



EU Drone Days

Launch of the European Drone Strategy 2.0

SESAR U-space Showcase

Brussels, 29-30 November 2022





The U-space Concept of Operations Where we are & what is next

Andrew Hately, EUROCONTROL & CORUS VIAM A







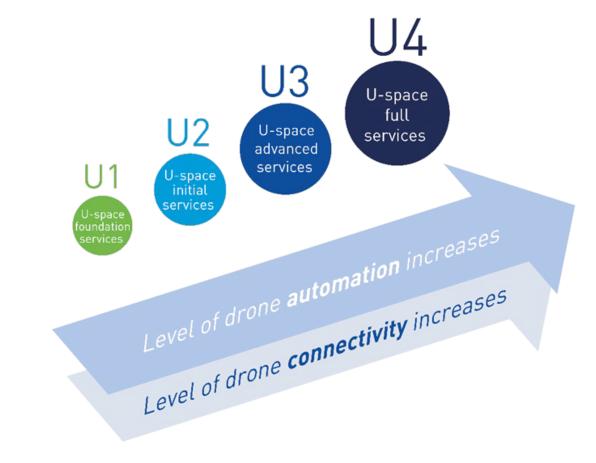






U-space history

- 2015: Riga declaration on remotely piloted aircraft (drones) "Framing the future of aviation"
- 2016: SESAR Drones Outlook Study
- 2016: Warsaw declaration for unmanned aerial vehicles, adopted at the end of "Drones as a source of jobs and growth" conference
- 2017: SESAR launches 10 research projects on UAS traffic management
- 2017: Helsinki declaration on drones
- 2017: U-space Blueprint



- U-space has been described as a set of services
- These services are clustered into 4 "U levels"





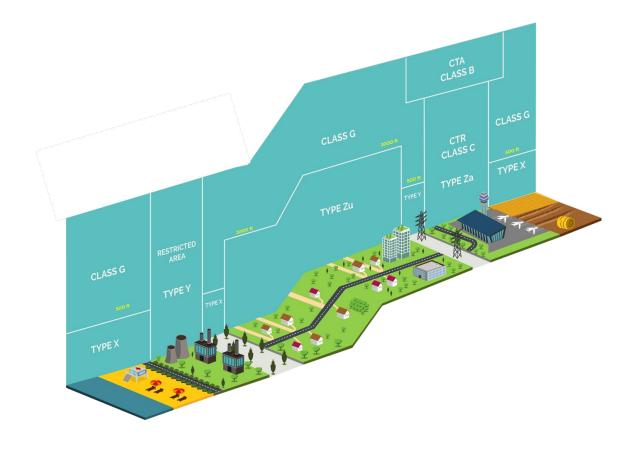






U-space history

- 2018: SESAR "Roadmap for the safe integration of drones into all classes of airspace"
- 2018: SESAR launches 9 demonstrations of Uspace technology
- 2019 U-space concept of operations published by CORUS project (SESAR)
 - Explains the Airspace, the Services and how they are used
 - Provides a common language and understanding for research, regulation and deployment



CORUS airspace designations X Y Za Zu











U-space history

- 2019: EU "drone" regulations
 - 2019/947 on the rules and procedures for the operation of unmanned aircraft
 - 2019/945 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems
- Supported by amendments to other aviation regulation
- Divided operations by risk
- Provide the means to create airspace structures to enable or limit UAS flight

OPEN



- No involvement of Aviation Authority
- LIMITATIONS: Visual line of sight, max. altitude, distance from airport and sensitive zones

SPECIFIC



- Operations Authorisation
- Specific qualification of drone, personnel, equipment based on safety assessment

CERTIFIED



- Regulatory regime similar to manned aviation
- EASA and Authority Certificates











U-space history ... and future

- 2021: EU "U-space" regulations
 - 2021/664 on a regulatory framework for the Uspace
 - 2021/665 & 2021/666 amending...
- 2021: SESAR awards six projects to demonstrate U-space applied to Urban Air Mobility

What is Urban Air Mobility?

- Higher risk.
- There will be passenger carrying vehicles
 - Safety of life: Every accident potentially fatal
 - Higher standards required
- There will be non passenger carrying vehicles in the same airspace
 - The same high standards apply

Why apply U-space to UAM?

