THE NEW CONQUEST OF THE MOON

Sometimes we are privileged to be witnesses to, or *participants in*, significant changes that mark the course of history, of History with a capital, of significant events that shape history. This is what is happening now in the subject we are concerned with: the exploration of space.

Is there anyone who hasn´t looked at the moon and wanted to go there?

And it happened.

Both robotic spacecraft and the legendary Apollo flights achieved their goal. However, for some time now, for too long, the Moon has been relegated to second place in the field of space exploration, forgotten, except for some recent missions by States seeking to make their mark in the field of space (China, India, Japan). Low Earth orbit, which is home to the ISS and a swarm of satellites, has become the most desirable goal. Some satellites have been launched into more-distant orbits for operational reasons, while a few probes have ventured beyond the Moon in their daring missions of exploration. They carry scientific instruments that send us data which helps us to understand both the universe and our own planet better.

After the Space Race between the two superpowers of the past ended, programmes for space exploration became the preserve of large State space agencies. However, we now find ourselves at the dawn of a third age: that of commercial access to space, where a wide range of companies who used to be mere contractors or equipment suppliers now participate directly in the exploration of space through their own missions.

One such initiative, which has been organised by the X Prize Foundation and sponsored by Google, is the Google Lunar X Prize (GLXP). This is an international technological competition in which 25 multidisciplinary teams compete to land a rover on the moon´s surface and fulfil a series of “mission requirements”: in addition to landing on the moon the rover must travel at least 500 meters and transmit high-definition images and videos back to Earth. Teams are also eligible to win other prizes if they complete additional tasks such as visiting the site of a previous lunar mission, finding water, or beating earlier records for moving and operating capabilities. The teams must be privately and not publically funded, and develop low-cost methods in order to achieve results which are economically viable and reproducible.

One of the teams taking part is the industrial conglomerate Barcelona Moon Team, the only Spanish team in the competition.

BMT is led by the Barcelona-based company, Galactic Suite, which develops projects to promote space tourism, and headed by its President Xavier Claramunt and his team, and through hard work and dedication they have succeeded in bringing together the best talent in the Spanish space industry. During the initial stage they had to overcome a lot of hurdles to get the project operational, such as administrative barriers, and convincing sceptics and doubters that their idea was viable. However, thanks to the efforts of a small but dedicated group of people, the project has gained momentum, and is now supported by companies such as GMV, Altran, Casa Espacio, Thales Aliena España, the INTA, the UPC and Stardust Consulting.

The project, which is being developed in Spain and is currently at stage A-B1, involves designing and developing a lander, whose specifications should be compatible with the launcher capacity and the transfer model, and a rover to carry out the mission on the moon´s surface. The team intends to not only complete the mission requirements of the Google Lunar XPRIZE, but also to take additional scientific and commercial payloads.

Going to the moon has never been an easy task: going to the moon from Spain in the current difficult times makes the task that much harder.

For this reason the team is committed to the long-term potential of the project, and their objective is to go beyond fulfilling the mission requirements set by the GLPX. Instead, they want to capitalise on the huge effort that has gone into the project by applying the technology and innovations to future projects and long-term goals. Their intention is to set up a company with a sound technological base which will be able to offer low-cost space-resource exploitation missions to different destinations, ranging from orbits, the moon, to other celestial bodies. In this context low-cost means several things: first, reusing technologies that have been developed by Spanish companies for small satellite missions, modifying them as required; second, using, whenever possible, commercial systems, or systems whose resistance to space conditions has not been fully tested; third, adjusting mission requirements to fit the estimated budgets to prevent costs from spiralling while the project is being developed and; fourth, optimising the reliability-cost equation by reducing the first variable by a few tenths, since this is an unmanned mission, in order to cut standard costs by a tenth.

If the team is wholly or partly successful the participating companies will benefit, in the short term, from the enormous publicity generated, as well as from having had the opportunity to test, under flight conditions, technologies which may be used by space agencies in subsequent missions. In the long-term, the proposed company will benefit from being a specialist in low-cost missions, as well as being ITAR free, a sine qua non condition for the launch vehicle chosen.

The company has benefited from this new approach towards space exploration. Instead of being focused on prohibitively expensive state agency missions (mainly ambitious scientific projects requiring maximum reliability), space travel is now centred on providing commercial access to space. Customers range from space industry companies, universities, to research teams, which want to develop their projects in the environmental conditions of space or complete other objectives, from sending nanosatellites and microsatellites into orbit to the commercial exploitation of space resources.

We have recently witnessed an historic milestone in space exploration, the successful docking and return to Earth of SpaceX´s Dragon capsule. SpaceX is a private company which has demonstrated that it has the capacity to develop not only rockets, but also spacecraft which can successfully travel to specific destinations. As in every sphere of human activity, pioneers are leading the way in this field, but it is also necessary to consolidate and perfect technical advances, and collaborate on initiatives which stimulate the commercial use of space by a wide range of users.

Galactic Suite shares this view, and its aim is not only to fulfil the GLPX requirements, but also to lead the way to new, previously undreamt of avenues of development for the Spanish space industry. This is a high-risk venture, and depends on a great number of different factors. In addition to the technological challenges, the launch vehicle is clearly one of the most crucial ones, since Spain does not have the technology required to develop a launch vehicle from scratch, and using one that has been financed by the State, through the ESA, is not a financially viable option, for the reasons discussed above.

After exploring all the options currently available in the launch vehicle market, the company has found a world-class strategic partner, the China Great Wall Industry Corporation, which sells the Long March rockets. The model chosen for the mission is the LM-2C- CTS-2, which is a two-stage, liquid-propellant vehicle with a solid upper stage. It is extremely reliable, as demonstrated by the fact that by 2011 it had undertaken 35 successful missions.

Two things in particular must be highlighted in the project´s development. First, the enormous efforts made by the Spanish industry´s companies to adapt the transfer model´s design to the lunar orbit, and the lander and rover to ITAR regulations and sensitive material export controls. The team has been successful on all counts, and has demonstrated that alternative ways are possible. Second, the project has enabled them to become familiar with the large family of Chinese launch vehicles and their capabilities, knowledge that will stand them in good stead when developing future missions.

These challenges are tough enough in themselves, but there is also another, key, requirement in the GLPX: teams must be privately-funded. Financing is the most essential part of the project as, without financial backing, the project will literally not take off. So far the company has won significant funding for the Chinese part of the mission (launch vehicle and propulsion system), while it is actively looking for a wide range of sponsors. It has signed up some technological companies that are interested in the project, as well as companies that want to associate their brand and image with an exciting project where the creation process and the long-term developments are as important as the spectacular climax.

Finding financing is a difficult challenge under any circumstances, and much more so at the present time, even though there is a well-known statistic, supported by several studies, which shows that the rate of return for every euro spent on space exploration is 1:5. It must be admitted that it is a high-risk undertaking, and it is likely that many people do not understand the true significance of this mission. However, we are hopeful that there are many others, a majority, who are able to appreciate its pioneering spirit, the importance of the technical and scientific innovations, and the opportunities it

offers to our engineers, technicians and the next generation.

Through this project the team hopes to place the country at the forefront of an activity that, through history and circumstances, has been dominated by entrepreneurs the other side of the ocean. If we can capitalise on our huge resources, in particular our human resources, use our well-established strategic alliances advantageously, and strengthen our creativity and determination, we will have the opportunity to be in the vanguard of space exploration. It is up to us to decide whether we want to be mere onlookers or active players: to make history.