SERVICE

This article provides the description for the flight authorisation service. This service is mandatory in both controlled and uncontrolled airspace and applies to UAS operators only, not to manned aircraft — like the rest of the U-space services. The reason for being mandatory also in uncontrolled airspace is the need for situational awareness of the USSPs of all the UAS traffic intending to operate in the U-space airspace. This allows USSPs to apply the prioritisation rules prior to providing the authorisation. It also allows them to pre-tactically manage traffic flow. With the information about the intended flight and other information about the type of the operations and its endurance as well as some related aircraft performance, the USSPs should be able to de-conflict the potentially conflicting flights before these flights take place. In order to do so, when there is more than one USSP providing U-space services in the U-space airspace, all USSPs are obliged to share the flight authorisation requests between themselves (of course adhering to the GDPR requirements). The platform that was foreseen for all USSPs providing services in a certain case of U-space airspace implementation was named in the previous draft 'USSP platform'. Based on the comments received during the consultation which indicated that EASA's proposal was going too much into an architecture, the requirements related to the USSP platform have been included into the USSPs' obligations and some other are proposed as requirements for the CIS provider. Still, the objective is the same. In some cases of U-space airspace implementation, this obligation for the USSPs to be able to identify and share information between all the USSPs providing services within U-space airspace is fulfilled with the so-called discovery and synchronisation service. This approach will be included by EASA in the associated AMC and GM in the near future.

As mentioned above, in Article 6 (UAS operators), the flight authorisation service is provided on the basis of the UAS operator having filled in the flight authorisation request form (former flight plan) that UAS operators need to fill in before flight departure. The content of this form is provided in Appendix 2 to the Regulation.



ARTICLE 13 — TRAFFIC INFORMATION SERVICE

This article contains the requirements for the provision of known air traffic information relevant to the UAS operator's flight (those in close proximity to the position or intended route of the UAS flight). To provide this service, the USSP may use the information on other traffic available to them through the network identification system or through other technical means (e.g. from manned aircraft ADS-B, transponders, etc.) implemented in the U-space airspace. The main objective of this service is to alert and to help the UAS operator to avoid a collision.

This service provides the alerts, air situation and known/predicted (e.g. if tracking service is available) traffic to the UAS operator.

Detailed and accurate information about the position of other unmanned aircraft and the update frequency of the information will need to be identified and being assessed during the USSP certification process for the specific U-space airspace implementation.

ARTICLE 14 — TRACKING SERVICE

This article contains the requirements when tracking service is used as a supporting service to provide traffic information services and support, for instance, the flight authorisation service. This service can be used to track the real-time and historical telemetry data of the UAS if the necessary supporting infrastructure exists and the UAS is flying in the range of the service capability. The providers of such service can track UAS through the signal between the aircraft and its remote controller as well as through additional surveillance observations available for the same UAS flight. They can then fuse all this information to calculate/estimate a UAS flight track. To be able to provide this service, there is a need to have different UAS flight information sources. The performance expected from this service will be based on the performance of the UAS flight information sources and the method and algorithm used for the tracking fusion. They shall be commensurate with the specific U-space airspace implementation and this shall be assessed during the certification process.

In practical terms, this service receives data from the different tracking sources coming from the USSPs (e.g. e-identification), UAS or the CIS provider to fuse it into unique and reliable UAS flight tracks.

ARTICLE 15 — WEATHER INFORMATION SERVICE

This article lays down the requirements for the weather services and what weather information should be provided by USSPs providing weather service. This service collects the weather information necessary to support UAS operational decisions in a specific U-space airspace and support the provision of other U-space services such as the flight authorisation service.

It is recognised that the weather information for UAS operations may be different from the one provided by today's meteorological service providers; in particular, as regards support of operations under the 'open' and 'specific' categories. UAS can fly near buildings and in areas where current aeronautical meteorological information is not always provided. Therefore, this article specifies a minimum content of weather information to be available for the purpose of UAS operations in the near future. It does not exclude the possibility that current aeronautical meteorological service providers can also provide this service.



The proposed regulation does not specify who may provide this service. Regulation (EU) 2017/373¹¹ contains the provisions on aeronautical meteorological services for MET providers that provide aeronautical meteorological services within ATM/ANS. In accordance with Regulation (EC) No 550/2004 (the SES service provision regulation), MET providers have to be certified to provide MET services; however, they may be designated (or not) by Member States to provide services. This is the case for MET providers providing aeronautical meteorological services within ATM/ANS. The legal basis for U-space services and their providers does not require any designation of these organisations and, therefore, this leaves the door open as to which organisation may provide weather services in the U-space airspace.

ARTICLE 16 — CONFORMANCE MONITORING SERVICE

This article includes a general description of the objective of the conformance monitoring service and what the requirements are for the USSPs providing this service. This service checks the current track of each UAS with respect to its planned mission as defined in the approved flight authorisation and compares it with it. It also considers the existence of new geo-fencing areas dynamically established and not existing before the flight authorisation was approved and alerting the UAS operators when detecting non-conformities. The monitoring is performed per UAS flight. When non-conformities of the UAS flight are detected, and potential hazardous situations are evident, the USSPs shall also alert other traffic (manned or UAS) and other USSPs or other relevant authorities with the available means. It is acknowledged that for some VLOS flights in areas of very low traffic, the monitoring service will be of little added value. This is however a U-space service that supports achieving the objectives of the Regulation as soon as traffic density and complexity increase.

CHAPTER V

CIS PROVIDERS AND U-SPACE SERVICE PROVIDERS CERTIFICATION

This chapter covers the certification scheme for both the CIS provider and the USSPs. It is considered that the certification provisions under this chapter can apply to both, independently of the fact that the certified CIS provider is designated by the Member State because it provides the CIS on an exclusive basis whereas the USSPs are only required to be certified. USSPs do not need to be designated as there may be more than one USSP providing services in the same U-space airspace implementation.

This chapter sets up the framework for the establishment of conditions under which the CIS provider or USSPs are allowed to provide services, based on the safety risk associated with the services they provide, including concrete rules for possible suspension and revocation of certificates.

ARTICLE 17 — APPLICATION FOR A CIS PROVIDER AND U-SPACE SERVICE PROVIDER CERTIFICATE

The provision of U-space services /CIS within the EU shall be subject to certification by the relevant competent authority established by the Member States. In the case of USSPs that wish to provide U-

¹¹ Commission Implementing Regulation (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011 (OJ L 62, 8.3.2017, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1582472923004&uri=CELEX:32017R0373>).



space services across the EU (pan-European services), the certifying authority is EASA. This article provides the framework for the recognition of certificates at EU level. In order to provide the CIS as well as U-space services, both the CIS provider and the USSP have to be certified by the competent authority. The certification scheme aims at preserving public interest requirements, most notably in terms of safety, and the certificate confirms that the CIS provider or USSP meets the requirements contained in the Regulation for providing specific services to the level of performance defined for the particular U-space airspace implementation and commensurate with the risk associated with the services they provide.

The competent authority issues the certificate provided they comply with the requirements referred to in Article 6 and those contained in Chapter IV for the U-space services they provide. Certificates are issued for a bundle of such services (network identification, geo-awareness, traffic information and flight authorisation plus any supporting U-space services used to provide the mandatory ones) and the competent authority shall check the validity of the certificate on a regular basis. The certificates shall specify the rights and obligations of the CIS provider and USSP, with particular regard to safety and also with regard to security of information (e.g. cybersecurity). In order to maintain their certificate valid once it has been issued, the USSP and CIS provider shall respect the conditions and limitations set out by the certifying competent authority in Appendices 2 and 3 for the USSP (see paragraph below) and CIS provider respectively. Such conditions should be objectively justified, non-discriminatory, proportionate and transparent.

Appendices 2 and 3 introduce the standard certificate forms for the USSP and the CIS provider. By introducing this single certificate concept, all the privileges of a USSP are to be mentioned in the attachment to the certificate specifying the types of U-space services, the respective conditions and associated limitations. For the CIS provider, the certificate form does not include an attachment with the type of services, conditions and limitations of the certificate because the CIS provider shall always provide the required CIS for the U-space airspace for which the CIS provider has been designated. This facilitates the mutual recognition of certificates across the EU.

ARTICLE 18 — CONDITIONS FOR OBTAINING A CERTIFICATE

This article lists the conditions for obtaining a CIS or a USSP certificate. It is based on criteria and requirements similar to those used for ATM/ANS providers (those contained in Subpart B of Annex III to Commission Implementing Regulation (EU) 2017/373) to obtain and maintain their certificate. These requirements are considered to be also applicable to CIS providers and USSPs providing services to UAS operators in the U-space airspace as their services are of a similar nature to that of the ones provided by ATM/ANS providers.

As both the CIS provider and USSPs are organisations that directly contribute to safe UAS operations within U-space airspace, it is important that they have a risk-based management system in place. In order to apply this system and to take into account the different types of CIS providers/USSPs and the performance of the services they manage, the proposal lists some necessary requirements for the management system. The elements of this management system are therefore harmonised for all the different types of CIS providers or USSPs, but their application may be different depending on the different services provided. Therefore, the proposed management system provides a proportionate application of requirements to both providers.



