Autonomous systems and drones
University of Helsinki
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Traffic Management Finland Group

- Traffic Management Finland Group, **TMFG**, was formed on January 1st 2019. In Finland all four types of traffic management and control functions are situated in the same Group. TMFG is 100% owned by Finnish state.

- Group's largest subsidiary is **ANS Finland**, which is responsible for air traffic control.

- Railway traffic control is managed by an organisation based on a merger between **Finrail** and the **Finnish Transport Agency's rail traffic control operations**.

- **VTS Finland** is responsible for vessel traffic control.

- Road Traffic management is controlled by **ITM Finland**.
<table>
<thead>
<tr>
<th>YEAR 2018 IN NUMBERS</th>
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<tbody>
<tr>
<td>Revenue (EUR million)</td>
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<td>Operating profit/revenue (%)</td>
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<td>Flights processed by area air traffic control</td>
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<td>Flights processed per day on average</td>
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<td>Minutes of delays attributable to ANS Finland</td>
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<td>Employees at the end of the year</td>
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The number of overflights increased by 4.7%.
The traffic volume of Helsinki Airport increased by 10.3%.

VISION
- We are the most competitive provider of air navigation services in Finland and the most preferred partner in Europe.
- We have the world’s most environmentally-friendly airspace.

OUR VALUES
- Safety is the starting point of everything we do.
- We fulfil our customer promise.
- Skilled employees are our strength.
- A well-functioning society and healthy environment are important to us.

→ We are a reliable and punctual service provider.
First ever Drone taxi flight at an international airport on Aug 29th

https://vimeo.com/366208890/5628a5b360
Autonomous systems and drones, -terminology from hell

UTM
Unmanned Traffic Management

VLOS
Visual Line Of Sight

BVLOS
Beyond Visual Line Of Sight

CIS
Central Information Service

FMS
Flight Management System

USS
U-Space Service

USSP
U-Space Service Provider

SORA
Specific Operations Risk Assessment

UAS
Unmanned Aerial System

LAANC
Low Altitude Authorization and Notification Capability

E-VLOS
Extended Visual Line Of Sight

DAA
Detect And Avoid

CIM
Central Information Management

BRLOS
Beyond Radio Line Of Sight

SAA
See And Avoid
The GOF USPACE project at a glance
Flight Information Management System (FIMS), supports also cross-border drone operations

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

Use-cases demonstrate integrating manned and unmanned aviation

- Urban drone fleet ops in Helsinki with Police intervention
- Model flyers, general aviation and drones sharing same airspace
- Est-Fin-Swe maritime SAR exercise in Gulf of Finland
- International parcel delivery between Helsinki and Tallinn
- Urban drone fleet ops in Tallinn in controlled airspace
- 100km+ inspection flights in forestry and utility inspection
- Urban Air Mobility flight from Helsinki-Vantaa airport to downtown Helsinki

All use cases demonstrate actual operational needs
Flight Information Management System (FIMS) was established to enable collaboration and data exchange between the participants.
User cases
- Weather obs
- Weather data
- Border guard
- Delivery service
- Foto missions
- Area surveillance
- Search And Rescue
Unmanned Traffic Management - system

Flight mission functionalities
- Flight plan
- Approval
- Mission control
- Mission cancellation
- Dynamic geofencing
- Data sharing
- Position tracking
ANS Finland digitalization project

1) Briefing facility function
2) Air space situation
3) UTM
Summary: GOF lessons learned

- Need for European interoperability standards and stress test environments
- A dataflow has many services, most likely one of them a more central one – a single source of truth for a region
- Aim to have basic U-space services tracking, flight planning and flight conformance monitoring integrated in Ground Control Stations
- Tracking solutions need significant additional work
- U-space services must be resilient to poor mobile network coverage
- Stakeholder involvement is key – it’s people behind safety, systems help
ANS Finland vision on UTM

- Need for one national UTM service provider as an “umbrella organization”
- All other UTM service providers can join via open API’s
- Shared information on drones and their intentions
- Same data for all (air space model, air space reservations, airport OPS hours, other traffic)
- Traffic information on all traffic
- Static data, Dynamic data, Dynamic Dynamic data (real time air space reservations)

- ANSP has all the information needed
- Capability to act as national UTM service provider
- Not as a monopoly, but enabler
- Real time data for all, same level service = equal service
- Via digital solution open interface for business use and for authority and officials
- Digital platform, cloud services, micro services
- Flight Information Service, Aeronautical Information Service
- ANSP’s task in ATM, very strong link also in UTM

AIR NAVIGATION SERVICES FINLAND