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COMMITTEE A

Agenda Item 5: Emerging issues

5.2: Operations below 1000 feet

5.3: Remotely piloted aircraft system (RPAS)

5.5: Other emerging issues impacting the global air navigation system including unmanned aircraft systems (drones), and supersonic and commercial space operations

UAS INTEGRATION IN EUROPE

(Presented by Austria on behalf of the European Union and its Member States¹,
the other Member States of the European Civil Aviation Conference²;
and by EUROCONTROL)

EXECUTIVE SUMMARY

With the rapid rise in unmanned aircraft systems (UAS) activities across Europe, the European Commission has taken active steps to coordinate research, development and deployment to promote safe UAS operations and the sustainable growth of this rapidly evolving sector. The Single European Sky ATM Research (SESAR) programme leads the research aspects and supports the overall European policy that adopted a two-pronged approach: instrument flight rules (IFR) remotely piloted aircraft systems (RPAS) integration, and the initiation and development of the U-space concept to address UAS traffic management (UTM). This paper firstly describes the European approach to enabling IFR RPAS integration, including the coordination between the various European agencies, industries and operators. It also presents the U-space initiative, which brings together researchers, developers, regulators, manufacturers, operators and service providers in a harmonised approach to its development, demonstration and implementation. The paper explains the European approach to standardisation and regulation and its coordination with national and international agencies, for example in the United States, and how this is integrated into the European ATM Master Plan, which provides the research and development framework for the safe integration of all UAS in European airspace.

¹ Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

² Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Iceland, Republic of Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

1. INTRODUCTION

1.1 The global increase in the demand for the capability to conduct business and operations using unmanned aircraft systems (UAS) has brought with it challenges for States and regional regulators and other aviation authorities. Although steady progress has been made over many years regarding larger remotely piloted aircraft systems (RPAS), including the valuable work being conducted by ICAO's RPAS Panel. The recent big increased in the demand for use of smaller drones has necessitated an increased pace and prioritisation around the world to integrate this entirely new form of aviation management through the introduction of UAS traffic management (UTM)³, in the EU called the "U-Space".

1.2 In Europe, the European Union recognised the need for a European approach to solving the challenges presented by UAS integration, and has launched a number of initiatives to ensure this harmonised approach throughout Europe. In parallel, coordination mechanisms have been set up between Europe and equivalent UAS development authorities around the world in order to promote global harmonisation.

1.3 The future of European air traffic management (ATM) is guided by the European ATM Master Plan⁴. In 2017, the SESAR Joint Undertaking initiated a yearlong consultation designed to bring together all European institutions and authorities and UAS stakeholders to agree the way forward for achieving a seamless UAS integration, allowing regional plans to build on the many activities already under way within Member States. This consultation was performed through three working groups (WG):

- WG1: IFR Integration, chaired by the SESAR Joint Undertaking (SESAR JU);
- WG2: U-Space, chaired by the European Commission; and
- WG3: Standards and regulation, chaired by the European Aviation Safety Agency (EASA).

1.4 The output of this consultation was the 'Roadmap for the safe integration of drones into all classes of airspace'⁵, which defined a two-thread approach: instrument flight rules (IFR) RPAS integration and UTM. The roadmap envisages that, once initial research and deployment is underway in each thread, operations are becoming routine, and the regulatory environment matures, the whole aviation environment, including IFR RPAS and U-Space, will evolve together. All developments underpinned by a harmonised approach to standardisation and regulation. The roadmap will be fully integrated into the European ATM Master Plan during 2018.

2. IFR RPAS INTEGRATION

2.1 Over the years, there have been many national initiatives to enable the implementation of IFR RPAS integration, and there have been many regulatory advances in support of this goal. It is well recognised that considerable progress has been made through ICAO's RPAS Panel and other multi-national organizations such as EUROCONTROL and the Joint Authorities for Rulemaking on Unmanned Systems (JARUS). In 2015, the SESAR JU defined how pan-European RPAS integration activities would be implemented and, in did in 2016; perform nine demonstrations⁶ across Europe to demonstrate the state of the art and to help identify priorities for further developments on the operational,

³ For the purposes of this paper, the term 'RPAS' is used to describe typically larger UAS that are intended to be operated IFR under conventional air traffic services, whilst the term 'drone' is used to describe those UAS that will operate under UTM services; 'UAS' is a general term used to describe all unmanned aerial systems. This convention is applied solely for convenience in this paper and is not suggested as an official ICAO distinction.

⁴ <https://www.atmmasterplan.eu/>.

⁵ <https://www.sesarju.eu/sites/default/files/documents/reports/European%20ATM%20Master%20Plan%20Drone%20roadmap.pdf>.

⁶ <https://www.sesarju.eu/sites/default/files/documents/reports/RPAS-demo-final.pdf>.

technological and regulatory elements. These initial demonstrations took place in Spain, France, Italy, the Netherlands and the United Kingdom.

