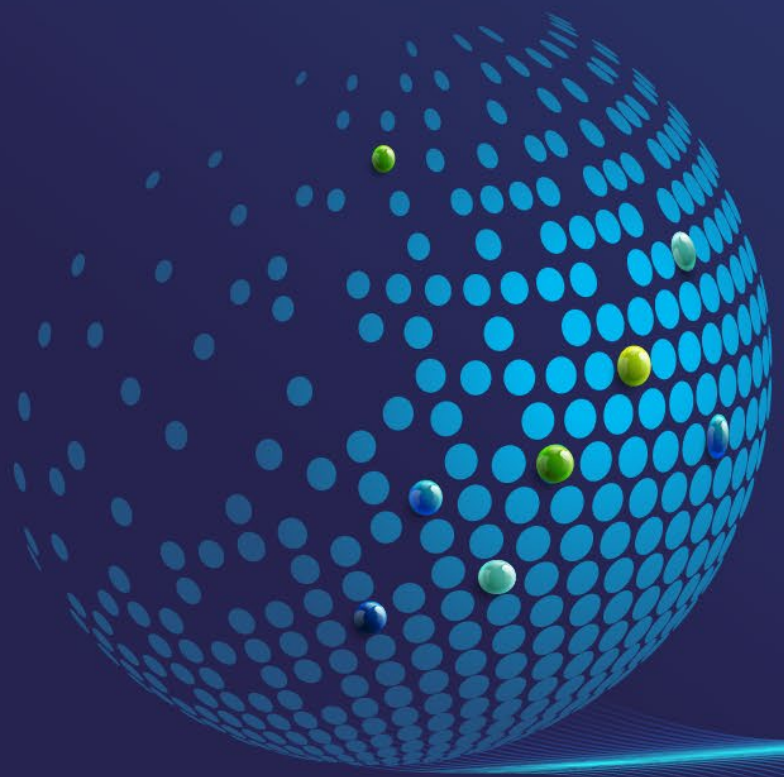


U-space: From concept to operations

Feasibility of ATM U-space interface in emergency management operations

Giovanni Riccardi, ENAV

Antonio Strano, Leonardo

SESAR 2020 SHOWCASE

#SESARShowcase

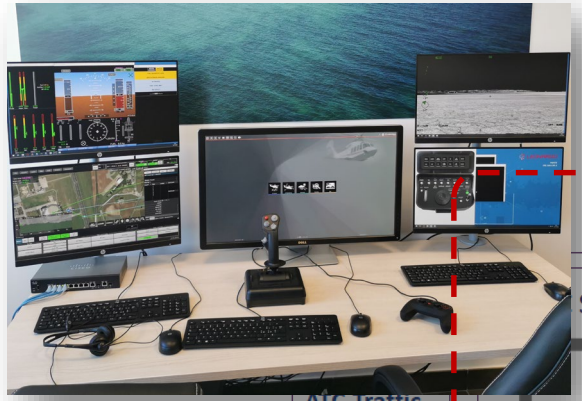
#EuropeForAviation

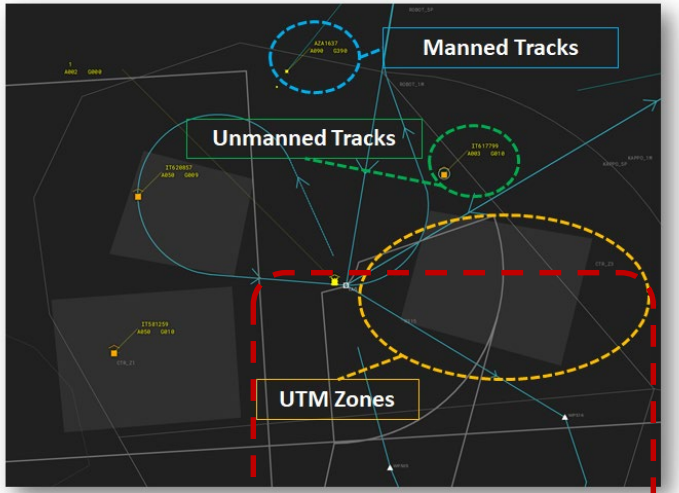
Italian “Cluster #4” Real Time Simulation overview

