RPAS ATM CONOPS

Presentation in EDA ARF meeting

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Aim

- Providing very high level common understanding about the “What”
- The “How” is not part of this CONOPS

Storyline…

- March 2016: Initial draft from EUROCONTROL
- May 2016: Commented by some States
- June 2016: Draft 2 proposed to JARUS
- Currently being commented by JARUS members
- Reviewed draft expected by October 2016
Problem statement

- RPAS are
  - Affecting current aviation traffic
  - Creating new traffic
  - Interacting with population at a larger scale than current aviation

- Other new airspace users have the same kind of impact (Suborbital)

- A dedicated Air Traffic Management CONOPS is required to
  - *Pave the way* to future procedures and regulations
  - *Foster RPAS activity* whilst providing adequate safety levels for airspace users and ground third parties
  - * Guarantee that the current airspace users* will be impacted only if absolutely necessary
Integration requirements for RPAS: 4 items

- The integration of RPAS shall not imply a significant impact on the current users of the airspace;
- RPAS shall comply with existing and future aviation regulations and procedures;
- RPAS integration shall not compromise existing aviation safety levels nor increase risk: the way RPAS operations are conducted shall be equivalent to that of manned aircraft, as much as possible;
- RPAS specifics must be transparent to ATC and other airspace users
EUROCONTROL RPAS ATM CONOPS

- **Is flexible**: it is independent from continuously evolving scenarios
- **Is generic**: it addresses any RPAS category or technology
- **Is operationally oriented**: it provides an operational ATM perspective based on areas of operations
- **Is opening the door to standardized contingency procedures**
- **Is based** on the following logic
  - Area of operation
    - **Class of traffic**
      - Class of airspace
        - Category of RPAS (from EASA CONOPS)

NB: *This CONOPS is a draft, it is as of today not validated.*
Areas of operations as used in this CONOPS

- **AGL**
  - Space operations

- **100 km / 62 Miles**
  - Very High Level operations (VHL)

- **FL 600**
  - IFR/VFR operations

- **500 ft**
  - Very Low Level operations (VLL)

- **0 ft**
What is a “Class of RPAS traffic”?

As RPAS are very difficult to categorise due to the large variety of shapes, sizes, performance and operations; different traffic classes have been developed to support the management of large numbers of RPAS operations.

A “Class of RPAS traffic” is a set of flying rules, operational procedures and system capabilities applicable to

- the RPAS
- to the RPAS operator when operating the RPAS in a portion of the airspace.
- to the Services applicable in that airspace
Services supporting RPAS traffic

Services are external to the operator and they are the backbone of the RPAS ATM system:

- Such services are not unique, but they are interoperable and interdependent;
- CNS services may be separated in C, N and S services;
  - The C service is providing C2 Link service and may contribute to N and S service;
  - The S service is creating the air situation picture of all the tracked RPAS;
- A UTM overarching system is providing the backbone for all the required services; it encompasses several services tailored to the Traffic Classes.
- Those services are separated from the oversight Authority;
- The relevant Authorities (not only aviation) have access on demand and in real time to the services information based on labels and privileges.
RPAS Very Low Level (VLL) operations

Assumptions

- The rules of the air will not be adapted for low level RPAS operations at this altitude, thereby maintaining the 500ft boundary as implemented around the world already.
- A dedicated supporting RPAS low level ATM management system is required. Relying on the mobile phone network to reduce the implementation costs is an option.
- A C2 service is provided;
- “Detect and avoid” and self separation capability is implemented;
- The State has executed an airspace assessment, defining where RPAS can operate and where not. Geo-fencing is in place;
- RPAS have tracking capability.
RPAS VLL operations

→ 4 RPAS Classes of traffic

As RPAS are very difficult to categorise due to the large variety of shapes, sizes and performance, different traffic classes have been developed to support the management of large numbers of RPAS operations.

- Class I: Reserved for RPAS EASA cat A (VLOS only);
- Class II: Free route (VLOS and BVLOS);
- Class III: Organized commercial medium/long haul traffic (BVLOS);
- Class IV: Special operations (this category of RPAS traffic conducts very specific types of operation that will be assessed on a case by case basis. (VLOS and BVLOS).
VLL operations

Operational options supported by the RPAS classes

Present situation

Class I, II & III

Free Flight

Class I & III

Structured Routes

Increasing traffic

EUROCONTROL RPAS CONOPS
Class IV traffic:

- Class IV traffic can operate within the layer between ground and 500ft. This category is designed for highly specialised operations and as such not many of these types RPAS are expected. These can be civil, state or military operations and as such:
  - Should be addressed on case by case basis;
  - Require special authorisation;
  - Could require tracking capability;
  - Must be able to remain clear of all other traffic;
  - May have priority on manned aviation depending on the mission type
IFR/VFR CONOPS

2 RPAS Classes of traffic

Class V:
- Class V is IFR/VFR operations outside the Network not flying SIDs and STARs. In this environment, RPAS not meeting Network performance requirements will be able to operate without negatively impacting manned aviation. Operations at airports will be accommodated through segregation of launch and recovery.

