DREAMS – DRone Enhanced Airspace Management System

The IDS UAS Traffic Management approach
IDS S.p.A. Company

UTM Context

IDS Approach

DREAMS system
IDS Company Overview

• Founded in 1980, is a system engineering and manufacturing company providing high technology solutions in selected defense and civil sectors

• Totally independent

• IDS HQ: Pisa (Italy)

• 5 Subsidiary worldwide

• IDS corporation totals more than 580 professionals, 75% with technical degrees

• IDS’s Quality Management System certification - UNI EN ISO 9001:2015
Customers

Corporate System Integration
- Defence
- Space
- UTM/Airports
- Naval

ElectroMagnetic Engineering
Aeronautical & Unmanned Systems
Satellite Communication
Air Navigation
Radar Systems

Research & Development Laboratories, Technological support to divisions
IDS and its international companies support clients on every continent in different areas

and:
- Indian MoD
- French MoD
- Turkish MoD
- Korean ADD
- Chinese MoD
- Egyptian MoD

MoD, DoD, Navies, Armies, & Air Forces

Global Industrial Firms

BAE SYSTEMS Raytheon GE Aviation Global

... 85+ ANSPs/CAA

Global Customer Base
More than 30 year experience in AIM system provision to support ATM-related solutions

Air Traffic Flow Management

UTM

Dynamic data (NOTAM, FPL, PIB)

Airspace configuration & booking

Air navigation Division

DRone Enhanced Airspace Management System

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SESAR 1 - Industrial Research and VLD DEMO

- Operational, Technical and Transversal project (e.g. i4D Trajectories, Trajectory Management, PBN procedures, Verification & Validation, Service Modelling, SWIM).
- EUROCONTROL subcontractor for Digital NOTAM and Digital Briefing.
- INSuRE Project: RPAS Integration into non-segregated ATM

SWIM DEMO and Master class

- IDS SWIM-service provides a web GUI to request Flight Plans and Weather data to WFS and WCS services (2015)
- Global Demo - IDS Service allows distributing Digital NOTAM messages to interested clients (2016)
- xNOTAM system (D-NOTAM airspace closure following volcanic ash event) (2012)

SESAR 2020

- RPAS Project: Surface operations by RPAS; IFR RPAS Integration
- ASM/DCB Project: Management of Dynamic Airspace configurations; Integrated Local DCB Processes
- AIS/AIM Project: Static Aeronautical Data Service; Aeronautical Digital Map Service; AIM Information Services

SESAR UTM

- SESAR2020 RPAS EXPLORATORY RESEARCH - RPAS-02 - Drone information management: DREAMS Project (Drone European AIM Study)
- SESAR RPAS EXPLORATORY RESEARCH - RPAS-01 CONOPS – CORUS Project Led by EUROCONTROL IDS (as UAS manufacturer) in the Advisory board
- Thousands of drones already in operation
- Significant increase forecasted for the next few years
- Great market potential in multiple sectors

- reduction of human exposure to risky work operations
- new services and business opportunities
- efficiency
- employment opportunities

- Safety, security, privacy, data protection, environment

- Infrastructure to enable and safely manage UAS operations in low-altitude airspaces
UTM high level objectives

- Reconcile safety constraints, coming from ATM domain and requirements and challenges of drone industry
- Allow safe and efficient integration of *large scale drone traffic* into low altitude airspace
- Overcome existing constraints and limitations on airspace access
- Reach the full exploitation of potential of UAS operations making them cost effective and operationally feasible
- Key enabler for the implementation of BVLOS operations and autonomous operations and services
• Development of DREAMS system: a fully web-based solution to contribute to the stepwise implementation of UTM services in line with U-space concept
• Basic capabilities for short term implementations (drones registration, no-fly zone service, ...)
• Enhanced capabilities to collaborate with stakeholders to define and validate new operational concepts and requirements

UTM Challenges

- Rising number of aerial vehicles (sUAS)
- Low altitude CNS, tracking and surveillance
- UTM stakeholders: role, responsibilities, procedures
- Great variety of drones (MTOW, size, performance) and mission needs
- Limited capabilities to carry heavy or power intensive equipment
- Suitable services for provision of up to date reliable data
- Standard definition
- Separation standards and contingency management
- Maturity of on board capabilities and technologies for BVLOS operations
What is DREAMS system

- UTM capabilities in support of planning, execution and post flight phases of UAS Operations
- Based on existing technologies and standards currently applied in the aviation industry.

