

# UTM/ATM Integration- Challenges/Lessons Learned from U- Space GOF project

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# Agenda

- **Frequentis Drones Solutions**
- **U-Space GOF Project**
- **Flight Information Management System (FIMS)**
- **Challenges**
- **Lessons Learned**
- **Conclusion**



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# Frequentis Drones Solutions

- **Drone Management**

- Flight Information Management System (FIMS)

- Drone Registration and Identification
    - Flight Plan Management
    - Flight Plan Data Fusion
    - Safety Nets

- Air Situation Display

- **Drone Detection and Incident Handling**

- Flight Information Management System (FIMS)

- Integration with existing Infrastructure and Sensors
    - Surveillance Data Fusion

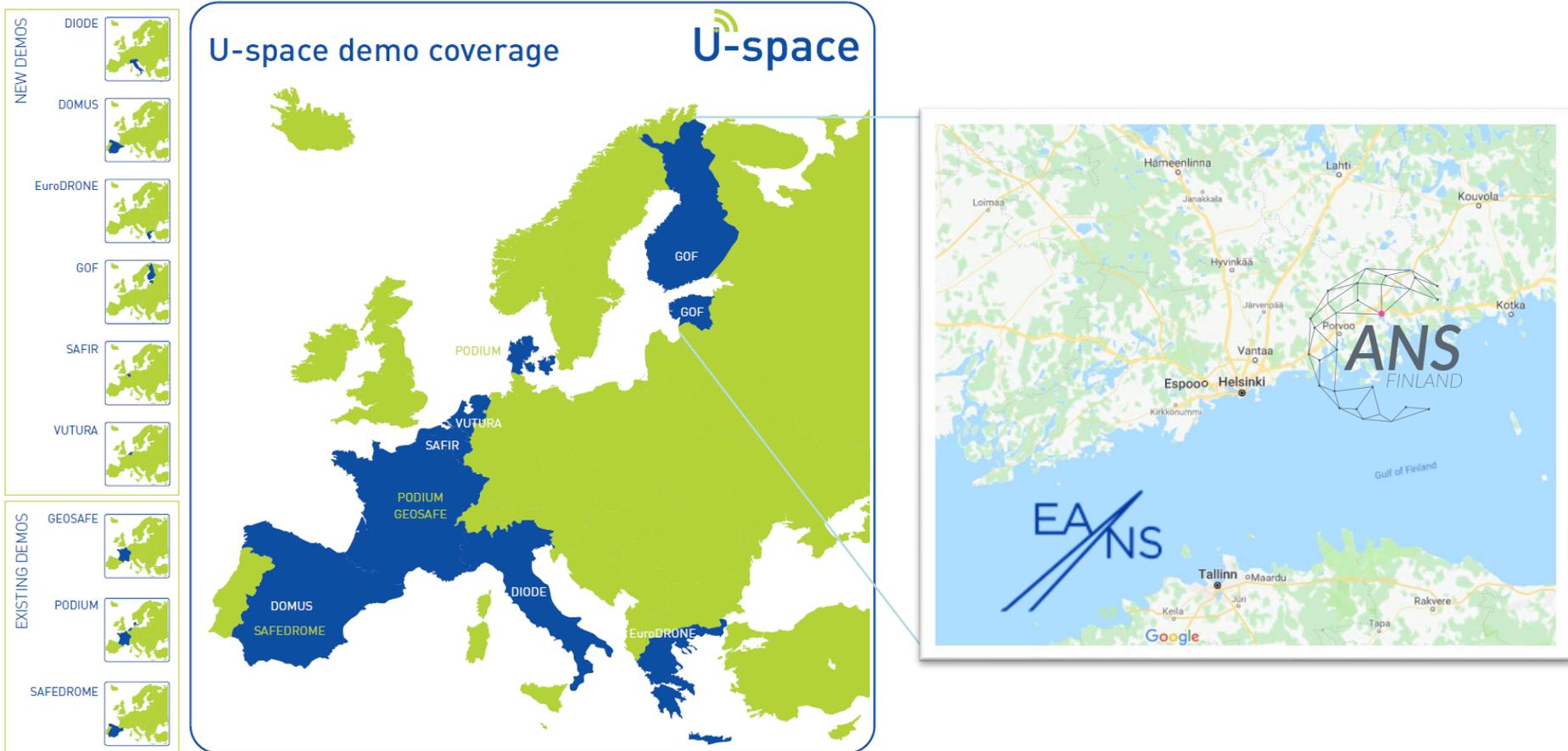
- Incident Management System



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# SESAR U-Space Demonstrations



