Slido: #IAM2024

SCAN ME

EASA Innovative Air Mobility Implementation Forum

In cooperation with:

Alliance for New Mobility Europe · ASD · Drone Alliance Europe · Global UTM Association · JEDA

Feedback from the U-space implementation and clarifications on roles and responsibilities in U-space

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Vidmantas Kairys
JEDA, Vice-president

Andres Van Swalm
UNIFLY, CEO

Daniel García-Monteavaro
ENAIRE, Head of the Drone Business Development Dpt.

Workshop title

Slido: #IAM2024

Goal: include here the workshop's goal

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Roles and Responsibilities in U-space

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U-space : Not a single, but multiple/shared roles and responsibilities as allocated by the Regulations

*Art. 3, 17, 18
*(EU) 2021/664

MS & Competent Authorities

Authorities at national, regional and local State services (e.g. law enforcement and emergency services)

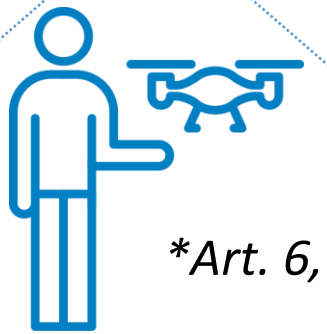
*Art. 18(f)

Manned Aircraft

(EU) 2021/666

ATM/ANS & ATC

(EU) 2021/665



*Art. 6, 11

CISP, s-CISP, USSP

*Art. 5, 7-13, 14-15

EASA

U-space architecture vs CIS models

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Decentralised 

VS

Centralised 

Distributed 

VS

Centralised 

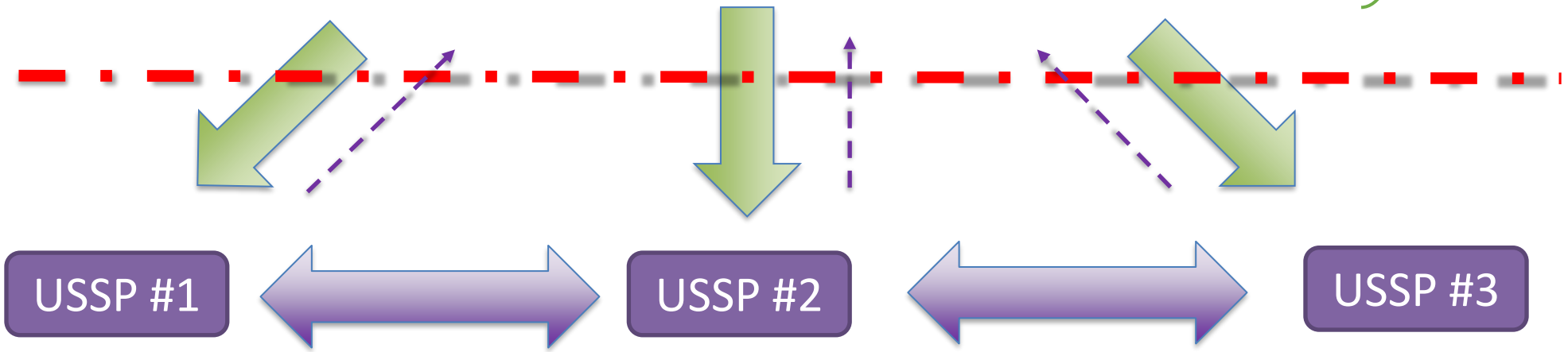
Art. 5(6)

Roles and Responsibilities

Roles and Responsibilities

CISPs or s-CISP
(Single) Common Information Service Provider(s)

Art. 5



Art. 7

5. U-space service providers shall:

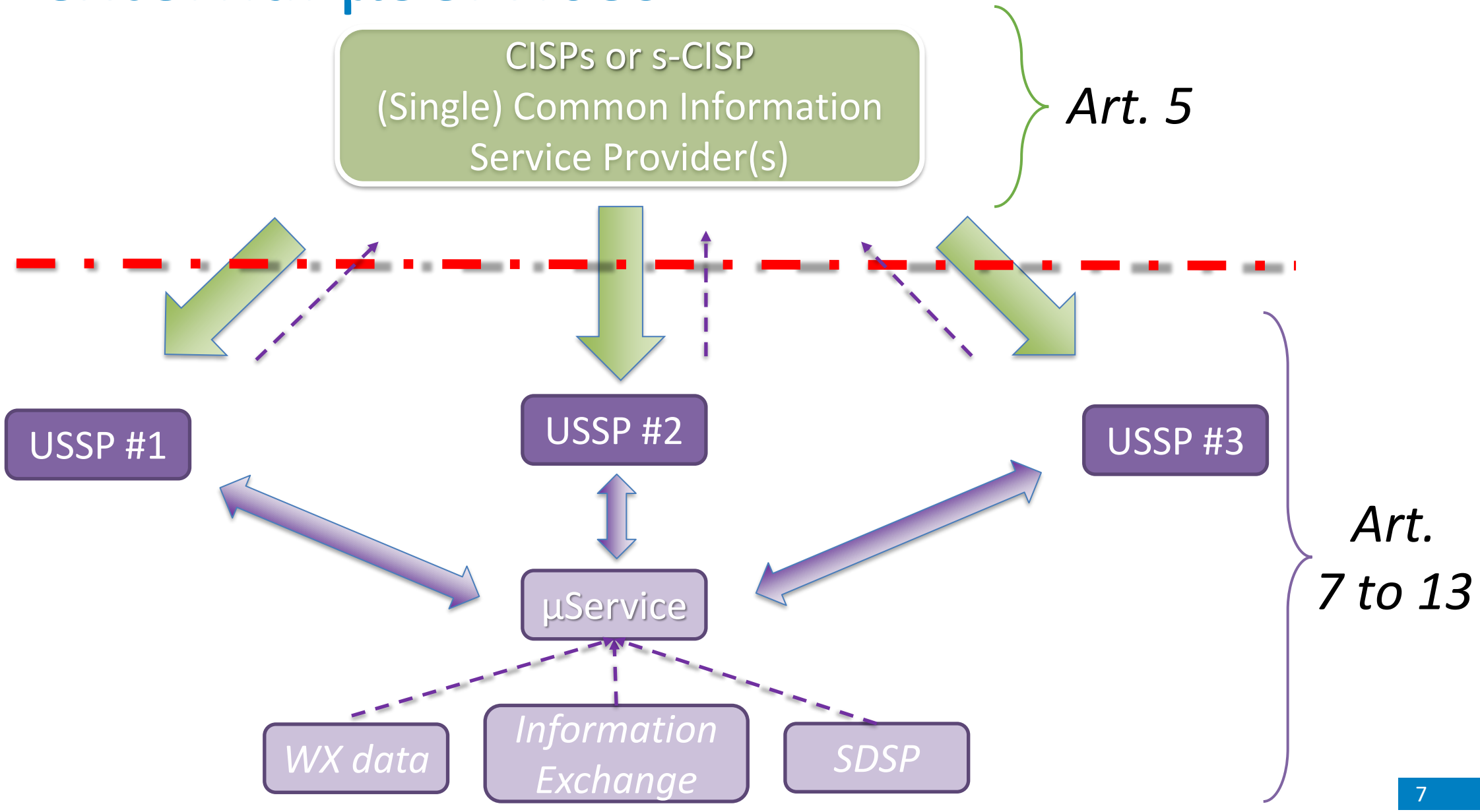
(a) exchange any information that is relevant for the safe provision of U-space services amongst themselves;