2.2 Additional technological and operational research and development needs were identified, and the SESAR JU 2020 programme included three industrialisation focussed research projects looking at RPAS separation, collision avoidance and surface movement. Multinational consortia bringing together key European industrial entities and industries conduct these projects. The SESAR programme is closely coordinated with projects being undertaken by the military through the European Defence Agency (EDA), whose projects contribute significantly to issues such as detect and avoid, command and control (C2) automated landing and remote pilot workstations, amongst others. Military operators are likely to be the largest initial stakeholder group to operate IFR RPAS, so the decision by EDA's members to pursue, what in Europe is called a civil/military dual-use path has been invaluable to both accelerating the pace of developments and in ensuring harmonisation of standards, requirements and concepts across all European stakeholder groups.

2.3 The European UAS integration roadmap follows ICAO's steps of accommodation, integration and evolution. It is well recognised that it should be possible to enable non-segregated RPAS operations without requiring full integration but to enable this; special provisions would need to apply. The second wave call of the SESAR 2020 programme, currently under definition, is looking to aligning solutions with this philosophy to expedite the commencement of non-segregated RPAS operations. Once again, this approach is fully coordinated with the EDA, whose projects are designed to complement the SESAR programme in support of the European roadmap. Integration work will be conducted in parallel with accommodation studies, with a specific focus on accommodation as a first step, initial non-segregated operations.

2.4 The importance of space-based technologies to UAS operations is fully recognised. Both the European Space Agency (ESA)⁷ and the European GNSS Agency (GSA)⁸ are both running their own UAS-related projects and contributing to other European UAS projects to cover the use of satellites for precision navigation and C2.

3. U-SPACE

3.1 In Europe, the need for coordinated and accelerated action to enable drone operations was adopted in a policy by the European Union following high-level conferences in Riga (2015)⁹, Warsaw¹⁰ (2016) and Helsinki¹¹ (2017). Their respective declarations on drones have stimulated considerable activity in Europe.

3.2 In 2017, the SESAR JU published the U-space Blueprint¹². This document, which builds on the groundbreaking work undertaken in the United States by National Aeronautics and Space Administration (NASA) and the Federal Aviation Administration (FAA)¹³, described the vision for U-Space in Europe. This was followed by the European UAS roadmap, which elaborated more about the nature of U-space and the type of U-space services that would be required to deliver the vision, as well as the supporting technological, standardization and regulatory activity.

3.3 The first wave of research and development projects in support of U-space comprised nine exploratory research projects within the SESAR 2020 programme, each looking at a different aspect of UTM, including collision avoidance, airborne technology, ground technology, C2, information

⁷ http://www.esa.int/Our_Activities/Telecommunications_Integrated_Applications/DeSIRE.

⁸ <https://www.gsa.europa.eu/newsroom/news/egnos-and-galileo-opening-door-new-drone-applications>.

⁹ <https://ec.europa.eu/transport/sites/transport/files/modes/air/news/doc/2015-03-06-drones/2015-03-06-riga-declaration-drones.pdf>.

¹⁰ <https://ec.europa.eu/transport/sites/transport/files/drones-warsaw-declaration.pdf>

¹¹ <https://ec.europa.eu/transport/sites/transport/files/2017-drones-declaration-helsinki.pdf>

¹² <https://www.sesarju.eu/sites/default/files/documents/reports/U-space%20Blueprint%20brochure%20final.PDF>

¹³ <https://utm.arc.nasa.gov/index.shtml>

management and cyber security. All of these projects coordinate with a central project¹⁴, under the leadership of EUROCONTROL, to define a European concept of operations for drones in very low level (VLL) airspace. Since the pace of developments for U-space is so fast, SESAR JU has also initiated three very large-scale demonstration projects. These projects bring together drone manufacturers and operators, air navigation services providers (ANSPs), regulators, airports, software engineers and UTM service providers in a drive to push forwards the state of the art by actually flying multiple drones in urban, sub-urban and rural environments, as well as inside controlled airspace near airports. Demonstrations are taking place in France, Denmark, the Netherlands, Spain and Switzerland. A fourth demonstration is also about to start, focusing on geofencing. The impact of such all-inclusive projects is expected to be so high, that a second wave of U-space VLD projects is about to be awarded, to take place at demonstrator sites across Europe.

3.4 The Helsinki declaration, supported by the conference participants, called for the development of a network of drone demonstrator sites across Europe. There are currently many such sites being set up including, inter alia, sites in Denmark, France, Italy, the Netherlands, Poland Spain, Switzerland and the United Kingdom. The European Commission, with the support of EASA, the SESAR JU and EUROCONTROL, provides regulatory and operational support for many individual national initiatives on U-Space under the umbrella of the EU U-Space Demonstrator Network. The Union support should fasten the creation of the drone services market. Finally, as part of the European innovation partnership on smart cities and communities (EIP-SCC), and in line with the Helsinki declaration, the European Commission has initiated the set-up of a network of drone demonstrator sites, managed by EUROCONTROL, which, amongst other aims, will be able to support the implementation of Urban Air Mobility (UAM)¹⁵.