Subpart B of Annex III to Commission Implementing Regulation (EU) 2017/373 is referenced as it includes the elements of the management system, the procedures to manage the changes to such system and what to do in case some activities are contracted to other organisations. In addition, personnel and facilities requirements, the storage and protection of records as well as the provision of an operations manual are also important elements to assess as a prerequisite for granting a certificate.

The management system required for USSPs and CIS providers is focused on managing the performance of the services they provide and as such is focused on quality and managing the relevant interfaces with those providers and organisations that have the safety view (ATC providers and UAS operators). Similarly to ANSPs, when the USSPs provide ATC-like services such as tactical de-confliction services to UAS operators and therefore they have the safety view, they will be required to have a safety management system in place.

Once they can demonstrate that the way they are organised corresponds to the provision of their services and those are provided to the level of the required performance, CIS providers/USSPs may be granted with a certificate by the competent authority.

CIS providers and USSPs are also required to implement an information security management system which is quite important for these organisations as in order to provide their services, they will use highly automated systems with a high degree of digitalisation. In addition, they will need to implement the necessary liability and insurance covers corresponding to their services and the relevant emergency response as conditions to obtain a certificate.

ARTICLE 19 — VALIDITY OF THE CERTIFICATE

This article mitigates the situations where a CIS provider or USSP does no longer comply with the requirements applicable to it. Two major elements are taken into account: the operational and financial performance.

If the competent authority finds that the holder of a certificate no longer satisfies the requirements, it can act appropriately to ensure that safety is not compromised. Such measures may include the revocation of the certificate.

The validity of the certificate is unlimited provided that the CIS provider or USSP continues to operate in compliance with the requirements of this Regulation. This approach should facilitate and promote the implementation of a risk-based oversight scheme by the competent authority, and also allow for continuous oversight based on the identified risks instead of oversight aiming at ensuring compliance and closing the findings only at the stage of the re-certification process.

A specific paragraph reflects the situation where the provider is not active, either at the beginning or during its activities. This is to ensure that the certificate serves its main purpose which is to ensure that the provider operates and continues to operate under the applicable requirements.



CHAPTER VI COMPETENT AUTHORITIES

This chapter includes provisions concerning the competent authorities, which are responsible for issuing those certificates and exercising oversight and enforcement tasks.

ARTICLE 20 — COMPETENT AUTHORITY

The main objective of this article is to ensure that the competent authorities have the capacity to assess the resources needed to effectively perform their certification, oversight and enforcement tasks and to act accordingly should this not be the case. It also specifies that EASA is the competent authority for the CIS providers or USSPs providing pan-European services, that is if they provide services within more than one Member State or when the services are provided from outside the territory to which the EU Treaty applies.

ARTICLE 21 — TASKS OF THE COMPETENT AUTHORITIES

This article proposes requirements for competent authorities that perform certification, oversight and enforcement tasks in respect of the CIS provider and USSPs. It also lists a number of obligations that are directly related to the functioning of the U-space system.

With a view to ensuring that the requirements for the CIS provider or USSPs are complied with at all times while ensuring that the competent authorities can effectively perform their tasks, those authorities are granted certain specific investigatory powers. Those powers should be exercised in accordance with the applicable national rules and procedures, while having due regard to a number of specific elements which are meant to ensure a fair balance between all rights and interests.

Competent authorities also need to act in order to ensure that the U-space system as a whole can function properly. This is why they are mandated to establish and maintain a registration system to record the service providers involved in the U-space, to determine the type of data to be made available to those who need it, and the way this data can be exchanged in order to guarantee interoperability of the systems.

ARTICLE 22 — EXCHANGE OF SAFETY INFORMATION AND SAFETY MEASURES

This article highlights the importance of safety information exchange between the national authorities and EASA so that they can take the necessary measures to address the safety issues and notify them to the persons or organisations concerned.

ARTICLE 23 — PRICING OF COMMON INFORMATION SERVICE

The CIS provider designated per U-space airspace is one. This is a monopoly and the price of the CIS thus needs to be regulated. The price should reflect the cost for the management of the CIS, with a markup reflecting the risks associated with its activities. ANSPs and USSPs should exchange safety information through the CIS for free.

ARTICLE 24 — AMENDMENTS TO COMMISSION IMPLEMENTING REGULATION (EU) 2017/373

This article proposes two amendments to Regulation (EU) 2017/373 that lays down common requirements for ANSPs. As the interaction of USSPs with ANSPs is necessary to ensure the exchange of information and the coordination for air traffic management in the U-space airspace, it is necessary



to put requirements on the ANSPs. Because these entities are regulated under the said Regulation, it is proposed to amend the relevant provisions of this Regulation to include such ANSP obligations.

ARTICLE 25 – ENTRY INTO FORCE AND APPLICABILITY

It is important to provide Member States, potential USSPs and CIS providers as well as ANSPs, UAS and unmanned aircraft operators with sufficient time to allow them to effectively implement the Regulation. However, it is also important to ensure that the implementation of what it is considered to be the first-phase regulation on U-space does not lead to obsolete technical solutions. Therefore, the proposal is that the implementation time is 1 year after Regulation enters into force. It is equally important to ensure that the implementation of this first-phase regulation provides valuable results based on which more advanced services and procedures can be developed at regulatory and standardisation level.

The proposal of 1 year for transition period considers also the fact that there are already some industry standards developed related to the mandatory U-space services, as well as the fact that there are similar cases of implementation already within the different Member States.

2.5. What are the stakeholders' views — outcome of the consultation

The draft Opinion was consulted from 8 October to 30 October 2019 and more than 2 500 comments were received from 93 organisations. As shown below, those organisations were mainly ANSPs, drone associations/operators, drone industry and competent authorities. Nevertheless, the general aviation community as well as specific private companies interested in the draft Opinion provided many comments.

Figure 1 provides the distribution of the comments per type of stakeholders.

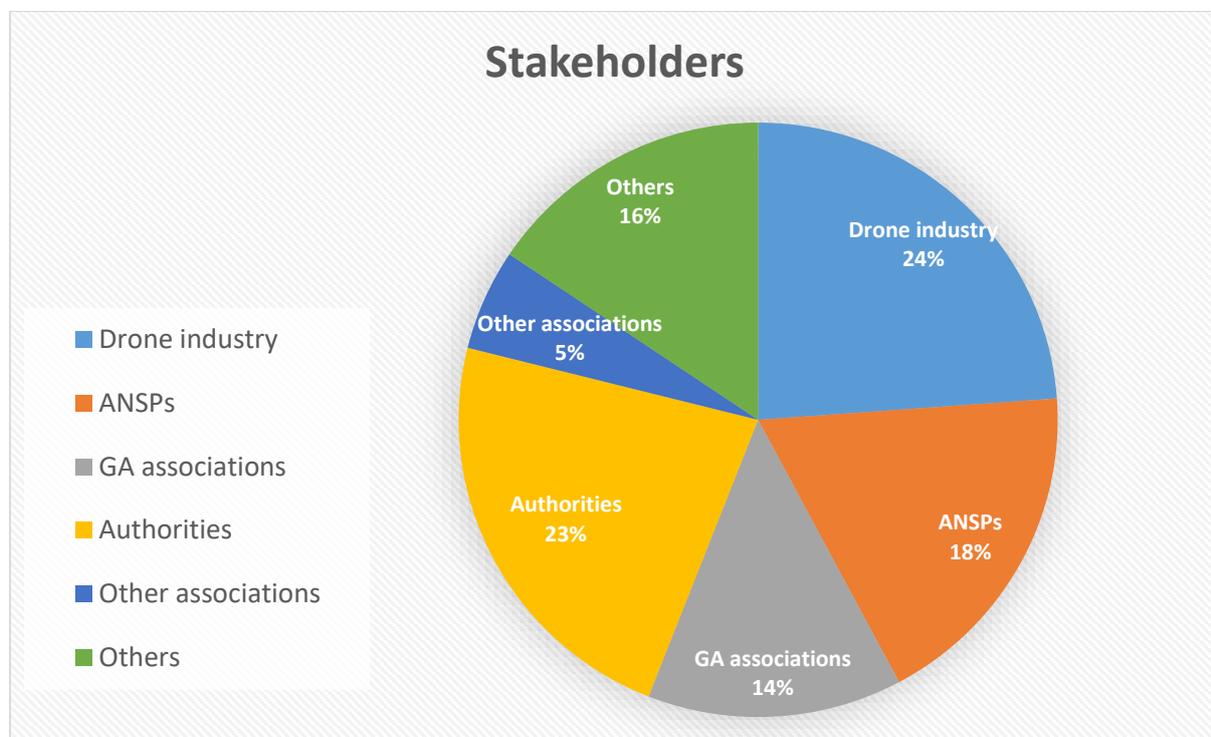


Figure 1: Distribution of the comments received per type of stakeholders

As shown below, the most commented articles are the ones on the services. The graphic also shows hundreds of comments on the explanatory note. Of course, this part contains also comments on services and all other articles so the statistics is an estimate.

Figure 2 provides the distribution of comments per article/chapter.