ANNEX II

Publication of the common information referred to in Article 5(4)(a)

1. Providers of common information services shall ensure that the information referred to in Article 5(1), (2) and (3) is available online through common open, secure, scalable, sustainable technologies that are able to support the required levels of availability and performances, and that ensure interoperability and the free movement of U-space services in Union.

USSP external µServices



Success function

$f(x)$ = HARMONISATION × INTERROPERABILTY

Viability of U-space is at stake

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JEDA
Joint European Drone Associations

U-space services from UAS operators perspective

UAS is a part of transport industry

- “Why should I buy UAS services?”

Flying factory

Operational environment:
Safety,
Environmental protection,
Security,
Privacy.

Key aspects that must be upheld to maintain a competitive edge and meet client agreements:
Timeliness,
Accuracy,
Speed,
Safety.

General requirements

- **Interoperability:**
  - The system must be able to interface with a variety of other systems, such as vertiport management systems, weather monitoring systems, and other UTM/ATM platforms.
- **AI and Automation Support:**
  - Efficient UTM systems should provide drone operators with automated route planning and real-time suggestions for route adjustments to avoid congested areas, conflict resolution, weather hazards, or temporary flight restrictions, saving time and energy while ensuring safe operation, thus help operators in decision-making processes.
- **Compliance with Standards and Regulations :**
  - Drone operations are subject to strict regulatory requirements, which vary by region. The UTM system should automate compliance checks, ensuring that drone operators are fully compliant with all regulations (e.g., flight height, no-fly zones), helping to avoid costly fines or operational interruptions
- **User-friendly Interface:**
  - The UTM system interface must be intuitive and easy to use, reducing operators' workloads during all flight phases (e.g., takeoff, landing, etc.).

Critical aspects for commercial drone operators: On-time Delivery Commitments

- **Precision in Timing:** Drones need to meet specific delivery windows, which may be as narrow as 15–30 minutes for services like food delivery or medical supplies.
  - UTM systems must ensure that flight paths are optimized in real-time to avoid delays caused by airspace congestion, weather, or unforeseen disruptions.
- **Real-time Traffic Flow Adjustments:** An efficient UTM system allows drone operators to navigate around busy airspace or dynamically reroute based on real-time conditions.
  - This helps maintain delivery schedules and ensures that drones arrive on time, meeting the expectations set by the customer and the contract.

Critical aspects for commercial drone operators: Accuracy in Delivery

- **Precise Navigation to Delivery Locations:** For commercial drone services, accurate GPS and airspace data are essential to ensure drones reach the correct delivery points.
  - UTM systems should provide accurate, up-to-the-second location data, allowing for precise control during drop-offs, especially in urban environments with restricted landing zones.
- **Dynamic Geofencing and Obstacle Avoidance:** UTM systems should assist with dynamic geofencing, ensuring that drones stay within designated operational areas and avoid restricted or dangerous zones.
  - This is crucial for delivery in densely populated areas where obstacles like buildings, power lines, and trees need to be considered.

Critical aspects for commercial drone operators: Speed of Service

- **Optimized Routes for Shortest Flight Times:** Speed is often a critical factor, especially for time-sensitive deliveries like food, medical supplies, or urgent documents. The UTM system should continuously monitor flight paths and provide the most efficient routes to the destination.
  - This minimizes air time, reduces battery use, and ensures that deliveries are made as quickly as possible.
- **Avoidance of Delays in Congested Airspace:** With more drones operating in shared airspace, delays could become an issue.
  - An efficient UTM system must manage drone traffic, providing priority routing or safe corridors for commercial deliveries to ensure minimal delays and efficient use of the airspace.

Critical aspects for commercial drone operators: Consistency with Service Level Agreements (SLAs)

- **Meeting Agreed Service Standards:** Drone operators will likely have Service Level Agreements (SLAs) in place with their clients, requiring them to deliver within strict timeframes, ensure specific delivery accuracy, and operate reliably in various weather or operational conditions.
  - A reliable UTM system helps drone operators meet these agreed-upon performance metrics, preventing penalties or breach of contract.
- **Real-time Performance Monitoring:** UTM systems should provide operators with tools to monitor the status of each drone and delivery in real time, allowing them to intervene if any issues arise that could affect SLA adherence

Critical aspects for commercial drone operators: Cost Efficiency and Fleet Optimization

- **Battery and Resource Management:** Efficient UTM systems help optimize flight paths to conserve battery life, reducing the need for frequent recharges or battery swaps. This is particularly important for high-frequency delivery services where drones are operating back-to-back missions.
  - Lower operational costs through efficient energy use can improve the overall profitability of the drone delivery service.
- **Fleet Utilization:** The UTM system must help operators maximize the utilization of their drone fleets by minimizing downtime between flights.
  - Efficient scheduling, real-time airspace monitoring, and rapid approval processes enable drones to be continuously deployed, maximizing revenue-generating operations.