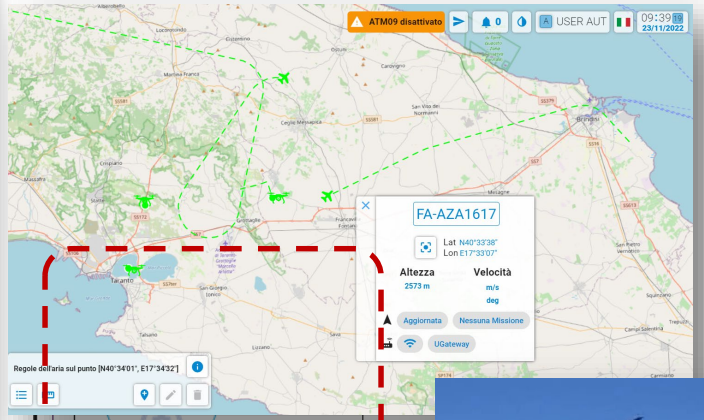
Collaborative Interface for emergency originated from ATM and application of Dynamic Airspace Reconfiguration

- ATM-U-space collaboration at strategic and tactical level to manage mixed drone and manned air traffic within controlled and uncontrolled airspace.
- The simulation environment visualizes properties of drone traffic within controlled airspace, aeronautical information, as well as possible control actions on drones regarding interfering HEMS flights.
- Interactions of an ATM System and one U-space System, to lay the foundation for the automation of the process regarding the publication and transmission via NOTAM of the static and dynamic information.
- Exchange of information between ATM and U-space through SWIM.

Validation Platform Overview







SYSTEM

ATC Traffic generator

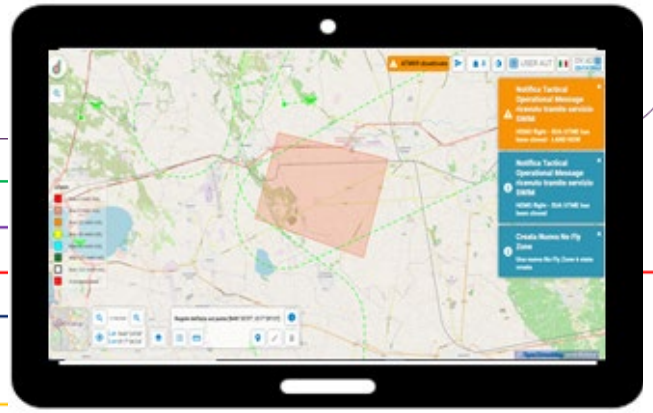
HEMS Traffic generator

FDP

MRT

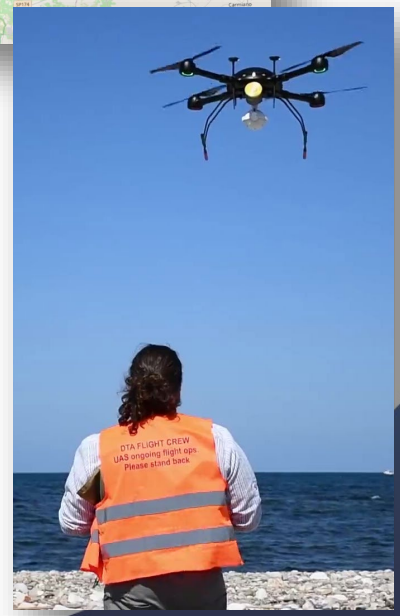
UAS (authorization)

