THE NEW SPACE ECONOMY: REGULATIONS AND PROJECTS.
NEW STEPS TOWARD SPACE.

The launching of Sputnik into the earth´s orbit in October 1957 marked the beginning of the space age as we know it, and was an historic milestone which bolstered the national pride of the USSR, and caused serious concern in the US, as it saw that it was losing what had become known as the Space Race. This expression was coined at the height of the Cold War, when the balance of power between nations was very different to the world we know now.

Although this may all seem very remote to us, at that time space was viewed as a theatre of operations where different countries vied to augment their national prestige and power. The two superpowers competed to demonstrate their power using the same technology used in their menacing nuclear arsenals; their spacecraft were adaptations of their missile launchers while the key component of the space capsules, where the first astronauts travelled in extreme discomfort, were the thermal shields of ICBM warheads, which had to re-enter earth´s atmosphere on ballistic trajectories.

These events are now common knowledge, and are not the subject of this article, although there was one very important development which must be considered. While the primary goal of the conquest of space was to send manned flights and planetary probes into this new “sea” in the hope of finding answers to scientific problems and enhance mankind´s knowledge of the earth and the universe, this period also saw the emergence of a new, previously unimaginable type of economic activity: a space economy based on artificial satellites that provided diverse services: telecommunications, observation of the earth, etc. However, this space economy was monopolised by big companies and consortiums, which all worked in collaboration with the national space agencies, in one way or another.

This situation held true until quite recently, when an unprecedented surge in space technologies and their applications opened up the multi-use satellite market to a much wide range of operators.

It was around this time, which is also when space shuttles were withdrawn from use, that new, fully-private, pioneering companies began to appear, whose goal was to convert space into an economic development zone, a concept which NASA´s Administrator, Charles Bolden, would use to describe the LEO a few years later.

Private capital companies dedicated to space exploration and exploitation were not a new phenomenon: for example in the US market companies such as Boeing, Lockheed Martin, Grumman, etc. that are, to all intents and purposes, private companies, have enjoyed a privileged relationship with NASA from the start of the Space Race. They are all large contractors that have close ties to the Security and Defence markets and activities, have led space programmes and, as main contractors, have built up close relationships to leading suppliers over the course of the missions. The same holds true for Europe, where several big companies, mainly French, German and Italian, as well as some large Spanish firms, have worked with the ESA for many years.

These companies have begun to explore innovative ideas with the goal of providing commercial access to space for payloads and manned flights. The first flights were suborbital and dubbed “space tourism” flights, but the companies´ main objective is the LEO, by launching CubeSats and nanosats into orbit, as their small size allows a larger number of users to conduct space experiments. In this case the main challenge is to ensure the missions are cost-viable. One example is the company Space X, which has provided suborbital services and docked at the ISS, within a NASA programme, with its Falcon 9 rocket and the Dragon capsule. In addition, well-established companies, such as Boeing, and new startups, such as Orbital Science Corporation with its Cygnus spacecraft and Sierra Nevada Corporation with Dreamchaser, have also decided to take a competitive risk and enter the fray.

These commercial projects are just the gateway to a host of other exciting ideas being explored by private space entrepreneurs, who are drawing up business plans for even more ambitious projects: ideas which until recently were confined to the realms of science fiction are now being discussed in technical-scientific forums with the utmost seriousness: power stations in orbit; asteroid mining; redirecting objects in space; the extraction of resources from celestial bodies; space debris management etc. In this sense “commercial” should be understood to be not only mercantile, i.e. activities whose goal is to make a profit, but also as private enterprise activities that are not restricted by a space agency´s requirements, and are not dependent on state financing, either from one country or group of countries.

It is therefore clear that the space economy is now a physical and tangible reality, driven by private enterprise and pioneers around the world. While they are working on all types of space activities, their main objective for the future is to mine the resources that lie beyond our planet.

After this brief introduction to the concept of a new space economy, it is necessary to analyse one the most important aspects related to this subject: the legal implications of this new type of economy. Essentially, we need to analyse how the old legal framework governing space activities, which was established decades ago by international space treaties, can be brought into harmony with the needs of the present-day world, where numerous countries have passed legislation that favours commercial access to space.