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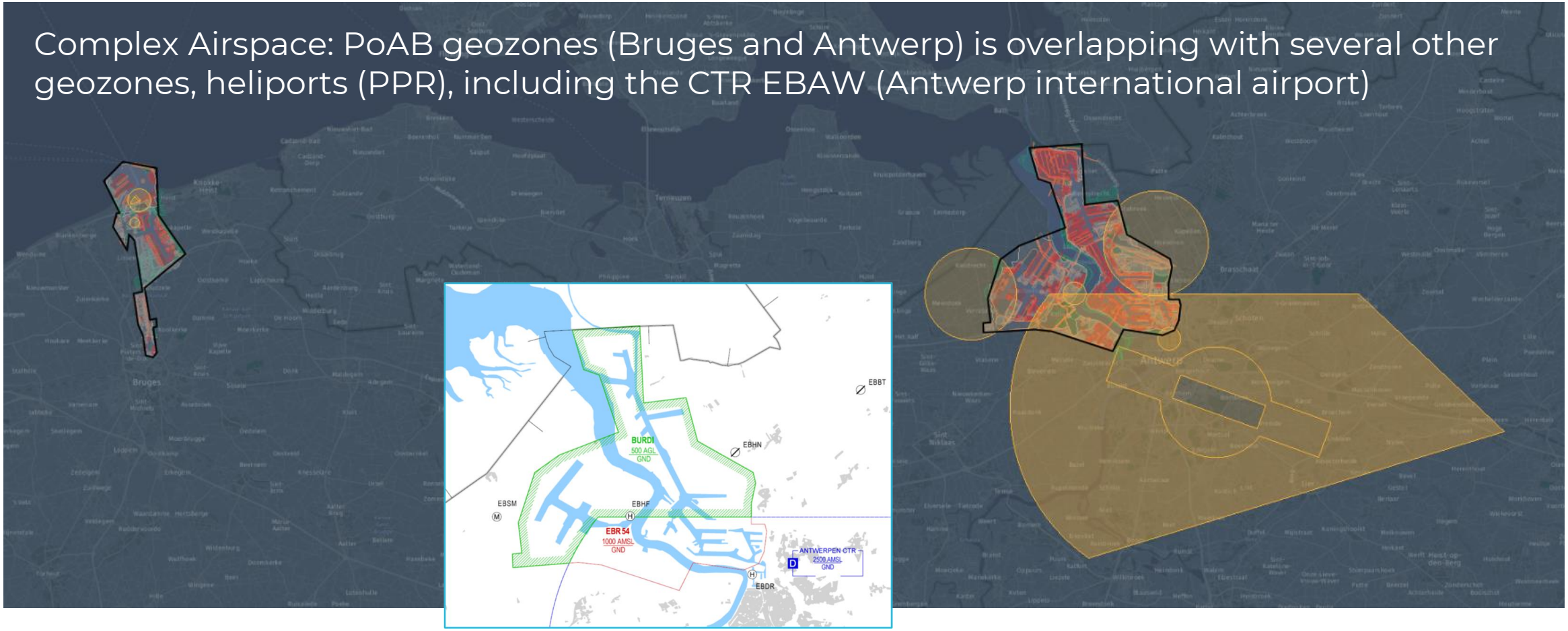
Belgian U-space

- Burdi (SESAR Project) as enabler for U-space
- Establish first U-space airspace in Belgium
  - Port of Antwerp Bruges
- Involvement of all relevant stakeholders:
  - Competent authority, sCIS, ATSP, USSP, local authorities (e.g. port authority and police), Belgian Defence and Drone Operators

sesar JOINT UNDERTAKING
Co-funded by the European Union

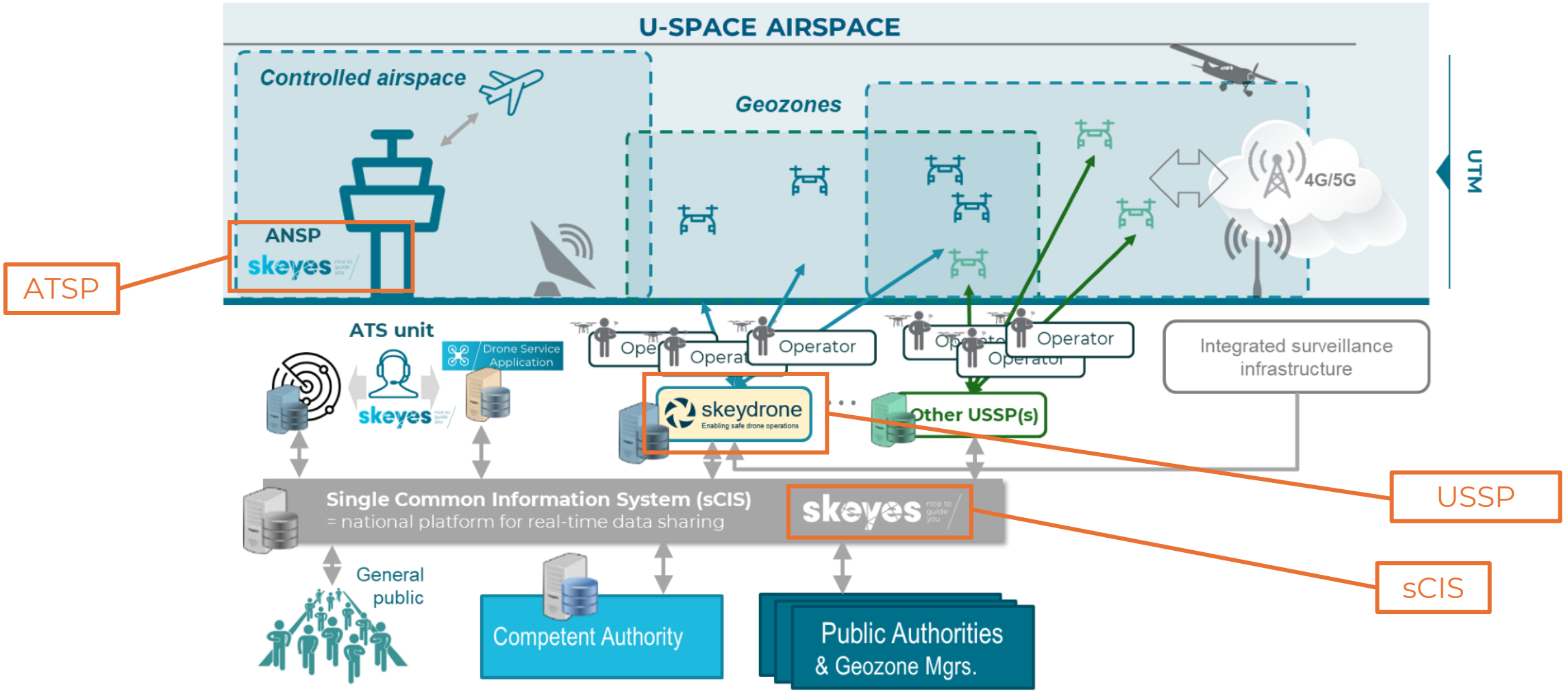
Today: EU 947/2019 – PoAB Geozone Manager Pre-U-space

