

FLYNEX



U-SPACE WHITE PAPER

EUROPEAN DRONE MANAGEMENT

CONTENTS

Glossary	3
1. CURRENT REGULATION OF AIRSPACE IN EUROPE	4
2. FUTURE REGULATION OF AIRSPACE IN EUROPE	5
3. UNMANNED AERIAL TRAFFIC MANAGEMENT	6
4. THE U-SPACE	7
4.1 Goal and Benefits	7
4.2 Implementation Requirements	9
5. FLYNEX RESPONSIBILITIES AND UTM CONNECTIVITY	11
Sources	13

GLOSSARY

- ATM** Air Traffic Management
- BMVI** Bundesministerium für Verkehr und digitale Infrastruktur
(German Federal Ministry of Transport and Digital Infrastructure)
- BVLOS** Beyond Visual Line of Sight
- EASA** European Union Aviation Safety Agency
- NASA** National Aeronautics and Space Administration
- SESAR** Single European Sky ATM Research
- UTM** Unmanned Aerial Traffic Management



1. CURRENT REGULATION OF AIRSPACE IN EUROPE

The European Union Aviation Safety Agency is the European air safety authority and is responsible for air traffic control at the European level. Until 2003, air traffic control was the responsibility of individual European states. Due to the increasing need for uniform guidelines and laws, the EASA was founded.

The EASA was established in response to a decision of the European Parliament and the Council of the European Union. The work began in September 2003. Today the EASA is responsible for ensuring safety and environmental protection in civil aviation in Europe.

The specific tasks include¹:

- › Regulatory harmonization and certification
- › Development of the EU internal aviation market
- › Preparation of technical rules for air transport
- › Type certification of aircraft and components
- › Approval of companies that design, manufacture or maintain aeronautical products
- › Safety oversight and assistance to EU countries (air operations, air traffic management, etc.)
- › Promoting European and international safety standards
- › Cooperation with international actors to improve safety in Europe (e.g., by maintaining the “EU Aviation Safety List”, a list of banned airlines)

¹European Union



2. FUTURE REGULATION OF AIRSPACE IN EUROPE

In June 2019, the European Commission adopted a draft law proposed by EASA to harmonize various UAV regulations in Europe. To achieve this, both technical and operational requirements were defined to which all member states need to submit. Initially, the EU regulation was to come into force on 1st July 2020.² In April 2020, the EU Commission extended the deadline to 1st January 2021. The reason given is the corona crisis and the resulting slowdown of various decision-making processes.

The regulation will make conditions dependent on the risk posed by the aircraft and flight maneuvers. Two new terms have been introduced to evaluate the factors. Firstly, the „classes“: In the future, aircraft will be classified into equipment classes. Manufacturers will be obliged to a class between C0 and C4 for their products. The assigned class provides information about the risk involved in the operation and sets the technical requirements that the manufacturer must meet.

The second term, „category,“ is intended to describe flight maneuvers. There are „open,“ „specific,“ and „certified“ maneuvers. The first category, „open“, again consists of three subcategories: A1, A2, and A3.

The first three classes C1, C2, and C3, will be equipped with a geo-sensitization system. It is intended to access Europe-wide uniform data on no-fly zones and general airspace boundaries and to warn long-distance pilots. All member states will provide their data themselves.

²German Federal Authority for Air Navigation Services



3. UNMANNED AERIAL TRAFFIC MANAGEMENT

Unmanned Aerial Traffic Management is a term coined by NASA and the FAA to describe the management of unmanned aerial vehicles. The traditional ATM system still needs to meet the new requirements for an integrated air traffic management system that includes unmanned aerial vehicles. UTM can be understood as a separate system that complements the ATM in its function. It is intended to be used wherever drone missions occur outside of the pilot's visual range (BVLOS). It allows processes and missions to be made more efficient. ([UTM and ATM – This Is the Difference](#))

Advantages of BVLOS

- › Automation up to autonomous flights in the future
- › Simplified use of pilots not having to be present on site
- › Especially suitable for routine flights

Requirements and specifications for BVLOS

- › Precise flight information and geodata
- › Safety measures on the device
- › Stable radio connection

INFO | BVLOS

BVLOS stands for „Beyond Visual Line of Sight“ and refers to a UAV flight in which the device is out of the pilot's visual range.



4. THE U-SPACE

The new laws, which will be passed based on the EU directives, can be understood as a first step towards realizing U-Space. For this purpose, the focus group SESAR (Single European Sky ATM Research Program) was set up to take on the project.

U-Space is a framework for the integration of drones into European airspace. Yet no airspace management system is developed explicitly for UAVs, and current legislation needs to be oriented to individual use cases. The U-Space is intended to change this. EASA describes U-Space as a set of services in an airspace area provided by a digital system.³

4.1 GOAL AND BENEFITS

The U-Space is intended to contribute to the integration of a large number of drones into European airspace. The aim is to achieve a high degree of automation of processes and connectivity between the drone and its environment. The advantages of U-Space can be divided into four categories.

