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Space as a Key Element of Europe's Digital Sovereignty

Jean-Pierre DARNIS

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Initiative on "European space governance"

This tripartite initiative (Ifri, DGAP, IAI) is intended to provide analysis pertaining to the international space competition and its impact on the European space industry as well as its governance. Through a series of publications and public events, the goal of the initiative is to raise awareness among stakeholders in the European Union on the challenges presented by the transformation of the global space industry. It is coordinated by **Éric-André Martin**, General Secretary of the Study Committee on French-German relations (CERFA) at Ifri.

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Executive Summary

The European space sector today finds itself at a crossroads between challenges and opportunities. While the 2019 European Space Agency (ESA) Ministerial Conference marked a progression in terms of budgets, a sign of renewed space ambitions, the technological and financial acceleration from the United States represents a disruptive scenario that poses threats to the continuity of European space capabilities. It is not only a question of the efficiency gains of an American ecosystem that has been able to renew the relationship between public and private, with, for example, the remarkable results in terms of new launchers, but above all the acceleration produced by the paradigm of integration between space and digital. This aspect is particularly significant when looking at broadband telecommunications constellations, large-scale projects capable of installing commercial monopolies that also rhyme with complete integration of the technological chain. Europe runs the risk of being quickly disqualified if it does not manage to formulate a further leap in quality that will enable it to cope with the power of the current deployment. Space represents a decisive element for digital sovereignty that Europe must not only state but also translate into concrete programs.

Résumé

Le secteur spatial européen se trouve aujourd'hui à la croisée des chemins. Alors que la conférence ministérielle de l'Agence européenne de l'espace (ESA) de 2019 avait marqué une progression en termes de budgets, signe d'une ambition spatiale renouvelée, l'accélération technologique et financière en provenance des États-Unis constitue un scénario disruptif qui fait peser des menaces sur la continuité des capacités spatiales européennes. Il s'agit non seulement des gains d'efficacité d'un écosystème américain qui a su renouveler le rapport entre public et privé, avec par exemple les remarquables résultats en matière de nouveaux lanceurs, mais surtout de l'accélération produite par le paradigme d'intégration entre spatial et digital. Cet aspect est particulièrement significatif en ce qui concerne les constellations de télécommunication à bande large, projets de grande ampleur, capables d'installer des monopoles commerciaux qui riment aussi avec une intégration complète de la chaîne technologique. L'Europe court ainsi le risque d'être rapidement disqualifiée si elle n'arrive pas à formuler un saut qualitatif, qui lui permette de faire face à la puissance du déploiement en cours. L'espace représente un élément décisif pour une souveraineté digitale que l'Europe se doit non seulement d'énoncer mais aussi de traduire par des programmes concrets.

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Introduction

On the 1st of July 2020, the European Commissioner Thierry Breton has declared that Europe shall realize a satellite constellation to provide high speed internet connection to be operational by 2027. This program would eventually enhance the European spatial infrastructures: After Galileo (positioning) and Copernicus (Earth Observation), a third "internet connectivity" space-based program would further develop European capabilities. Breton has clearly indicated that such an initiative is part of a global policy to ensure the "digital sovereignty" of Europe, also speaking of the "strategic autonomy". Furthermore, there is a vision of Europe being able to keep up with United States (US) and China which are already planning or deploying such systems.

It is very important to stress that this decision links Space policy with a broader concept of "digital sovereignty". This is indeed a fundamental step that needs to be scrutinized.

During the 20th century, Space was perceived as a "stand alone" sector, with a strong legitimacy and prestige. This was true for the US, but also for Europe where space institutions (national agencies, European Space Agency) and companies were acting separately from other programs and technological sectors. During this period, Europe was able to develop a full set of space activities, from launchers to satellites, following from a certain distance the rhythm imposed by the US and Russia during the space race years. After the cold war, Europe could even be considerate as the second space power behind the US.

The 21th century has widely modified this panorama. China has grown its capacity being also able to appear as a space power. Even if China is still behind the US in terms of technology, it is fulfilling its plan to master and develop a full set of capabilities, also planning to compete for exploration.[1] This external factor already indicates how the ranking of "space powers" is changing. But a more substantial evolution is coming from the breeding of space technologies with digital ones.

