



□ Public-private relations in the space sector

General Military Review

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Published on 08/02/2019

L'Armée de Terre dans la société

Public-private relations in the space sector have been revolutionised under the impetus of the United States over the last ten years or so. Battalion Chief Jean-Hugues Delhumeau considers the evolution of the place of new private players and the threat of commercial exploitation of space resources. He insists on the innovative and balanced role that France and Europe must play in this area.

Innovation has recently been placed at the centre of the action of the Ministry of the Armed Forces with the "Defence Innovation" transformation plan, Minister Florence Parly having even specified to the national representation that "everyone must take charge of his or her position".⁸² Military space activities are thus doubly concerned, since French space has been resolutely interministerial since its origin and among the precursors in its civil-military duality. Above all, the French space sector involves private actors more and more upstream: at the last consultation committee between the State and industry in the space field (CoSpace), the Minister expressed the interest of the armed forces in what is in fact a national innovation policy: "Space, which is poorly regulated, is an area of opportunities as well as new threats. The technical progress of various actors, sometimes non-state actors, poses new challenges. France must continue to innovate in its space strategy in order to remain at the forefront in the civil and military fields."⁸³

Indeed, space has indeed been alive for about ten years and essentially on the other side of the Atlantic, which Xavier Pasco⁸⁴ calls the new space age⁸⁵ or New Space in the United States. For the time being, we are witnessing a redistribution of public/private relations that is shifting the subcontracting industry from being a subcontracting industry to a partner in this field, which was for a long time exclusively state-owned because it is a sign of sovereignty. Isn't it already too late to innovate in this field? Is a French and European revolution in this sector not preferable to make up for our delay? Revolution is understood as transformation in very important dimensions and scales, often even if it means sacrificing what constituted the Ancien Régime on the altar of modernity, including its

structuring elements. To innovate is to transform by basing oneself more on what already exists, which one does not systematically seek to eradicate, but to enrich. This article seeks to consider the recent and ongoing evolution of public/private relations for the space sector as a whole, both civil and military. It will be limited at the international level to the United States and Europe, with the other space actors still fully following the old state model, whether historical (Russia) or emerging (China, India, etc.).

No, a revolution wiping the slate clean is dangerous for France and Europe, and for the whole of humanity: continuous innovation must be favoured, which prudently transforms existing public/private relations without selling off the common good. We shall first explain the dynamics of private space actors, which has revolutionized the sector in the United States. We will then look at the strengthening of national space policies, detailing the innovative response of Europe and France. Finally, we will draw attention to the looming exploitation of space: international control by States and an urgent strengthening of space treaties are indispensable.

American private actors have revolutionized the space sector .

The new space age or New Space began in the United States in the 2000s with the conjunction of two major facts: the massive investment in space by the Internet majors and the awarding of American institutional contracts to private actors under the Commercial Orbital Transportation Services (COTS) programme.

During the golden age of NASA and the conquest of space, the Silicon Valley in California saw the development of most of the pioneers of the Internet. Creativity had to take precedence over all other considerations, including economic and financial. The cardinal principle of the start-ups that flourished there gradually became the fastest possible return on investment. These two models are supported very differently: the first favoured vertical in-house development and complete autonomy to develop without hindrance, generating considerable costs; the second was to concentrate on product design and delegate manufacturing to a network of subcontractors. Today, the majority of start-ups in the US space sector are following the latter and seeking to take advantage of low-cost off-the-shelf components. One notable exception, which seeks to retain complete autonomy, is SpaceX: the clear objective of its president, Elon Musk, to join Mars, requires that production tools and resources all contribute to this long-term objective rather than to overly immediate goals.⁸⁶ The widespread introduction of the Internet and the prospect of extending the network via space (facilitated by lower costs and the accessibility of the launch technologies) saw the financing of these start-ups by the giants GAFAM⁸⁷. Their very lucrative objective is the sale and distribution of data: they bring to space start-ups their funds, their culture of risk and their methods, very different from those of the traditional space world.⁸⁸

