JOINT AUTHORITIES FOR RULEMAKING OF UNMANNED SYSTEMS

Workshop on Drones: outreach to industry

Eric Sivel
JARUS Chairperson
Cologne, 20 June 2016
AGENDA

• General Presentation
• Ongoing activities
• JARUS Structure
• Recent key deliverables:
  • SORA
  • ATM Conops
• Way Forward
JARUS is a group of experts from its NAA members, including regional authorities originally established in 2007.

JARUS members collaborate to recommend technical, safety, and operational requirements for the certification and safe integration of UAS into airspace and at aerodromes.
# GENERAL: JARUS MEMBERS

**New Member Countries in 2016: Costa Rica, Croatia, Kenya, Republic of Serbia**

<table>
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<tr>
<th><strong>EASA Member States</strong></th>
<th><strong>Rest of the World</strong></th>
<th><strong>International Organisation</strong></th>
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<td>Austria</td>
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<td>United Kingdom</td>
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**EASA Member States not members yet**
- Bulgaria
- Cyprus
- Hungary
- Iceland
- Liechtenstein
- Lithuania
- Portugal
- Slovakia
- Slovenia
At the end of 2015, the SCB representing the Industry was established representing:

- Aircraft manufacturers (AIA, ASD)
- Unmanned system Industry (AUVSI, UVSI, small UAS Coalition)
- ANSP (CANSO, COCESNA)
- Standardization Bodies (EUROCAE, RTCA and ASTM)
- Operators and pilots IAOPA, IBAC, IFALPA, IFATCA, IATA

Representatives from these organisations joined the JARUS Plenary Meeting, which took place in Madrid from 11-15 April 2016.

Experts from the SCB have been invited to contribute to the JARUS Working Groups.
JARUS deliverables/products are recommended certification specifications and operational provisions made available to interested parties such as ICAO, NAAs and regional authorities for their consideration and use.

JARUS does NOT develop law or mandatory standards.

NAAs and regional authorities decide how to use harmonised provisions from JARUS.
JARUS is contributing to the development of the RPAS regulatory framework, in the domains where other organisations (e.g. ICAO) have not been active yet, to promote a harmonised approach.

Current ongoing JARUS activities will be based on initial framework principles:

- **UAS Operational Categorisation** (i.e. open, specific, and certified) – Higher level (2014/EASA/2016)
- **Risk assessments for UAV operations** (Specific operational risk assessment – SORA (2017))
- **ATM concept** for different operations – Higher level (2016)
- **DAA concept** for visual line of sight, extended, and beyond VLS – Derived (2016)
- **Command and control concept** for different operations – Derived (2016)

All key deliverables will be available to the RPAS Community early in 2017

Once JARUS reaches consensus on the concepts above, operational, technical, and certification specifications will be derived from them.
<table>
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<tr>
<th>WG</th>
<th>Title</th>
<th>Description</th>
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<tbody>
<tr>
<td>WG3</td>
<td>Certification Spec for LURS</td>
<td>Certification Specification for Light Unmanned Rotorcraft Systems</td>
<td>Published 30/10/2013</td>
</tr>
<tr>
<td>WG5</td>
<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>
<td>Published 10/10/2014</td>
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<tr>
<td>WG1</td>
<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 09/09/2015</td>
</tr>
<tr>
<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 01/11/2015</td>
</tr>
<tr>
<td>WG3</td>
<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>
<td>Internal Consultation</td>
</tr>
<tr>
<td>WG6</td>
<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>
<td>Internal Consultation</td>
</tr>
<tr>
<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>To be soon published</td>
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<tr>
<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>
<td>Internal Consultation</td>
</tr>
<tr>
<td>WG7</td>
<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>
<td>Internal Consultation</td>
</tr>
<tr>
<td>WG1</td>
<td>FCL GM</td>
<td>Guidance material to the JARUS FCL Recommendation</td>
<td>Internal Consultation</td>
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</table>
WORKING GROUPS STRUCTURE

- CONOPS
- SAFETY & RISK MANAGEMENT
- COMMAND AND CONTROL
- AIRWORTHINESS
- FLIGHT CREW LICENSING (FCL)
- OPERATIONS (OPS)
- DETECT & AVOID

JARUS - Joint Authorities for Unmanned Systems
WORKING GROUPS (WGs) – 1/2

WG 1 – Flight Crew Licensing (FCL)
  o Requirements for licensing and competencies in RPAS activities;
  o Pilot licensing and training

WG 2 – Operations
  o Operational requirements for access to airspace
  o Organizational requirements for RPAS operations

WG 3 – Airworthiness
  o UAS certification & airworthiness provisions/specifications for:
    ✓ Rotary wing, Light Unmanned Rotocraft System (CS-LURS)
    ✓ Fixed wing, Light Unmanned Aeroplane System (CS-LUAS)
    ✓ Very light UAS (VL IUAS)
    ✓ Airships, free/tethered balloons
WG 4 – Detect and Avoid
  o Define performance provisions (operational/technical)
  o Establish safety objectives for the risk of collisions

WG 5 – Command, Control & Communications
  o Establish performance provisions (operational & technical) for C3

WG 6 – Safety and Risk Management
  o Define top level RPAS airworthiness, system safety objectives and guidance material (known as AMC RPAS.1309)
  o Establish UAS recommendations & conclusions on UAS failure classifications in terms of severity definition and probability requirements.
  o Create a methodology to assess the risks of «specific» RPAS operations and evaluate relevant mitigations

WG 7 – Concept of Operations (CONOPS)
  o Develop a classification scheme for RPAS
  o Considerations for RPS Certification, C2 & signal relay and launch and recovery equipment
Specific Operation Risk Assessment (SORA)
Specific Operation Risk Assessment (SORA)

- Enables the **Specific** operations
- Accounts for **type, scale, complexity of the activity, third parties at risk**
- **Holistic** and not atomistic
- Focus on **objectives** rather than means
- Allows for **scenario** determination
- Allows for continuous improvements (**iteration loops**)
- Developed with **stakeholders**
Specific Operation Risk Assessment (SORA)

Recommended level of rigor

Intrinsic risk of UAS operation

- Operational
- Design
- Production
SORA

**SORA Input**
- Concept of Operations
  - Information on:
    - Operator
    - Intended operation
    - UAS description
    - Remote crew

**Specific Assurance and Integrity Level (SAIL) evaluation**
- Ground Risk Class
- Air Risk Class
- Lethality

**SAIL determination**

**SORA Output**
- Objectives to be met and their (level of robustness):
  - SAIL I: 18 (Low)
  - SAIL II: 19 (Low), 6 (Med)
  - SAIL III: 11 (Low), 15 (Med), 6 (High)
  - SAIL IV: 3 (Low), 19 (Med), 12 (High)
  - SAIL V: 6 (Med), 28 (High)
  - SAIL VI: 35 (High)

**SORA Annexes**

Feedback loop for «continuous improvements»
Specific Operation Risk Assessment (SORA)

- The SORA is in internal JARUS consultation (via JARUS website). Comments from JARUS members and the SCB are welcome!

- A link with industry standardization bodies will be established to develop guidance material
RPAS ATM Conops
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 and to the operator when operating the RPAS in a portion of the airspace.

A Class of RPAS traffic is supported by CNS services external to the operator.
WAY FORWARD

• Increased JARUS participation already anticipated from both NAAs and industry

• Increased coordination facilitated by new organization (e.g. Secretariat, regional offices)

• Valuable contributions to ICAO efforts from members/advisors involved in JARUS & ICAO

• Continuing need for increased membership and resource commitments from ALL