4. SAFETY, STANDARDISATION AND REGULATION

4.1 The European UAS roadmap recognised that underpinning all drone-related activity in Europe is the need for a coherent and harmonised approach to safety, standardisation and regulation. In view of the adoption by the co-legislators of a new regulatory framework for aviation safety, which is set to include safety rules for UAS, the European Commission, with the active support of EASA, is working on a detailed regulatory framework¹⁶ in the matter. The current thinking is based on the so-called “operation centric approach”, with three categories of drone operations: open, specific and certified. Considerable consultation has been undertaken, and EASA has elaborated draft regulations¹⁷, containing the following elements:

- a) a framework to safely operate drones;
- b) technical and operational requirements for drones, including geo-awareness;
- c) necessary elements of product legislation, involving CE marking; and
- d) rules on beyond visual line of sight operations.

4.2 These elements provide a step in the direction of U-space by including requirements for Registration, E-identification and Geo-awareness that will need to be complemented in due course. The Commission is working towards adoption of the draft Regulations by the end of 2018.

4.3 Aviation industry standardisation in Europe is in principle organised by EUROCAE and their working groups (WGs) cooperate closely with other regional industry standardisation developments

¹⁴ <https://www.sesarju.eu/projects/corus>

¹⁵ <https://eu-smartcities.eu/initiatives/840/description> .

¹⁶ <https://www.easa.europa.eu/easa-and-you/civil-drones-rpas/drones-regulatory-framework-background>

¹⁷ <https://www.easa.europa.eu/document-library/opinions/opinion-012018>

organisations, such as the RTCA in the United States EUROCAE created WG105¹⁸ to define European standards for drones. WG 105 have six focus teams: UAS Traffic Management (UAS); Command, Control, Communication (C3); Detect and Avoid (DAA); Design and Airworthiness Standards; Specific Operations Risk Assessment (SORA), in the latter case complementing work developed by the Joint Authorities for the Regulation of Unmanned Systems (JARUS); and Enhanced RPAS Automation (ERA). However, it was recognised that, such was the widespread interest in drones, including many stakeholders new to the aviation world, that contribution to drone standardisation would need to be conducted by a wider group than just EUROCAE members are. As a result, the European Union under the chair of EUROCAE established the European UAS Standardisation Coordination Group (EUSCG). This group has created a UAS standardisation rolling development plan¹⁹ that brings together all the European UAS standardisation activity under one umbrella, allowing this activity to progress in a coherent and integrated fashion, with contribution from the widest possible range of interested stakeholders.

5. CONCLUSION

5.1 Europe has a long and well-documented experience in the integration of unmanned aviation into the European aviation system, and States have been involved with addressing the ATM integration problem for many years. Developments in technology have added impetus to the demand for more unmanned flight, and the increased demand for widespread use of UAS/drones has made it imperative that Europe adopt a harmonised and coordinated approach to the resolution of the problem.

5.2 The SESAR JU has published the roadmap for the integration of UAS into all classes of airspace, and this brings together all UAS activities from an R&D perspective into one coherent plan in the process of being incorporated into the all-encompassing European ATM Master Plan. It describes a two-thread approach, allowing separate developments in the fields of IFR RPAS integration, and U-Space. This distinction is necessary in the earlier stages of research and deployment, anticipating the whole aviation environment to evolve together as one.

5.3 European research and development projects on UAS are centred on the activities of the SESAR JU. The European Commission is providing regulatory and operational support to projects that are technologically mature, yet struggle with operational and regulatory issues. The EU Demonstrator Network is sharing the expertise of these projects. Many European agencies, ANSPs, industrial entities and operators are cooperating to deliver a comprehensive range of projects. Military activities form an essential part of this, allowing the military both to contribute to the European body of knowledge, and to benefit from the work of civil agencies. U-space is a key European initiative that is enabling the rapid development and deployment of U-Space services in Europe, with contributions from all interested stakeholders.

5.4 The European Commission, with the active support of EASA, is leading the development of a regulatory framework suitable for all types of UAS operations, while the industry standardisation of UAS technologies and concepts is managed by the EUSCG, allowing all European UAS stakeholders to participate.

5.5 The Conference is invited to take note of progress in Europe in integrating UAS of all kinds with manned aviation.

— END —

¹⁸ <https://www.eurocae.net/about-us/working-groups/>

¹⁹ https://www.eurocae.net/media/1514/version-10-rdp_17_02_2018.pdf