

**PRIVATE HUMAN ACCESS TO SPACE;
COMMERCIAL SPACEFLIGHT PROJECTS IN SPAIN: CHALLENGES AND PERSPECTIVES**

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I) INTRODUCTION

The aim of this paper is to provide a general overview of current projects that consider Spain a potential location for the development of ventures that in some way involve the different aspects of *Private Human Access to Space*.

To ensure the completeness of this overview, I will also refer to those projects that are considered to have a potential influence on the opening up of commercial space activities. These are understood to be activities undertaken by private enterprise, under the tutelage of the relevant authorities but not directly contracted by these authorities. The private sector is now coming into its own. Up to now it has contracted agencies and governments, but now the opportunity is there to go solo with the development of all kinds of initiatives that have one common factor: going into space, the final frontier.

There are three relevant points to be taken into account in the development of these activities. These points have been used to define the structure of this paper:

- a) The growing interest of different operators in basing their activities in Spain.
- b) The limitations resulting from the lack of an appropriate legal framework for commercial space activities in the form of Space Law, along the lines of this type of legislation in our neighbouring countries.
- c) The need to take the actions required to enable the various national and international operators to participate in the different projects that are in progress.

Prior to this, it is important to consider the current framework within which these initiatives are to be developed, with a brief summary of the institutions, associations and the legal bases that are directly related to aerospace activities in Spain in one way or another.

II) THE LEGAL FRAMEWORK that is currently in place in Spain to govern aerospace activities is briefly summarised below:

UN treaties

A. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies. (27/01/1967; Official State Gazette (BOE) 4/2/1969) Outer Space Treaty

B. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space. (22/4/1968; Official State Gazette (BOE) 8/6/2001) Rescue Agreement

C. Convention on International Liability for Damage Caused by Space Objects (29/3/1972; Official State Gazette (BOE) 2/5/1980) Liability Convention

D. Convention on Registration of Objects Launched into Outer Space (14/01/1972; Official State Gazette (BOE) 2/5/1980) Registration Convention

E. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Moon Agreement, (18/12/1979). Not ratified.

Other Regulations

Principles Passed by the General Assembly

A. Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space. UNGA Res 1962 XVII

B. Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting. UNGA Res 37/92

C. Principles Relating to Remote Sensing of the Earth from Space. UNGA Res 41/65

D. Principles Relevant to the Use of Nuclear Power Sources in Outer Space. UNGA Res 47/68

E. Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries. UNGA Res 51/122

Related resolutions passed by the General Assembly

A. Resolutions 1721 A and B (XVI) of 20 December 1961. International cooperation in the peaceful uses of outer space. UNGA 1721B (XVI)

B) Paragraph 4 of resolution 55/122 of 8 December 2000. International cooperation in the peaceful use of outer space. UNGA Res 59/469. Certain aspects concerning utilization of the geostationary orbit.

C. Resolution 59/115 of 10 December 2004. Application of the concept of the “launching State”.

D. Resolution 62/101 of 17 December 2007. Recommendations on enhancing the practice of states and international intergovernmental organizations in registering space objects.

- ESA Convention 30 May 1975
- ISS Intergovernmental Agreement of 29/01/1998
- Founding treaties of INTELSAT, EUTELSAT, EUMETSAT, INMARSAT
- One-off agreements with NASA for the use of specific airports as emergency landing bases for the Space Shuttle
- One-off agreements with Russia, the most recent being the Agreement dated 09/02/2006

Spanish legislation.

- Ratification of the first four international treaties
- Position of Spain on COPUOS: (AC. 105/635/Add.13) Spain's position was fixed in 2005 in the following regard: Aeronautics Law is considered applicable if a flight takes place in airspace (both take-off and landing), while Aerospace Law will be applicable only when the flight takes place in outer space. However, a distinction is made between space objects that are launched using rockets and land due to their aerodynamic characteristics, and those in which the aerodynamic properties are essential both for take-off and landing (this would include almost all current models of suborbital spaceplanes). In the case of the former type of space object, it is assumed that Aerospace Law is applicable from their launch until their return to the atmosphere for landing, at which point Aeronautics Law again comes into force.
 - Regulation governing the registration of space objects: RD 278/1995 of 24 February creating the Spanish national register of space objects (Official State Gazette (BOE) 9/3/1995)
 - Specific regulation concerning Telecommunications
 - Airports in Catalonia; Law 14/2009 of 22 July concerning airports, heliports and other airport infrastructures
 - Spanish Air Navigation Law
 - Constitutional competencies concerning space and air navigation: 148/149 CE

The Treaty of Lisbon.

