

Interaction between ATM and UAS operators in U-space operations and potential automation benefits

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Abstract (250-750 words)

Uncrewed Aircraft Systems (UAS), commonly referred to as drones, are increasingly identified and applied in civil use cases, amongst them delivery of medical support systems, medicine, or hospital samples in urban areas. The rapid usage of drones in such context is enabled through advanced air mobility (AAM) and, in particular in Europe, the envisaged U-space ecosystem. When operating in U-space, airspace users are supported by numerous services, such as Flight Authorization or Conformance Monitoring. The level of automation and the number of available services is foreseen to increase in the coming years and decades, leveraging the U-space ecosystem from service level U1 with basic mandatory services only up to service level U4 with high automation. However, the U-space airspace may be in the vicinity of controlled airspace supervised by air traffic management (ATM) with conventional manned traffic managed and separated by air traffic control. In uncontrolled airspace, currently only non-binding Flight Information Services (FIS) are offered to crewed aircraft by Air Navigation Service Providers (ANSP). Especially in controlled and also in uncontrolled airspace, the (automated) interaction between U-space airspace users and ATM may be required and can improve safety of both crewed and uncrewed airspace users.

Such cases include contingencies or emergencies on either part of the airspace, or requests to use the respective other airspace for urgent flight operations. To that aim, the U-space ecosystem is foreseen to be enriched with procedural and collaborative interfaces between U-space and ATM on the one hand, and the dynamic airspace reconfiguration service on the other hand. Still, the interaction could start from direct communication using voice channels and would need to evolve to automated, service-driven requests and responses, in order to ensure effectiveness and scalability.

This paper aims to shed light on the various scenarios and use cases in the scope of UAS operations in which the efficient interaction between U-space airspace users and traditional ATM users is most likely necessary. Ongoing and completed research projects as well as reference material issued by e.g. aviation authorities, such as the European Union Aviation Safety Agency (EASA) or the Think Tank of the European Parliament, will be taken into account. The different applications of UAS in U-space are collected and investigated on the possibility or the requirement to interact with ATM. Focus will be given on specific scenarios necessitating close coordination and efficient interaction between U-space users and ATM services. Further, the roles and responsibilities of the actors in these scenarios, i.e. UAS operators, U-space service providers, and air traffic control, will be investigated. In addition, the level of automation and the interaction means is assessed against the current legislative requirements, and potential gaps are identified. The research is complemented with scenarios stemming from the SAFIR-Ready project, tasked by the European research program SESAR to develop advanced (U3) and full (U4) U-space services. The project is investigating requirements for medical transport tasks for drones in urban areas in order to ensure their operational readiness for short-term (emergency) flights. In a final step, the benefits that can be expected from increased automation, i.e. higher service levels of U-space that cover specific societal needs, are discussed. The findings of this paper can be a

valuable input to both UAS operators and U-space service providers aiming to conduct AAM operations in effective collaboration with ATM.