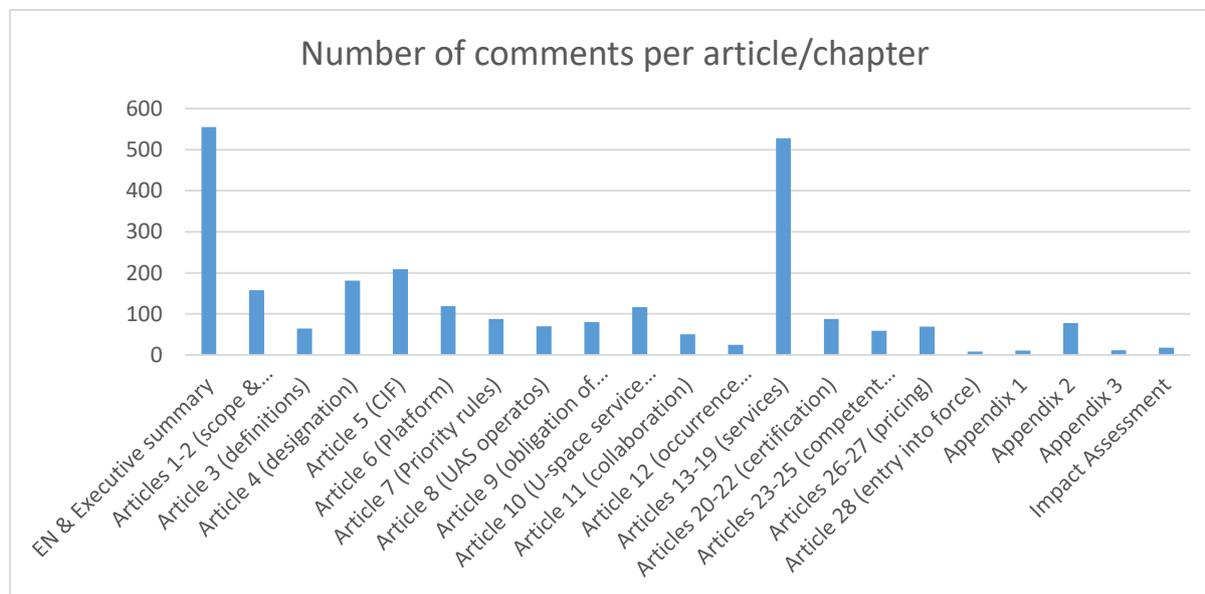


Figure 2: Distribution of the comments received per article/chapter

Some of the comments conflicted with each other due to the variety of the stakeholders.

The Appendix to this Opinion (a stand-alone document) is a comment-response document where both the main comments received and EASA's responses to them are presented.

The following provides a non-exhaustive list of the main subjects commented:

- The regulatory development for the U-space is too rushed and EASA/the European Commission should take more time to develop it;
- The overall system of the U-space and how it should work is not understood/clear;
- The sharing of responsibilities between USSPs and ANSPs is unclear;
- It is not clear if the proposal applies only to unmanned aircraft operators;
- The scope of the regulation should apply to the 'open' category drones;
- The U-space services are not mature and their description should demonstrate how they can contribute to safety;
- The relationship between the common information function and the USSP platform;
- The impossibility for the provider of the Common Information to become a USSP;
- The regulation should only be applicable 2 years after its publication.

In addition to the input from the AB consultation, EASA took into account the following elements:



- the adoption in June 2019 of the two Regulations on rules and procedures for the operation of unmanned aircraft (Regulation (EU) 2019/947) and on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (Regulation (EU) 2019/945);
- comments and position papers received from stakeholders after the consultation;
- the feedback received after the High Level Conference on Drones held in Amsterdam in December 2019; and
- comments received during several meetings with Member States, ANSPs, industry associations, model aircraft associations and clubs as well as the general aviation community.

2.6. What are the expected benefits and drawbacks of the proposals

BENEFITS

The proposal should affect as little as possible the existing ATM system and manned aircraft operators and at the same time maintain equitable access to airspace. It will also facilitate the overall growth of the European UAS services market, as the regulation enables harmonised implementation of U-space across the EU while mitigating the associated risks.

The proposed U-space regulatory framework should support and enable operational, technical and business developments, and provide fair access to all airspace users. The market should drive the delivery of the U-space services to adequately reflect UAS operators' needs.

As regards UAS operators, they will be able follow the same rules and be provided with the same mandatory U-space services wherever they operate in the EU. As regards USSPs, they will be subject to the same certification and service requirements.

The proposed mandatory set of U-space services should facilitate UAS operations in the EU through the development of several components such as data exchange infrastructure, technical enablers, and procedures for coordination and information exchange. The proposal foresees implementation that is supported by the necessary open standard communication protocols that enables the coordination of all the actions undertaken by the U-space actors and all the interactions between those actors. CIS is particularly important as the obligation to make the information available to and share it with all the participants in the U-space will increase safety by providing essential flight information such as the actual aircraft positions, and flight authorisation requests, where necessary, as well as airspace constraints.

As regards manned aircraft operators, the proposal ensures the situational awareness among aircraft operators operating in the U-space airspace which is established in uncontrolled airspace (and for uncontrolled traffic within controlled airspace such as VFR traffic within class E). The U-space airspace established in uncontrolled airspace and the potential use of U-space services by all participants can provide an additional safety layer for today's manned aviation flying in uncontrolled airspace.

A European regulatory framework will enable the national competent authorities to maintain high levels of safety when allowing UAS operations in their airspace. The European regulation will also facilitate a level playing field when the different competent authorities of the different Member States or EASA manage the approval process for USSPs. The oversight and approval functions of competent authorities will ensure safety in a harmonised way.

DRAWBACKS



The development of the U-space concept is still ongoing and validations of all originally defined U-space services, rules and procedures have not been completed as there are still ongoing validation activities within SESAR and national research and demonstration projects. For instance, due to the lack of experience with tactical de-confliction techniques for drones, the way to manage UAS traffic within the U-space airspace today can only be based on strategic and pre-tactical de-confliction techniques.

The main principle followed in the U-space airspace is similar to the one used in the (advanced) dynamic flexible use of airspace, which is already used for manned aviation. New concepts such as tactical separation (separation minima, rules and procedures), and DAA systems, capabilities and technologies are not considered to be mature enough at this stage to be included or considered in a first-phase regulation on U-space.

Similarly, promising developments in other areas, such as information and communications technology (ICT) and mobile telecommunications, which may become the foundation for connectivity between UAS, operators and the USSP's systems used to provide services within the U-space airspace, are still to be validated for use in a U-space environment. This is also the case for the future 'CNS' infrastructure that will support more advanced operations within the U-space airspace. Therefore, the implementation of this first-phase regulation will cater for the expected UAS traffic and complexity of the near future. Nevertheless, amendments will be required as soon as the U-space concept matures to allow for full deployment of the U-space.

This Opinion should be considered the first step towards the U-space implementation. It is likely that the fast ongoing technological developments and the expected evolution of the operational concepts and needs will require additional regulatory actions in the short term in order to ensure continuous harmonised development of the U-space implementation.



3. Impact assessment (IA)

3.1. General context

UAS operations are a novelty in aviation as their development is at the initial phase, the traffic management of unmanned aircraft has to be considered in a very complex air traffic environment where already approved organisations are already present and providing services, and new services to support UAS operations need to be proven in a newly designated airspace by Member States as U-space airspace. Therefore, this chapter highlights the main elements to help understand in which context this impact assessment has been drafted.

What is meant by U-space?

U-space is meant as a set of services provided in an airspace volume designated by the Member State to manage a large number of UAS operations in a safe and efficient manner.

The aim of the U-space services is to provide the UAS operators with information about where and how high can they fly, the status of the airspace volume in which they intend to fly, information about other traffic that may be conflicting with their planned trajectory/mission, and weather information such as wind. Furthermore, the aim of the U-space services is to support the UAS operators by processing their flight authorisation requests.

3.1.1. Current regulatory situation and developments

The European Parliament and Council have adopted the amendment to the Basic Regulation which extends the scope of the EASA system to all UAS sizes and categories. This has allowed the adoption by the European Commission of the new set of rules for safe operations of UAS in the 'open' and 'specific' categories¹².

The UAS regulations in the 'open' and 'specific' categories contain some building blocks that enable the development of some of the U-space mandatory services. These are the e-identification capability of the UAS to enable the network e-identification service and the geo-awareness capability of the UAS (within the 'open' category) to enable the geo-awareness service in the U-space. In addition, the registration system of the UAS operators required by these regulations enables the necessary access to UAS operator information by the USSP and also supports the network e-identification services. The establishment of the geographical zones by Member States also provides essential data for the functioning of the U-space. All these requirements need to be complemented with additional U-space services to enable more UAS traffic density and complexity in the near future.

Last but not least, Declarations of High Level Conferences have called for the development and implementation of a U-Space system¹³.

3.1.2. EU policies concerned

The Commission wants Europe to lead the transition to a healthy planet and a new digital world, by bringing people together and upgrading our unique social market economy to fit today's new

¹² <https://www.easa.europa.eu/regulations#regulations-uas---unmanned-aircraft-systems>

¹³ Declarations of Riga (2015), Warsaw (2016), Helsinki (2017) and Amsterdam (2018 and 2019).



ambitions¹⁴. The Green Deal of the Commission together with the digitalisation agenda have concrete consequences for transport.

These policies affect transport — responsible for 27 % of the bloc's greenhouse gas emissions. Transport is the only major sector in which emissions have grown since 1990, driving an increase in the EU's overall emissions in 2017. As the EU wants to deliver on the climate commitments made with the Paris Agreement, Europe needs smarter and more ambitious transport policies.