The growth of the digital dimension since the early 2000's has affected space in two ways. First digitalization is connecting different sectors through

1. See "China's Largest Rocket Takes Flight with Its Next-generation Spacecraft", iCrowdNewswire, May 6, 2020.

platforms. Space based Earth Observation (EO) products such as interferometry have entered the chain of value of several digital ecosystems (for example google integrates Copernicus products). This integration of space-based data within the "digital chain" is both an opportunity and a risk. It is indeed an opportunity to valorize the space infrastructures and capabilities already developed, which can find a new market through data integration. It represents also a risk when data integrators are so powerful that they could vassalize space actors due to their low capitalization.

Secondly the "new space economy" moment brings Information Technology (IT) tycoons like Elon Musk or Jeff Bezos to produce space technology, also using their fast-track technological management capabilities applied to space. This investment coming from the tech sector indicates an acceleration in terms of technological development but also mobilization of important investment capabilities to foster the "new space", building upon the venture capitalism mechanism which are already in place in the digital sector.

Europe has developed a series of systems which cover all the space value chain, from launching to services also including satellites. Europe has a good level of autonomy when speaking of space technologies and space represents a key part of a modern data retrieving and processing chain. Until a few years ago, the leitmotiv was "space for citizen" while space technologies would showcase their utility for European Union (EU) taxpayers. This concept still exists but the "new space" tycoons are bringing back a grand vision of the space as a human adventure, eventually a positive aspect that could benefit all space activities.

But on another hand the new space moment indicates a fastening of the production and the value chain. Space X represents an important sign of a disruptive paradigm, not only because of the capability to speed up the technical process for launchers, but also being able to mobilize US public contracts though an innovative service approach, an indirect way to subsidize the activity and an anti-cyclic market which enable Elon Musk's company to then compete aggressively on the so called "commercial market" for launchers.[2] To that extend the US new space benefits from the National Aeronautics and Space Administration (NASA)'s change of paradigm when moving from inhouse production to service contracts awarded to private companies. This re-orientation of NASA financial capabilities is creating an important leverage for the development of the "commercial" space market. This could also lead to potential problems, while strategic technologies such

2. See "SpaceX Eyes 'Tipping Point' Test for Commercialization of Low-Earth Orbit", *Financial Times*, May 27, 2020.

as space ones lies completely with the private sector and can reinforce the power of private groups, a synonym of loss of sovereignty for the US federal government. But this trend is already underway within the IT sector where the private capacities are fully integrated in the US Department of Defense (DoD) future strategy.[3] Even if there is a debate about the soundness to leave to private operators key elements (cloud capacities, artificial intelligence services…), if not the globality, of the management of the future defense network, those moves are already happening as the JEDI contract has recently indicated.[4] Space tech is following the same path, with a risk of concentration of activities within a few private companies, a replication for space activities of the GAFAM model for the digital industry. The political sovereignty and regulation of tech giants is a question today, but will be even more compelling if the concentration progresses, eventually including space technologies.

It is quite paradoxical to witness the fact that while Europe has wisely increased its investment in space programs during the 2019 ESA ministerial council,[5] there is a growing concern about potential disruptions which could jeopardize European efforts.[6]

The challenge of the launchers international markets is the first sign of an emerging critical aspect for Europe, as it is very challenging to catch up with Space X paradigm. But it might not be the most serious one if we analyze the changes that digitalization of space is triggering.

3. See A. Eversden, "Pentagon's CIO Shop Teams with Armed Services to Prep for Move to JEDI Cloud", *Defense News*, October 3, 2020.
4. The Joint Entreprise Defense Infrastructure (JEDI) describes the effort made by the US DoD to create and manage a cloud system for its needs and operation. It represents a main scenario of cooperation between DoD and digital companies. See more at: www.cloud.mil.
5. See M. Cabirol, "L'Allemagne devient le premier contributeur de l'Agence spatiale européenne (ESA)", *La Tribune*, November 29, 2019.
6. See A. Claverie, "Le spatial européen après la Covid-19", *Recherches & Documents FRS*, No. 17, Fondation pour la Recherche Stratégique, 2020, available at: www.frstrategie.org.

A Merging Between Space and Digital?