In this regard, we must start by looking at the wide range of regulations passed by the FAA-AST in this area. The Office of Commercial Space Transportation (AST) was established in 1984 as part of the Office of the Secretary of Transportation within the Department of Transportation (DOT). In November 1995 the AST was transferred to the Federal Aviation Administration (FAA) as the FAA´s only space-related department in order to: regulate the US space transportation industry; ensure compliance with international regulations; protect the public health and safety, and national security and foreign policy interests of the United States; promote and facilitate commercial space launches and re-entries by the private sector; recommend appropriate changes in Federal statutes, treaties, and regulations on space matters and; facilitate the strengthening and expansion of the United States space transportation infrastructure.

The AST issues licenses for commercial launches of orbital rockets and suborbital rockets, and also issues permits for the operations of launch sites, or "spaceports".[1]

FAA commercial space transportation regulations are located in Chapter III, Parts 400 to 460, of Title 14 Code of Federal Regulations (CFR) USA.

It should be stressed that the aim of many of the regulatory changes that have been implemented in the West over the last decade has been to establish licensing and supervision systems to regulate the commercial access to space by private enterprise. The main goal, which by and large has been achieved, is to balance the need for safety in all operations, in particular with respect to third parties, with the need for flexibility to incentivise and promote space activities. In this regard, recent regulations passed have effectively “relaxed” the operational criteria in force for a period of between five to ten years, which is considered the time necessary to allow this industry to become firmly established.

It is also worth noting that there have been several Latin American initiatives in this field. It is laudable that in just a few years these countries have been able to establish space agencies, and the requisite regulations, in order to channel their efforts to gain access to space. Both elements (laws and agencies) are very important, as they enable the countries to strengthen and

[1] http://www.ecfr.gov/cgi-bin/text-idx?gp=&SID=1f58495405665a030c05e44bca5a8591&mc=true&tpl=/ecfrbrowse/Title14/14chapterIII.tpl

coordinate their efforts more effectively, bring together all industry players, and set up recognised institutions with clearly defined competencies and responsibilities.

Their success can be measured by the fact that the Mexican Space Agency, which has gained a notable reputation over a very short space of time, is going to host the 20126 International Astronautical Congress in the town of Guadalajara.

Another example of how to successfully encourage private commercial access to space is a revolutionary new law brought in by the US which breaks new ground, both in terms of its contents as well its potential implications: the American Space Technology for Exploring Resources Opportunities in Deep Space Act, more commonly known as the **Asteroids Act**. (H.R. 5063; 113th Congress)[2].

This Act deals with one of the most contentious issues under debate in the international community today, an issue that will determine the future of activities in space: whether an individual or entity which uses, mines, or processes space resources acquires property rights over them. This is something which is more tangible than merely using or occupying certain orbits. The Act is framed in terms of appropriation, the common heritage of mankind, global benefit, exploration and utilisation rights etc. Consequently this Act which, it must be remembered, has been enacted by a single State, has two important ramifications. The first is that it is an example of unilateral legislation which affects what, under international treaties (although the treaties are in fact a "global" appropriation of space which may be open to debate) is the heritage of mankind, by encouraging commercial access to space and the use of space resources. Secondly, this Act calls into question the "authority" of international regulations, which were created decades ago when the world was a very different place, and which therefore should be reviewed and brought up to date.

Specifically, this Act has been passed by a single State to stimulate an industry whose goal is the exploration and utilisation of asteroid resources. The Act declares that activities should be carried out in a manner consistent with the existing international obligations of the US, and that the frameworks necessary to meet the international obligations should be developed. Although the Act stresses that it is compliant with international law on several occasions, the fact that it lays down the need for further legislation means that, even though it grants *ab initio* utilisation rights, they may be difficult to enforce in practice, unless it can be shown that the Act is fully valid, the principles of the Outer Space Treaty permit such activities, and the US´s failure to ratify the Moon Agreement is not a barrier.

The Act seeks to establish the "right" of North American commercial entities to explore and utilise resources from asteroids in outer space. It also

[2]http://www.spacepolicyonline.com/pages/images/stories/AsteroidsActHR5063.pdf

grants property rights over these resources to these entities, as the “first in time” rule will apply.

The Act further states that the district courts of the USA shall have exclusive jurisdiction in any legal actions arising from the implementation of the Act. That is to say, a hypothetical dispute about the mining rights for an asteroid, with all the consequent implications, could be heard in a court in Arizona.

The Act therefore deals with some of the thorniest issues in space rights: the use of space and how the principles of the international treaties clash with today´s reality.

Obviously one of the most important legal questions that arises is how to reconcile the provisions of the Asteroids Act with the principles established by Article II of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies of 27 January 1967, otherwise known as the Outer Space Treaty.