# U-Space Demo Coverage

U-space		U-space demo coverage								
Project	Country	Environment	Area survey	Parcel delivery	Linear survey	Point survey	UAM	Leisure	Emergency / SAR	External
DIODE		-Rural -Sub-urban -Airport	-Agriculture -Archaeo -Road traffic	Ad-hoc	Electricity rail	-On airport -Photography	n/a	Yes	-Firefighting -SAR	-Manned a/c -ATC -V21
DOMUS		-Rural -Urban -Maritime -Airport	-Terrain -Construction -Road traffic -Maritime patrol	-Medical -Urgent delivery	n/a	-3D modelling -Building inspection	n/a	Yes	-Firefighting -Road traffic accident	-Manned a/c -ATC -V21
EuroDRONE		-Urban -Airport	No	-Commercial	-Long distance utility	-On airport	n/a	Yes	n/a	-V2V -V21 -ATC
GOF		-Urban -Maritime -Forestry -Airport	-Drone fleet management	-International parcel delivery	-Long-range sensory data collection 100km+	-Drone fleet management	Air taxi form airport to city centre	Yes	-Maritime traffic surveillance -SAR -Police	-Manned a/c -ATC
SAFIR		-Urban -Airport	-Inspection for Port Authorities	-Commercial -Medical	-Oil spill -High tension line	-Line incident intervention and Pylon inspection	n/a	Yes	-Port inspection on criminal offenses	-Manned a/c -ATC -V2V -V21
VUTURA		-Rural -Urban	-Agriculture	-Commercial	n/a	n/a	n/a	Yes	-Drone interception -Firefighting -Police	-Manned a/c -ATC
GEOSAFE		-Rural -Urban	-Agriculture	-Commercial	n/a	-On airport -Security surveillance	n/a	Yes	-Police	-ATC -V2V -V21
PODIUM		-Rural -Urban -Airport	-Agriculture	-Commercial -Urgent delivery	n/a	-On airport -Security surveillance	n/a	Yes	-Police -SAR	-Manned a/c -ATC
SAFEDROME		-Rural -Sub-urban -Airport	-Agriculture -Drone fleet management	-Commercial	n/a	-Drone fleet management	n/a	Yes	n/a	-Manned a/c -ATC -V2V -V21

# GOF Project Partners



## Supporting Authorities

- Finnish CAA
- Estonian CAA

## Program Management

- Frequentis
- EANS
- Robot Expert

## ANSP

- EANS
- ANS Finland

## FIMS provider

- Frequentis

## Governmental Users

- Police of Helsinki
- Police & Border Guard Estonia

## U-space Service Provider

- Airmap
- Altitude Angel
- Unifly

## Commercial UAV operators

- Aviatec
- BV Drone
- Robot Expert
- Fleetonomy
- Hepta Airborne
- Video Drone
- Volocopter



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# GOF - Project at a glance

## Flight Information Management System (FIMS)

- ⇒ Integration of UTM and ATM systems
- ⇒ Cross-agency / country drone (UAV) information exchange
- ⇒ Accessibility of a Common operational picture
- ⇒ Enable Joint Operations / authority collaboration

Large scale demonstration



## UAV use-case demonstrations

<p>Urban drone fleet ops in Helsinki with Police intervention</p>	<p>Model flyers, general aviation and drones sharing same airspace</p>	<p>Maritime SAR exercise with helicopters in Gulf of Finland</p>	<p>International parcel delivery between Finland and Estonia</p>	<p>Urban drone fleet ops in Tallinn in controlled airspace</p>	<p>Inspection flights in forestry</p>	<p>Urban Air Mobility flight at Helsinki-Vantaa airport</p>
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# FIMS at the core of interoperability