- U-space ConOps looks far into the future.
- U-space = test lab for ATM
- Urban Air Mobility aims to be uncrewed
 - If UAM uses UAS, can it use U-space?











CORUS-XAUM: extending and revising the U-space ConOps

- Vertiports
 - Interactions with U-space: planning, contingencies and synchronisation with manned aviation
- Flight rules
 - How to integrate UAS and manned aircraft
- Airspace structure
 - Initial operations of passenger carrying EVTOL
- Aligning the U-space ConOps with the U-space regulations
- Incorporating the work of other projects
 - ICARUS and the Common Altitude Reference
 - plus many more
- Revised ConOps available from our website. https://corus-xuam.eu/new-u-space-conops/
 - Please comment the website will explain how
- A final ConOps will be prepared at the beginning of next year.











U-space ConOps ed 3 (2019) services

Identification and Tracking Registration Registration Assistance e-identification Tracking (Position report submission)

Airspace Management / Geo-Fencing

Geo-awareness

Drone
Aeronautical
Information
Management

Geo-Fence provision (includes Dynamic Geo-Fencing) Mission Management

Operation plan preparation / optimisation

Operation Plan processing

Risk Analysis Assistance

Dynamic Capacity Management Conflict Management

> Strategic Conflict Resolution

Tactical Conflict Resolution Emergency Management

> Emergency Management

> > Incident / Accident reporting

Citizen Reporting service

Monitoring

Monitoring

Traffic Information

Navigation Infrastructure Monitoring

Communication Infrastructure Monitoring

Legal Recording

Digital Logbook

Environment

Weather Information

Geospatial information service

Population density map

Electromagnetic interference information

Navigation Coverage information

Communcation Coverage information Interface with ATC

Procedural interface with ATC

Collaborative interface with ATC



Surveillance Data

Exchange

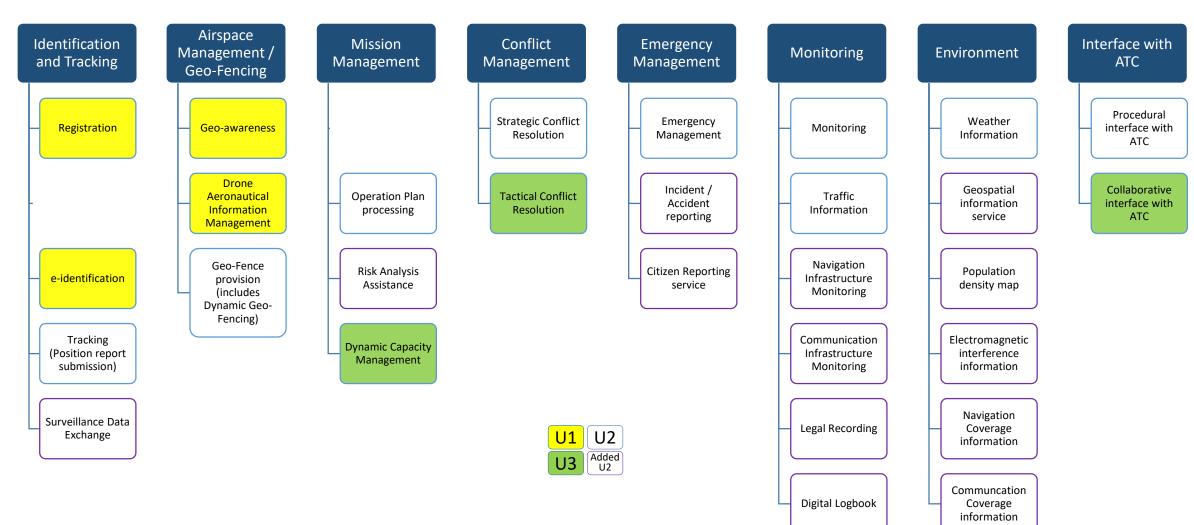








Removing services without precise definitions















Removing services without precise definitions

Registration e-identification Tracking (Position report submission) Surveillance Data Exchange

Geo-awareness Drone Aeronautical Information Management Geo-Fence provision (includes Dynamic Geo-Fencing)