Article II of the Treaty established that *“**Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means”.***

Although it is true that the Asteroids Act only refers to asteroids and not to larger celestial bodies (which can be seen as a way of circumventing the problem by explicitly renouncing any rights to planetary bodies such as the Moon), Article II of the Treaty makes it is clear that celestial bodies cannot be appropriated by a country through a “claim of sovereignty”, or by virtue of “use or occupation”, or, finally, “by any other means”. If we consider international law as a whole, it is possible to conclude that the Treaty was intended to prevent any of the powers of the time from claiming rights to the Moon (the primary objective), or to space in general, while the specific allusions to “use” and “occupation” suggest that it also intended to ensure that neither space nor the celestial bodies could be claimed by anyone.

At this point it is useful to compare this Article with Article 11 of another treaty, the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, or Moon Agreement, of 18 December 1979. However, it is important to remember that this Agreement has not been ratified by the USA or by the majority of States which have space capabilities which means, logically, that it does not apply to the nationals of these countries. It seems clear that since the Outer Space Treaty restricted activities related to the new space economy, the subject of this article, the leading countries in space exploration did not want to commit themselves to anything that would limit the develop of their space capabilities in the future.

The Moon Agreement established several principles in the subsections of Article 11:

1. The moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement and in particular in paragraph 5 of this article.

2. The moon is not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means.

3. Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person.

5. States Parties to this Agreement hereby undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible.

From this we can deduce one of the main reasons explaining why many countries have not ratified this Agreement: namely that resources on other celestial bodies cannot be used or exploited until an "*international exploitation regime*" is established. In accordance with the principles of this Article, States cannot exploit or use asteroid resources by exercising a claim of national sovereignty, which is the classic formula enshrined in public international law. However it is not clear, and this is a key point, whether private enterprises can undertake these activities since, although they are subject to the laws of their State, they do not make any claims of sovereignty.

From a strictly practical point of view, there is a second important issue. It is clear that if private companies have to wait for the international community to resolve this legal vacuum by enacting a treaty or regulations which, while not contravening the old treaties, would legalise these activities, they will probably have to wait for a long time, which would hinder the development of the space industry. The space industry is facing enormous and complex challenges, and the last thing it needs is additional barriers. This does not mean that space should become a place where companies operate *extra legem,* or outside the law, but instead points up the urgent need for new regulations. Since it would appear inevitable that the new space economy will continue to grow, it is essential to ensure there are regulations in place to provide international legal certainty, and prevent a "Wild West" situation from unfolding.

There are also other important principles which were established in the Outer Space Treaty:

Article I: The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.

The principle "for the benefit and in the interests" of all countries is one of the most controversial concepts since it is manifestly obvious that private enterprises, which expend enormous efforts (technological, financial etc.) developing their space capabilities, and are driven by the profit-motive, are unlikely to share this philanthropic stance. When this principle was enshrined in the Treaty the idea that not only States (through their space agencies) but also private companies would be able to access space was a possibility that the lawmakers barely considered although, as will be discussed below, they did not rule it out completely. But it is now a real possibility, and therefore most of the States with space capabilities have not ratified the Treaty, as it would restrict the activities of their nationals in the future.

In this regard, there have been several suggestions as to how the commercial activities of space companies can also benefit mankind. Almost all of these proposals include creating an international body, or adapting an existing institution, which would issue "administrative concessions" for space resource exploitation to companies in exchange for a consideration, which would be calculated on the basis of the profits made. However, any determination of the considerations should take into account the enormous sums invested by the companies to develop their space capabilities. There is a large body of opinion that considers that a concessions system would be financially damaging and only serve to discourage space activities, since these companies already pay taxes on their activities in their country of origin. Another intriguing possibility would be for the companies to share some of the knowledge they have acquired while developing and using their space technologies with space agencies, for use in research, exploration and scientific projects. This would ensure that all mankind would directly benefit from private commercial space activities.

Article VI: States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall

require authorization and continuing supervision by the appropriate State Party to the Treaty.

This Article establishes the general principle that States are responsible for the activities of their nationals, and requires the implementation of a licensing and supervision system for this purpose. Although, as has been mentioned, this Treaty has not been ratified, it is applied de facto in the USA, since the FAA-AST manages a licensing and supervision system which controls private space activities.

