

**ERAINT Evaluation of the RPAS-ATM Interaction in Non-segregated Airspace**

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<p><b>Research Questions</b></p>	<p>How will IFR separation be managed by the RPAS and the ATC? Which are the implications of the limited RPAS performance? Is sector capacity greatly affected by an RPAS operating in it? How to manage RPAS suffering a contingency in flight? How to manage that emergency? Can the ATC manage the airspace in such situation? Can the RPAS pilot or even the RPAS if operating autonomously, help the ATC to have the relevant information he needs to safely manage the emergency by declaring its intentions? Will the ATC controllers accept such active participation by the RPAS pilot or by the vehicle alone?</p>			
<p><b>Research Scope</b></p>	<p>The ERAINT project focuses on the study of the practical implications/limitations of a RPAS operating under an IFR-ATM environment, and the benefits that technology and automation could bring to both the pilot and the ATC. Even though regulations and collision avoidance is critical, operational aspects are equally important. In addition to the understanding of the detail-level RPAS operation, a number of additional factors are still an unknown. Most of them relate to the effect, negative or neutral, that RPAS will have on the capacity of the already crowded European airspace. Capacity effects may be produced by an increase of separation conflicts due to the dissimilar performances of RPAS and airliners, or due to the increased workload to the ATC controllers. All these factors need further understanding through the analysis of multiple scenarios in which the RPAS mission and performance, the surrounding traffic, the ATCo capacity; etc, become variables that can be explored. The project is being organized around a spiral development strategy that progressively addresses the identified objectives: separation management in the first iteration, contingency management in the second iteration, and impact on airspace capacity in the third one. A high fidelity evaluation of RPAS operations will be reproduced through a realistic airspace access process: (1) creating a coherent RPAS mission, (2) submitting it to a simulated ATM authority for its evaluation and negotiation, (3) executing it in a monitored real-time environment, and (4) evaluating the outcome of the operation by the RPAS operator, the ATM providers and some “neutral” external observer. Furthermore, equivalent scenarios will also be created to be analyzed under fast-time simulation tools. The results of this stochastic analysis will be combined with the real-time analysis into the same ConOps.</p>			
<p><b>Research Results</b></p>	<p>The main expected achievement of the project is the production of a detailed and low-level Concept of Operation for RPAS operating in controlled non-segregated airspace. The ConOps will be limited to a number of topics, it will be further validated and will that focus on en-route IFR operations; and explicitly exclude VFR operations, airfield operations and collision avoidance issues. The elements under investigation will be: the en-route automatic separation management with open and closed instructions by the ATC and proactive participation of the RPAS through the negotiation of separation manoeuvres on the RPAS RBT; the contingency management with automatic or even, in case of lost of link, the autonomous operation by the RPAS, with active intentions interchange and negotiation between the RPAS and the ATC; and the strategies to access non-segregated controlled airspace limiting the negative impact of the RPAS operation to airspace capacity and ATC workload.</p> <p>The expected result of the project are the evaluation of the proposed ConOps under efficiency and workload metrics obtained during extensive real-time analysis and fast-time stochastic analysis, the determination of possible automated procedures to maintain or increase the RPAS pilot’s flexibility, the proposal of autonomous operations</p>			

	<p>in case of a loss of communications, the definition of an information flow between the RPAS and ATC which increases the safety of the decisions under separation conflicts or emergency scenarios, the design of the support tools and HMI interfaces of the ATCo to provide a better RPAS management, and the provision of a database of the flight experiments logs for third party organizations.</p>
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