Space as a key capability within the IT chain

During the last decades of the 20th century, space technologies have emerged as a fundamental architecture for data retrieving and transmission. Satellite communication is a classic function of space-based services. But the positioning programs (GPS and later Galileo) have directly translated a concept of space services reaching a larger public, with the explosion of the GPS receivers. When relying on dedicated terminals, this technology was already able to conquer large part of the users with the wide diffusion of products such as Tom Tom receivers, opening the way to mass market applications. But clearly the use of positioning technologies made a huge step ahead when integrated within the cellular phones, also meaning that positioning data can be merged with other types of data such as the one provided by GSM or Wi-Fi networks.

If positioning has paved the way for this insertion of space-based data within the data flow through smartphones applications, earth observation data is following this path of a multi-level integration.

Again, earth observation in the 20th century would provide stand-alone products able to characterize in a rather static way some places based on interferometry or optic technologies. The growing availability of EO data for apps, also fostered by free access to Copernicus data,[7] is rapidly changing this market, also benefiting from automatic processes for imagery interpretation through artificial intelligence. There is an issue for Europe in order to cope with the exponential volume of data, merging space data with other sources such as open data, and the increasing role of artificial intelligence: those operations requires huge processing and storage resources which are most of the time owned and managed by non-European entities. This represents a market issue but also a sovereignty one. Furthermore, on the EO market we can observe how US authorities have

7. See "Les développeurs d'applications mobiles peuvent désormais intégrer facilement des données d'observation de la Terre", CORDIS, European Commission, October 25, 2019, available at: https://cordis.europa.eu.

developed an important demand through defense customers such as National Reconnaissance Office (NRO) or National Geospatial intelligence Agency (NGA) which provides to US providers a strong captive market,[8] indeed a comparative advantage if we think of the weak and divided EO demand coming from public authorities on the EU side.

This evolution of space is not only about its effective capacity to contribute to an "App based" data value chain, but a global transformation of the different models that have sustained space activities.

This is a rather challenging context for "classic" space industries which are used to rather think following a "top down" logic, where space provides the value-added data to be then marketed through dedicated channel. This logic was very strong within the latest 20th century EU funded programs when "space for citizen" was building up the case for a "space push" for a whole economical sector which, if not properly funded, would have face "the cost of non-Europe" in the field of space technologies.[9] Following that vision space appeared to be an economic enabler, a multiplier able to feed the development of sectors depending on its outcome.

The new "digital space" vision is less consequential than this action/reaction logic, as space systems appear to be completely integrated in a holistic strategy aiming at making sure that every side of the market is under control.

This "global data" control also liaises earth space-based data with potential data coming not only from orbiting platforms but also from the exploration of extra-atmospheric space which is supposed to wider the dominion of data. The US 2018 space policy directive 3 which transfers space traffic management to the Department of Commerce could lead to a potential opening of this field to the private sector,[10] with an extension of the range of the "monitoring and data" space market. This directive lays the ground for the definition of global rules for space commerce, which is *de facto* promoting the US vision as the dominant one.

This is the reason why the merging between space and digital, often symbolized by the investment of IT tycoons in the space sector, has to be considered as less anecdotic than it can appear at the first sight.

8. See "Maxar Technologies Inc at Credit Suisse Global Industrials Conference", CQFD disclosure, December 2, 2020.
9. See "The Cost of Non Europe in the Field of Satellite Based Systems", European Parliament Think Tank, December 18, 2007, available at: www.europarl.europa.eu.
10. See T. Hitchens, "SIA Calls For Space Traffic Rules ASAP", *Defence News*, September 24, 2020.

The "new space" push: access to space, but not only

The "new space" economy comes from the conjunction of different factors.[11] An important turning point was the end of the Space Shuttle program in 2011 which brought NASA to look for commercial solutions to ensure space transportation. The Commercial Orbital Transportation Services (COTS) program, funded in 2005, was the sparkle which started the engine of the commercial space market, setting up a new contract system which could potentially benefit to private companies.

This considerable evolution enhanced the development of a commercial sector which has seen since the years 2000 a series of entrepreneurs setting up companies to provide technologies for all the segments of space markets, from access to space to services and exploration. There we can see visionary entrepreneurs, often coming from the tech world, entering the space market and developing companies targeting markets such as space transportation, satellite services but also asteroid mining or space tourism.