The introduction of UAS operations and U-space as an enabler of these UAS operations offer an opportunity to greening aviation as in particular UAS operations under the 'open' and 'specific' categories make more use of electric and hybrid propulsion technologies. At the same time, it is expected that UAS and the enabling traffic management of those (such as U-space) can offer connected and more digital and automated mobility and therefore be part of smart mobility initiatives at the cities.

3.1.3. Current UAS operations

There are no coherent European-wide data on UAS operations collected on a regular basis today. Data collected by EUROCONTROL as part of a 2019 survey of 14 Member States showed a steady growth of registered operators between Q1/2018 and Q3/2019, with important seasonal variations.

The data related to visual line of sight (VLOS) operations indicate that the total number of authorisation requests by UAS operators in Q3/2019 has somehow exceeded the number of approvals that are presently managed by the authorities. With the implementation of the regulations, it could be concluded that there is a need to streamline the approval systems to be able to cope with the approvals of/authorisation requests for UAS operations. This is the reason why EASA has developed and is continuously developing standard scenarios and predefined risk assessments based on the available mature national experiences. This aims to support the UAS operators operational authorisation and approval processes.

In addition, the approval of some BVLOS operations may require airspace restrictions such as segregated airspace to be able to mitigate the air risk and therefore these airspace mitigation measures are difficult to be taken as it takes time and wider consultation with all the stakeholders concerned (e.g. ANSPs, military authorities through the local airspace management cells). This can be considered as a reason for not having more BVLOS operations today in the European airspace.

3.1.4. International context

There are several initiatives across the world already implementing some basic UAS traffic management (UTM) services in their airspace¹⁵. For instance, in the USA, the Federal Aviation Administration (FAA) opened up airspace for UAS operations around airports through the Low Altitude Authorization and Notification Capability (LAANC) programme. The LAANC programme is automating the FAA authorisation process on the basis of a set of requirements. It provides UAS operators with access to controlled airspace at or below 400 feet, awareness of where pilots can and cannot fly, as well as it provides air traffic professionals with visibility into where and when UAS are operating. The

¹⁴ COM(2019) 640 final – The European Green Deal.

¹⁵ This is shown in the map of global UTM implementation initiatives presented at https://gutma.org/map/Main_Page.



LAANC is available to pilots operating under the Small UAS Rule Part 107, or under the exception for Recreational Flyers.

In China, some initial UTM services are being implemented. The Civil Aviation Administration of China (CAAC) issued rules on identification over the cloud- and geo-fencing. Since May 16 2019, a cloud-based system has been collecting the e-identification of the UAS to enable real-time flight management. UAS weighing more than 7 kg and operating BVLOS must be connected with the UAS cloud in real time.

In Europe, there are several Member States that are taking initiatives to develop and implement initial U-space services — mainly static geo-awareness and flight authorisation. This is the case for Switzerland, Poland, Finland, Italy, Spain and France among others. Some of these initiatives are related to U-space demonstration projects within the SESAR programme (but also outside the SESAR programme) and they have not always reached the deployment phase. In some Member States, these initiatives implement the requirements for the Member States to provide information on geographical zones to the UAS operators should they establish said zones. Such initiatives are considered the very basic steps for the implementation of the U-space as foreseen by the proposed Regulation, but it needs to be noted that they do not pertain to U-space services as proposed in the regulation. Additionally, there is no harmonisation among these initiatives in terms of scope, approach and standards being used.

3.2. What is the issue?

Unmanned aircraft are all aircraft without a pilot on board. They can be big or small, they can carry passengers and/or cargo and they can perform many different types of operations which can be carried out VLOS or BVLOS. Commission Delegated Regulation (EU) 2019/945 and Commission Implementing Regulation (EU) 2019/947 already contain the requirements for UAS operations in the ‘open’ and ‘specific’ categories¹⁶. The implementation of these regulations will already enable harmonisation of UAS operations across the EU. In addition, there are regulatory developments in place within EASA to make proposals to the European Commission for the regulatory framework for UAS operations under the ‘certified’ category which will allow more complex operations such as the transportation of passengers and regular cargo or package deliveries within an urban environment.

There are several predictions made by various industry stakeholders’ studies that estimate that the number of UAS operations will grow significantly within the European airspace¹⁷. In particular, as technology develops, higher levels of automation will be used.

The question is why the existing air traffic management system that keeps air traffic safe and prevents air collisions is not used and extended for the purpose of UTM. The answer is that the existing ATM system is a human-centric system and therefore it is not possible for the human being to be able to manage a large number of highly automated UAS operations. Even if many tasks and processes are today digitalised and automated within the ATM systems, it is not feasible for human beings to cope with and manage the expected high numbers of UAS operations. Hence, while the Single European

¹⁶ The concept of ‘open’ and ‘specific’ categories is described under <https://www.easa.europa.eu/easa-and-you/civil-drones-rpas/drones-regulatory-framework-background>.

¹⁷ Airbus forecasted for 2035 that a number approximately equivalent to that of daily flights in European airspace today — over 30 000 in one day — are going to take place in one single hour over one single city.



Sky framework regulates the provision of air navigation services for the safe operation of general air traffic, a complementary traffic management system is required to for the management of UAS traffic. The development of a European regulatory framework for U-space aims to enable safe and harmonised use of these technologies.

3.2.1. Safety risk assessment

As there is no sufficient data to perform a through quantitative safety risk assessment of the proposed regulation, EASA will use a general qualitative approach to conduct the safety risk assessment of the options analysed in this impact assessment. There is little experience with the implementation of the basic U-space services proposed in the regulation. Therefore, the assessment of the impacts is done on a qualitative basis only.

To perform the safety impact assessment, EASA has been inspired by the approach taken by Joint Authorities for Rulemaking on Unmanned Systems (JARUS) to develop the air risk model which led to Annex C and Annex D to the specific operations risk assessment (SORA)¹⁸. This model has also been adopted by EASA as AMC to Commission Implementing Regulation (EU) 2019/947. Indeed, Annexes C and D are supporting UAS operators in demonstrating to their competent authority how they mitigate adequately (to an acceptable level) the risk of mid-air collisions with manned aircraft. The air risk model of SORA is based on ICAO Doc 9854, Section 2.7 'Conflict management'. As indicated in Annex C to SORA, SORA has used UTM/U-space mitigations to a limited extent, because UTM/U-space was only at the early stages of development when said Annex was prepared. When UTM/U-space provide adequate mitigations to limit the risk of UAS encounters with manned aircraft, an operator can apply and obtain credit for these mitigations — whether they are strategic or tactical.

There is little experience within the European Member States on the implementation of the basic U-space services which are considered mandatory by the proposed regulation within the European airspace. In addition, the national demonstrations have not provided so far safety data based on which a safety risk assessment can be performed.

There is safety data on UAS/UAS incursions, near mid-air collisions between manned aircraft and UAS and some data related to UAS incidents and accidents where the UAS crashed on the ground on in the water/sea. At the moment, this safety data is not consolidated either worldwide or by EASA¹⁹ as there is no harmonisation in the definitions used for these events. This should be done by EASA in the near future. In addition, it is difficult to estimate which of these events would have been prevented if U-space airspace and U-space services would have been implemented as foreseen in the proposed regulation. In general, it can be assumed that with a harmonised implementation of U-space services, some of these events such as UAS incursions due to lack of UAS operators' awareness of where they can fly or not could have been avoided. But this can only be done in a general manner.

The approach that EASA will use is to justify how the proposed regulation will cover in a general manner each of three conflict management pillars defined in ICAO Doc 9854:

- Strategic mitigation

¹⁸ http://jarus-rpas.org/sites/jarus-rpas.org/files/jar_doc_06_jarus_sora_annex_c_v1.0.pdf

¹⁹ There are various databases containing UAS-related incidents available within some civil aviation authorities and industry.



- Separation provision
- Collision avoidance

3.2.2. Who is affected?

UAS operators: All legal or natural persons operating or intending to operate one or more unmanned aircraft. UAS operators that operate unmanned aircraft that are considered toys or those under subcategory A1, and UAS operators that conduct operations under model aircraft clubs and associations, and wish to operate within the established U-space airspace, will be obliged to use U-space services and conclude a contract with one of the certified USSPs for that particular U-space airspace implementation. UAS operators are benefitting from those services as the latter support them in conducting their operations safely and therefore in delivering their services.

USSPs: They are the single interface for the UAS operators requesting to be provided with U-space services in U-space airspace. They are affected as they need to obtain a certificate in accordance with the regulation in order to become a USSP. They need to provide the complete set of mandatory U-space services to become a USSP. They also need to have arrangements with ANSPs and use the necessary information from the CIS.

Airspace users (other than UAS operators): With the proposed way to implement U-space in controlled and uncontrolled airspace, mainly manned aircraft operators operating in uncontrolled airspace are potentially affected as they would need to comply with some requirements that they did not have to comply with before the implementation of the regulation. Indeed, they will need to make their position available with some performance requirements to allow USSPs to provide UAS operators with the relevant services and information with the aim of resolving potential conflicts. In the coming years, U-space implementation is foreseen to take place in very low level (below the minimum heights for VFR), in urban environment or around aerodromes. When the implementation takes place within controlled airspace, manned aircraft operators are provided with ATM/ANS services as today and the ANSPs are in charge of coordinating with USSPs to avoid conflicts between manned and unmanned traffic. Therefore, the main impact of this proposal is on manned aircraft when conducting operations in uncontrolled airspace or as uncontrolled traffic. General Aviation, rotorcraft operators and military or State airspace users are the airspace users mostly affected by the proposal.