Complex Airspace: PoAB geozones (Bruges and Antwerp) is overlapping with several other geozones, heliports (PPR), including the CTR EBAW (Antwerp international airport)



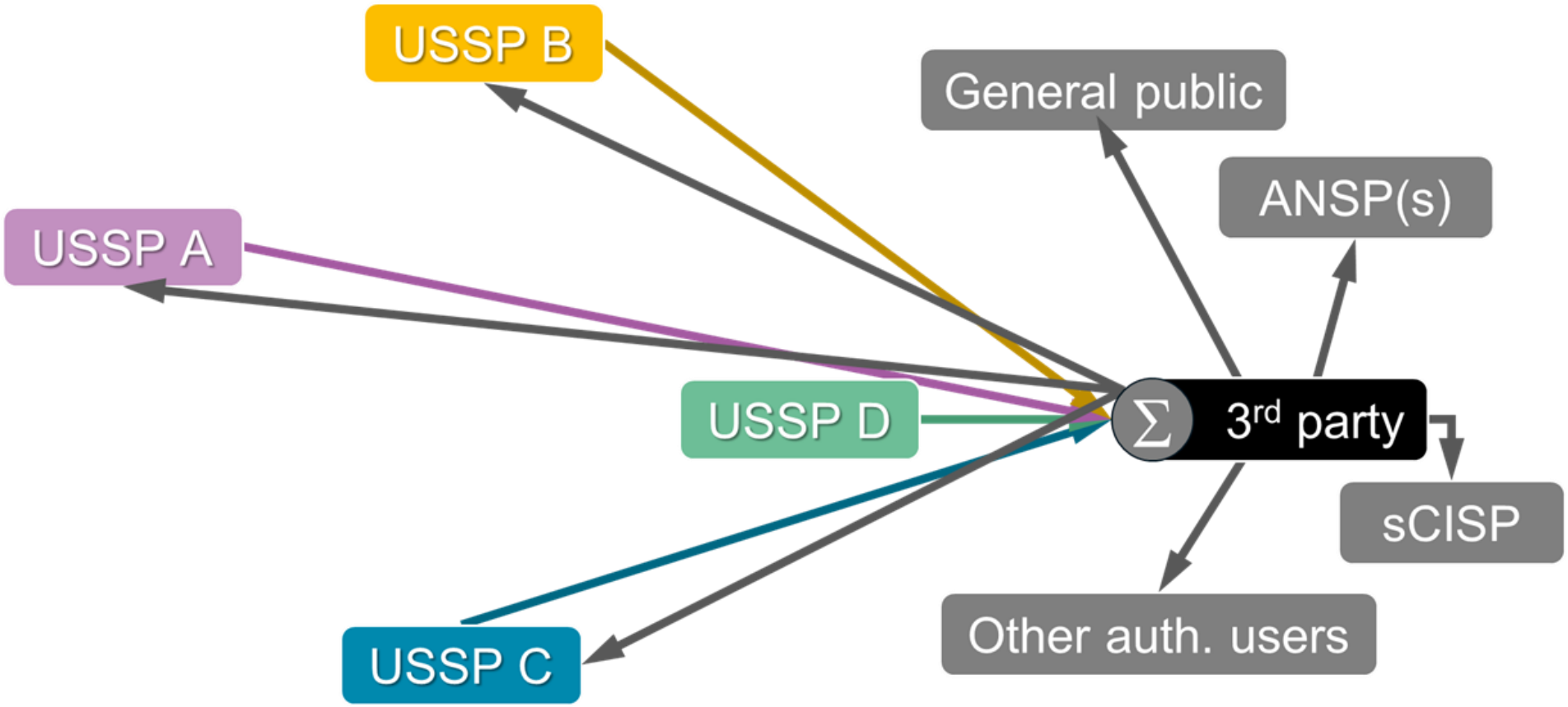
BURDI

2025: EU 664/2021 – BE U-space



BURDI

sCIS as USSP coordinator



Roles and Responsibilities

BURDI

	Pre-U-space *Today*	**U-space – Uncontrolled airspace** *2025*	**U-space – Controlled Airspace** *2025 - ...*
Summary	UTM system in the area of PoAB operated by the port authority	UTM system in the area of PoAB operated by the port authority, but safety related UTM services are replaced by U-space	UTM system in the area of PoAB operated by the port authority, but safety related services are replaced by U-space, the ATSP is also included for additional safety services in controlled airspace
Applicable Regulation	EU2019/947	EU2019/947 EU2021/664	EU2019/947 EU2021/664
Geozone	**Geozone** with the obligation to use **UTM services**	**Geozone** with the obligation to use/interface **limited UTM services** + requirements for **U-space**	**Geozone** with the obligation to use/interface limited **UTM services** + requirements for **U-space** + **CTR**
R&R Port Authority	**Safety** (UTM services) and **Security** (take-off/landing locations, overflights, drone detection)	**Security** (take-off/landing locations, overflights, drone detection)	**Security** (take-off/landing locations, overflights, drone detection)
R&R USSPs & sCIS	-	**Safety** - Skeydrone and other USSPs: U-space services - Skeyes: sCIS (USSP Coordinator)	**Safety** - Skeydrone and other USSPs: U-space services - Skeyes: sCIS (USSP Coordinator)
R&R Skeyes ATSP	-	-	**Safety** (DAR)

ARA

The **Belgium U-space Conops** defines a **methodology** which translate EU regulation to a national framework/Belgium context

The **ARA** is performed and the calculations are made, based on the **location/situation of the U-space geozone**