Class VI:
- Class VI is IFR operations, including Network, TMA and Airport operations with RPAS capable of flying SIDs and STARs as designed for manned operations. These are either manned transport aircraft enabled to fly unmanned with similar capabilities or new types able to meet the set performance requirements for the Network, TMA and airports.
Very High Level operations

*Subcategory of IFR operations → Class VII*

**Very High Level (VHL) Operations**

- Suborbital unmanned flights operating at altitudes above FL 600 will be growing fast in numbers as private companies have projects to use that upper airspace. Business range goes from Telecommunication service to space tourism.
- No VFR is anticipated because of high speed or low manoeuvrability of the vehicles.

**Class VII:**

- Class VII consists solely of IFR operations **above FL600 and transiting in non-segregated airspace.**
- These types of RPAS are solely designed for operations at very high altitudes. The launch and recovery of fixed-wing RPAS can be from dedicated airports and outside congested airspace.
Update on harmonized civil regulations and standards
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<td>01</td>
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<td>WG3</td>
<td>Certification Spec for LURS</td>
<td>Certification Specification for Light Unmanned Rotorcraft Systems</td>
<td>Published</td>
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<td>RPAS C2 Link RCP</td>
<td>Guidance material to explain the concept of C2 link RCP and identify the requirements applicable to the provision of C2 communications.</td>
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<td>FCL Recommendations</td>
<td>The document aims at providing recommendations concerning uniform personnel licensing and competencies in the operation of RPAS</td>
<td>Published</td>
<td>09/09/2015</td>
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<td>JAR doc</td>
<td>04</td>
<td>JAR-DEL</td>
<td>WG6</td>
<td>AMC RPAS 1309 (package)</td>
<td>Document developed as an integral part of a type-certification process. It is a means of compliance to a 1309 airworthiness requirement.</td>
<td>Published</td>
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<td>CS-LUAS</td>
<td>It provides recommendations for States to use for their own national legislation, concerning Certification Specification for Light Unmanned Aircraft Systems.</td>
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<td>SORA</td>
<td>Specific Operations Risk Assessment. Recommends a risk assessment methodology to establish a sufficient level of confidence that a specific operation can be conducted safely.</td>
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<td>07</td>
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<td>WG5</td>
<td>CPDLC</td>
<td>The Controller Pilot Data Link Communications document is meant to summarize the most relevant information about CPDLC and the supported ATS services, and to associate them with RPAS operations.</td>
<td>Published</td>
<td>20/06/2016</td>
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<td>JAR doc</td>
<td>08</td>
<td>JAR-DEL</td>
<td>WG4</td>
<td>Detect and Avoid</td>
<td>This document describes the methods to derive design objectives for DAA systems based on airspace requirements.</td>
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<td>RPAS Operational Categorization</td>
<td>Categorization scheme that describes the level of regulatory involvement for the varying types of UAS and UAS operations.</td>
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<td>FCL GM</td>
<td>Guidance material to the JARUS FCL Recommendation</td>
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<td>11</td>
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<td>WG4</td>
<td>Detect &amp; Avoid CONOPS for VLL operations</td>
<td>It is intended to allow for further developments and elaboration of the operational concept for UAS at VLL.</td>
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<td>JAR doc</td>
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<td>ICAO Circular</td>
<td>328</td>
<td>Circular</td>
<td>UASSG</td>
<td>Unmanned Aircraft Systems (UAS)</td>
<td>This circular was the first attempt to provide a global understanding of UAS</td>
<td>Published</td>
<td>2011</td>
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<td>ICAO Annex</td>
<td>all</td>
<td>Annex</td>
<td>RPASP</td>
<td>Update of the annexes to the Chicago Convention</td>
<td>The introduction of the RPAS as a new airspace user implies significant changes in several annexes and especially annexes 2, 6, 8 and 11.</td>
<td>Candidate SARPS to be provided by November 2017</td>
<td>Expected publication 2020</td>
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<td>ICAO Manual</td>
<td>10019 V2.0</td>
<td>Manual</td>
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<td>Manual on Remotely Piloted Systems (RPAS)</td>
<td>To reflect the changes in the Annexes</td>
<td>On going</td>
<td>Expected publication 2019</td>
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NOW I HAVE TO ANSWER QUESTIONS