Operation Plan processing Risk Analysis Assistance **Dynamic Capacity** Management

Strategic Conflict Resolution **Tactical Conflict** Resolution

Emergency Management Incident / Accident reporting Citizen Reporting service

Weather Monitoring Information Geospatial Traffic information Information service Navigation Population Infrastructure density map Monitoring Communication Electromagnetic Infrastructure interference information Monitoring Navigation **Legal Recording** Coverage information

Procedural interface with ATC

Collaborative interface with ATC

Digital Logbook

Communcation Coverage information













Separating conflict detection and resolution

Registration e-identification Tracking (Position report submission) Surveillance Data Exchange

Geo-awareness Drone Aeronautical Information Management Geo-Fence provision (includes Dynamic Geo-Fencing)

Operation Plan processing Risk Analysis Assistance **Dynamic Capacity** Management

Strategic Conflict Detection Strategic Conflict Resolution **Tactical Conflict** Detection

Emergency Management Incident / Accident reporting Citizen Reporting service **Tactical Conflict** Resolution

Traffic

Communication Infrastructure Monitoring

Monitoring

Information

Navigation

Infrastructure

Monitoring

Legal Recording

Digital Logbook

Weather Information

Geospatial information service

Population density map

Electromagnetic interference information

> Navigation Coverage information

Communcation Coverage information













Procedural

interface with

ATC

Collaborative

interface with

ATC

New services: Vertiport availability & CAR

Identification and **Tracking** Registration e-identification Tracking (Position report submission) Surveillance Data Exchange Vertical Conversion

Airspace Management / Geo-Fencing

Geo-awareness

Drone Aeronautical Information Management

Geo-Fence provision (includes Dynamic Geo-Fencing)