Spanish government institutions with authority over aerospace matters

MINISTRY OF INDUSTRY
MINISTRY OF SCIENCE AND INNOVATION
CDTI (Centre for the Development of Industrial Technology)
INTA (National Institute for Aerospace Technology). MINISTRY OF DEFENCE
MINISTRY OF FOREIGN AFFAIRS
MINISTRY OF PUBLIC WORKS AND TRANSPORT. AENA. AESA

3- THE GROWING INTEREST IN COMMERCIAL SPACEFLIGHT PROJECTS BASED IN SPAIN. PERSPECTIVES.

There are currently four types of project in the planning stage that would involve commercial spaceflights in Spain:

a) Suborbital flight projects initiated by companies.

Although for commercial and legal reasons each of these companies is required to publicly indicate their interest in line with questions of opportunity, advertising etc., it should be noted that to date, several pioneering companies in suborbital flights have shown a direct interest in establishing an operational base in Spain. These companies have carried out a variety of negotiations, exploration procedures and enquiries concerning the real possibilities of putting such a project into action.

One reason for this interest is the suitable geographical location of Spain in terms of the physical possibilities of launching space objects. In addition, the undeniable tourist appeal of the country in general terms provides a not insignificant complementary factor for this type of activity and its potential clients. Moreover, it is increasingly not only the area of "space tourism" that is to be exploited; new commercial access to space is opening up linked to scientific and technical progress, ranging from experimentation in conditions of microgravity to the options available for the use of suborbital spaceplanes as the first phase in the process of placing loads in low earth orbit.

When assessing the potential of Spain in the sector, these companies looked for a series of elements that are necessary if they are to carry out their activities. Some of these elements are available in Spain, while others are present to a limited extent or are non-existent.

On the one hand, Spain can provide elements such as Spaceports, which will be explored in greater detail below. In addition, the country offers flight conditions that combine both reliability aspects and the number of hours of sunshine, safety and the attractiveness required for a flight in which, although the main attraction is space, the curve of the earth and the absence of gravity, the passenger will also have the opportunity to "look down" to earth. Spain meets these conditions.

On the other hand, the necessary institutional support for this type of private activity is something that is currently still at an early stage of development, more from the point of view of promoting facilities for investment than of direct participation in projects, on the understanding that the development of such projects should be the responsibility of private enterprise.

b) Spaceport projects.

In close relation to the previous point, it should be taken into account that Spain can provide the infrastructure for commercial access to space. Although it would be extremely difficult to find a location for spaceports for rocket launches in peninsular Spain (and here we are thinking of "typical" spaceports such as Cape Canaveral or Kourou), there is clear potential for the construction of infrastructure for suborbital vehicles of the characteristics available on the market, which can be operated as aircraft for a large part of the flight.

At present, despite the fact that in the past locations such as Saragossa and even Getafe have been suggested as possibilities, it should be noted that the location of these facilities, the population of the surrounding area and the air traffic that they deal with mean that they are not suitable for this type of venture.

However, as has been made clear on more than one occasion in international forums on this very subject, the location of Lleida Alguaire airport in Catalonia, in the northeast of the Iberian Peninsula, offers very real possibilities.

There are four factors supporting this:

a) Firstly, this is the ideal location, in an area with a reasonable population density, in a thriving city, Lleida. This is further enhanced by the proximity of, and excellent transport links to, a city of global importance such as Barcelona. In addition, a substantial area to the west consists mainly of the Monegros desert and areas used for military practice flights. This reduces the risk of third party activities while allowing interesting projects and developments to be undertaken.

b) Lleida-Alguaire Airport is administered by the public law body Aeroports de Catalunya (Airports of Catalonia), an organisation that is affiliated to the Commercial Spaceflight Federation. The latter organisation is renowned for its work in developing commercial activities in the space sector. This interest on the part of the airport operating company in moving into the aerospace sector is clear evidence of its aim to be able to operate in this sector should suitable circumstances emerge.

