DRONE ENABLE
Towards a common framework for UTM
The Italian experience

Montreal, 22 September 2017
Presentation

1. Setting the scene
2. Italian implementation of UTM
3. First achievements
4. Roadmap for future growth
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Setting the scene

Challenges related to Drones

- **Airspace safety & reliability**: Rapid growth of drones, without proper regulation and dedicated supporting services, impacts airspace safety and reliability.
- **Airspace accessibility**: Drones need to be safely accommodated.
- **Creation of Public Value**: Strong concerns about security and privacy. Urgency to unlock the enormous potentials promised by full exploitation of drone based services.
- **Financial sustainability**: Innovative services offered to new kind of users need to be financially sustainable and can generate new revenue streams.
Setting the scene – ENAC and ENAV work

Regulatory framework

• Geographic limitations for flying drones
• Operating condition for safe operations in VLOS
• Qualification of pilots
• Recognition of commercial operators
• Security provisions
• Registration and E-Identification of drones
• Technical and operational conditions to operate a drone in BVLOS
Setting the scene – ENAC and ENAV work

Airspace and UAV Traffic Management

- Development of CONOPS for BVLOS Operations
- UTM development and deployment as a key answer to the Drones development and integration
- Role and level of engagement of ANSPs in the UTM
- Implementation of UTM concept in the Italian Airspace
Implementing the UTM

- Participation to international activities (ICAO, EASA, GUTMA, …)
- Partnership with the National Aviation Authority
- Collaborative environment to launch BVLOS operations
- Development and deployment of the Italian UTM solution
ENAC and ENAV agreement - August 2016

1. Registration and E-Identification
   Provide a system for web registration ([www.d-flight.eu](http://www.d-flight.eu)). ENAV is indicated as the Provider of the Registration and e-identification services for drones (currently only those for professional use) on behalf of ENAC.

2. BVLOS regulatory framework
   Sets a collaborative framework to enable BVLOS operations:
   - BVLOS concept of operations (2016)
   - BVLOS validation campaign (2017, ongoing)
   - Setting of regulations and standards

3. Infrastructure
   ENAV commits to the development and deployment of the UTM system infrastructure in Italy.
Collaborative environment to launch BVLOS operations

- Face to face meetings and activities involving ENAC, ENAV, and key national industrial players, public entities and drones operators
- BVLOS concept of operations released
- Ongoing validation campaign on the field
- Focus on the Asset Survey

Ensure the Involvement of Stakeholders in the process

Collaborative environment to launch BVLOS operations

- Mandatory enablers
  - Precision Agriculture
  - Environmental monitoring
  - Logistics, medium complexity
  - Urban, autonomous flight, high complexity

Mission and environment complexity

- Asset Survey

- Technological enablers
  - UAS capabilities
  - UTM systems
  - CNS/Meteo

- Human/Procedural enablers
  - Research and Development
  - Contingencies
  - Qualifications and training

- Regulations
  - Regulations and laws
  - Certifications
  - License
Development and deployment of the Italian UTM solution: the first achievement


- Useful public information about drones
- Maps and No Fly Zones (beta testing)
- Registration and (static) identification of drones
Development and deployment of the Italian UTM solution: the roadmap

- **Project Started**
  - Business Case
  - Project Plan
  - HL architecture
  - Management decision
  - Signature of Agreement with ENAC

- **Basic services**
  - Information
  - E-registration
  - Identification
  - No Fly Zones

- **U-Space foundation services**
  - E-registration
  - E-identification
  - Geofencing

- **U-Space initial Services**
  - Flight planning
  - Flight approval
  - Tracking
  - Airspace dynamic information
  - Procedural interface with ATC

- **U-Space enhanced Services**
  - Capacity management
  - Assistance for conflict detection

- **U-Space full services**
  - Integrated interfaces with manned aviation
  - Additional new services
Static: before flight, a QR code encoding the registration number (UIC) has to be attached on the drone frame;

Dynamic: the drone broadcasts its encoded **UIC** in the surrounding portion of airspace, e.g. by RF. Whoever concerned should be able to read the **UIC** and decode it with e.g. a smartphone. The identification process can be completed by querying [www.d-flight.it](http://www.d-flight.it), using the **UIC** as the key. The level of information accessible will depend upon the permissions granted to the *identifier*.

*E-identification should be possible regardless the availability of mobile communication means*
Development and deployment of the Italian UTM solution: d-flight target architecture

- Communication and navigation infrastructures (mainly outside UTM perimeter)
- Meteo and other external services consumed by UTM
- Authenticating user
- Authentication and planning
- Self-registration, registration of UAS
- Notify or send mission requests
- Validate and authorise mission
- Management of rules for geo-fencing and separation
- Alerts, mission progress, logs
- Send telemetry and payload data
- Receives 3D information, speed, power, autonomy
- Know identity, link quality
- Registered drone
- ATC
- Aviation user
- Citizens law enforcement
- Situation awareness, alerts, offline queries
- Conflict detection & alerting

ICOA – Drone Enable UAS Industry Symposium
Development and deployment of the Italian UTM solution: the contextual diagram

Communication and navigation Infrastructures (mainly outside UTM perimeter)

- ADS-B/FLARM

- e-identification (U1)

- Tracking (U2)

- Mobile Comm

- Weather
  - Terrain&Obstacle
  - In/out ports
  - Re-fueling services

- UTM Maneuvers (U3+)

- Pilot e-identification and tracking (Virtual Box)

- Conflict Alert (including Geofencing)
  - UnConformance Alert
  - Situation Awareness

- C2 Proprietary Link

- UTM Maneuvers (U3+)

- UTM Box

- UTM App

- UTM Front Ends and ICDs

- UTM Supervision
  - Configure
  - Manage
  - Monitor
  - Backoffice
  - Billing
  - Etc.

- Third Parties Applications
  - Subscription

- User
  - Get Informed
  - UAS Awareness
  - Subscribe

- Registered Owner/Operator/Pilot
  - Manage profile
  - Register and manage Fleet
  - Submit Mission
  - Receives approval
  - Negotiate amendments
  - Notifications
  - Log and Playback
  - e-Payment

- UTM Servers

- External Service Provider
  - AIS, NOTAMs, ATC

- Ground Control Stations

- Zones UTM/airs

- Alerts
In early 2016, a **Business Case** has been developed, based on available market outlooks.

**Main assumptions:**

- Registration, e-identification, Tracking, Geofencing and Mission declaration/approval will be **regulated services** provided by one single Italian UTM provider.
- Users will be charged based on services they use.
- A set of more advanced and business oriented services, not subject to regulation, will be proposed by the UTM provider, at competitive prices in the open market.

On such assumptions, the Business Case yields a positive ROI within a 3/5 years period, depending on best and worst expected growth, in particular of BVLOS operations.
Development and deployment of the Italian UTM solution: the PPP

D-Flight will be further developed and deployed by a Public Private Partnership (PPP), between ENAV and an industrial partner, being selected through an open competitive tender

• Selection process is ongoing:
  • it was started in August 2016
  • it will be finished by 2017

• The industrial partner will act as the main technological supplier

• ENAV will retain control of the PPP
Conclusions

• UTM is a key element to answer the challenges related to Drones

• Institutions, States and Stakeholders have to cooperate to:
  • respond to market and social demand
  • timely support full exploitation of drones potentials and benefits
  • ensure safe and secure integration of drones in the airspace
  • identify a financially sustainable framework

• ENAC and ENAV have started the development and deployment of UTM in Italy