In the same years, the American space agency, NASA, made a historic turn. The disintegration of the Space Shuttle Columbia on its return on February 1, 2003 revealed profound human and organizational problems. The commission in charge of proposing the next space policy recommended that NASA "aggressively use its contractual authority to reach out to private actors and bring back the best ideas, technologies and management tools".⁸⁹

Thus, the COTS programme was launched, aimed at outsourcing transport to the International Space Station. The first opening to the private sector, its principles are:

limited government investment, purchase of complete services, step-by-step control based on performance. NASA pays for each step once it has been validated. The contractor invests its own funds. After selection, SpaceX was selected in 2006, then Orbital Sciences Corporation in 2008, with each program demonstrating its capability by making a first flight to the ISS in 2012 and 2013. SpaceX and Boeing were selected in 2012 to transport astronauts. Today, ISS refueling with Dragon or Cygnus automatic capsules is commonplace, with the development of the Dragon V2 and CST-100 habitable capsules still in progress.

Since 2006, the COTS program has allowed a certain development of these private American players. Thanks to this access to institutional launches and associated subsidies, they have made their respective launchers more reliable and continued their experiments: today, SpaceX launches its Falcon 9 rockets (18 in 2017) with no worries and reuses, after recovery and reconditioning, a large part of its main stages.

Exclusively developed in the United States over the last ten years, this assertion by private space players has led to a cautious and slow restructuring of Europe, which is seeking to preserve its achievements through innovation.

Europe in space is cautiously seeking to innovate in order to preserve its achievements

The appearance of private actors in the space sector, and then the strengthening of their role, could have developed a certain globalisation of the sector: it seems, on the contrary, that the immediate reaction to this new paradigm is on the national basis which still governs it.

Europe is seeking to protect its majority market share in commercial launches: by 2016, Arianespace had launched 10 of the 19 commercial satellites, or 52.6%. Its CEO, Stéphane Israël, states, "This success confirms the relevance of Arianespace's offer, which aims for the best possible balance between reliability, availability and price, while constantly adapting to market developments."⁹⁰ Europe therefore initially sought to respond to the technological and financial advances made by private American players by adapting its launcher offer, which was its primary target. Ariane 6 and its two variants, A62 and A64, were given a baptismal font by the 2014 ministerial conference to be simpler and less costly than Ariane 5: Instead of the 150 M€ of the latter, an Ariane 62 launch (institutional satellites) will cost 70 M€, an Ariane 64 launch (commercial satellites) will cost 96 M€ (more powerful, Ariane 64 targets the still existing need for geostationary satellites for telecoms). For the same purpose, a reusable engine, Prometheus, could, by 2030, replace the Vinci re-ignitable engine planned for Ariane 6, allowing a further reduction in costs. More broadly speaking, Europe is arming itself against the new private American players: a first draft space strategy for Europe was officially released on 26 October 2016 and was adopted on 30 May 2017 by the European Union. One of its four strategic objectives is to "foster a globally competitive and innovative European space sector", even specifying that "...new entrants are creating new space challenges and ambitions; the activities...new entrants are creating challenges and new ambitions in space; space activities are becoming increasingly commercial, with the growing involvement of the private sector; and major technological transformations are disrupting traditional industrial and business models in the sector, reducing the cost of access to and use of space."⁹¹ It is only a short step to join a protectionism, which until recently was reviled by the Commission. However, this is indeed what the Union seems to be moving towards, a "Buy European Act", a law of European preference, is being prepared, according to the daily La Tribune.⁹²

The signatories would undertake to grant a preferential option for their institutional satellites to the launch services offered by Arianespace. This "Buy European Act" was to be discussed at the European Ministerial Council in March 2018: a real change for Europe, which in the past has already selected non-European launchers for its launches.

France, for its part, has also clearly identified the need to take greater account of private players: a report requested by the Prime Minister in 2016, the Open Space plan aims to build on the expertise acquired to open up to a new culture by positioning itself as a partner of new players and a promoter of innovation and technological breakthroughs.⁹³ This is exactly the principle of Open Innovation, where transformation is achieved from both inside and outside by combining what has been achieved with new ideas from inside and outside, without sacrificing what already exists. As a sign of this strengthening of national space policies, perhaps linked to this increased concern of national private actors, the announcement of the German order for two optical observation satellites from the German satellite manufacturer OHB at the end of 2017 breaks the Franco-German agreements of Schwerin⁹⁴. From Helios, they had distributed the optical satellites to France and the radar satellites to Germany, each benefiting in exchange from part of the capacity of the other. However, Airbus Space Systems, Europe's largest satellite manufacturer, is none other than the former French champion Astrium.

