A Vision for Safe & Efficient UAS Operations

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The Rise of the Drone...

2.7B€
COMMERCIAL DRONES
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2016 GLOBAL---
PERSONAL DRONES
1.7B€

3 Ways Drones Could Change the Insurance Industry
Here's how the insurance industry could save as much as $6.8 billion per year by using remote-controlled drones.

Santa delivered the drone. But not the safety and skill to fly them

Interpol warns of drone attacks by terrorists on critical infrastructures

7M DRONE REGISTRATIONS ANTICIPATED BY 2020 IN USA

37K+ REMOTE PILOTS CERTIFIED IN USA
Expected Timing of UAS Commercial Services

- Photography & Movies
- Building/Mining Progress
- Agriculture
- Critical Infrastructure Examination
- Bushfire Surveillance
- Tower Maintenance
- Traffic Watch
- Shark Watch
- News Reporting
- Police Monitoring
- Crime Scene Exams
- Bushfire Surveillance
- Point-to-Point & Package-to-Pickup Point Delivery
- Medical Sample & Transplant Delivery
- Point-to-Many Point Delivery
- Direct-to-Home Delivery
- Personal Air Transport
- Uber Drone

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Thales in all segments
Digital Transformation: four technology pillars

- Connectivity
- Big data
- Artificial intelligence
- Cyber security
Digital collaboration is the key to optimizing aviation flight operations

Transporting a passenger from one city to another can involve many distinct entities – multiple aircraft operators, airport authorities, ANSPs, MET offices.

Passenger experience and efficient operations rely on optimization of the route, staff, crew, network, airspace and more. Better data leads to better decisions and better results.

Improving global efficiency & safety
Control of Drones – Moving Toward High Levels of Automation
Control of Drones – Moving Toward High Levels of Automation
The UAS Operating Environment

INNOVATION AND DIGITAL TECHNOLOGIES

Drone operations now and in the future?

10,000m
Beyond visual line of sight

150m
Farmland and inspection

50m
Photography

TELECOMMUNICATIONS
RELAY TO REMOTE AREAS

CLASS A
CLASS E
CLASS G

Growth & Jobs – Internal Market – EU in the World – Energy Union – #AviationStrategyEU
This pictorial diagram depicts the key systems, players and concepts related to UAS operations. It is important to note that when properly integrated, UTM and C-UAS enhance the performance of the other system by sharing information which helps each system perform its distinct functions for effectively.
A Wider View of UAS Integration

Enabling Safe & Efficient Operations
<table>
<thead>
<tr>
<th>Guiding Principles of an Effective UTM Solution</th>
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<tbody>
<tr>
<td>Enables safe, secure and efficient professional &amp; recreational UAS operations in all environments</td>
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<tr>
<td>Ensures coordination and de-confliction between manned and unmanned operations</td>
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<tr>
<td>Organizes and manages efficient use of uncontrolled airspace to deliver safety and security</td>
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Just as UAS vehicles and operations are changing rapidly, so too must the UTM solutions which will manage and secure those operations.

The timeline above highlights the key operational steps and the expected timeframe when they should be available.

- **2017**: No road-blockers
- **2018**: Standards Needed
- **2020**: Safety cases Needed
- **2022**: Very high density UAS management

UTM Roadmap
Conclusions

Project conclusions

- Future RPAS operations may be safely integrated into non-segregated airspace using existing ATC processes
- Lower performance RPAS could result in an increase in ATC workload
- A Mode S transponder is essential to avoid surveillance issues & facilitate integration
- For routine access to non-segregated airspace, detect & avoid capability is required
- RPAS considered predictable in emergencies
- Instrument Rating not fully applicable to RPAS

As new technologies emerge to advance the drone flying experience, the industry maintains a singular focus on interoperability and safety requirements needed to relax regulatory constraints.

Digital Transformation

Integration Journey
“Drones overall will be more impactful than I think people recognize, in positive ways to help society.”

- Bill Gates