RPAS Air Traffic Insertion: challenges and industrial perspectives

Fabio Ruta
Rome, November 15th 2018
RPAS key-factors

- Complementary to conventional assets
- The limit is the machine, no the human onboard
- High capability, performance and flexibility
- Proven valid asset on the military field
- Valid asset also for civil applications
- Diversification of business models
- Significant positive impacts in other sectors
The main RPAS drivers

- The capability to fly outside segregated airspace is a **key-enabler** for opening the future market
  - for **civil market** since most of the possible uses requires to **routinely access the airspace**
  - Strength-factor for **military users** to acquire the necessary flexibility to operate in civil airspace
  - **Interoperability is** a key-factor to broaden the market footprint

- The **dual use approach** is a strategic factor → **one investment, many fallout**

- The **certification requirements** (the pilot is not on board) **can influence the business**
  - If over dimensioned → high cost, reduction of possible users spectrum
  - If under dimensioned → more safety and security risks enabling that mature non-EU competitor product can be offered in Europe

- Do not limit the RPAS business
  - Different business models are to be explored (from the Product to the Service)
  - **RPAS can compete with other assets in existing applications**
  - Maximize the **technological exploitation** → positive side effects also for manned aviation
Air Traffic Integration: the framework

- Multi-dimension and global
  - **Stakeholders:** Politics, Service Providers, Institutions, civil & military Users, Industries, ...
  - **Multi sectors:** air, ground and air traffic control
  - **Geographical:** from National, to regional areas, to worldwide at ICAO level

- Multidisciplinary and interconnected actions
  - **Regulation:** requirements for the Type Certificate and to operate in the Airspace
    - **Operation Air Traffic** (OAT) under the Military rules and authorities
    - **General Air Traffic** (GAT) under the Civil rules and authorities
  - **Standards:** necessary to develop the product
  - **Technologies:** enable the new expected capabilities

- Evolution, complexity and diversity
  - **Evolution:** integration in the today AATM and in the future Single European Sky
  - **Complexity:** airborne, ground and service providers synchronisation
  - **Diversity:** rules, standards & technologies for different RPAS & users (civil /military)
Air Traffic Integration: the main orientations

The main pole orientation

- **Europe**
  - **Civil**: regulation & certification by EASA, standards by Eurocae, technologies by MoD & SESAR
  - **Military**: regulation & certification by MoD (OAT only), standard by NATO, technologies by MoD

- **US**
  - **Civil**: under FAA responsibility, standard by RTCA
  - **Military**: regulation & certification by MoD (OAT only), standard by NATO, technologies by MoD

At the beginning two different approach were adopted by Europe and US

- Both aligned with the high level indication defined by ICAO
- European Operational/risk-based approach vs US Mass Energy-based one
- US centralised approach (FAA) vs European distributed one (Nations)

A more common approach among Europe and US is today envisaged

- More centralised approach in Europe with EC/EASA
- Operational and risk-based approach
- Collaboration on regulation preparation & joint action for standard interoperability
- Similar RPAS categorisation
The approach for regulation, standardisation and R&T

JARUS Common Regulation Working Body

- Operational & Personnel
- Organizations Approval
- Airworthiness
- Detect & Avoid
- C3
- UAS System Safety
- CONOPS

Contribution to regulation

Inputs to standard

Technologies needs

R&T Organisation

R&T regulation inputs

EDA, MoD, SESAR, EC, FAA, Industry …

On the above, Leonardo is an active key-player
The Status: regulation

- All JARUS working groups were launched and, with industry support, are working on the regulations

<table>
<thead>
<tr>
<th>Civil RPAS/UAS categories</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>Specific</td>
<td>Certified</td>
</tr>
<tr>
<td>Will not require an involvement by an Aviation Authority</td>
<td>Risk assessment &amp; Specific Operation Authorization required</td>
<td>A certification by aviation authority required</td>
</tr>
<tr>
<td>Hobyst &amp; micro ops</td>
<td>BVLOS extended ops</td>
<td>Controlled ops</td>
</tr>
</tbody>
</table>

- EASA
  - **Open and specific category**: draft implementing regulation & delegated acts delivered
  - **Certified category**: NPAs publications, Q2/2018 & Q2/2022, opinions or decisions Q2/2019 & Q2/2023.