Ordering optical observation satellites from OHB, which has never done so before, allows Germany to acquire the know-how and to complete the spectrum of its own resources. Space remains a sovereign domain...

But the growing weight of private players also makes commercial exploitation of exo-atmospheric space, which is currently very little controlled, inevitable. As a natural consequence of the private dynamic, the commercialization of space resources is a stage where the current revolution must come to a halt to make way for reasoned and universal innovation.

The exploitation of space remains to be framed: we must innovate, without revolutionizing!

The increase in human activity in space and the rapid multiplication of new arrivals are bringing to light the limits of the United Nations space conventions, including questions relating to the management of space traffic and mining. The 1967 Outer Space Treaty is already known to provide a very imperfect framework for the militarization of space by prohibiting only the presence of nuclear weapons and weapons of mass destruction. As for the exploitation of space mining resources on the other planets or space bodies of the solar system, there are no regulations dealing with their exploitation. Article 2 of the 1967 Space Treaty prohibits any national appropriation of outer space, but not for private use: "Outer space, including the Moon and other celestial bodies, shall not be subject to national appropriation by proclamation of sovereignty, use or occupation or by any other means". This is the whole problem of the international space treaties, drawn up in the midst of the Cold War in response to state rivalries, which are definitely no longer adapted to the challenges of the 21st century.

Two states, the United States and Luxembourg, took the initiative in 2015 and 2016, without prior international consultation, to legalise the exploitation of space mining resources, reinforcing the idea of what could rapidly become a new space race.⁹⁵ under the pressure of the new private space actors. By recognising private property in space

and thus authorising exploitation, these States also wish to encourage companies to invest despite the scarcity of public funding. In particular, asteroids are almost inexhaustible sources of materials such as gold, nickel, cobalt and platinum, which are in great demand by the ever-increasing demand for electronics and integrated circuits.

On November 25, 2015, Barack Obama signed into law the US Commercial Space Launch Competitiveness Act (HR2262).⁹⁶ which authorizes in its paragraph 51303 any citizen of the United States to "appropriate any resource obtained, including the right to hold, possess, transport, use and sell the resource obtained". At the very end of the law, a very practical disclaimer is specified: "the United States does not thereby assert any sovereignty, ownership, exclusive rights or jurisdiction over any celestial body" and thus complies fully with the letter of article 2 of the Outer Space Treaty. In spirit, however, space ceases to be a common good, as a result of a unilateral decision by the United States....

Conclusion: a historic and innovative player, France has a role to play

Having revolutionised the space sector, the new place of private players in the United States has forced Europe to innovate cautiously in order to preserve its achievements without falling too far behind. This is the right attitude, because the role of the States in space must be preserved in the future: it is urgent to provide a framework for the exploitation of space resources to protect the common good. It is now a matter of innovating and finally rewriting space law, which is too incomplete and outdated.

France identified this major risk by 2030 in its document entitled "Future Shocks".⁹⁷ "It must play its part in international bodies between now and then to ensure the adoption of new codes of conduct and strengthen space security: with its international position and its space sovereignty shared with Europe, the world's leading commercial player, it is in the best position to innovate!

82 Florence Parly, Senate debate on the Strategic Review, 24 October 2017.

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84 Xavier Pasco has been the director of the Strategic Research Foundation (SREF) since October 2016, and a specialist in American space policy.

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86 Ibid, pp.110-112.

87 Google, Apple, Facebook, Amazon, Microsoft.

88 Anne Bauer, "L'espace nouveau terrain de jeu du capital-risque", *Les Échos Entrepreneurs*, December 1, 2017, <https://business.lesechos.fr/entrepreneurs/financer-sa-creation/030956301311-l-espace-le-nouveau-terrain-de-jeu-du-capital-risque316470.ph>.

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Release date 12/12/2018
