



Early Demand Map for Aerial Systems and Applications

AERIAL GROUP

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Aerial Group's Presentation.

- Set of needs of all activities that might require joint action of aircraft flying simultaneously.
 - These are the elements of general interest for the Autonomous Government's set of technological obstacles: technology aimed at solving problems related to air traffic control, managing unique situations where manned and unmanned aircraft come into competition, and establishing separate air spaces for conducting missions included in the obstacles proposed by the Departments of the Autonomous Government of Galicia.
- Represents general CUI public innovation purchase interests:
 - Given that the Autonomous Government of Galicia's set of obstacles must operate in settings where safety and protection risks can be substantially mitigated and the value from the application of UAVs compensates the lesser accepted risk, the CUI is a unique opportunity to further develop and put into practice UAV solutions with a realistic application horizon and with potential market opportunities.



Outcome of market consultations in the Aerial Group.

- Content developed by GAIN, based on an analysis of the RFP-A proposals.
- Among the expressions of interests received from the RFP-B queries, 6 proposals are related to these subject matter.

Innovation purchases identified by the Air Group:

Air traffic safety and management for shared air space.





TENDER 1

Traffic management and safety in shared air spaces



Tender objective: concept (1)

HORIZON

The safety of manned flight operations cannot be compromised under any circumstance during the development and operation of unmanned aerial systems.

In situations where UAVs share air space with manned aircraft flights, **said UAVs must have systems that include equipment that reasonably enhances the safety level when piloting and controlling them.** Additionally, air traffic management (ATM) systems and procedures must incorporate complimentary procedures and technological improvements.

RESTRICTED AREAS

While attempting to establish this model of symbiosis between manned and unmanned systems, said symbiosis can be created out of the need to create specific missions, like some of the ones included in the resolution scenarios corresponding to the Autonomous Government of Galicia's obstacles where it would be desirable, in a restricted movement area, to simultaneously operate manned and unmanned aircraft. For example, operations related extinguishing fires, maritime alerts and environmental crisis and emergency management.

These needs are also applicable to situations where fleets of UAVs are operated.

Objeto de la licitación: concepto (2)

The conceptual element of a project of this nature must require, in the current situation, an air traffic area that is restricted or limited by public authorities due to a concrete special situation. For example, one could consider establishing traffic lanes for moving operative means to the operation site, as well as an extensive area of operation

The equipment and systems that this project intends to develop are geared toward installation aboard unmanned aerial vehicles (on-board solutions). However, one complimentary interest could be in systems that could be part of the air traffic control and management systems that must include public ATM infrastructure (on-land solutions).

LACK OF CREW

The most common risk factors identified in the operation of unmanned aircraft are related to managing in-flight contingencies which, in the case of manned aircraft, would be handled by the crew. In fact, the most critical obstacle for getting UAVs into the air space is guaranteeing a single UAV can be safely operated under any operational circumstances, even under critical flight conditions.

Tender objective: concept (3)

In order to fully overcome this obstacle, four essential problems must be addressed. Development during the initial phases must be centred around these problems., thereby responding to the following circumstances, which could be potentially catastrophic for the mission:

- a) Loss of communication with the base station (LoL: Loss of Link). Unavoidable circumstance, including with redundant systems.
- b) Inability to detect and avoid collisions (LoS: Loss of Separation). This makes autonomous detection and evasion systems necessary.
- c) Loss of signal from navigational and positional support infrastructure, such as GPS (LoG: Loss of GPS). This is why it is necessary to establish the capacity to generate and complete courses autonomously.
- d) Loss of Engine (LoE). A single point of failure, with a very limited reaction time. To resolve it, it is necessary to replicate, albeit partially, the ability of a human pilot to make emergency landings.

Tender objective: concept (4)

As individual events, such contingencies could occur separately or in any combination thereof, thereby giving rise to varying conditions of severity. If we assume that any combination of flight contingencies can occur, even during a situation of LoL, safety in these situations involves having on-board autonomous flight management systems.

As a result, the systems that will be incorporated into the UAVs themselves to make these operations possible must include solutions for avoiding these risks (e.g. anti-collision systems, back-up communication and navigation systems, etc.). All of these systems and equipment would be covered under elements related to equipment needed to complete the mission: interaction with the environment, piloting and interactions with ATM systems.

Autonomy when generating and completing a course will be essential, to varying degrees, so as to face these contingencies as the only possible solution when there is no pilot.

Tender objective: project contents (1)

In order to respond to the previously-listed catastrophic contingencies, the project must develop and test a number of the following elements:

1. On-board systems in UAVs that guarantee that any operation following a functional loss of communication, positioning or navigational infrastructure is managed safely.
2. Remote piloting systems that allow for integration of this interaction between an unmanned aircraft and its environment, which includes other manned aircraft, while at the same time making it possible to complete the mission.
3. On-board systems in UAVs that interact with ATM systems as well as with control, mission and piloting systems, thereby making it possible to complete a mission under the safety conditions required by air traffic regulations.
4. In addition to the foregoing, air traffic management systems are considered to be compliments of interest that make it possible to coordinate manned and unmanned aircraft operations within a concrete area. These systems could be integrated and tested at the CIAR [Rozas Airborne Research Centre].

Users

- Potential users include all missions included in the obstacles that require the simultaneous flight of more than one aircraft.
- It is especially important on missions involving manned aircraft.
- The potentially most demanding missions would be:
 - Emergencies
 - Fires
 - Sea rescue



User needs that are intended to be covered

- Need to simultaneously use several aircraft.
- Need to use manned means alongside UAVs

Expected outcomes and effects: improvements in current services (efficiency).

Currently, these types of operations cannot be completed, so the concept of efficiency is not relevant.



Expected outcomes and effects: new services or functions (efficacy).

- In general, it would make it possible for several aircraft—both manned and unmanned—to operate at once.
- Development of these functionalities would make it possible to develop new solutions to current service issues:
 - Systems that support communications between operative equipment in isolated emergency areas, both on land as well as at sea.
 - Systems that support risk operations, such as transportation of materials and deposit of equipment.



Scope of the tender objective and timeframe

- The aim is to develop an experimental system that makes it possible to test operations of several aircraft at once with an acceptable level of safety.
- Tender in the spring of 2017.
- Timeframe for execution: two years.



Estrategia de licitación

- Pre-commercial Public Procurement (CPP).
- 6 million euros
- Tender in the spring of 2017, assignment in October, completion by the end of 2019.
- Key assessment criteria:
 - Credibility of the solution.
 - Technical quality of the proposal.
 - Prior experience with these types of systems.
 - Potential impact on international market.
 - Local content (20% minimum)
 - Access to international aeronautic market.