ATM/ANS providers: ATM/ANS providers provide today ATM/ANS services to manned aircraft in the flight information regions (FIRs) of the Member States. The type of services (ATC or FIS) provided is determined by the Member States. U-space airspace will be designated by the Member States either in controlled or uncontrolled airspace. Existing ATM/ANS providers will need to establish interfaces with the USSPs to ensure that flight authorisations are coordinated and traffic information as well as the status of the portion of airspace designated for the operations of UAS are shared as necessary. In the case ATM/ANS providers were also the designated CIS provider, they would need to comply with some additional requirements.

Member States: They need to designate the necessary U-space airspaces and the CIS provider(s). They also need to establish relevant performance requirements to be met. The relevant authorities of the Member States concerned are at local, national and EU level (EASA), depending on the type of regulations/operational procedures to be put in place and on the enforcement measures to be established and applied.



Competent authorities: They need to certify and oversee the USSPs and the CIS provider(s) under their responsibility. In the case of pan-European service providers or USSPs whose principal place of business is outside the EU but are seeking a certificate to provide U-space services within the European airspace, the competent authority for certification and oversight is EASA.

Military authorities: They could be affected by the regulation but in principle they are the ones that will provide constraints and restrictions deemed critical to preserve national security for the U-space airspace through the CIS.

Other authorities: Local authorities (at the regional or even city/local level) that based on each Member State's administrative organisation may have been delegated some tasks under this regulation could be affected. They can provide their input, data and restrictions in relation to environment, security or public acceptance. As regards police and law enforcement authorities, U-space is a way to have additional access to UAS network e-identification information from the UAS operators flying in the U-space airspace. This way they also contribute to addressing public concerns.

3.2.3. How could the issue/problem evolve

If no action is taken, Member States will continue implementing U-space following their national initiatives. Individual actions in each Member State may result in different approaches and therefore could eventually penalise harmonisation and fair competition. This will negatively affect European industry and European UAS operators which will not benefit from the mutual recognition system guaranteed through the implementation of an EU regulation. This will also increase implementation costs as the UAS operators will need to equip their UAS with different on-board capabilities to be able to operate in different U-space airspaces across the EU. Ultimately, this may have an impact on safety.

It is considered that without the development and implementation of U-space services and U-space airspace, the UAS service market will not be able to achieve its full potential as today's UAS operational and flight authorisations are quite difficult to obtain for more complex UAS operations.

3.3. What we want to achieve — objectives

As stated in Article 2 of the proposed regulation, the objectives this Regulation are to:

- (a) support safe, secure and environmentally friendly operations of aircraft in the U-space airspace while respecting the privacy of European citizens;
- (b) maintain the current safety levels for manned aviation;
- (c) create the conditions for an internal market for U-space services; and
- (d) ensure fair, affordable and efficient access to the U-space airspace to all airspace users.

To support the safe increase of different type of UAS operations which will become more complex as they will be using aircraft with a higher degree of automation, there is a need to implement U-space. U-space aims to provide services to UAS operators to support their operations in volumes of airspace designated as U-space by Member States.

In addition to the general objectives above, which are derived from the Basic Regulation objectives, EASA aims to support the European Commission in achieving the goals of the EU policies in relation to transport as well as that of creating a strong and competitive UAS service market.



A further objective is to harmonise as early as possible the implementation of U-space across the EU.

As regards the specific objectives of the U-space services, they are to:

- prevent collision between UAS and between UAS and manned aviation;
- expedite and maintain an orderly flow of UAS;
- provide advice and information useful for the safe and efficient conduct of UAS flights;
- notify appropriate organisations regarding emergency or abnormal situations with the UAS which may endanger people and goods on the ground or manned aviation; and
- ensure that environmental, security and privacy requirements are met.

Not every service contributes to meeting all the objectives but the provision of all U-space service does.

Note:

- The implementation of U-space should also contribute to supporting the actions to be implemented in relation to unauthorised UAS (counter-UAS measures for which EASA has also developed an C-UAS action plan).
- Together with the implementation of the already existing regulations, it could contribute to supporting the national security measures against potential misuse of UAS.

3.4. How it could be achieved — options

3.4.1. Baseline Option — Option 0 ‘No policy change at EU level. U-space implementation is done at national level’

This option is the ‘do nothing Option’ and therefore leaves the implementation of U-space to the Member States. There is no development of a U-space framework at EU level.

3.4.2. Option 1 ‘Develop a harmonised framework for the establishment of U-space across Europe’-

This option foresees the development and implementation of a European regulatory framework for U-space across the EU.

Table 1: Selected policy options

Option No	Short title	Description
0	Option 0	No policy change at EU level. U-space implementation is done at national level.
1	Option 1	Develop a harmonised framework for the establishment of U-space across Europe.

3.5. What are the impacts

3.5.1. Methodology applied

The methodology applied for this IA is the multi-criteria analysis (MCA) which allows comparing the two options by scoring them against a set of criteria.



MCA covers a wide range of techniques that aim to combine a range of positive and negative impacts into a single framework to allow easier comparison of scenarios. The MCA key steps generally include the following:

- (a) establishing the criteria to be used to compare the two options (these criteria must be measurable, at least in qualitative terms); and
- (b) scoring how well each option meets the criteria — the scoring needs to be relative to the baseline scenario.

The criteria used to compare the two options were derived from the Basic Regulation, the objectives of the proposed Regulation and the maturity of U-space as a whole.

As shown in detail in the following table, the scoring of the impacts uses a scale of -3 to +3 to indicate the negative and positive impacts of each option (i.e. from 'low' to 'high' negative/positive impacts), with also a 'no impact' (0) score possible. This scale has been chosen as there is no sufficient data to use more granular scores.

Negative impact	Score	Positive impact	Score
-3	High negative impact	+3	High positive impact
-2	Medium negative impact	+2	Medium positive impact
-1	Low negative impact	+1	Low positive impact
0	Neutral/insignificant	0	Neutral/insignificant

3.5.2. Assumptions made for the assessment of the impact

The assumptions for the assessment of the impacts made below are the following:

- (a) U-space airspace is not everywhere but it is designated mainly where needed: mainly in low level airspace (below 500 ft outside the urban airspace, below the minimum height at the city within urban environment and around airports).
- (b) Option 0 could also mean that the ANSPs manage UAS traffic and provide U-space services themselves or the Member States decide not to implement U-space. Therefore, the situation remains as it is today but with adding the building blocks already foreseen in the regulation for UAS operations in the 'open' and 'specific' categories.
- (c) The assessment does not take credit for the potential availability of detect and avoid or sense and avoid capabilities of the UAS as the standards based on which general credit can be taken for all airspace classes are not yet available — in particular for low-level airspace.
- (d) The U-space services considered in this assessment are the ones included in the draft proposal. If additional services are considered necessary to support the U-space airspace implementation by the Member States, they cannot be included in the assessment as there is no harmonised description of them and how they should contribute to achieving the safety objectives.

3.5.3. Safety impact

As explained in Section 3.2.1, there is no consolidated safety data showing that the number of UAS-manned aircraft encounters and UAS incursions in areas such as aerodromes are increasing within the



European airspace. With the implementation of the European Regulation for UAS operations in the 'open' and 'specific' categories, the requirements aim to mitigate the air and ground risks posed by UAS. For UAS operations under the 'open' category, there are very clear requirements (e.g. UAS operators' responsibilities, maximum height of 120 m, geo-awareness system and systems of geographical zones for Member States in case they wish to use them). For UAS operations under the 'specific' category, the operators need to perform a SORA to properly mitigate air and ground risks.

As the number of UAS operations increases within the European airspace, these requirements need to be complemented with the UTM approach to be able to maintain safety and efficiency.

Option 0

The option of no policy change leaves the implementation of U-space to the Member States should they consider it necessary to manage the amount of actual UAS traffic in their airspace. The Member States could also decide that the management of the UAS traffic is done by the ANSPs. As EASA does not have a complete list of actions foreseen by Member States, the assessment is done only on the basis of an evaluation of the available options.

The following assessment is made in a general manner for each of three conflict management pillars defined in ICAO Doc 9854:

- (a) **Strategic mitigation:** For the strategic mitigation layer, Member States may decide to use the possibility given in Article 15 'Operational conditions for UAS geographical zones' of Regulation (EU) 2019/947 and use tools/applications to clearly indicate to UAS operators where they can fly or not and under which conditions. For manned aircraft, Member States may decide to make this information available in the aeronautical information publication (AIP) or through notices to airmen (NOTAMs). The Member States may use restricted areas, dangerous areas, or (temporary) segregated areas or other tools available to enable UAS operations. When considering the early implementation of the U-space airspace and when considering the first UAS operations which will take place mainly within the 'open' and 'specific' categories, this layer is going to be the most effective for conflict management as manned aviation flies in very low-level airspace mainly in the case of emergency or to conduct a specialised operation under specific approval (e.g. helicopter emergency medical services (HEMS), search & rescue (S&R) or other specialised operations).
- (b) **Separation provision:** Depending on the tool used for the strategic mitigation, the Member States may ensure separation of UAS traffic by segregation of airspace or using time as the separation provision means depending on their assessment. When the UAS traffic is within an airport environment, Member States may decide to use the same separation provisions that are available for manned aircraft. However, UAS are not able to comply with the rules applicable to VFR traffic and unless they are equipped and certified as IFR traffic, there is no possibility for them to comply with IFR rules. Each Member State will thus need to define what rules and procedures will be applicable in each case.
- (c) **Collision avoidance:** UAS traffic cannot see and avoid, as there is no standardised DAA system for which credit can be taken for all airspace classes, it is difficult in general to claim the availability of this layer. In addition, if there will be sufficient confidence that the whole airspace traffic is cooperative and the traffic information could be made available to UAS operators, this could facilitate the compliance of the UAS operators with their responsibilities of ultimately



avoiding collision. EASA does not have sufficient information on how Member States will mitigate this layer.