The UAS capabilities and performance requirements (GM based)
(a) climb/descent rates or vertical speed, horizontal speed, autonomy/range/endurance,
N/A
(b) noise levels,
N/A
(c) connectivity,
N/A
(d) required navigation equipment,
N/A
(e) flight data accuracy, integrity and latencies (refresh rate),
N/A
(f) availability and integrity of the command-and-control link,
N/A
(g) resilience to environmental conditions (e.g. as applicable: wind, icing, electrical interference),
N/A
(h) resilience to cyberthreats and related security measures.
N/A

The **UAS capabilities** are **not** defined as the choice was made to define operational capabilities and limitations, and not exclude certain UAS

The U-space services performance requirements (AMC based)
(1) the 'geographic proximity' to UAS operators at which the UAS remote identification has to be acquired and provided to support the network information service;
- Horizontal: 400m - Vertical : 500ft
(2) the maximum data 'latency' and 'frequency' at which the traffic information needs to be provided to UAS operators to ensure the proper functioning of the traffic information service;
- Minimum refresher interval of 2 s
(3) the 'proximity' to the UAS position, and the associated definition of the surveillance volume at/within which the traffic information should be provided to UAS operators;
For uncrewed aircraft traffic: - Horizontal: 1.5NM - Vertical : 500ft For crewed traffic: - Horizontal: 3NM - Vertical : 700ft
(4) the 'deviation thresholds', meant to be the maximum acceptable deviation from the intended UAS flight path, to be considered by the USSP when processing a flight authorization or to generate a non-conformance alert to the UAS operator;
Rotary wings, for which uncrewed aircraft speed will be limited to a maximum of 19m/s, and ascent rate shall be at least 10m/s - Horizontal deviation threshold: 50 m - Vertical deviation threshold: 15 m Fixed wings, for which uncrewed aircraft speed will be limited to a maximum of 30m/s, and ascent rate shall be at least 8m/s - Horizontal deviation threshold: 100 m - Vertical deviation threshold: 10 m Deviation threshold in time: 5 min.
(5) flight authorization constraints that may be defined to ensure fair and efficient access to the U-space airspace;
- Maximum duration of the requested flight authorisation is 24h - Minimum and maximum time between the issuing of a flight authorisation request by the operator towards the USSP and the start of the request flight authorisation: maximum 1 month and minimum 15 min - Minimum and maximum time between the issuing of a flight activation request by the operator towards the USSP and the start of the request flight authorisation: maximum 5 min and minimum 1 min. - Flight activation by the USSP should not occur before start of the network identification service (i.e. the USSP receives the identification and location data from the UA).
(6) the data quality requirements for weather data, when relevant;
N/A
(7) the minimum coverage (e.g. horizontal and vertical range within and, when required, also outside the U-space airspace) for the receipt of information from electronically conspicuous crewed aircraft that are not subject to air traffic control, considering the means of compliance as defined in AMC1 to point SERA.6005(c) of Regulation (EU) No 932/2012, and complementary information about crewed aircraft traffic potentially shared by the relevant air traffic service units.
- Horizontal: 3NM - Vertical : 700ft

The applicable operational conditions and airspace constraints (AMC based)
(a) for U-space airspace designated in controlled airspace, the means and procedures to disseminate information regarding dynamic airspace reconfiguration;
N/A
(b) the potential pre-established contingency or emergency procedures;
N/A
(c) the weather limitations, in terms of maxima or minima for important meteorological parameters (e.g. maximum gust, and visibility minimum, temperature minimum);
N/A
(d) the maximum simultaneous UAS operations, and the maximum density of UAS flights allowed within the designated U-space airspace;
N/A
(e) the minimum safety distance (spacing) to be maintained between crewed and uncrewed aircraft in airspace where crewed aircraft operations are not subject to air traffic control;
N/A
(f) the residual airspace risk class (ARC) to support the specific operations risk assessment (SORA) as defined in Regulation (EU) 2019/947;
ARC-b
(g) any other operational conditions and constraints derived from the airspace risk assessment (e.g. mitigation of specific hazards identified during the assessment).
(a) For UAS operations conducted within the Antwerp Harbour U-space airspace the following operational conditions and airspace usage constrains are implemented: For rotary wings uncrewed aircraft: - Horizontal speed will be limited to a maximum of 19m/s - Ascent rate shall be limited to a maximum of 10m/s For fixed wings uncrewed aircraft: - Horizontal speed will be limited to a maximum of 30m/s - Ascent rate shall be limited to a maximum of 8m/s (a) Crewed aircraft intending to operate within U-space airspace (i.e. below 500ft AGL which are to request a derogation at BCAA prior operating below 500ft AGL) are to make themselves e-conspicuous 3NM prior entering the U-space airspace volume. (b) The UAS flight authorization volume consists out of one (1) 4D volume describing the UAS flight authorization requested volume. The transversal projection of this volume shall be equal to the footprint of this requested volume.

