



# EUROCAE WG-73 on Unmanned Aircraft Systems

By Daniel Hawkes, Chairman

## Update on UAS-Related Standards Activities

### The EUROCAE Organisation

The European Organisation for Civil Aviation Equipment was established in 1963 to provide a forum in Europe where administrations, airlines and industry could meet to discuss and resolve technical problems. EUROCAE started the preparation of minimum performance specifications for airborne electronic equipment. More recently, the organisation has extended its activities to include complex CNS/ATM systems including their ground segment.

Consistent with the international implications of its work, EUROCAE works in close cooperation with its US equivalents (RTCA, SAE, ARINC), with the major aviation administrations (ICAO, EASA, EUROCONTROL, FAA, European CAAs) and with other organisations (IATA, CANSO, ASD).

EUROCAE documents may be referenced by EASA as means of compliance with European Technical Standard Orders (ETSO). Others are referred to in ICAO Standards and Recommended Practices (SARPS), EUROCONTROL Safety and Regulatory Requirements (ESARR), and FAA standards.

EUROCAE is recognised by the European Commission as the unique body with the competencies necessary for the standardisation required to support the Single European Sky concept. As a consequence, EUROCAE is deeply involved in the development of Community Specifications and technical material in support of the SESAR Joint Undertaking.

### Background of Working Group 73

In 1999, following a joint EUROCONTROL/ NATO workshop, EUROCONTROL approached the Joint Aviation Authorities (JAA) with a request to consider certification and operational issues for civil unmanned aircraft. JAA tasked its CNS/ATM Steering Group to review the subject resulting in a recommendation to the JAA executive that «...a strategy be developed for dealing with evolving issues relevant to

certification, operation, personnel licensing, maintenance, and continued airworthiness of Remotely Piloted Vehicles (RPVs) in the airspace of European States.» With the support of industry, a task force was created as a Joint JAA/ EUROCONTROL initiative and this led to the publication of a task force report in May 2004. The report made many technical and strategic recommendations directed to ICAO, JAA, EUROCONTROL, the newly created EASA, and to the unmanned aircraft industry. JAA and EASA informed EUROCAE about the work being conducted on unmanned aircraft and EUROCAE WG-73 was established. It held its first meeting at EUROCONTROL headquarters in Brussels in April 2006.

WG-73 is recognised as the European UAS expert group to propose technical inputs to EASA for additional airworthiness criteria and/or Special Conditions that have not been detailed in the earlier rule-making proposals

### WG-73 Mission and Terms of Reference

The mission of WG-73 is to develop a requirements framework that would enable unmanned aircraft to operate within the constraints of the existing Air Traffic Management (ATM) environment in airspace without segregation from other airspace users. Any non-compatibility issues where UAS operations cannot be supported will be identified. These issues will be considered by EUROCONTROL and/or ICAO for the purpose of identifying compensating ATM strategies associated with UAS ATM special handling.

The Terms of Reference specify the delivery of six products in accordance with the schedule shown in Table 1:

- Deliverable 1  
UAS related elements regarding the Operational Concept. This internal working group report was completed in January 2007. It provided a preliminary inventory of airworthiness certification and operational approval items that need to be addressed.
- Deliverable 2  
Work Plan. The plan is maintained as a living document. It identifies work packages and timescales to guide the future

Table 1:  
Current WG-73  
Deliverables  
Schedule

Deliverables	2007	2008	2009	2010	2011	2012
<b>Deliverable 1 List of Issues</b>	Compl'd 13 Jan '07					
<b>Deliverable 2 Work Plan</b>	Ongoing activity with periodic review					
<b>Deliverable 3 Concept document</b>		Draft Iterations	Interim version July 2009	Final WG agreed version 2nd quarter		
<b>Deliverable 4 C3SS</b>			Launch ED-78A processes	2nd quarter		
<b>Deliverable 5 Sense &amp; Avoid</b>			Launch ED-78A processes			4th quarter
<b>Deliverable 6 ATM Compatibility</b>	Ongoing activity with periodic review					

activities of WG-73.

- **Deliverable 3**  
A Concept for UAS Airworthiness Certification and Operational Approval in the Context of Non-segregated Airspace. The objective of this proposed 4-volume report is to assist development of recommendations and a requirements framework for civil UAS. Its scope addresses general regulatory issues, security, radio spectrum requirements, operational approval, airworthiness certification and maintenance. A specific volume focuses on UAS, typically less than 150kg mass, limited to visual line-of-sight operations (VLSO). This volume provides guidance material and recommendations that can be adopted as a basis for regulatory policy by national administrations responsible for this category of UAS.
- **Deliverable 4**  
UAS Command, Control and Communication Systems. This document will define the requirements for command, control and communication systems including autonomous operation.
- **Deliverable 5**  
UAS «Sense and Avoid» Systems. This document will define the requirements for unmanned aircraft systems associated with separation assurance and collision avoidance.
- **Deliverable 6**  
Catalogue of UAS ATM Non-compatibility Issues. This document will identify those aspects of UAS normal and abnormal operations that would require special ATM consideration.