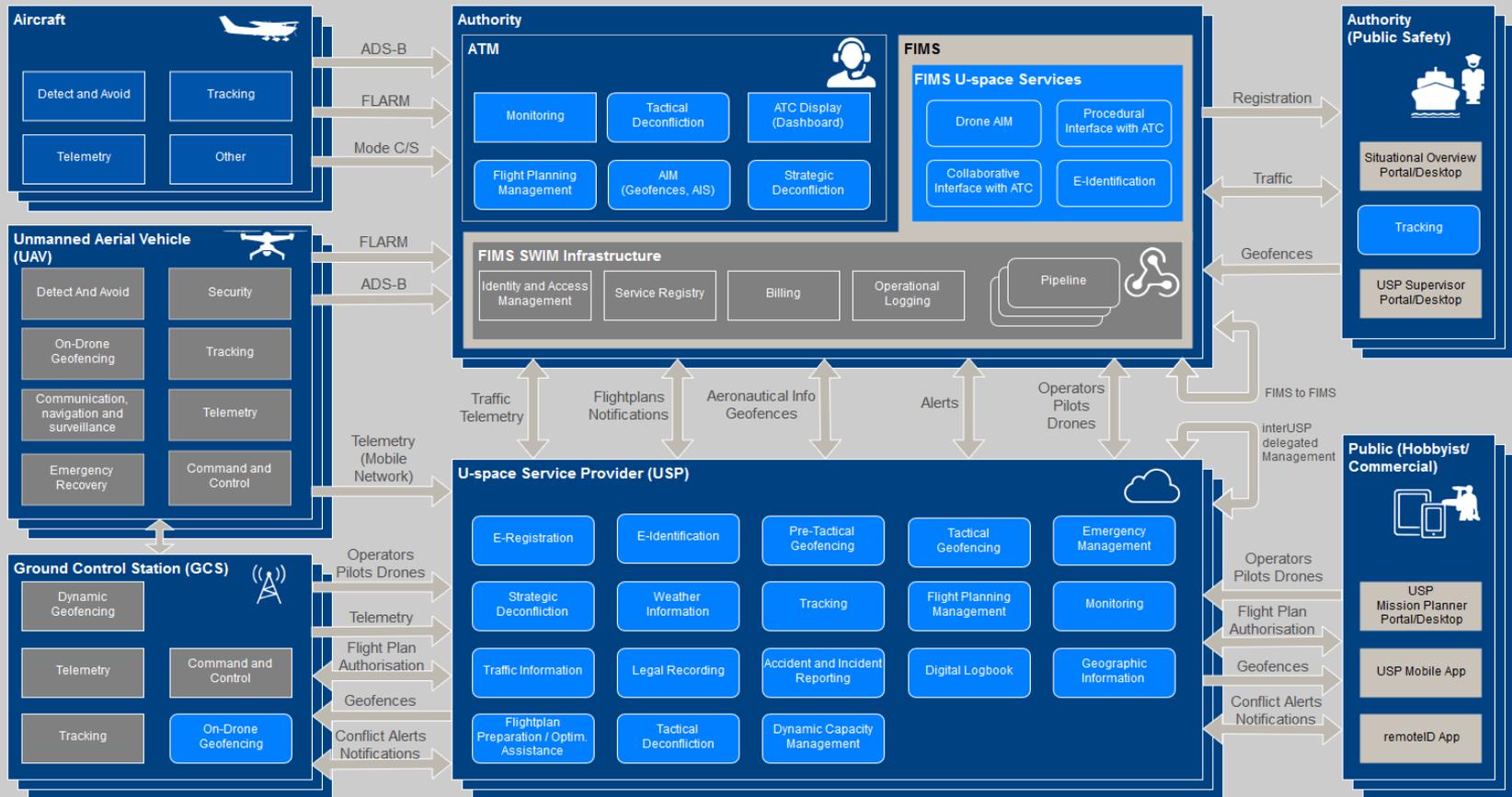
- **Serves and Integrates multiple UTM Service Providers (USP) – creates a liberal market regime**
- **Supports standard protocols based on SWIM principles to connect UTM services from several USP's to FIMS**
- **Provides real-time situational awareness to all airspace users – supports privileged access**
- **Supports FIMS to FIMS connections enabling cross-border and FIR to FIR operations**
- **Enables the integration of additional COTS UTM components, e.g. precision weather, 3D mobile coverage charts, dynamic charts on aggregation of people**