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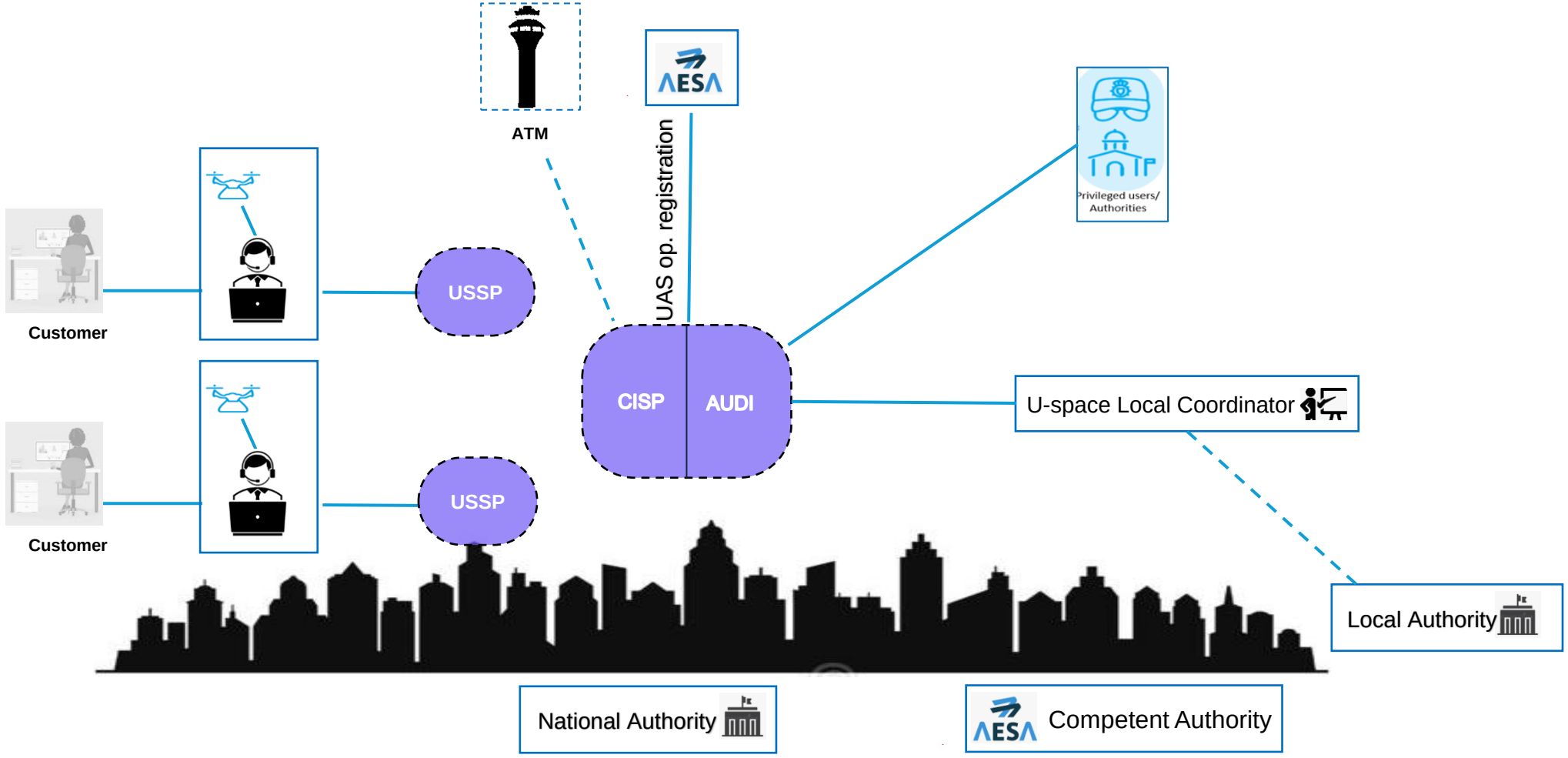
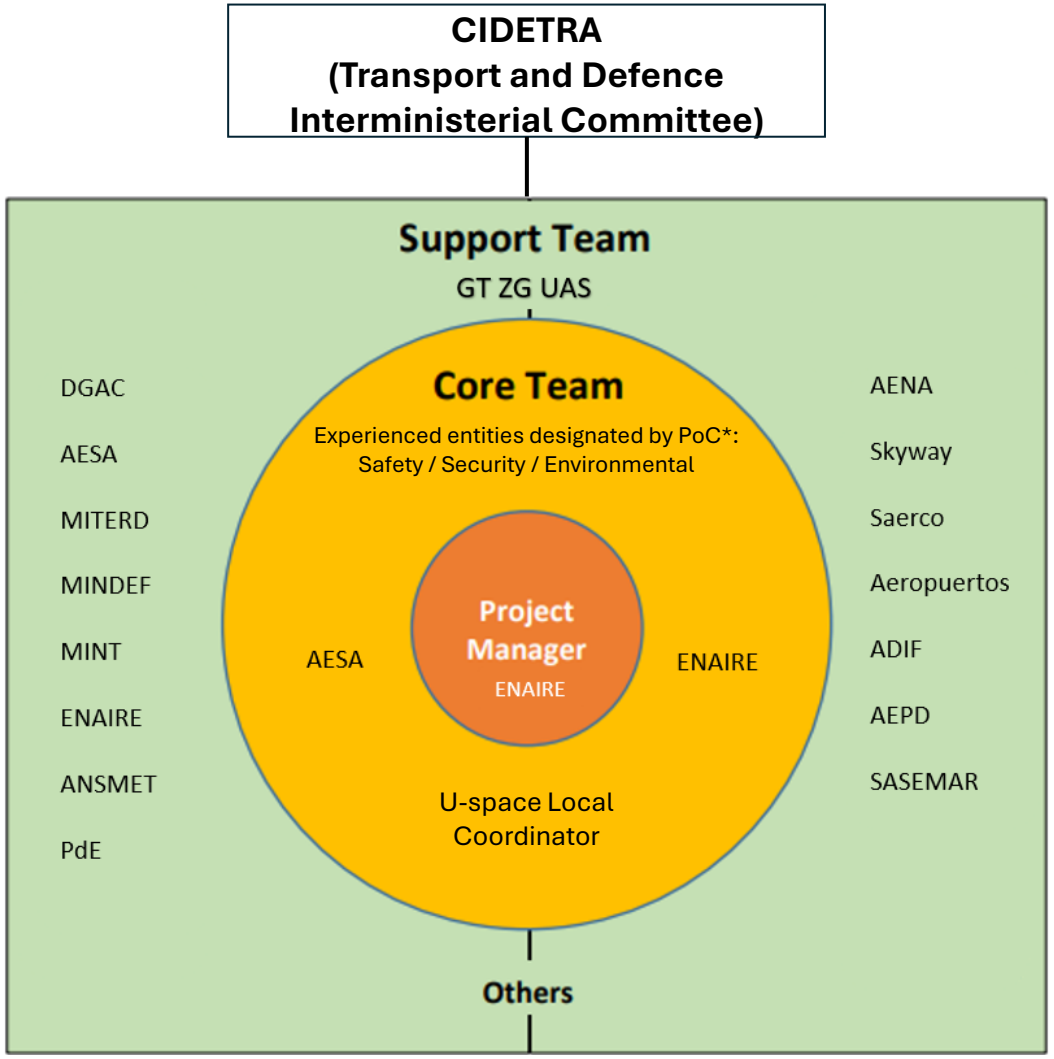
U-space Roles and Responsibilities