³European Aviation Safety Agency

**EU CITIZENS:**

- › U-Space will enable new, drone-based service providers to enter the market
- › U-Space makes drone flights safe
- › The U-Space ensures privacy and takes care of an environmentally friendly implementation of drones in everyday life (noise and visual pollution)

AUTHORITIES:

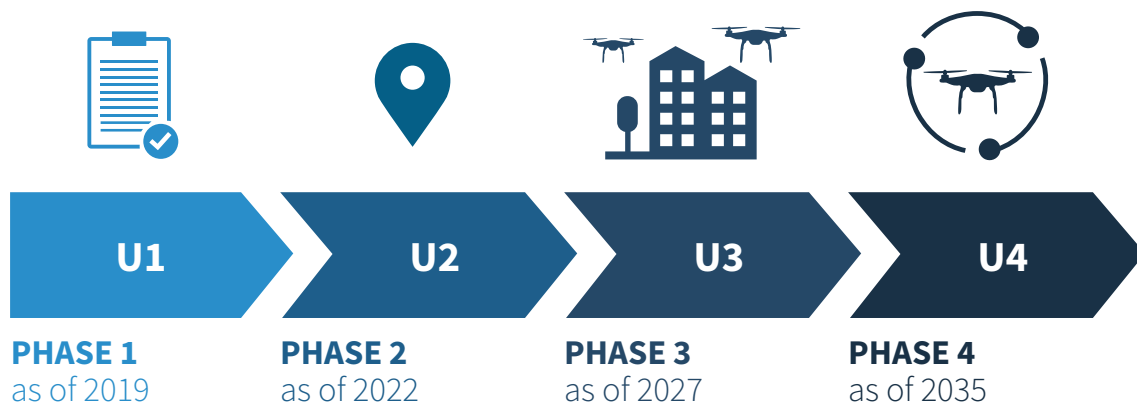
- › U-Space simplifies airspace regulation
- › The U-Space simplifies the assurance of privacy, security and environmental friendliness
- › The U-Space simplifies the registration and identification of drones
- › The U-Space simplifies the protection of danger zones

DRONE PILOTS/DRONE USERS:

- › The U-Space allows fair, flexible and open access to the airspace
- › U-Space enables access to the market for new UAV services

COMPANY:

- › U-Space enables the development of new business models
- › U-Space creates jobs and market growth
- › The U-Space promotes the movement towards automation and digitalization



4.2 IMPLEMENTATION REQUIREMENTS

SESAR defines four stages of the U-Space concept and specifies a time frame in which the various sub-objectives are to be achieved. Each step represents the basic requirements necessary for the successful implementation of U-Space.

U1

PHASE 1 – AS OF 2019

The first phase of the U-Space concept is dedicated to providing three essential services. The services include e-registration, e-identification, and geofencing. They are designed to enable Urban Air Mobility to function smoothly.

In simple terms, it should be possible to record and store drones and their pilots in a single register. The drones should be able to identify other unmanned aircraft in the sky, which is a technical challenge. Before the end of 2020, a law will be passed requiring manufacturers to install uniform signal receivers in their equipment.

Geofencing is the virtual fencing of an area. The unmanned aircraft is given a signal that it is not allowed to fly over the area. There ought to be fixed boundaries for defined coordinates, which prevent an approach. In the future, centralized units will adjust, control, and manage geofences. Once these three services are in place, the second phase of the U-Space concept will begin.

U2

PHASE 2 – AS OF 2022

In the second phase, drone flight management and UTM are to be optimized. To this end, interfaces with authorities are to be established, for example, to simplify and shorten approval procedures. Additionally, software for flight planning, including tracking options, will be available. Dynamic airspace information is also to be made available to everyone. The services from Phase 1 are to be applied here. A functioning UTM system requires a sufficiently developed mobile radio network and GPS modules in all aircraft. The position and flight path of the aircraft is transmitted to the drone pilots via the UTM system.

U3

PHASE 3 – AS OF 2027

It is intended to enable more complex missions and flights into and through densely populated areas. Technology for detecting and avoiding collisions with other aircraft and mobile objects on the ground must be implemented and reliable to achieve these missions. According to the BMVI, the information from the UTM system should be obtained via a „web interface“⁴. Additionally, drone flights can be controlled and managed via a tablet or a mobile phone.

U3

PHASE 4 – AS OF 2035

In phase 4, the U-Space should be completed and fully utilized. There will be a high level of automation and connectivity between the drone and the U-Space, as well as between software and authorities.

FlyNex has been involved in unmanned aerial systems for many years and will continue to monitor the upcoming changes and regulations at European level. Through our work in industry committees, associations, and advisory board activities for the BMVI, we strive to achieve balanced protection of the interests of companies that want to use drones for their individual purposes, as well as future-proof solutions for the operation of drones. Germany and FlyNex want to continue to play a leading role in the use and application of commercial UAV solutions on a global scale.

Based on the experiences from industrial and commercial drone projects, FlyNex works for the sustainable use of drones.

