



# RPAS-ATM Integration Demonstration

## Final Workshop

### *Summary of Achieved Flight Results*

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- Specific RPAS procedures does not constitute a concerned issue for both Remote Pilot and Air Traffic Controllers, both when RPAS is alone (i.e simulated segregated area), and when is operated with co-operative conflicting traffic.
- The transparency requirement has been confirmed, as ATCOs were able to manage unmanned traffic in the same way they manage manned traffic.
- C2L jamming and spoofing conditions did not have a substantial impact on Safety of RPAS operations. Remote Pilots and Controllers have reported that with the proposed procedures they were able to positively manage the tested demonstration scenarios. It has been evidenced that a clear indication of aircraft behaviour to remote pilot has to be represented on pilot HMI. Moreover controllers need to well known the specific procedures of RPAS, and specific training activities need to be foreseen for a unsurprising and aware management of this kind of conditions; furthermore the ATC shall be informed about the estimated endurance of the RPAS.
- The use of a Detect And Avoid (DAA) system in support of pilots and controllers for Traffic Avoidance operations is well manageable, even if a partial increase of workload with respect to RTS has been revealed.
- In those unplanned cases where the prototypal DAA system did not operate as expected, safety was not compromised because the RFO was able to control the RPAS in all instances and aircraft separation was managed safely by the test ATCOs.

## *1/2 General, on flight test organization*

- The OPV configuration of FLARE contributed to achieve an acceptable operational Level of Safety, being the pilot on board a major mitigation to the hazards identified during the safety assessment. This had a positive impact on the feasibility of the overall demonstration activities.
- The Real-Time Simulations and Flight Trials have both an important role in investigating objectives related to human performances, security and safety aspects. RTS can be used as learning sessions for new procedures, nominal or emergency procedures, and the use of advanced support system, both to remote pilots and to ATCOs. Subsequently, Flight trials are strictly required to acquire real measures of those objectives in close to real conditions.
- It is consequently suggested to plan RTS and actual flight trials with a close schedule, and also to alternate the two phases more than a single time, in order to better benefit from the relevance of both kind of experimentations.
- It is recommended to promote a cooperation and comparison from different projects for better assessed conclusions, both referring the SJU Demos activities recently concluded, and more generally for future large RPAS integration programs. The R&D community would profit from a common database where data coming from different initiatives and projects are collected and made available to allow further analysis.

## *2/2 Specific, on RPAS integration*

- The HMI should provide the remote pilot with warnings in case the RPA reaches flight envelope limits (e.g. stall situation). The lack of physical presence in the aircraft, along with the lack of haptic, acoustic and visual cues, makes it harder or even prevents the remote pilot to identify flight problems (aerodynamic performance problems) in due time.
- The introduction of new standardised phraseology is important in order to improve the communication efficiency between ATC and the remote pilot. This can have a positive impact on both pilot and ATCO workload and consequently on operational safety.
- RPAS operational performance limitations should be made available to ATCO in order to provide them with useful information about expected behaviour and feasible manoeuvres.
- It is required that DAA system indications result well clear to Remote Pilot and Controllers. Also the rules governing the use of the DAA system, have to be well communicated to pilot and controllers before the system operations. Specific training on the humans use and interfaces with DAA systems could be required.
- Thought the use of the outside view camera was not critical for the pilot during RPAS operations, it should be located in front of the remote pilot, this way he will have all the information he needs for decision-making within his Useful Field of View (UFOV).