Meteo SERVER



Simulate Drone Tracks

Track Data from UTM tracker



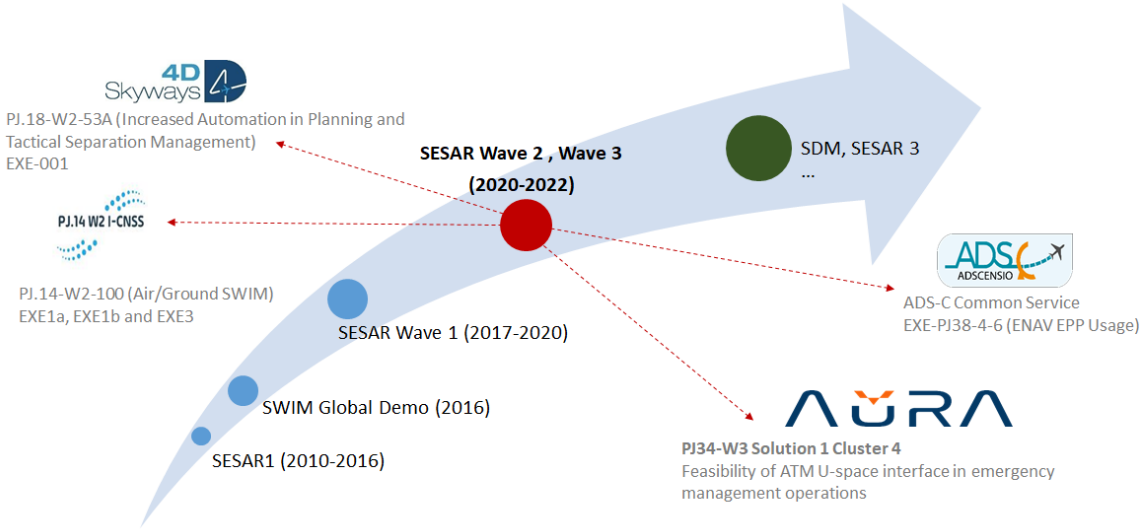
#SESARShowcase

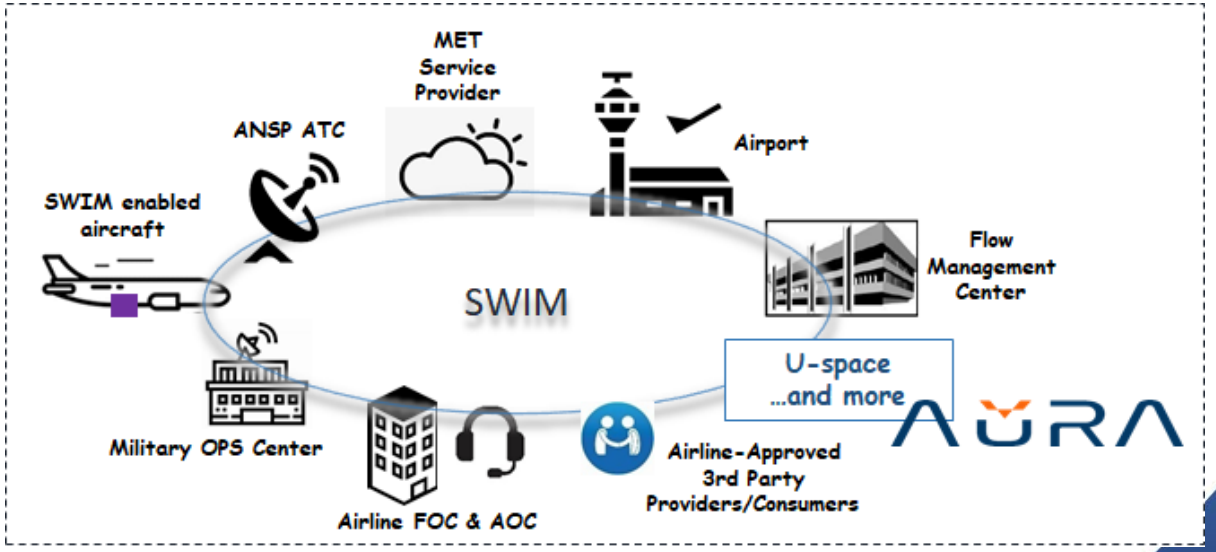
#EuropeForAviation

System Wide Information Management (SWIM):

cost-effective and state of the art based approach enabling seamless interoperability, automation and digitalization

sesar JOINT UNDERTAKING





...SWIM and Leonardo SWIM Platform evolution...

Leonardo SWIM Platform key characteristics

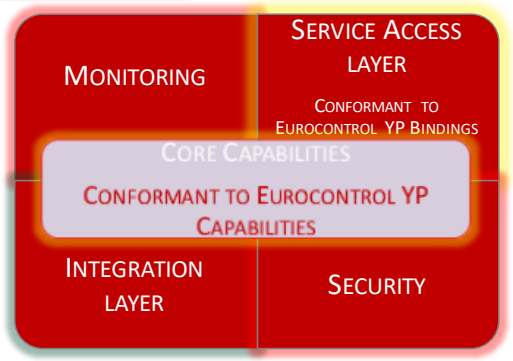
Reliability
- Reliable routing
- Delivery guarantees
- Ordering guarantees
- Safe-modes of operation
- …

Monitoring
- Nominal and non-nominal events
- Metrics
- Statistics
- Reporting
- Alerting
- …

Messaging
- Advanced routing
- Advanced filtering
- Rich set of MEPs
- …

Security
- Authentication
- Authorization
- Overload protection
- Message level security
- Message screening
- …