Example of ARA Coordination Mechanisms

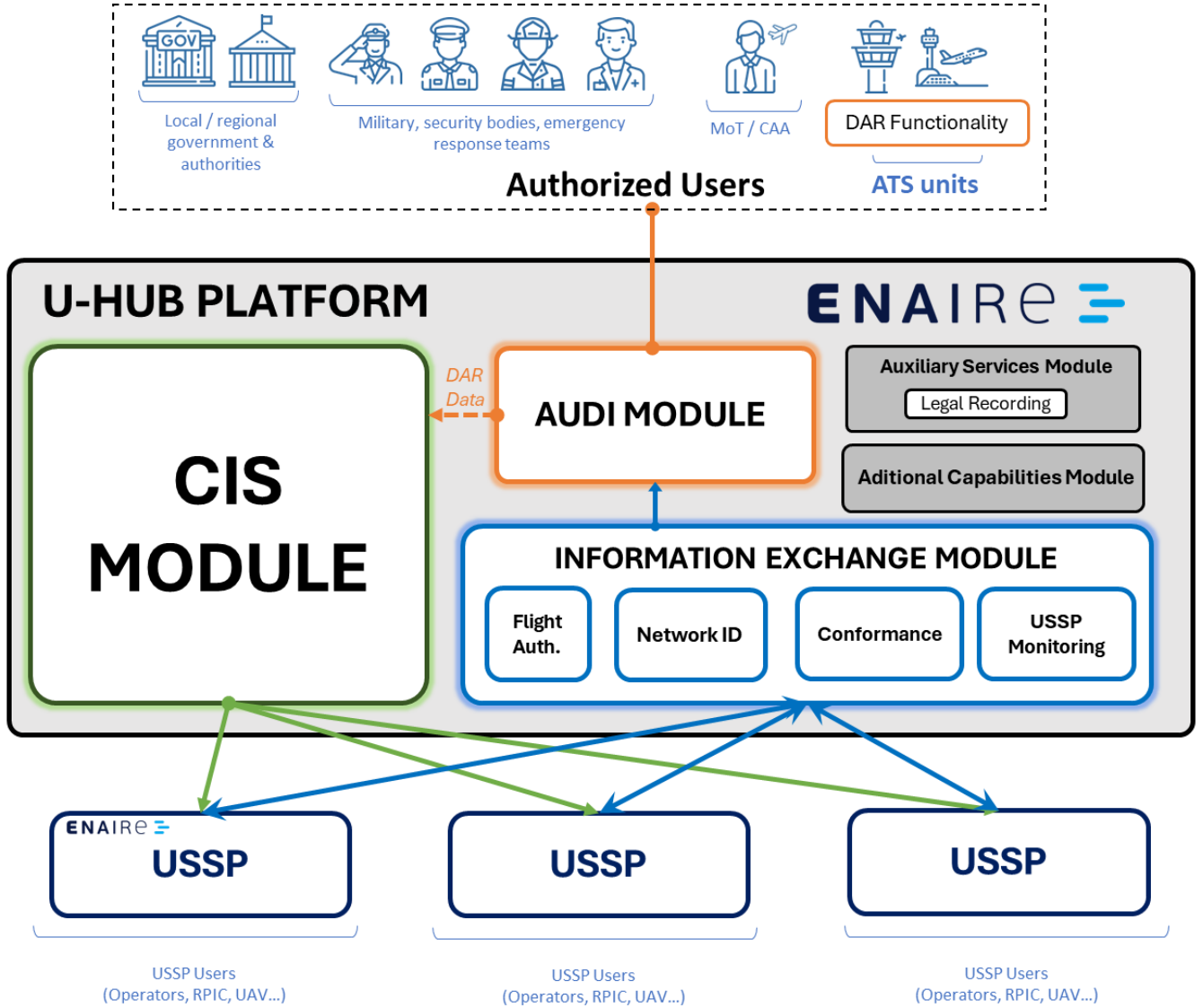


*Within the Core Team:
In each U-space candidate airspace, the PoC(s) involved will designate entities with expertise and that will review safety, security or environmental aspects.

In some cases, they could be from the General State Administration or from the regional (CCAA) or even local administrations at the discretion of whoever holds the competences.

INFORMATION EXCHANGE MODULE

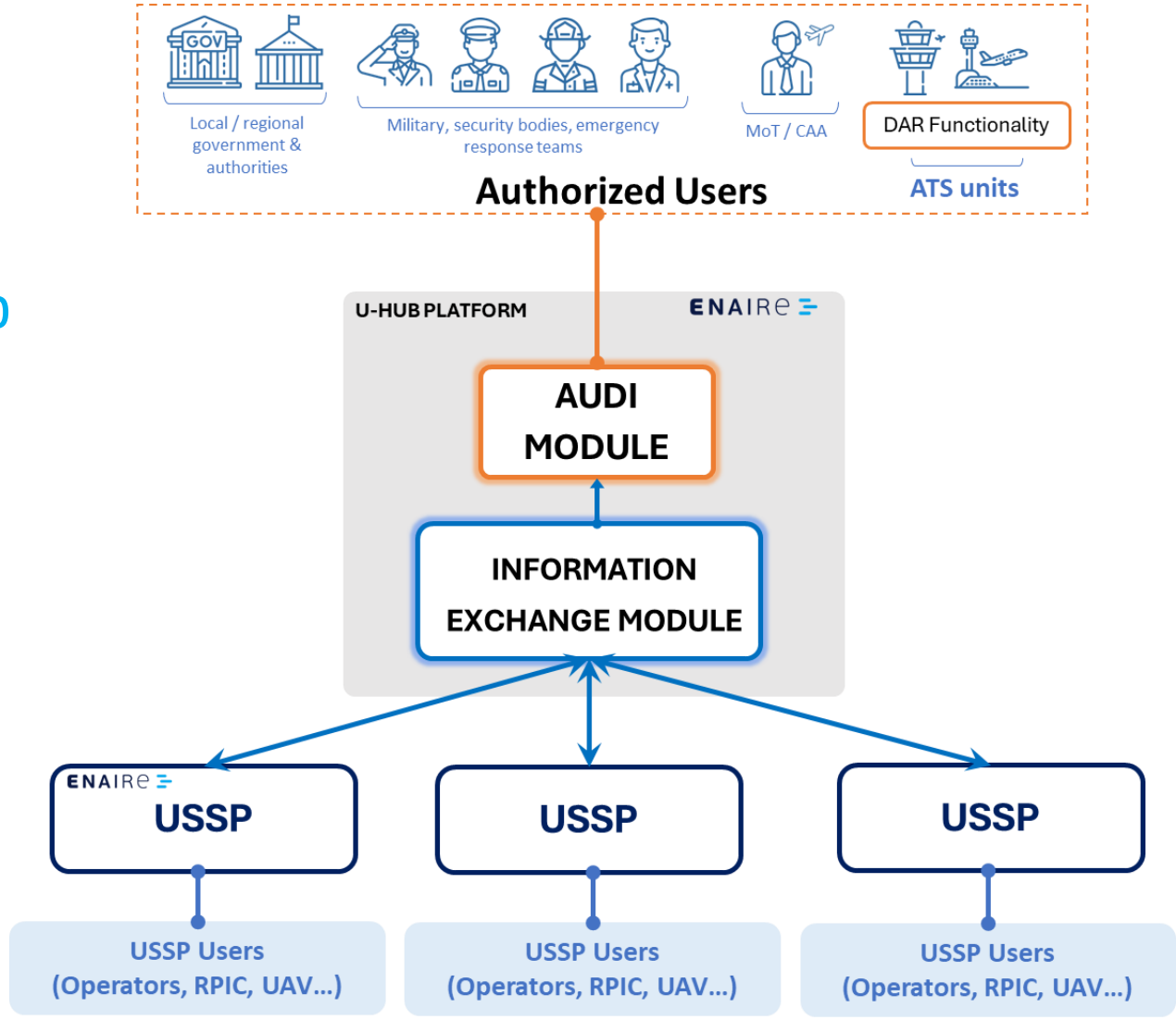
An indirect USSP Data Exchange Implementation for a centralized architecture solution, managed by the designated CISP under State mandate