To ensure a formal approach to requirements setting, the Terms of Reference specify the use of EUROCAE document ED-78A, *Guidelines for Approval of the Provision and Use of Air Traffic Services Supported by Data Communications*. Whilst not originally foreseen in the context of UAS, the guidelines can be used to produce objectives and compliance evidence relevant to the safe integration of UAS into non-segregated airspace. For example, evidence may take the form of an *Operational Services and Environment Definition (OSD)*, and standards for *Safety & Performance Requirements (SPR)*, and *Interoperability (INTEROP)*.

### WG-73 Structure

The working group has consisted of four subgroups supported by a total of 160 members operating under the guidance of a Leadership team. More recently, a team has been created from the resources within the existing subgroups to apply the formal ED-78A processes. The initial task of this team is to establish a UAS Architecture and Technical Baseline upon which the ED-78A processes can be applied. Collaboration will take place with RTCA Special Committee 203 (SC203) for

Figure 1: Structure of WG-73

Leadership Team			
Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
UAS Operations & Sense & Avoid	Airworthiness & Continued Airworthiness	Command & Control, Communications & Spectrum, Security	Light UAS (<150kg) & Operations with Visual Management of Separation
WG-73 UAS Architecture and Technical Baseline Group			

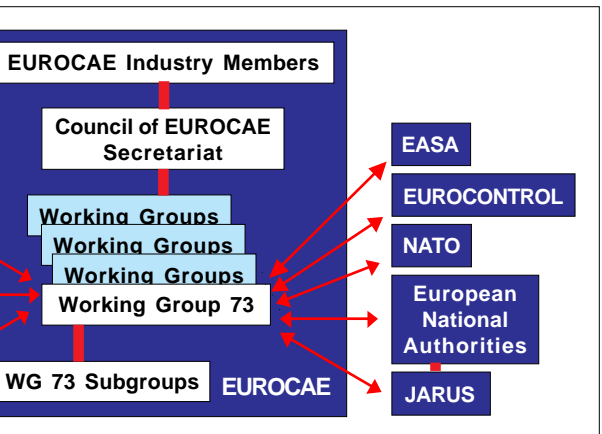


Figure 2: Primary External Relations

this activity. The overall structure is illustrated in Figure 1.

### International Coordination

WG-73 is an independent working group but its terms of reference advise coordination with other bodies dealing with UAS activities, for instance EASA, EUROCONTROL, FAA, RTCA, ASTM, SAE, ICAO, and NATO. With the establishment of JARUS (*Joint Authorities for Rule-making on Unmanned Systems*), WG-73 now has an effective and coordinated interface with authority specialists. The JARUS Chairman is a member of the WG-73 Leadership team. Furthermore, to assist coordination between EUROCAE WG-73, the corresponding SC-203, and FAA, the Leadership team includes the Chairman of SC-203, and the FAA Manager of the US Unmanned Aircraft Program Office. Similarly, WG-73 is represented in the ICAO UAS Study Group with an Observer.

### Progress Achieved

The working group has now held nine plenary meetings supported by numerous subgroup meetings and joint WG-73/SC203 Leadership meetings. Work packages have evolved covering the subjects of UAS operations, airworthiness and certification, radio spectrum requirements, command and control, and security.

WG-73 has continued to provide technical support to EUROCONTROL for the bid for UAS radio spectrum at the 2011 World Radio Conference.

Deliverable #3, *A Concept for UAS Airworthiness Certification and Operational Approval in the Context of Non-segregated Airspace* is in production. An interim document is being prepared for internal consultation with the intent to offer a working group agreed 4-volume version to the EUROCAE Council at the end of 2009. A final version is planned for 2010. The technical content of each volume of the Deliverable is summarised in Table 2.