- The government of the Autonomous Community of Catalonia has implemented Law 14/2009 of 22 July concerning airports, heliports and other airport infrastructures within the scope of its competences. This regulates the establishment and management of airport infrastructures that are not classified as being of general interest, these coming under the management of AENA, the Spanish airport and air traffic authority. This regulation includes a number of references to the subject of space travel, although it should be noted that it is the national government that has authority over matters of air

and space navigation. The regulation itself reflects the desire to foster the possibility of carrying out these activities from this infrastructure, and it is also pioneering in its reference to space tourism.

Due to its importance, here is a translation of the literal transcription of the law:

Article 13.-1 Duties and powers

1. In order to comply with the functions conferred on it by this law, Aeroports de Catalunya is assigned the following duties:

*j) To carry out and foster educational activities in the sectors of knowledge linked to air and **space transport** and to airport infrastructures.*

*k) To carry out activities in the fields of **promotion, research and development in the sectors of air and space transport** and airport infrastructure within the framework of the priorities set out by the relevant department in these matters.*

Article 13.2

*b) To **participate** in committees, organisations, associations and any public or private, Spanish or international association linked to air and **space** transport, either on its own behalf or, where appropriate, as representative of the Government of Catalonia.*

*c) To carry out activities in the fields of **promotion and marketing** of air and **space** infrastructures and **transport**.*

ARTICLE 26.2 ACTIVITIES IN THE UTILITY SPACE

Those facilities and services required for the promotion and practice of activities linked to space and space tourism or any related activities may be located in the utility space.

Additional Provision 8

EIGHT. ACTIVITIES LINKED TO SPACE

Within its framework of authority, the Government of Catalonia shall encourage appropriate actions intended to promote and develop activities linked to space, specifically those involving training, awareness-raising and space tourism in order to enable these to be carried out within the scope of the infrastructure regulated by this law.

c) Space Resorts.

Two types of project have been mentioned up to now: terrestrial infrastructure in the form of spaceports and suborbital spaceplanes in relation to the interest of a variety of operators in basing their commercial flight operations in Spain. Another area that we should not forget is that of ambitious and pioneering projects such as the construction of a space hotel by the Barcelona company Galactic Suite.

This project first came about some years ago within an architecture studio involved in the design of buildings for locations classified as "extreme habitats"; I think we would all agree that space comes under this umbrella. The project has undergone logical, natural evolution up to now, based on technical development and economic factors. It is currently structured into a development project in a number of phases, using ATV and/or Russian modules.

While it may seem that an idea like this is extremely complicated, which it is, other similar projects such as the one carried out by Bigelow suggest that this is not just some crazy scheme, and will spur us on to try and bring together the technical, scientific and economic resources to carry it to completion.

The thriving development of suborbital flights will be no less than a preliminary to orbital flights, which in the medium term will be carried out for a variety of aims, from simple leisure to scientific research. Private projects such as the SpaceX Dragon capsule, originally intended to provide access to the ISS, could have a broader market – as was recently remarked in the last meeting of the FAA in Washington (February 2011), it is not only launchers and spaceships that are required, but also places to go in them.

d) Marketing.

All that remains is to mention other initiatives linked to commercial space activity, such as the marketing of (generally suborbital) spaceflights, as carried out by the company Bru and Bru, Virgin Galactic's representative in Spain and Andorra.

Alongside all of these other activities, we must also make reference to those that are to be undertaken by local industry in all of its forms, whether individually or as part of aerospace clusters. This is a key factor in the success of these projects and will lead to valuable contributions to development in the fields of aeronautics and aerospace in terms both of industrial and scientific advances and those linked to infrastructure, services etc.

4. CHALLENGES

All of these aspects that we have discussed throw up a series of challenges that we must overcome if these plans are to become reality.