Although this authorisation and supervision is currently limited to the launching, recovery and establishment of infrastructures, any activities that involve direct interaction with celestial bodies require regulation on a range of aspects, such as planetary protection, the detection of possible forms of life etc. This is of the utmost importance if you consider the fact that although such activities may be performed by a single company from one country, they could have positive or negative repercussions on the whole of mankind. This is an aspect that must always be taken into account, given recent scientific advances, and announcements by space agencies about the real possibility of discovering basic forms of life.

This article may appear to be merely a theoretical legal discussion of the type so popular beloved by academia, but new regulation in this field is a pressing priority, since an ever-increasing number of private space initiatives have now been legalised by the Asteroids Act.

These initiatives are being undertaken by companies such as Planetary Resources, Deep Space Industries and the Shackleton Energy Company. [3] Each company is developing space programmes, which are still in the theoretical stage, to detect celestial bodies containing elements that can be exploited economically, including something as essential as water. Water can be broken down into components essential to space exploration, and is one of the main targets of these companies.

In addition to these companies, other companies have joined forces to promote commercial activities. An example of this is COMSTAC, the Commercial Space Transportation Advisory Committee, which was established in 1984 to provide information, advice, and recommendations to the Federal Aviation Administration (FAA) on matters concerning the U.S. commercial space transportation industry, and to develop effective legislation.

COMSTAC membership consists of senior executives from the space industry, representatives from the satellite industry (both manufacturers and

[3] http://www.shackletonenergy.com; http://deepspaceindustries.com; http://www.planetaryresources.com

users), state and local government officials, and representatives from firms providing insurance, financial investment, legal and commercial services.

All these companies, along with other companies that are committed to the “new space economy”, have created working groups to develop projects that they believe are feasible, realistic and achievable, even though they may appear far-fetched and impossible to many legislators. This is an attitude which, unfortunately, can only result in sluggish decision-taking. The situation can be neatly expressed in terms of a simile: it is as if at the dawn of the XVII century some countries believed that sailing the ocean would be a waste of time.

It is clear that there are a range of problems when it comes to amending the international space treaties. One solution has been the creation of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), as well as a raft of other initiatives. These include drawing up codes of conduct and creating soft law instruments which, although they are not binding, aim to regulate and encourage space activities.

To conclude I would like to reiterate that the new space economy is a reality, and one that has increased enormously over the last few years. The goal of private space companies is to achieve commercial access to space, and they have received strong State support, in particular in the United States, where the FAA-AST has implemented effective regulation to encourage, incentivise and regulate commercial space activities. Companies such as Space X, with the Falcon 9 rocket, or Virgin Galactic and Xcor, are leading the way, while the number of spaceports has increased dramatically. Moreover the Asteroids Act has taken a further step down this road, going beyond the international treaties and, even though it professes compliance with international obligations, opens the door to commercial activities that only a few years ago were solely the preserve of sci-fi writers.

It must be remembered that the reason why numerous countries have enacted their own “space laws” has been to support this type of private enterprise, since space activities carried out by States or space agencies are already regulated by international agreements or national legislation. However, the advent of private commercial space enterprise calls for new legislative instruments and supervisory bodies: space laws and supervisory bodies which will provide private companies with legal certainty, and capitalise on the expertise of highly-experienced and qualified public-sector professionals.

This article has cited several examples of commercial space enterprise in the US space industry, as it is the country where most of the new space companies are developing their projects. However, it is vitally important that Spain makes every effort to develop its own industry to ensure it does not lag behind in this field. Although ambitious projects such as asteroid mining or the use of resources from celestial bodies such as the moon attract the most attention, the new space economy also includes companies that develop satellites, applications that are derived from and/or used in different space technologies, rockets, international projects etc. These are areas which are being developed primarily by private enterprise, and not by state-supported national and international space programmes (ESA, NASA etc.), and it is precisely this type of space capabilities that need to be encouraged and incentivised. It is undoubtedly true that Spain´s participation in the ESA, with the consequent return of its investment, has been extremely positive and helped boost the Spanish space industry. However, in order to stimulate the industry we need to create a propitious business environment which will provide these companies with the legal certainty and institutional support they need. In other words, to create an environment where companies are willing to take the risk of developing space-related products, and will be able to develop outstanding products which will be commercial viable in the global market. It has to be stressed that these two approaches to space activities are not mutually exclusive: science, exploration and State-led space missions can coexist with commercial and business space activities which, when it comes down to it, create wealth, highly-qualified employment, and decisively contribute to the expansion of mankind beyond the established frontiers of the Earth. This is something that is bound to happen in the near future, and we want to make sure that we are part of it.