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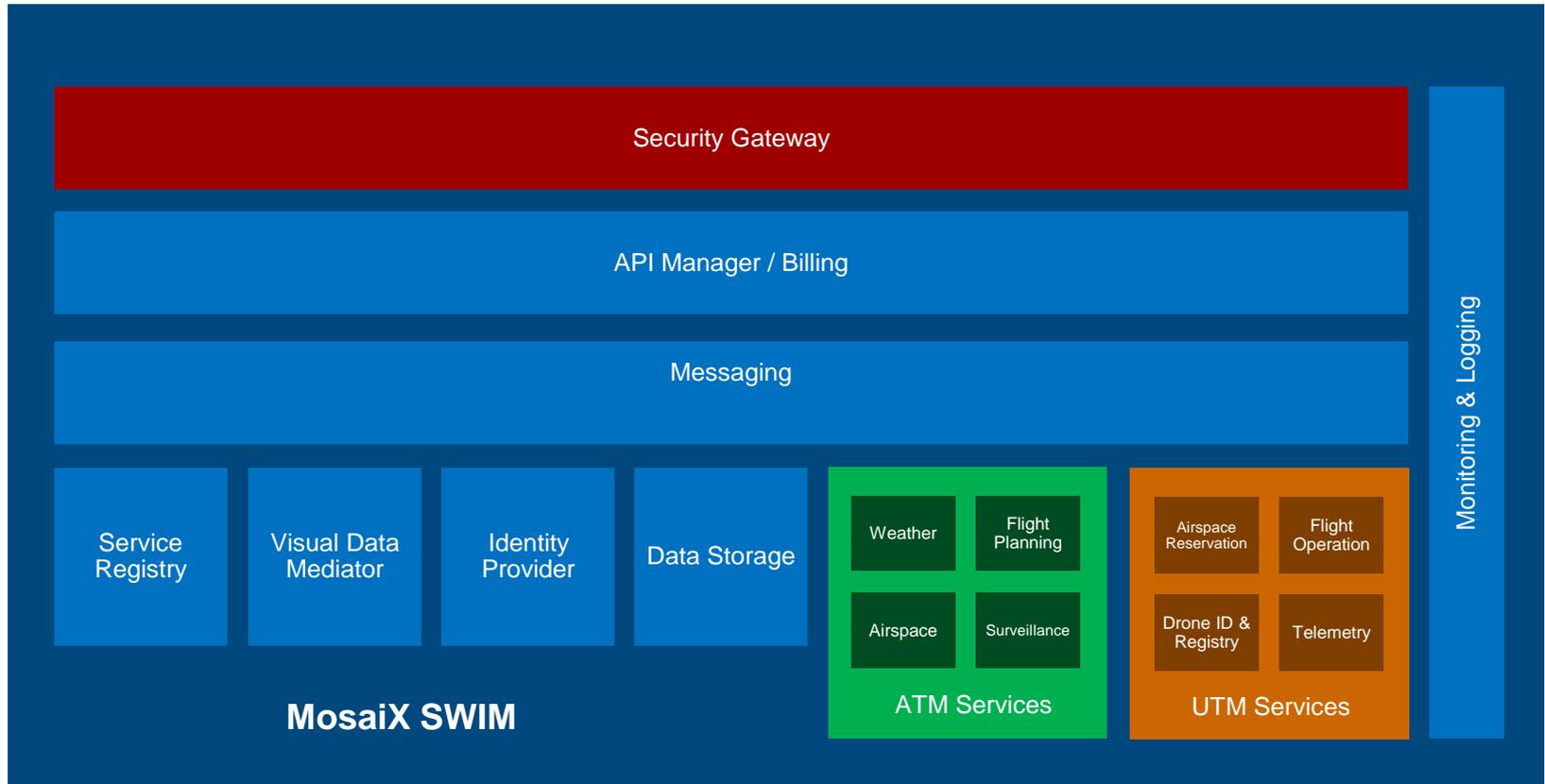
# GOF USPACE VLD - Design & Architecture



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# MosaiX SWIM – Digital Data Platform



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# Challenges

- **Safety – Operations in Controlled Airspace (CTR), airports & large cities, manned & unmanned**
- **Large consortium - partner different in interest, size and capabilities**
- **Building on existing products with little to no development – different APIs and runtime behaviour**
- **Demanding trials, both for operators and infrastructure partners**
- **Schedule – 6-7 months from first partner meeting to first trial**



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# Lessons learned

- **FIMS is a key enabler for a successful integration of UTM/ATM**
- **Standardized protocols reduce integration effort when integrating different UTM vendors**
- **Conversion between UTM and ATM environments works but ATM standards need to evolve to meet the UTM needs**
  - FIXM geometry in ATM vs. complex 3D volumes in UTM
  - IWXXM weather in ATM vs. Hyperlocal weather information & Wind LIDAR in UTM
- **Conversion needs to be standardized (i.e. ICAO)**
- **Affordable, reliable and secure telemetry “position” data link is the bottleneck**
  - ADS-B not designed for thousands of UAVs in a small area, FLARM is proprietary, 5G initially won't cover all areas



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# Conclusion

- **UTM/ATM Integration is today one of the best use case for SWIM**
- **FIMS architecture was successfully validated with multiple USPs across borders in a large geographical area**
- **FIMS will support SESAR with the design and standardization of the future ATM/UTM architecture**
- **FIMS will be used for drone detection in future validation projects**



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