Interaction with Authorities through U-Hub AUDI Module - Additional functionalities

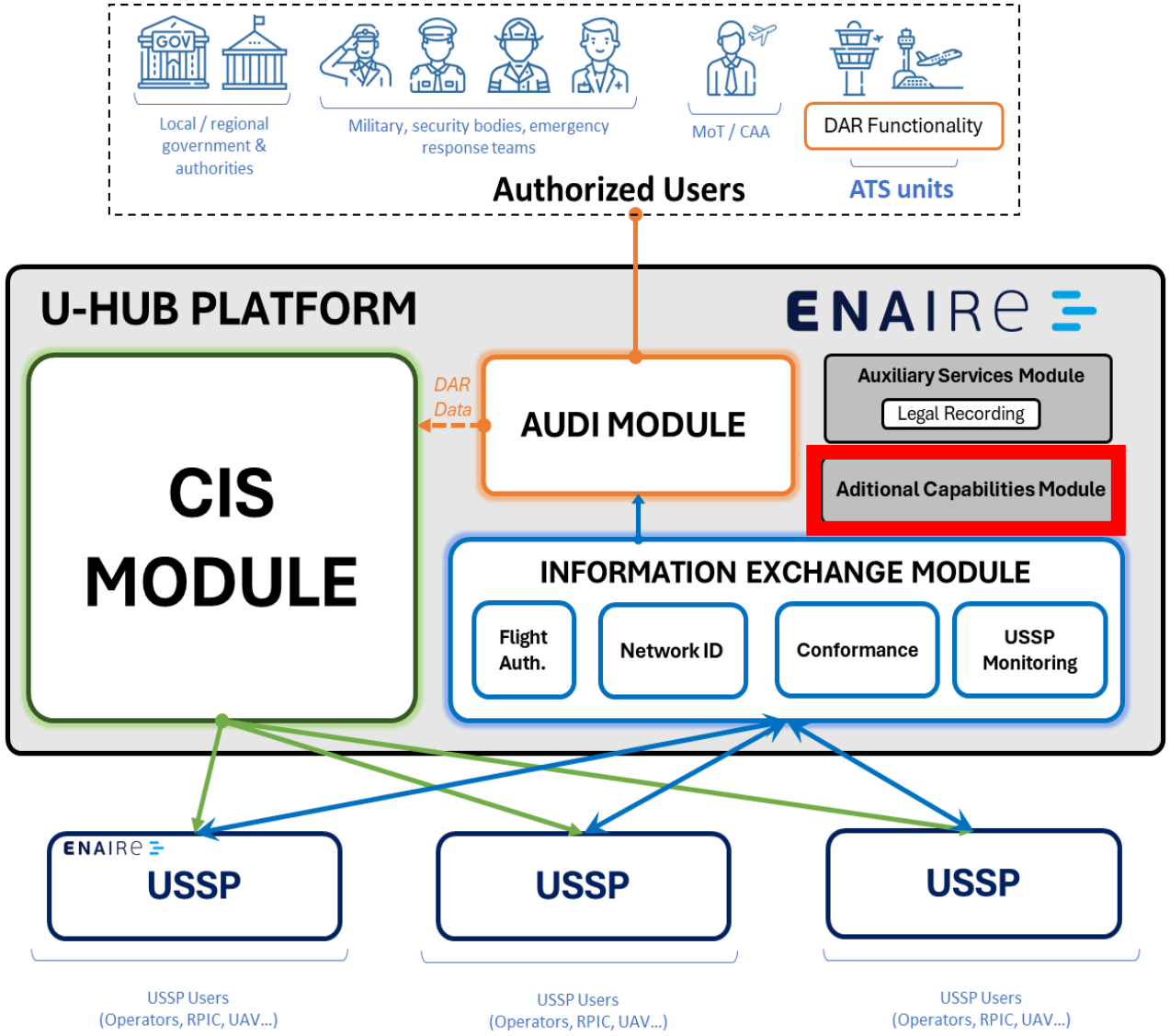
a) UAS operators have a one-stop shop for coordinating operations with authorities ; and

b) Local U-space Coordinators allowed to be part of the ecosystem.



Additional Capabilities Module

- E-conspicuity by Data Providers (e.g. ANSP, etc);
- Local GNSS or LTE/5G signal availability;
- Support to SORA/ARA operations validations from Authority
- …



ANSP and CISP designated entities Business separation

Independence of the ANSP and CISP service:

- *System*
- *Accounting*
- *Staff involved*
- *Funding based on CISP fees to USSPs*
- *Analytical accounting to remove U-space costs from en route charges cost-base to airlines*

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