This general assessment is done on the basis of known tools available to Member States and not knowing which U-space services the Member States will implement and how they will implement U-space. The main drawback of this option is that the requirements and technical solutions will vary from Member State to Member State. This could potentially have a negative safety impact as there will be no clear rules and procedures applicable to all UAS operators and all airspace users across the EU. This will be the case in particular for those UAS operators and U-space services providers wishing to operate in more than one Member States. **Therefore, the score given to this option is -1.**

Option 1

This option foresees the implementation of the U-space airspace by the Member States in areas where it is needed for the management of UAS traffic and the implementation of it as foreseen by the proposed regulation, for controlled and uncontrolled airspaces. In addition, when U-space airspace is implemented, U-space services are provided as described in the proposed regulation. Member States might use additional U-space services if they consider them necessary for the specific U-space airspace implementation. The use of additional U-space services is not considered in this assessment as they are not known, neither commonly agreed definitions or specifications of them exist.

As for Option 0, the following assessment is made in a general manner for each of three conflict management pillars defined in ICAO Doc 9854:

- (a) Strategic mitigation: This mitigation layer is foreseen with the designation of the U-space airspace as stipulated in Article 4 of the proposed regulation. Member States may establish U-space airspace after a risk assessment is performed for the airspace. The tool used for establishing this U-space airspace can be restricted airspace or temporary segregated airspace. But they can also use other tools such as dangerous areas (e.g. in uncontrolled airspace). It can be a temporary or permanent airspace structure depending on the traffic density or complexity. In controlled airspace, it is foreseen that U-space airspace is established as a temporary segregated airspace and the management of it is performed by the responsible ANSP. When the airspace is established as foreseen in the proposed regulation, in very low-level airspace, near airports or within urban airspace, there is a natural segregation (and therefore separation) with manned traffic, and the U-space will only be deactivated for UAS operations when a manned aircraft would need to cross the U-space airspace. Therefore, there is segregation between manned and UAS operations. When U-space is established in uncontrolled airspace or in airspace class E for uncontrolled traffic (i.e. VFR), the U-space airspace could be established as restricted airspace and this information shall be made available to manned aircraft. In this case, when for whatever reason manned aircraft would need to cross U-space airspace, they would need to make their position available to USSPs at regular intervals. The USSPs would use this information to create the necessary geo-fencing or geo-awareness information for the UAS traffic to avoid collision. This information can be used by the USSPs to provide traffic information to UAS. For UAS-UAS encounters, so far the regulation foresees that when U-space airspace is established, all UAS operators, except those exempted from the regulation, need to comply with the required U-space services.



- (b) Separation provision: This mitigation layer is ensured in different ways in controlled airspace and in uncontrolled airspace. When U-space airspace is in controlled airspace, this layer is ensured by segregation between manned and UAS traffic as they will not fly in the same airspace volume at the same time. If manned aircraft need to cross U-space airspace, this becomes unavailable for UAS traffic. The separation between UAS within U-space airspace is ensured with the use of services such as traffic information and through the management of flight authorisations to deconflict the traffic before the flight is initiated. When the U-space airspace is established within uncontrolled airspace or in the case of uncontrolled VFR traffic, when the U-space airspace is established within class E airspace, the separation provision is ensured by the manned traffic providing its position at regular intervals to the USSP and by the USSPs providing traffic information to UAS traffic or deconflicting the traffic through the flight authorisations. To support appropriate mitigation within this layer, additional U-space services such as tracking service or conformance monitoring can be used when the traffic and traffic complexity require so. This way of mitigating the risk within this layer works when the U-space is established in the very low-level airspace, around airports or within the airspace below minimum heights within urban environment. When the U-space is to be established at higher heights/levels or outside these use cases or when the traffic density or complexity of UAS traffic is increased, the regulation will need to be amended to require additional U-space services (e.g. tactical deconfliction service).
- (c) Collision avoidance: In the absence of DAA systems based on which standards can be credited for all airspace classes, this layer remains the most difficult to mitigate as UAS traffic cannot see and avoid other traffic and manned traffic is also unable to see and avoid small/medium-sized UAS. This is why the assessment and the proposed regulation relies mainly on stronger strategic and separation mitigation layers rather than on collision avoidance. That is the reason why as far as it is possible temporary segregation should be used to manage U-space airspace and cooperative measures should be applied within U-space airspace to manage UAS-manned traffic and UAS-UAS traffic separation. This together with the assumption that U-space airspace will be mainly implemented in very low-level airspace, around airports or in airspace within urban environment, as well as the expected low/medium UAS traffic density in the near future, makes it possible to do the following assessment. The way for UAS operators to comply with their responsibilities under SERA.3201 is to ensure that they are provided with the necessary traffic information to be able to avoid collisions. For this reason, it is required that manned aircraft make their position available to the USSPs at regular intervals when they fly within U-space airspace in uncontrolled airspace or when they fly as uncontrolled traffic (VFR in class E). When manned aircraft are provided with ATS/ATC services by ANSPs, it is expected that traffic information is shared between USSPs and ANSPs (through CIS or directly).

This general qualitative assessment is done on the basis of the assumptions taken being valid and the regulation being implemented as foreseen. In addition, the UAS traffic and traffic complexity foreseen is such that the proposed approach is able to safely manage the traffic. When these assumptions are not correct, then the assessment would need to be reviewed.

On the basis of the assessment made and on the basis of the information made available to EASA about the implementation foreseen by Member States within Option 0, EASA concludes that Option 1 will provide for a higher positive safety impact as the three conflict management pillars of ICAO are met in a harmonised way across the EU and therefore, this should avoid confusion from the UAS



operators and manned aviation traffic and should serve as a basis for more complex operations and amendment of the regulation with more advanced U-space services once they are mature. Compared to option 0, **the score for this option is then +1.**

3.5.4. Economic impact

Option 0

UAS operators that want to operate in the U-space would be provided with a number of U-space services. The type and number of U-space services will be determined by the competent authorities. The latter could require an extensive range of U-space services to be provided with and could even decide that the services vary from one U-space airspace to another (in the same Member State). Therefore, UAS operators may need to engage a lot of human and financial resources to comply with different technical or operational requirements in the same U-space airspace to receive the necessary U-space services. Furthermore, in the case UAS operators wish to provide services in another Member State, they will have to adapt their operational procedures and capabilities to be able to safely operate in the other national U-space airspace(s). Since there might not be equivalent implementation between the Member States, UAS operators might need to invest in the training and operations qualification of their pilots. The cost of operating in different Member States may be high due to the lack of harmonisation of U-space services implementation which implies different training, use of different application software and interfaces, and different authorisation regime.

National implementation of the U-space will have a negative economic impact on USSPs. In general, USSPs will have to bear the most significant investment in terms of infrastructure and performance capabilities. The cost to launch and maintain their activities includes the operation and maintenance of specific infrastructure and equipment that they will need in order to provide services in the U-space. Because the U-space services will be provided only at national level, such service provision could create fragmentation with different levels of service and performance in the EU, which will bring most likely additional cost for them but also to the overall aviation network.

Similarly to USSPs, ATM/ANS providers will have to develop and maintain some infrastructure, system and other ancillary services to be competitive. They will need to establish certain procedures for interacting and exchanging data with the USSPs. Such procedures and exchange most likely will be supported by automated tools which are currently not available. Some extra ATCO/FISO training may be needed.

For the authorities, the initial implementation of the U-space airspace may have a high cost due to the need for airspace redesign and the necessity to provide for the accuracy of aeronautical data used for airspace structures definition. Indeed, high-accuracy data origination will inevitably bring additional cost. In addition, the role of the (national and local) authorities will be primarily to ensure that the applicable rules are complied with by all U-space participants. In addition to their certification and oversight duties for traditional aviation operations, the authorities will have to also act as the certification authority for all USSPs. The same applies for their oversight responsibilities where they will need to ensure that the U-space framework they have established (airspace, overall systems they have approved) can be properly checked. In some Member States, federal and local authorities will also have to ensure the appropriate enforcement (police) measures and foresee the necessary human resources and financial expenses to be able to fulfil their duties. Also, given the rapid technological developments, each Member State will need to maintain separately their own national legislation.



Such maintenance will most likely be needed much more frequently than in the other aviation domains, which will bring an overall cost and burden for each of the competent authorities. However, if the volumes of airspace that are designated U-space airspace are a few, the economic impact on authorities may be slightly less than if there are multiple designated U-space airspaces. Also, the national implementation of U-space may not consider a centralised CIS provider and therefore the impact would be lower because the tasks of the authorities referred to above will be limited.

