



## Executive Summary

The Unmanned Aerial Systems in European Airspace (ULTRA) project began in mid-2012, supported by the EC under its 7th Framework Programme (FP7) to address the defined activity 'Assessment of the potential insertion of unmanned aerial systems in the air transport system'. It has been performed by a consortium of 12 organisations from across Europe and with experience in all aspects related to RPAS.

The overall objectives of the ULTRA project have been:

- To provide a comprehensive set of recommendations for the incremental insertion of civil Light RPAS (RPA with operating mass up to 150 Kg) in the European airspace in the short-term (i.e. within 5 years from 2012)
- To provide specific recommendations for selected "Use Cases" to be explored as "quick win" business cases.
- Highlight what needs to be done in order to unlock the full potential of the civil Light RPAS market in the long-term (i.e. 10-15 years from 2012).

To address these objectives, the project was organized into work packages addressing: Regulatory and Certification Base, Adaptation of Infrastructures, Safety, Social impact and Business/Economic effects on European Industry. Through initial definition of four Use Cases, the work in each area has focused on the 'quick win' business cases.

Among the myriad of potential uses cases a few of them were selected (following a methodology developed within the project) to be further assessed as "quick win" (short term) business cases. These use cases are:

- Wind Energy Infrastructure Monitoring
- Disaster Management / Fire Fighting Assistance
- Aerial Photography
- Pipeline Monitoring

The first three could be performed as Visual Line Of Sight (VLOS) or Extended-VLOS (E-VLOS) operations but the final case would, in principle, require operating Beyond VLOS (BVLOS).

Nine technical reports addressing the different aspects covered in the project, have been produced along with an overall Final Report that draws together the work against the evolving background in the Light RPAS domain that has occurred since its inception.

Some of the major conclusions and recommendations of the ULTRA project include:

- VLOS operations, progressing to E-VLOS, for "small" RPAS (RPA mass up to 25 Kg), as well as BVLOS operations for Light RPAS in segregated airspace are already feasible, as proved by the growing number of these operations in Europe. Therefore, in order to allow business to progress and gain experience (essential for a proper regulation), it is recommended that the required regulations are promptly established where they are not yet in place. This is recommended even if, as in the case of "small" RPAS operating in (E)VLOS, such regulations are not fully harmonized across Europe (as in that case harmonizing afterwards will not required much effort, but gaining an early experience will be more crucial). There needs to be a progression from national to harmonised and, eventually, common EU safety rules for civil Light RPAS to assist a European (and global) market.



- In order not to penalize the Light RPAS business, regulations must follow the principle of simplicity (majority of SMEs involved), proportionality (with the size of systems and organizations) and flexibility (“learning curve”).
- Organizational and human factors are (as in manned aviation) the most significant factors contributing to safety issues, and this is expected to be aggravated in the civil Light RPAS sector, where most organizations involved are SMEs with lack of an aviation safety culture. Thus, it is essential to promote an aviation safety culture within this community.
- Equipment suitable for Light RPAS varies significantly in functionality and maturity with a lack of distinction between ‘hobby’ and ‘professional-oriented’ quality systems. Standardization of the specific Light RPAS aspects and qualification criteria for the related equipment is then a fundamental issue, especially for Light RPAS where airworthiness needs to be certified.
- Size, weight and power (SWaP) constraints are a key factor for Light RPAS equipment, with research and developments necessary to maintain a competitive supply base in Europe.
- Integration into the aviation system is a step wise process. Operations beyond those currently feasible (under (E)VLOS or airspace segregation) will require address of a need for increased remote pilot “situational awareness” and Light RPAS “detectability” by other airspace users, as key aspects for Light RPAS to be operated alongside other (manned) aircraft. A key, and already existing, technology enabler is ADS-B, also fundamental for the future ATM system (SESAR). Beyond these aspects, specific detect and avoid solutions (including the definition of collision avoidance manoeuvres relative to obstacles as well as air traffic) will have to be defined for Light RPAS to operate in non-segregated airspace. However, due to the SWaP constraints and limited performance, unrestricted operations of Light RPAS in non-segregated airspace are not considered likely in the foreseeable future.
- In all cases, a safe integration of Light RPAS in the aviation system requires establishing a commonly agreed risk criteria framework for their operations.
- Liability, insurance, privacy and data protection issues all require address in the near term, deciding whether the existing regulatory framework is applicable to RPAS or needs to include specific norms for RPAS.
- Efforts to engage with the general public, to explain what RPAS are/are not and what benefits they can provide in the civil sphere, need to be increased and continued beyond the constraints of ULTRA. These should use a communications strategy aimed at gaining acceptance for RPAS, which makes use of modern Information Technology techniques.

The consideration of the initially selected Use Cases in the light of the work performed on the regulatory, technical and social aspects of Light RPAS, has borne out the existence of strong business cases.

The ULTRA project has proved a challenging but fruitful activity within the constraints existing and the rapidly evolving background environment of activities relevant to Light RPAS. The range and mix of consortium members has provided extended debate on a number of issues but ultimately led to more robust results and concrete recommendations.

The detailed reports produced can be accessed via the publicly accessible website constructed for the ULTRA project, which also provides further detail on the consortium and other material related to its output. This can be found at <http://www.ultraconsortium.eu> .