- FAA
  - Delivered regulation for Small RPAS: **Small Unmanned Aircraft Rule** (Part 107)
  - Under developing requirements for **extended operations beyond Part 107 including BVLOS flights**
### The status: technology enablers

<table>
<thead>
<tr>
<th>What</th>
<th>Who</th>
<th>Up to Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Standardisation support phase</td>
<td>EDA</td>
<td>• MIDCAS conclusion on Jan-2019</td>
</tr>
<tr>
<td>• Concept development &amp; Validation</td>
<td>SESAR</td>
<td>• Call expected in early 2019</td>
</tr>
<tr>
<td>• Prototype</td>
<td>EDIDP</td>
<td>• Could be under EDIDP</td>
</tr>
<tr>
<td>• Automatic take off &amp; landing</td>
<td>EDA</td>
<td>• In progress</td>
</tr>
<tr>
<td>• Autotaxi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Emergency recovery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• contingency procedures, communication, navigation, more automation and command &amp; control</td>
<td>EDA/ESA</td>
<td>• DESIRE</td>
</tr>
<tr>
<td>• IFR RPAS accommodation &amp; Integration in Airspace Class A to C</td>
<td>SESAR</td>
<td>• TERRA plus call expected in early 2019</td>
</tr>
<tr>
<td>• National</td>
<td>National</td>
<td>• D-Flight</td>
</tr>
<tr>
<td>• Extended technological capabilities for air traffic insertion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Technology for RPAS application</td>
<td>Horizon Europe</td>
<td>• Programme to be defined.</td>
</tr>
</tbody>
</table>

#### On the above, Leonardo is an active key-player
Leonardo positioning

- Significant technological development in the RPAS sector: Player for fixed and rotary wing

- R&T collaboration with key National and European Partners
  - SMAT – Sistema di Monitoraggio Avanzato del Territorio
  - MIDCAS – Mid Air Collision Avoidance System
  - ERA – Enhanced RPAS Automation
  - MEDALE - Mediterranean ATM Live Exercise
  - DESIRE – Demonstration of Satellites Enabling the Insertion of RPAS in Europe
  - TERRA - Technological European Research for RPAS in ATM – technologies for UTM system
  - D-Flight - Business Case for the provision of UTM services at national level

- Engagement with the main key-players
Leonardo positioning

<table>
<thead>
<tr>
<th>Product</th>
<th>Prototype &amp; Tech demo</th>
<th>Products in Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horus 2 kg</td>
<td>IBIS E TRP 5 14 kg</td>
<td>ASTORE (Falco Weaponized)</td>
</tr>
<tr>
<td>CREX-B 2 kg</td>
<td>ASIO (VMP) 8 kg</td>
<td>SKY-Y 1.200 kg</td>
</tr>
<tr>
<td>SPYBALL (VMP) 1,7 kg</td>
<td>DRAKO (VMP) 5 kg</td>
<td>FALCO 48 1250 kg</td>
</tr>
<tr>
<td>Mirach 40 90 kg</td>
<td>HERO 205 kg</td>
<td>SW4 SOLO 1,8 t</td>
</tr>
<tr>
<td>MIRACH 100/5 330kg</td>
<td>NIBBIO 360 kg</td>
<td>P.1HH Hammerhead (*) &gt; 6.000 kg</td>
</tr>
<tr>
<td>FALCO XN (LT) 490 kg</td>
<td>FALCO EVO (LT) 620 kg</td>
<td>P.2HH Hammerhead (*) &gt; 6.000 kg</td>
</tr>
<tr>
<td>FALCO EVO (LT) 620 kg</td>
<td>Project ZERO Full Electric</td>
<td>AW119 RUAV/OPH 2.850 kg</td>
</tr>
<tr>
<td>FALCO 48 1250 kg</td>
<td>SKY X 1.450 kg</td>
<td>SKY-Y 1.200 kg</td>
</tr>
<tr>
<td>CREX-B 2 kg</td>
<td>IBIS E TRP 5 14 kg</td>
<td>ASTORE (Falco Weaponized)</td>
</tr>
<tr>
<td>HORUS 2 kg</td>
<td>IBIS E TRP 5 14 kg</td>
<td>ASTORE (Falco Weaponized)</td>
</tr>
</tbody>
</table>

(*): PIAGGIO: in partnership with Leonardo  
(**): In partnership with Dassault and Airbus D&S
Threats and Opportunities

Regulation / Certification / Standardization
- Good progress mainly on “Open” and “Specified” categories but slow for the “Certified” one.
- Regulation preparation for certified RPAS start end of 2018 (a group of expert to be defined)

Technological Enablers
- EC mainly focusing towards small RPAS (high applications number & SME involvement)
- A change pace, in the brief period, is expected under SESAR framework

Outlook to next steps
- The preparation of the regulation for certified category is near
  - contribute to the regulation exploiting the national experiences & expectations: safety is a must
- Horizon Europe and the European Defence Fund could be a great opportunity for RPAS
  - Act for influencing the shaping of the future programs (not insertion only)

Italy was, is and must be a key-player on the RPAS domain
- Italy should play a key-role exploiting its great knowledge and experience
- Act at national level to reach the enough critical mass and results maturity to influence the regulation
- Leonardo is ready to actively collaborate with the National Stakeholders to provide a solid contribution on such domain
THANK YOU FOR YOUR ATTENTION