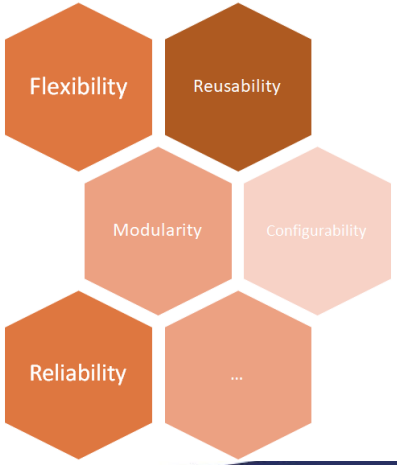
"SWIMize" existing systems/services
- Based on enterprise integration patterns.
- Rich set of protocol and technologies
- Data transformation
- Protocol bridge
- Extensible with any "legacy" protocol and/or data format.



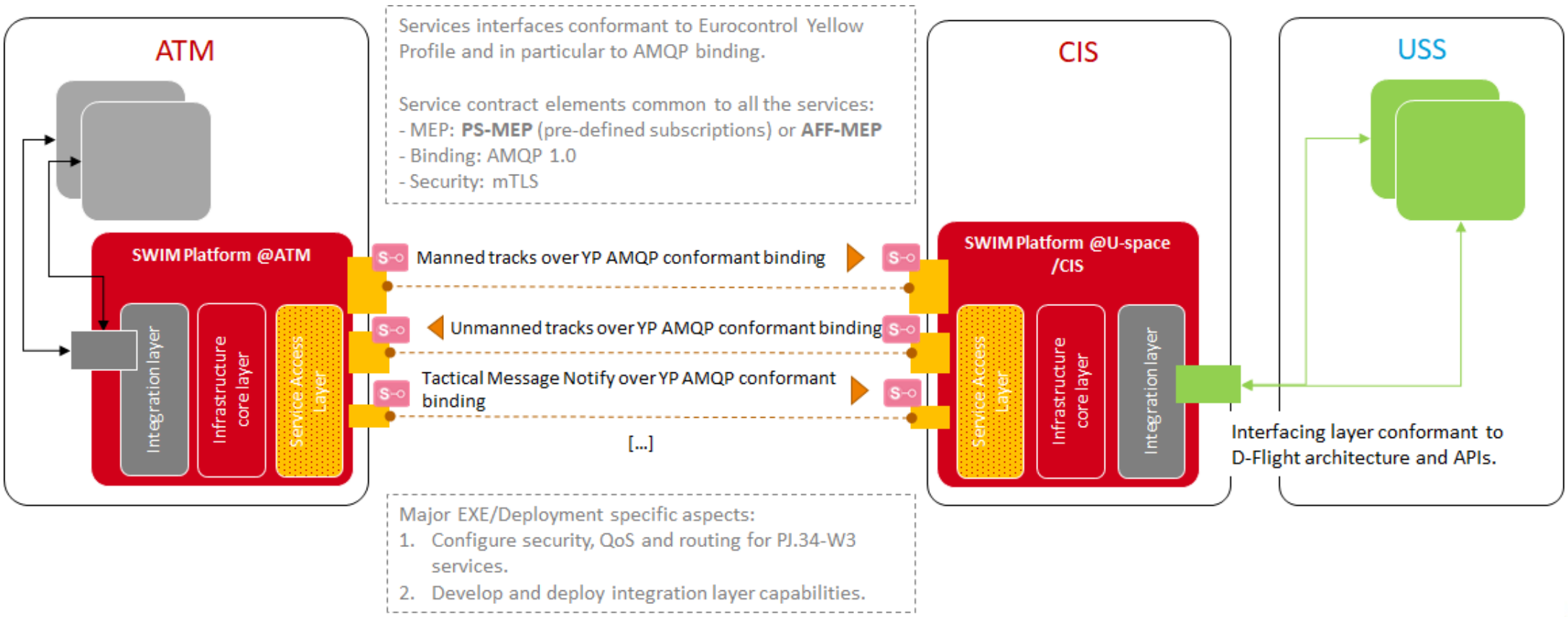
Flexibility & Extensibility
- Multiple deployment options
- Capabilities are highly configurable
- Deploy only what you need (operated/consumed services)
- Per-service and per-service group QoS.
- …

Leonardo's SWIM infrastructure solution vision:

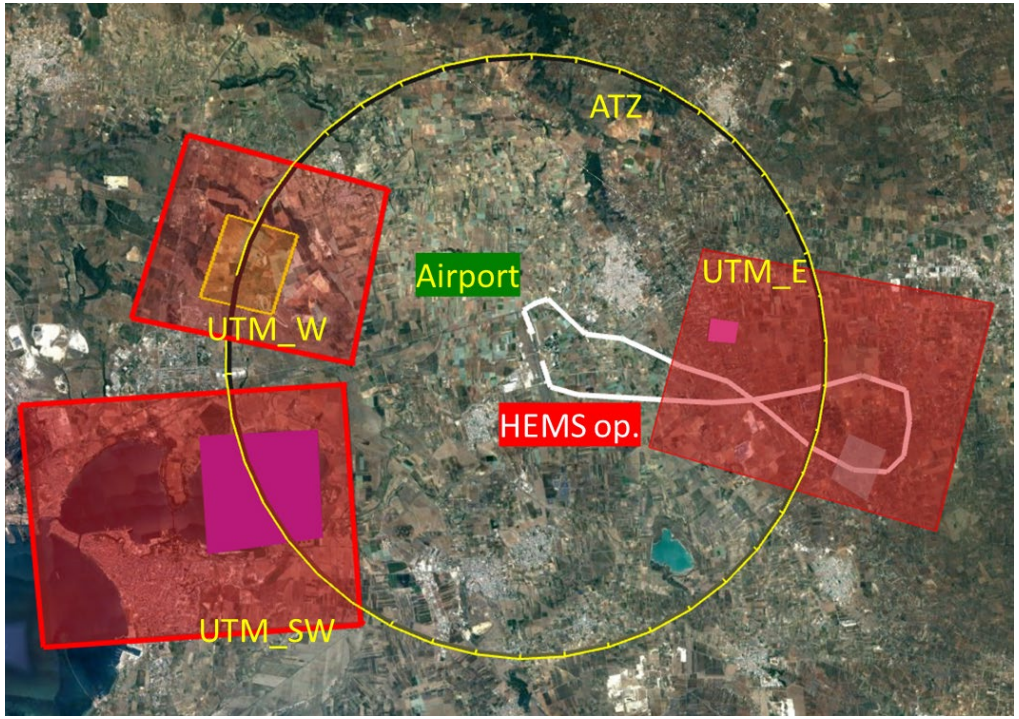
from per-SWIM profile prototypes to a product usable in different context according to user's needs, operational context and SWIM service level requirements operated on top of the infrastructure



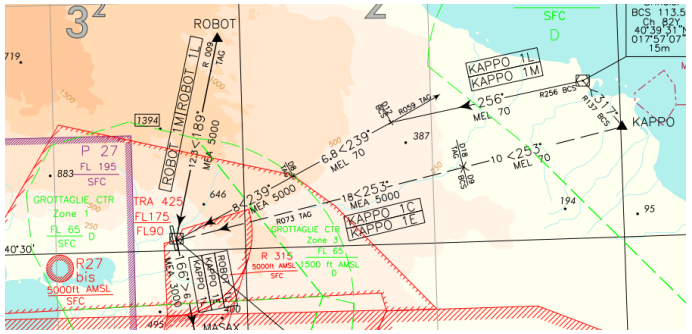
ATM - U-space: Leonardo SWIM Platform deployment

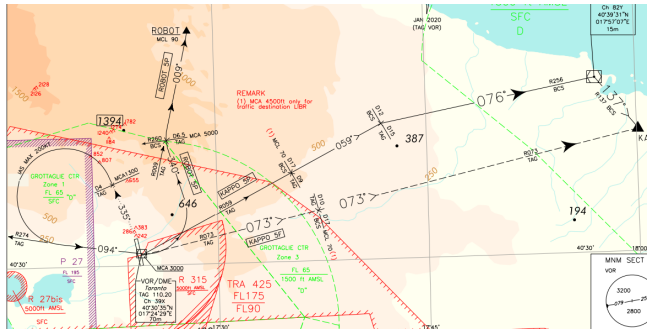


Operational scenario



- Taranto Grottaglie civil Airport Aerodrome Traffic Zone
- Use of arrival and departure procedure (SID and STARs) for manned a/c