⁴German Federal Ministry of Transport and Digital Infrastructure



5. FLYNEX RESPONSIBILITIES AND UTM CONNECTIVITY

FLYNEX IS A MEMBER OF

- › BVCP - Bundesverband Copter Piloten e. V. (<https://bvcp.de/>)
- › BVZD - Branchenverband Zivile Drohnen e. V. (<https://www.bvzd.org/>)
- › Curpas e.V. (<https://curpas.de/>)
- › DIN e. V. - Das Deutsche Institut für Normung e. V. (<https://www.din.de>)
- › DLR - Deutsches Zentrum für Luft- und Raumfahrt (<https://www.dlr.de>)
- › UAV DACH e. V. - Verband für unbemannte Luftfahrt e. V. (<https://www.uavdach.org/>)

FlyNex's vision of enabling all companies to instruct a drone with one click, collect the desired data, and automatically obtain all the necessary information from the collected data aligns with SESAR's U-Space concept goals. Therefore, FlyNex is actively working with partners to get closer to this vision. FlyNex enables companies worldwide to use drones for their own purposes.

IN DOING SO, FLYNEX FOCUSES ON THREE ELEMENTS:

1. security for operators and bystanders,
2. qualitative data and geoinformation for precise flight planning & control
3. bringing together all processes and participants in a collaborative, digital solution.

In addition, the [FlyNex Platform](#) already fulfills some functions defined for U-Space.



THESE FUNCTIONS AND COOPERATIONS INVOLVE

- U1** Dashboard where companies and pilots can register and be found
- U2** Mission planning based on current regulations and laws concerning airspace
- U2** Mission planning based on the weather situation, particularly the wind direction and speed
- U2** Interfaces between applicant and authorities (FlyNex approval service)
- U2** Mission planning based on a 3D map to map the lower airspace (DaViLuS)

IN ADDITION, FLYNEX WILL OFFER FURTHER TECHNOLOGICAL POSSIBILITIES IN THE FUTURE VIA ITS PLATFORM, SUCH AS

- U1** The possibility to set up geofences
- U2** The provision of complex and comprehensive geodata
- U2** The issue of digital flight permits by the relevant competent aeronautical authority
- U3** Exchange of flight data between devices and platform via documented interface
- U3** Logging of aircraft movements for monitoring and documentation of drone flights

SOURCES

- ¹ **European Union:** Agentur der Europäischen Union für Flugsicherheit (EASA)
https://europa.eu/european-union/about-eu/agencies/easa_de (german source)
- ² **German Federal Authority for Air Navigation Services:** EASA veröffentlicht neue Drohnenverordnung
https://www.baf.bund.de/SharedDocs/Kurzmeldungen/DE/2019/20190612_EASA_DrohnenVO.html (german source)
- ³ **European Aviation Safety Agency:** U-Space Regulatory Framework Workshop - 14-15 May 2019 – Cologne – Summary Of Conclusions, Mai 2019
<https://www.easa.europa.eu/en/downloads/98335/en>
- ⁴ **German Federal Ministry of Transport and Digital Infrastructure:** Connected Drones – Drohnen im Luftverkehr sichtbar machen
<https://land-der-ideen.de/wettbewerbe/deutscher-mobilitaetspreis/preistraeger/best-practice-2018/connected-drones> (german source)

ADDITIONAL SOURCES

Austro Control: EU plant Verschiebung der neuen Drohnen-Gesetze auf 2021, Mai 2020
https://www.austrocontrol.at/unternehmen/medien/presse__news/detail/__17
 (german source)

Bundesamt für zivile Luftfahrt; Boekholt, Amanda: U-space, April 2020
<https://www.bazl.admin.ch/bazl/en/home/drohnen/uspace.html>

SESAR Joint Undertaking; Garrity, Robin: Stratospheric Operations: The European perspective, November 2019
<https://www.icao.int/Meetings/DRONEENABLE3/Presentations/3.03.2%20-%20Robin%20Garrity.pdf>

SESAR Joint Undertaking; Guillermet, Florian: Safe and secure integration of drones (U-space), November 2019
<https://www.icao.int/Meetings/DRONEENABLE3/Presentations/2.01.1A%20-%20Florian%20Guillermet.pdf>

FlyNex, based in **Leipzig, Hamburg, Rotenburg** and **San Francisco** is the leading software solution for commercial drone projects. Through its cloud platform, FlyNex covers the full range of commercial applications for data collection by unmanned aerial systems.



Its solution enables companies and organizations to digitally capture thousands of assets, facilities, and buildings using drones. The complete integration of drones and Artificial Intelligence helps companies not only to collect data but also to analyze it automatically.

FlyNex is successfully used as a drone and data management solution by renowned companies and technology leaders in the construction, real estate, energy, and telecommunications sectors. In addition, FlyNex is involved in innovation projects across Europe to successfully integrate drones, e.g., for medical transport, intelligent air traffic management, or air cab navigation.

More info at: <https://www.flynex.io/>

CONTACT

FlyNex GmbH
c/o SpinLab
Spinnereistraße 7 | Halle 14 | 04179 Leipzig | Germany
info@flynex.de | www.flynex.io