For the next stages of work, EUROCAE WG-73 and RTCA SC-203 will collaborate on a safety assessment for initial UAS operations. The intent is to harmonise task plans and product development cycles to expedite the standards development being undertaken by each organisation. The Leadership teams will pursue mapping of EUROCAE WG-73 and RTCA SC-203 activities to take benefit of common processes, tools and resources, as well as technical data and findings from EUROCONTROL and the Federal Aviation Administration. A pilot safety assessment will test this approach by sharing data from each organisation's

**Table 2: Summary of Technical Content of EUROCAE WG-73 Deliverable 3**

<b>Title</b>	<b>A Concept for UAS Airworthiness Certification and Operational Approval in the Context of Non-segregated Airspace</b>
<b>Volume 1</b>	<p><b>General Considerations for Civilian Operation of Unmanned Aircraft</b></p> <p>Unmanned aircraft impact on ATM (Market studies, UAS flight performance, Demand for segregated airspace, Flight over populated areas).</p> <p>Aviation regulatory environment overview (Roles of ICAO, EUROCONTROL, EASA; Oversight of operations, Environmental protection, Radio spectrum WRC, Occurrence reporting, National UAS policies, Model aircraft).</p> <p>Military aviation (EUROCONTROL, EDA, NATO).</p> <p>Global developments (ICAO, FAA).</p> <p>Overview of UAS operations.</p> <p>Overview of UAS airworthiness certification.</p> <p>UAS Radio spectrum considerations.</p> <p>UAS Security management. References, terminology, airspace classifications.</p> <p>The European airspace SESAR project.</p>
<b>Volume 2</b>	<p><b>UAS Operations</b></p> <p>UAS Non-segregated operations, Definition and scope. The approach towards UAS operations standardisation. Safety processes.</p> <p>Major UAS operational aspects.</p> <p>Traffic separation and mid-air collision avoidance.</p> <p>Avoidance of ground and obstacles.</p> <p>Avoidance of adverse weather.</p> <p>The challenge of aerodrome operations.</p> <p>UAS pilot qualifications and training.</p>
<b>Volume 3</b>	<p><b>UAS Airworthiness Certification</b></p> <p>UAS airworthiness certification considerations.</p> <p>Type certification basis.</p> <p>UAS airworthiness categorisation.</p> <p>EASA Certification Specification tailoring for UAS &amp; guidelines.</p> <p>Safety objectives &amp; criteria. Restricted certification process.</p> <p>UAS Safety Assessment.</p> <p>Control station issues.</p> <p>Command and control.</p> <p>Emergency &amp; Recovery &amp; Flight Termination.</p> <p>Launch &amp; recovery systems.</p> <p>Automatic Take-off &amp; Landing Systems.</p> <p>Airworthiness aspects of Sense &amp; Avoid.</p> <p>Continuing Airworthiness Considerations.</p>
<b>Volume 4</b>	<p><b>Light UAS &amp; Operations with Visual Management of Separation</b></p> <p>Recommendations to National authorities for UAS &lt; 150kg for operations with Visual Management of Separation.</p> <p>Operational considerations for light UAS flights within segregated airspace and within non-segregated airspace.</p> <p>Insurance.</p> <p>Factors for consideration when developing a sense and avoid for UAS.</p> <p>Radar surveillance considerations.</p> <p>Approval to operate UAS &lt;150kg.</p> <p>Certification recommendations for various weight bands of light UAS.</p> <p>Civil Operator Qualifications.</p> <p>Cross Border Operations.</p> <p>Aircraft registration.</p>

technical baseline, which includes EUROCAE WG-73 scenarios for IFR operations in European Class A-B-C airspace, and RTCA SC-203 scenarios from IFR operations in U.S. Class A-E-G airspace.

A momentum continues within the working group. Strong support has been given by the EUROCONTROL Agency which has provided specialists from its air traffic management, safety, security, human factors, military, legal, communications, radio spectrum, navigation, and research & development domains.

### Joining WG-73

An application to join WG-73 and/or one or more of its subgroups may be requested by contacting the EUROCAE Secretariat ([eurocae@eurocae.net](mailto:eurocae@eurocae.net)) giving the name of the individual, the firm/organisation, the type of membership sought (Full or Temporary), and contact details. Applicants from firms/organizations that are Full Members of EUROCAE will be notified with details that permit access to the private workspace of the working group at [www.eurocae.net](http://www.eurocae.net)

Organizations newly seeking Full Member of EUROCAE status should request details of membership fees and conditions and from the Secretariat.

Applicants from non-member organisations and individuals will be considered for Temporary membership on a case-by-case basis and subject to the conditions of EUROCAE Temporary membership.

Such Temporary membership is strictly reserved for small and medium enterprises (SME) and organisations (sales <10 M€) or individuals from Europe or elsewhere, which are only interested in the participation of one to three Working Groups.

Annual fees for Temporary members per working group attendance are 500€ for SMEs and organizations, and 350€ for individuals.

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