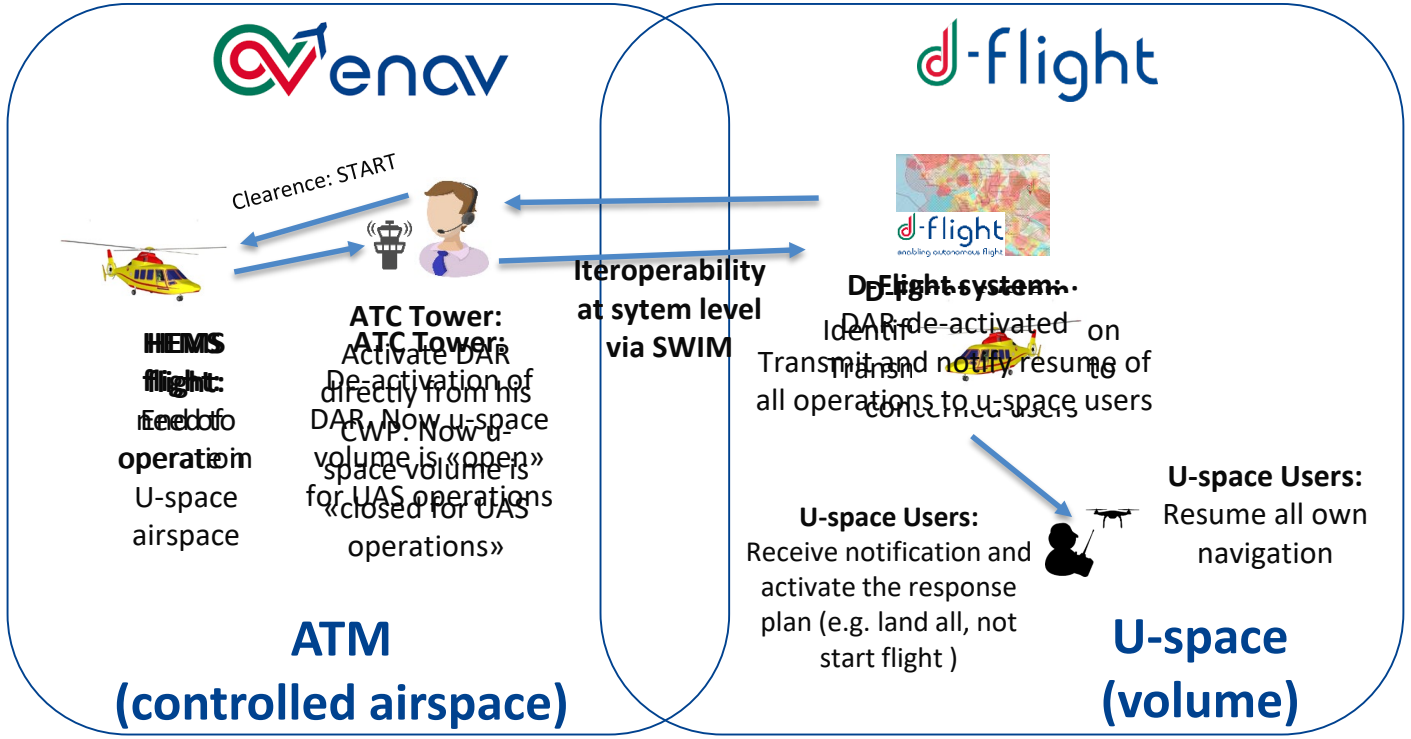




- Manned traffic sample : 10 Arrivals+10 departures
- Three U-space volumes (E, W, SW) designed for UAS operations
- 1 TWR +EXE ATCO + 1 ATCO Supervisor (acting as DAR manager)
- HEMS operations to be managed (Helicopter simulator + pilot)
- 6 UAS (simulated)+1 real UAS +pilot in the U-space volumes

Use case: Application of Dynamic Airspace Reconfiguration for management of HEMS operation

- Objective: management of ''high priority'' HEMS flight operation originated in ATM and executed in U-space.
- How: use of Dynamic Arispace Reconfiguration



Operational results and recommendation

- The management of HEMS operation started in ATM and executed in U-space through the use of DAR and activation/de-activation of U-space zones is feasible and manageable from an ATC side.

- From ATCO point of view, it is important to have the U-space zones identified plus the awareness of presence of drone inside on the CWP. Visualization of drone tracks in the volumes is not mandatory. The option to show them or not is suggested

- As recommendation for the future could be useful to have an alert message for the ATCO in case a drone goes outside from U-space zone in particular if U-space zone is in the Aerodrome Traffic Zone . This is linked with U-space service “conformance monitoring “ of the USSP and related notification to Air Traffic Control- (to be further tested in future validation activities)

- The USSP platform should have the capability to receive from remote pilot the confirm of drone landing and transmit it to ATC/ATM via SWIM . This will ensure if the area is cleared from drones and is safe for the flight of the HEMS