- Enables CAA, ANSP, private VLL airspace service providers and major UAS operators to implement UTM services.
- Provides wide set of functionalities and services for several UTM stakeholders through tailored services and ad-hoc interfaces.
DREAMS functionalities and U-Space services

- Static and dynamic geofencing
- Notification & alerting
- Airspace occupancy & DCB
- Flight plan definition & mng
- Flight validation and authorization
- Tracking
- Recording & playback

Strategic
- Registration & UAS ID assignment
- No-fly Zone and Airspace Management

Planning/Pre-flight

Execution

Post flight

Take-off

Landing

Mission Altitude

U1: Foundation Services
U2: Initial Services
U3: Enhanced Services

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DREAMS Supervisioning dashboard

- **2D/3D map**
- **Airspace occupancy**: current, in the future; occupancy at national, regional, district level; mission type
- «Short term» **occupancy warning**
- **Information layers** activation/deactivation: meteo layers, ATS geography, zoo fly zone (No-drone zones, Limited-drone zones), **flights** per status (planned, active, sys-active, completed,...)

- **Temporal navigation** and details visualization: airspace, no fly zone and flights
- **Flight search** (from map, free text, per status) and details visualization
- Tracking and visualization of cooperative drones and other entities
- **Flight authorization** request notification
- **Notification** in case of new no-fly zone impacting flights
- No fly zone **infringement alerting**
No-fly zone management and flight authorization

- **Automatic flight plan validation check** (airspace, no-fly zones and national rules)
- Request of impact assessment: **interference check VS other planned flights**
- **Flight Plan Rejection or approval**

- **No-fly zone definition and management:**
  - Features: permanent, temporary; originator.; no/limited drone zones
  - Status: draft, cancelled, rejected, published
- **Interference check:** overlapping with other airspaces and no-fly zones
- **No Fly Zone Impact Evaluation** on planned flights
sUAS Flight definition and management

- **Flight plan definition** (linear and area flight plans), single, repetitive
- **Flight plan validation** according to airspace constraints and national rules
- **Temporal navigation and visualization** of evolving airspace constraints and planned flights
- Flights **monitoring**
- Visualization of other traffic

- **Flight logbook**
- Operator, pilot and drone registration and management
- **Multi layer map visualization** (weather, airspace, traffic,..)
- **Supervise and manage your flights** (draft, planned, active, expired, rejected, completed, wait for approval,....) on interactive 2D/3D map
- **Timely notification** in case of new no-fly zones impacting your flights
- Drone registration and unique ID assignment
- QR code generation
- Drone manufacturer and models
• Homescreeen
• Layer Visualization
  o Live Traffic
  o Airspaces
  o Flights
  o Weather
  o No Fly Zones
• Mission definition (linear, rectangular, polygonal, circular)
• Flight logbook
• Start & stop
• Flight status notification
• Drone and pilot entity management
• Same technological platform as IDS ATFM system and D-NOTAM; interfaces to SWIM network, AFTN/AMHS system

• **Microservices architecture**: guarantee scalability and high availability requirements

• **SWIM based**: Aeronautical (AIXM), Weather (WXXM), Flight (FIXM) Information Exchange Model

• Development process: **Agile Scrum**

• Use of standard **open data formats**: (CSV, GRIB, XML, KML, JSON)

• **Web service interfaces**: build on open standards (XML, HTTP, REST, SOAP)

• Self-documenting interfaces (**API**)

• Continuous integration and deployment
Possible common framework elements

• **NOTAM management** impacting VLL airspace

• Automatic **airspace access** and **flight prioritization** according to sUAS operation classification

• Contingency management - **alternative drone flight path** generation and proposal

• Airspace alerting for **manned airspace users**

• Coordination with ATM/ATC and **notification and authorization** mechanisms

• **ATC tracks acquisition** and management

• .....
Thank you for your attention