Mission Management

> **Operation Plan** processing

Risk Analysis Assistance

Dynamic Capacity Management

> Vertiport Availability

Conflict Management

> Strategic Conflict Detection

Strategic Conflict Resolution

Tactical Conflict Detection

Tactical Conflict Resolution

Monitoring Management

> Emergency Management

Emergency

Incident / Accident reporting

Citizen Reporting service

Monitoring

Traffic Information

Vertical Alert & Info

`Navigation Infrastructure Monitoring

Communication Infrastructure Monitoring

Legal Recording

Environment

Interface with

ATC

Procedural

interface with ATC

Collaborative

interface with ATC

Weather Information

Geospatial information service

Population density map

Electromagnetic interference information

> Navigation Coverage information

Communcation Coverage information

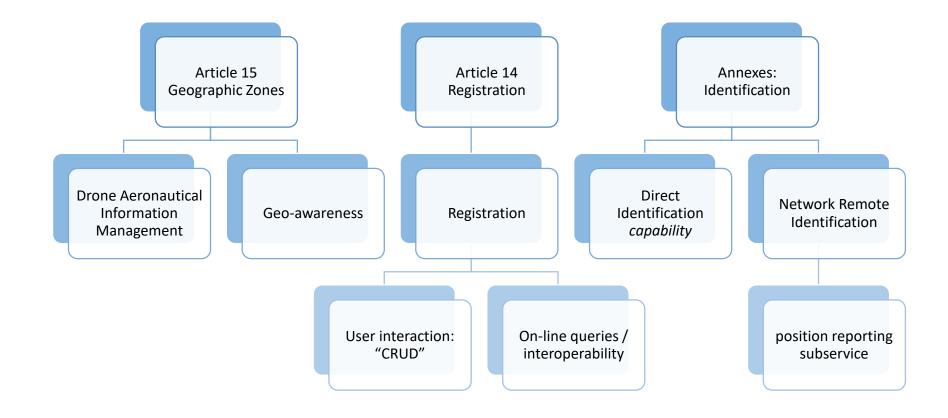
Digital Logbook







U1 Services: 2019/947





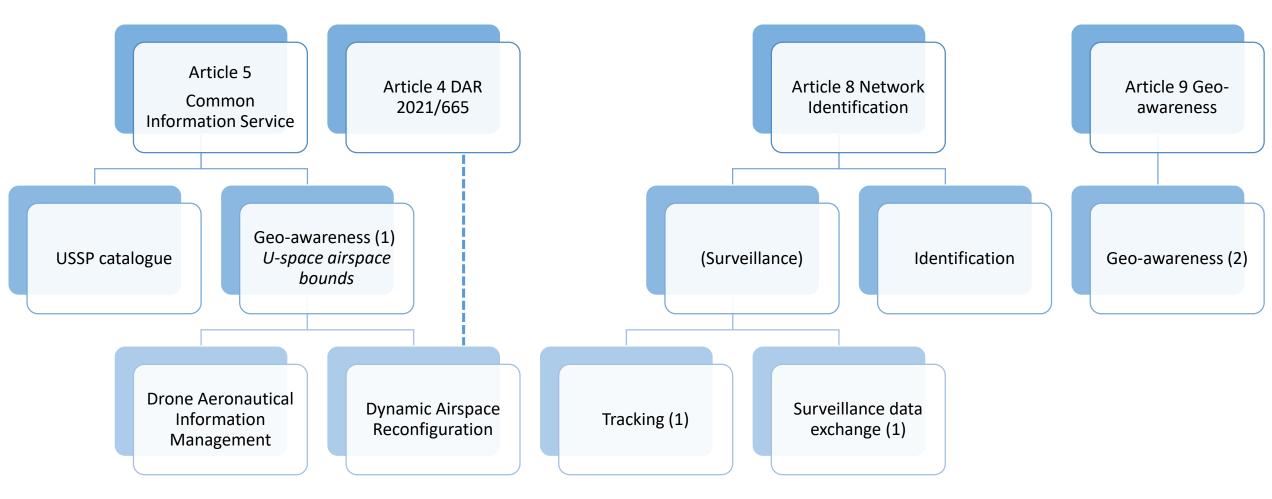








U2 Services: 2021/664: Articles 5-9





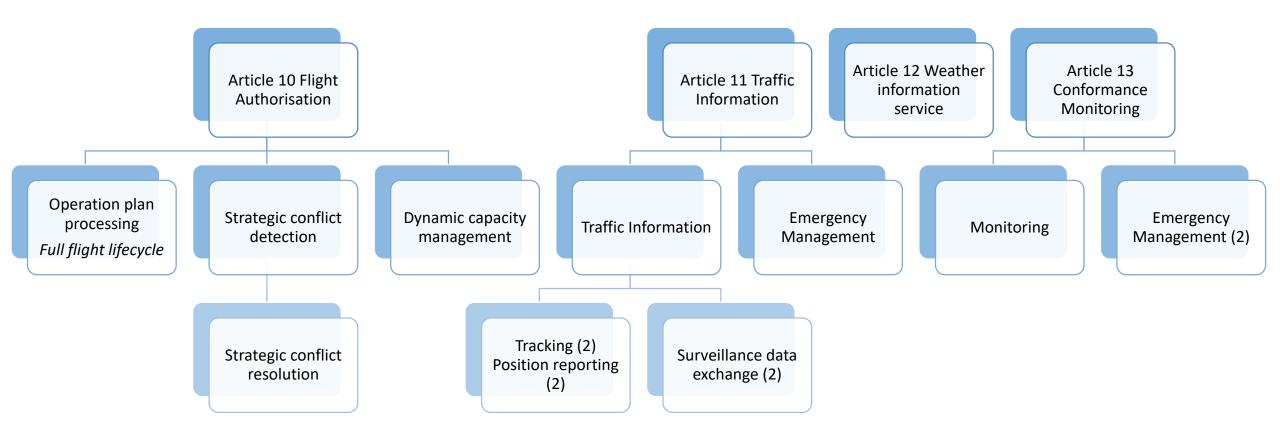








U2 Services: 2021/664 articles 10-12













U2 Services: Other

Accident / Procedural Incident Interface with Geographic Reporting ATC Geospatial Communication Legal recording Information coverage info Electromagnetic **Population** Digital log book interference density map map Navigation coverage info