Even though there are initial implementation costs to be borne by the affected stakeholders, they would benefit from the opening of the various national U-space service markets, allowing more complex UAS operations, even if the cost of such a national approach would limit those benefits.

In conclusion, depending on the level of national implementation of U-space in each Member State, the economic impact will vary. Nevertheless, this option would only, overall, enable limited business growth and would maintain restricted individual UAS service markets, each depending on national decisions. **Therefore, the score given to this option is 0.**

Option 1

For UAS operators, the economic impact is positive as even though they will be need to pay for the provision of U-space services, they will benefit from operating according to a clear European regulatory framework. Said framework will facilitate their business and open the market for the provision of UAS services in a European-wide harmonised way. As the U-space will provide the environment where operations can be conducted in a safe manner, this has a positive impact on their business capacity. Efficient routes provided by the service providers can support their operations in a cost-effective manner. This will allow them to increase their operations. Requirements for equipment and performance in the U-space airspace will bring some cost in the short term, but a harmonised approach will provide benefits in the long term, especially with regard to mobility and cross-border services.

In addition, the proposed regulation foresees the inclusion of the 'open' category except for toys, UAS within subcategory A1 and unmanned aircraft operated under model aircraft clubs and associations. This option may have a potential negative economic impact on the UAS operators under the 'open category' as in addition to the capability requirements as per Regulation (EU) 2019/945, they will need to have a contract with a USSP and receive a flight authorisation before operating in the U-space airspace.

Harmonised approval/certification for USSPs will enable application of the free market principles for the operators when selecting their service provider and may, therefore, reduce the cost of operations.

Under this option, the U-space regulatory framework requires that at least four U-space services are provided to UAS operators and gives the possibility for UAS operators to ask for more when available. In addition, it needs to be considered that there is a need to implement the minimum necessary infrastructure to support provision of U-space services and this will have an initial cost for the USSPs that may be recovered in the long term when U-space services are actually provided. U-space services will be provided in a harmonised manner at EU level as some common means to ensure interoperability and connectivity will be required. All these elements will inevitably create business opportunities for service providers and therefore have a positive financial impact.

ATM/ANS providers are currently providing services within a clear ATM/ANS (service provision) regulatory framework. In accordance with the proposed regulation, when they are providing the CIS,



they will not be allowed to provide U-space services in that U-space airspace. This requirement prevents them from participating in certain U-space airspaces and thus restricts potential business activities. Although this requirement seems necessary to ensure that there is no conflict of interest when the common information is made available to the different USSPs, this option does not have a positive economic impact on ATM/ANS providers in case they want to act both as a CIS provider and a USSP in the same U-space airspace. However, the proposed regulation opens a new possibility for ANSPs to act as a U-space services provider other than ATM/ANS provider in all other U-space airspaces.

As mentioned in Option 0, for the authorities, the initial implementation of the U-space airspace may have a high cost due to the need for airspace redesign, accuracy of aeronautical data used for airspace structures definition, etc. However, a harmonised approach and joint Member States efforts in this regard may bring cost reductions compared to Option 0. If additional personnel for the oversight and approval/certificate of the USSPs will be needed as described in Option 0, the mutual recognition, based on the harmonised approach will open the market and bring long-term benefits, compared to Option 0. This option overall enables business growth and creates a harmonised UAS services market with a positive economic impact on most of the affected stakeholders.

All in all, when evaluating the potential negative and positive economic impact, **the score given to this Option is +2.**

3.5.5. Environmental impact and impact on privacy

Today, people associate UAS with negative impact on the environment and citizens' privacy. The increase in the number of unmanned aircraft operating at low-level altitude will inevitably increase the nuisance and interference with the use and enjoyment of public or private property. This may be regarded as intrusive because UAS are expected to increase annoyance, discomfort, mental and emotional distress, and as a nuisance because of aircraft noise and visual pollution.

Option 0

This option allows each national authority to decide on the approach to be taken to protect their citizens from environmental constraints. In that case, each Member State will respond to such environmental concern according to its own national/local considerations. It may be argued that national protection of citizens may be more effective and efficient at national level than harmonised at EU level. However, external factors or other more urgent national considerations may affect the environmental actions/priorities of the authorities and therefore the impact would be highly negative for the citizens. This has already happened in the traditional aviation sector, where, in some Member States, some political decisions were made against environmental considerations. Also, in order to ensure fair and equal treatment of EU citizens, national solutions are not considered to be the most viable and sustainable ones. Therefore, this option is considered to be neutral in terms of benefits/drawbacks for EU citizens when thousands of UAS will be flying at low altitude. **Therefore, the score given is 0.**

Option 1

This option requires that environmental issues are tackled at EU level to ensure that a minimum protection of the citizens is ensured. The regulatory framework proposes a set of mandatory U-space services. These services should ensure, as much as possible, that environmental requirements are



met. Such provision of U-space services may facilitate the definition of areas with respect to acceptable noise levels in time and space and which can support foreseen planning of flights through these areas (e.g. geo-fencing services to protect privacy as well as environmentally sensitive areas such as bird protection zones, etc.).

The U-space services may also have an impact on defined zones with respect to noise sensitivity as well as allowed noise levels in each zone and may support flight route planning in order to minimise the noise impact on surrounding populated areas. The establishment of the U-space can benefit people on the ground who would be on the flight route of the unmanned aircraft and who could possibly suffer from the aircraft noise and/or visual pollution. Indeed, the operator will know which zones to avoid during flight planning and will get support and advisories from the USSPs in order to minimise the noise impact on the surrounding populated areas. This option may be dependent on the environmental strategy of the appropriate authorities in a given area.

Furthermore, all the necessary information that is required to be exchanged between the U-space participants should facilitate the protection of the EU citizens against noise, and privacy issues.

Therefore, it is foreseen that the establishment of a harmonised U-space across the EU contributes to the setting of a minimum level of environmental protection that can be complemented by national measures as well, if needed. **The score given to this option is +1.**

3.5.6. Security impact

While recognising their many useful purposes, UAS in the hands of malicious actors also pose a security threat to public spaces, critical infrastructure (not least aircraft and airports), sensitive sites (e.g. prisons, police facilities, military installations), and both high-profile and private persons. Recent incidents involving UAS have led to severe traffic disruptions at European airports and have highlighted potential risks to passengers and aviation staff. The challenges in protecting such spaces, sites and people are only likely to grow as UAS become more sophisticated, accessible and affordable. In particular, UAS operations in and around airports and other critical infrastructures must comply with strict security requirements in order to avoid any gaps and implement recognised solutions.

Option 0

Under this option, national authorities foresee security measures to deal with potential security threats. These authorities will manage security according to the experience related to dangerous events that occurred in their Member State and will therefore take the appropriate measures in order to ensure that such events do not occur anymore. When doing so, it has often been demonstrated (e.g. intrusion of UAS near airports) that the necessary measures were effectively taken to mitigate the security risks.

Member States are not waiting for the implementation of the U-space to develop security policies/measures related to drone activities in their territory. However, the implementation of U-space can provide the necessary means to efficiently manage security threats. Indeed, various U-space services required by the national authorities to be provided as well as the information to be exchanged with regard to UAS operations will have a positive impact on the overall security mitigation policy. This option has therefore a positive impact on security related measures. **Therefore, the score given to this option is +1.**



Option 1

Similarly to Option 0, the implementation of the U-space regulated at EU level has a positive impact on security. Indeed, all the elements described in Option 0 apply in this case. But furthermore, under this option, the obligation to exchange data, to coordinate with all the participants in the U-space and the requirement for the CIS provider to put in place cybersecurity protection measures (determined by EASA) will enhance the aviation security approach and reinforce the capability of the U-space to protect its system across the EU. As the threat posed by UAS is likely to continue to grow as they become more widely available, more affordable and more capable, the implementation of the U-space will be complemented with the upcoming regulatory proposal on the 'Management of information security risks'²⁰ proposed by EASA. This rulemaking activity is proposing a set of rules in the aviation security domain to ensure that the confidentiality, integrity and availability of information being stored, transmitted or processed through the aeronautical information systems are not compromised. This will contribute to an efficient U-space implementation and ensure that all the information managed by the CIS provider(s) is protected from cyberattacks and their consequences. Furthermore, the current existing requirements for registration, remote identification and geo-awareness functionality will be applicable as from June 2020. These measures will undoubtedly prevent some types of disruptive drone usage, and the development of U-space at EU level should enhance the preparedness and resilience of the aviation sector generally and airports in particular. **Therefore, the score given to this option is +2.**

3.5.7. Social impact

The social impacts analysed in this section are those related to mobility and employment.

Under both options, as the U-space will be the enabler for the development of new services and innovative UAS services, all citizens will benefit from this opportunity as they will be able to access certain services that were probably not possible before the U-space (e.g. easier delivery of services in remote areas). This has a positive impact on equal opportunities.

Option 0

With regard to mobility, a national U-space implementation would result in a negative social impact caused by the fact that each Member State will most likely develop highly customised 'system architecture' for the U-space services and this will limit the mobility of UAS operators and USSPs if they want to provide services in another Member State. As they can determine the type and number of U-space services to be provided for each U-space airspace(s), free movement of business activities could be limited within a Member State. Therefore, the implementation of U-space at national level would neither encourage competitive and cost-effective service provision at all times neither support the business models of UAS operations. Furthermore, this will not guarantee equitable and fair access to services for EU citizens.