These challenges are varied in character, from technical, scientific and economic to legal and regulatory, and others.

In the specific case of Spain and assuming that the first three challenges can easily be met, we come up against the limitation posed by the lack of specific regulation governing private access to space, regulation which has been put in place in a number of our neighbouring countries and is also well-developed in the USA (FAA). This means that at present, any development in the areas listed would require the fashioning of an ad hoc legal framework for the activity, with the additional layer of complication that this would bring with it in the form of certifications, authorisation, responsibility, safety, etc. Although this would not be impossible, it would be difficult and could drive away such projects and the high added value investment that this type of initiative implies.

Regulation is required, but it should be remembered that comparable regulations that are in place elsewhere always encapsulate the notion of promotion and fostering. Obviously the safety element is a major factor in this type of activity, but once this has been established, the authorities must focus on facilitating the development of plans and projects. We have already seen the fact that the Catalan Airports and Heliports Law makes mention of promoting activity linked to space tourism and while this content is a result of the system of division of competencies, it nonetheless captures the approach that the legislation governing such matters should take. In this regard, FAA regulation is the norm to follow, with the relevant adaptations to suit the situation in Europe.

We can therefore see that the most significant challenge facing Spain at present is to move forward out of this situation of a-legality or non-regulation of private access to space, implementing the legislation that is already in place and developing a specific Space Law that will cover such situations, with the necessary involvement of the public authorities while fostering private initiative.

Other limits, which apply not only to Spain, emerge in the form of ITAR restrictions, particularly taking into account the fact that the vast majority of suborbital craft and the technology used in these projects are subject to these. Even the US airspace sector is critical of a number of these restrictions, as they are seen as putting limits on free competition, but the current regime is nonetheless in place and should be respected.

This means that we must use our imagination in many aspects of these new developments, putting in place solutions such as test flights.

5°.- CONCLUSIONS

A number of space projects are considering using Spain as their operations and development base. There are Spanish and foreign entrepreneurs and institutions that are strongly committed to this sector in a variety of areas, both as motors behind the industry and as clients.

While it would be possible to fashion a bespoke legal framework for the development of certain operations based on the legal provisions currently in place, the growing momentum of development in this area throughout the world and the growing importance of the private sector in the field suggest that, as has been the case in a number of neighbouring countries and other pioneering countries such as the USA, it is necessary to lay down effective legislation that will provide operators with legal security and that will regulate all of the relevant aspects of this new activity, while at the same time promoting its continued development. Emphasis must be placed on this latter task in order to make it clear that regulation, while it must ensure that certain standards are met (particularly in regard to the safety of third parties) must also facilitate the development of these activities to the greatest possible extent. Regulation must be implemented that does not involve excessive bureaucracy or put too many obstacles in the way of development, which may encourage operators to resort to forum shopping instead of going for really attractive positions.

The success of the first projects is essential for their own survival and for the development of subsequent steps - from suborbital flights to spaceports distributed around the world, to free access to the earth's orbit, to its installations and beyond. This would also imply the move forward from the attention-grabbing cases of "space tourism" to the commercial, technical and scientific exploitation of space by industry, universities, etc.

Now is the time to rise to the challenge. At this moment, new, pioneering companies are emerging, just as in the past commercial sea exploration companies opened up the oceans in the age of discovery and the first airline companies opened up the skies. I firmly believe that the future, and the near future at that, will see the development of all of these activities alongside the large-scale exploration missions undertaken by the international space agencies. All those who make a commitment to this sector will be in an unbeatable position to meet the challenges that will emerge, something that, although based on regulations, business plans, scientific studies and engineering, is founded on something much more intangible than all those of us who are here know well: the desire to go beyond what we know and to conquer space; this same space that we could say has already conquered us.

The true challenge is not to let this opportunity pass us by. Anything that applies to Spain is also true for all of the other stakeholders in the international arena. The time will come in which competition will prevail, but I believe that during this phase, respecting the interests of each and every operator and project as well as ascertaining their positioning is a task that we must undertake together if we are to fully establish this future as a reality.