Service monitoring

Navigation Infrastructure monitoring Communication infrastructure monitoring





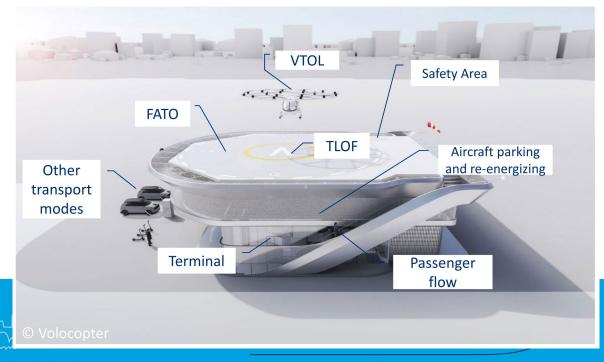




Passenger carrying operations

- EVTOL
 - Short endurance, currently
 - Initial operations have pilot on board
 - Un-crewed soon
- Passenger operations
 - Higher risk than cargo
 - Passenger operations have uncertain timing
 - Tactical processes are needed for efficiency
- Urban environment
 - High ground risk
 - High sensitivity to noise
 - High density of operations

- The Vertiport
 - Touchdown and Lift-Off area (TLOF) is a critical resource
 - TLOF are alternative landing spots for nearby aircraft
 - Vertiport resources are a key element in the planning of flights

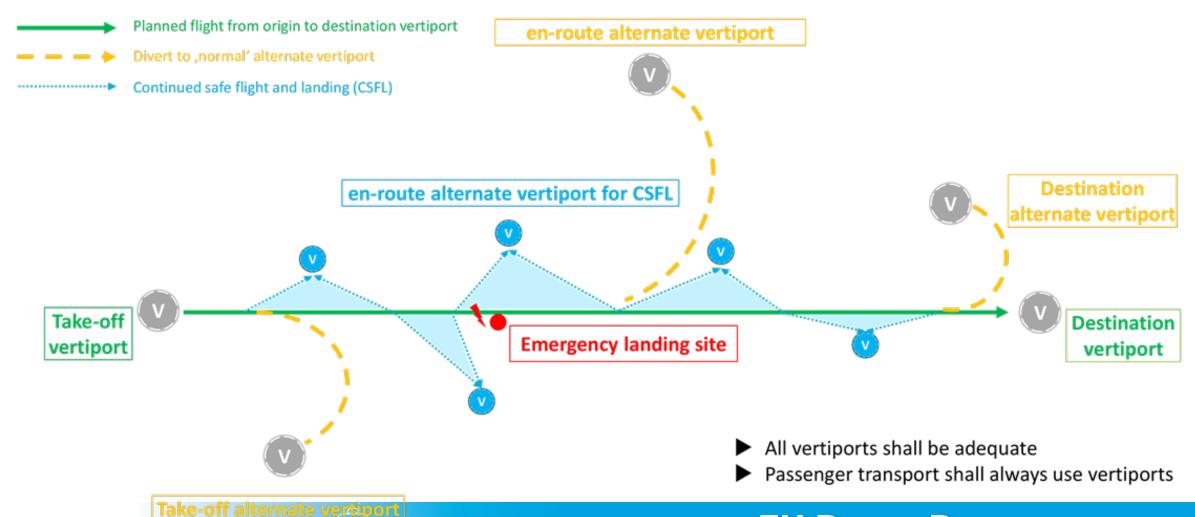








EVTOL flight and alternative landing spots







EU Drone Days
Brussels, 29-30 November 2022



A flight rule for U-space

- ICAO airspace classes A to G are defined in terms of flight rules and services.
- UAS in U-space are not currently considered as flying any of VFR, SVFR, IFR. Due to this
 - U-space airspace is a restricted area
 - UAS cannot fly among VFR, SVFR or IRF flights
- In order to have integration, we need to either
 - Fly UAS following an existing flight rule
 - Devise new flight rule for UAS and understand how manned aircraft can fly it or fly with it.
- We are working on a new flight rule. Two approaches look promising
 - SVFR like: with U-space providing situational awareness to UAS and supporting visual situation awareness for manned aircraft
 - IFR like: with different equipment carriage requirements to IFR and U-space providing a separation service.











Conclusion

- The U-space concept of operations can accommodate Urban Air Mobility
- The risk is higher and the service provision will need to be appropriately robust
- Adapting U-space for UAM is a step on the road to convergence with ATM

- The ConOps is available at https://corus-xuam.eu/new-u-space-conops/
 - Please comment new version early 2023