Whereas UAS operators will operate and develop business according to national U-space regulations, the growth of the UAS operations demand would affect the management of UAS operations, including mobility.

The impact on employment is closely linked to mobility. If the UAS operators and USSPs are limited in the way they can provide services, this could eventually have a low negative impact on their business

²⁰ [NPA 2019-07 on 'Management of information security risks', 30 May 2019.](#)



development and thus potentially on the employment market. **Therefore, for this option, the score given is -1.**

Option 1

This option establishes a framework for Europe and therefore facilitates operations in general, as it will provide the same criteria and requirements across Europe, with same-level obligations. This facilitates the movement of persons and services across the EU. UAS operators will benefit from the various services that will be provided, not only in the U-space where they are operating but they may also reach for services in other U-space airspaces of other Member States where service offers are equally or more attractive. The fact that a U-space framework is in place in one Member State may facilitate the usage of U-space services in another.

USSPs would benefit from the EU regulatory framework as they will have the opportunity to provide services in another Member State. Although the mobility of persons is less relevant for USSPs (because they can offer services across the EU from one single location), the possibility for personnel of these USSPs to establish themselves in another Member State exists and will be facilitated by the fact the European U-space rules will allow them to provide the minimum set of (mandatory) services and thus create an easy setting-up of their business. In a regulated environment in U-space, citizens may thus benefit from the full potential range of services that may be provided.

Through the provision of new U-space services, the proposal would ensure fair access of UAS operators to the airspace in a cost-effective manner. Therefore, the regulatory framework would open up a UAS services market because the U-space would enable fair, flexible and open access to the airspace. This framework would encourage UAS operators to develop their activities and also be an incentive for those who would like to start business in the UAS area. As the U-space is expected to create a safe environment that will also ensure privacy and environmental protection, UAS operators and USSPs will be able to develop new and sustainable business models, increase employment and contribute to the growth of the UAS market. Therefore, the establishment of U-space will have a positive impact on employment and labour market and **the overall score given is +2.**

3.5.8. Impact on General Aviation

General Aviation (GA) in the EU involves a wide spectrum of aircraft ranging from gliders to complex business jet operations. It constitutes an important part of the EU aeronautical industry and also an important part of the airspace users that may typically share airspace with the first set of UAS operations.

As UAS cannot see and avoid and cannot apply other rules foreseen within SERA to prevent collisions such as VFR or IFR rules, UAS operations raise a safety concern which is mid-air collisions with manned traffic in particular outside controlled airspace which is the airspace typically used by GA traffic. A mid-air collision could happen if the UAS pilot cannot see and avoid manned aircraft in time and vice versa.

Moreover, GA pilots cannot always see typical UAS traffic in a timely manner and avoid them with the means available today. The 'see and avoid' principle commonly used by VFR traffic and GA pilots within uncontrolled airspace cannot provide an acceptable level of safety if UAS traffic performing BVLOS operations flies in the same volume of airspace without any restrictions. The same applies to VFR traffic in airspace class E.



With the proposed regulation and considering the lack of DAA systems available for UAS for all airspace classes, it is considered necessary that GA traffic that would need to cross U-space airspace established within uncontrolled airspace or where uncontrolled traffic takes place, the manned traffic is requested to make their position available to the USSPs at regular intervals. It is important to highlight that U-space airspace is not restricted for manned aviation/GA, but when it is established outside controlled airspace or for uncontrolled traffic, there is a new obligation for the manned aircraft to provide its position to the USSP in order to allow the latter to provide traffic information to the UAS traffic and therefore support proper conflict resolution.

While it is considered to be a new obligation for manned aviation, mainly GA, rotorcraft performing HEMS operations or other type of operations within very low-level airspace or military/State aircraft operations, this impact, mainly economic, is considered to be low for GA traffic (and medium for other airspace users such as affected rotorcraft operators and military/State operators) as it is not expected that GA would fly below 500 ft (VLL), except for take-off or landing in the vicinity of an airport. Nevertheless, it is acknowledged that certain operations still may occur in VLL for reasons of emergency/contingency (e.g. engine failures) or in the case of gliders and balloons, which are heavily dependent on the wind and cannot always control their path and intent. In all these cases, it is important to evaluate how their position can be made available to the relevant USSPs.

Today, the risk of mid-air-collisions between GA traffic is dealt with by the European GA community and there are more and more low-cost conspicuity devices being voluntarily implemented by them (e.g. FLARM, Pilot Aware and low-cost low-power ADS-B out transmitters). EASA has launched an initiative in the context of its GA roadmap to address this identified safety risk and the Best Intervention Strategy (BIS) on Airborne Collision Risk that includes a set of proposed actions, was sent for consultation with the EASA ABs in 2019. EASA will decide on the actions proposed in the BIS to address this safety issue after reviewing the comments received.

EASA's intention is to combine the two initiatives and explore how the aggregation of multiple technologies and initiatives can serve to also improve the already existing safety levels for the GA community and to allow UAS operations at least as foreseen with the proposed regulation. Therefore, the implementation of U-space airspace as foreseen in the proposed regulation and the provision of the U-space services could also have a positive safety impact on GA in general.

Option 0

This option leaves the implementation of U-space to Member States and EASA does not have sufficient data to assess the impact of the individual implementation of the Member States on GA traffic. EASA has been made aware that in many cases to allow safe UAS operations, in particular BVLOS operations, the Member States have segregated the airspace where the UAS operations take place for obvious safety reasons. This approach has the highest negative impact on GA traffic as they will have more complex airspace structures to respect when preparing their flights. This does not mean that all Member States will use this approach to allow UAS operations. However, Option 0 entails no harmonised implementation of tools and procedures for U-space and therefore much more uncertainty for the GA traffic when flying across the European airspace, including the need to adapt to different local procedures and airspace structures. This option has therefore the highest negative impact on GA. **Therefore, the score given to this option -2.**



Option 1

Although the GA aircraft will be required to provide their position to the USSPs at regular intervals when flying within the U-space airspace which is designated in uncontrolled airspace or when they fly as uncontrolled traffic within the U-space airspace, the impact is limited to certain circumstances (flying in very low-level airspace, around airports or within urban environment). In addition, EASA intends to use the available conspicuity devices and initiatives to adapt them to fulfil this obligation and therefore also support the overall safety improvement of GA. This option foresees a harmonised implementation of the U-space airspace and services across the EU and considering the foreseen implementation, it is anticipated that the impact on GA is medium negative. **The score given to this option is -1.**

3.6. Conclusion**3.6.1. Comparison of options**

Based on the previous sections, a table is provided to compare and summarise the impacts per option and per criteria.

Reminder: Each impact criterion for each option is given a score between -3/+ and +3 scale.

	Option 0	Option 1
Safety impact	-1	+1
Economic impact	0	+2
Environmental impact and impact on privacy	0	+1
Security impact	+1	+2
Social impact	-1	+2
Impact on GA	-2	-1
Total	-3	+7

The **preferred option**, considering all impacts, **is Option 1** — Develop a harmonised framework for the establishment of U-space across Europe.

Compared to Option 0 under which the implementation of the U-space is made at national level, a clear common European approach to manage unmanned traffic in the U-space airspace(s) will create a safe environment. By defining a first set of rules so that all the participants in the U-space know what they have to do, this option will promote a minimum level playing field across the EU as well as an efficient and equitable airspace access for all aircraft operators.

3.7. Monitoring and evaluation

Monitoring is a continuous and systematic process of data collection and analysis about the implementation/application of a rule/activity. It generates factual information for future possible evaluations and impact assessments. It also helps to identify actual implementation problems and



support regular updates of the regulatory framework e.g. by adding additional U-space services when mature. A proposal on indicators to check is presented below:

What to monitor	How to monitor	Who should monitor	How often to monitor
<p>Occurrences, incidents and accidents involving UAS operation within the U-space airspace</p> <p>U-space services implemented by Member States in addition to those required by the regulation</p> <p>How U-space airspace is established and where it is established by Member States across EU</p>	<p>European Coordination Centre for Accident and Incident Reporting Systems (ECCAIRS)</p> <p>Through surveys, implementation support actions, UAS implementation network, EASA's ABs and standardisation inspections</p>	<p>EASA/NAA</p>	<p>On a recurrent basis, e.g. once a year</p>



4. Proposed actions to support implementation

- Focused communication in AB meetings (MAB/SAB/TeB/TEC/COM)
- UAS implementation network
- Provision of clarifications in electronic communication tools EASA–NAAs (EASA surveys or other)
- Detailed explanation with clarifications on the EASA website
- Dedicated thematic workshops/sessions at EASA
- Series of thematic events organised on the regional principle
- Combination of the above-selected means

Cologne, 13 March 2020

Patrick KY
Executive Director



5. References

5.1. Affected regulations

- Commission Implementing Regulation (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011 (OJ L 62, 8.3.2017)

5.2. Related regulations

- Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (OJ L 152, 11.6.2019)
- Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019)

5.3. Related decisions

- n/a

5.4. Other reference documents

- n/a



6. Related documents

Appendix to Opinion No 01/2020 (stand-alone document)