After a couple of decades, we can observe a further evolution of this "new space". The space transportation commercial sector has shown some impressive achievements with Space X's Falcon and Blue Origin's New Shepard reusable launchers. Furthermore, Space X has succeeded in its first human test flight in May 2020. Those milestones add credibility to these companies which are able to pursue their development plans.

Elon Musk (Space X) and Jeff Bezos (Blue Origin) personalize those success. They both come from the tech sector, the first having created PayPal while the second is Amazon's founder and CEO. Their investment in space enterprises can look like the dream of two huge space and sci fi geeks.[12] Notably the two IT tycoons have always been space and sci fi fans, and have developed up to a point where they are able to influence the technological vision of their companies. They believe for sure in the space conquest and have been able to mobilize capital and energies to develop their vision.

But let's not be lured by this paradigm of Star Wars and Star Trek fans. They also incarnate some very relevant trends that are already changing the space industry.

Firstly, they both come from the tech digital sector. It means that they are bringing a culture of investment in technology together with a great knowledge of innovation management. This combination can easily explain

11. See M. Weinzierl, "Space, the Final Economic Frontier", *The Journal of Economic Perspectives*, Vol. 32, No. 2, 2018, pp. 173-192.
12. See C. Davenport, "How Star Trek and Sci Fi influenced Jeff Bezos", Wired, January 26, 2019.

the relatively rapid development of their launchers, if compared to the rhythm of more traditional players.

Secondly the launcher development shall not distract us from the space bigger picture. If we see those two players as “pure” space access providers, we miss the point. For sure they are keen and conscious about the necessity to master an autonomous access to space. This is the beginning of all space adventure and represent a strategic bottleneck, leaving the possibility to plan and control space activity only to a few. This is also an important vision with the return of space human flight capabilities in the US, an aspect that corresponds to the grand vision of “space colonization” that both players often mention. But once we have celebrated the new chapter of a Manifest Destiny incarnated by private entrepreneurs, we shall carefully evaluate the side effects and developments of this mastering of access to space.

Musk’s and Bezos’s grand vision for space involves all the technologies available and, a crucial point, consider space and earth as part of the same system. This means that they are imagining ways to merge and jointly develop their earth and space businesses integrating space-based and ground-based IT capabilities. To that extend, the announcement of investment in broadband satellite constellations is extremely significant.

Satellite Constellations, a Competitive and Strategic Field

Satellite constellations are gaining a moment of interest. Here again we can observe the same trend as we have underlined with access to space. Satellite constellations have been developed in the late 20th century for a single-use purpose. Positioning (like GPS) or telecom (like Iridium or Globalstar) market have supported the deployment of constellation technologies. In the telecom market, both Iridium and Globalstar have face economic problems, a fact that has for long created doubts about the soundness of their business plan. More recently we see that there is a renewed interest for mega constellations, with operators aiming at putting thousands of satellites on orbit.

The race for satellite constellation

The first case that shall be mentioned is the One Web constellation.

One Web project started in 2014 announcing the objective of putting into orbit roughly 1,000 Low Earth Orbit (LEO) satellites, to provide worldwide high-speed internet services. This project has then taken off in the following years with the contribution of investors and contract for satellite production signed with Airbus and launching with Arianespace. The bankruptcy of One Web in March 2020 has clearly indicated the limits of a model based on important needs in terms of investments but also doubts about prospective for return.[13] Furthermore, the COVID-19 crisis has triggered a domino effect on the capital venture market, with the weakening of the Japanese group Softbank choosing to withdraw from the One Web project, a step which killed the economical soundness of this enterprise. One Web has been taken over by United Kingdom (UK) government, together with Indi Barthi Group, and is announcing its return to deployment in 2021.

One Web stop and go in 2020 appears to be quite significant. First, we can see a market logic coming short: doubts about future business plan but also the withdrawal of this Japanese main investor has brought the company to bankruptcy. A key question lies with the business model

13. See X. Pasco, "La fragilité des *start-ups* face à la crise du coronavirus : le cas de One Web", *Note FRS*, Fondation pour la Recherche Stratégique, April 9, 2020.

associated with the constellations which is often presented as doubtful[14] also taking into consideration today's price for mobile broadband terminal, an essential technology to ensure the development of such a market.[15]

But immediately after the bankruptcy we have noticed a mobilization of several actors to take over the company. Notably there has been a European interest too to consider the strategic aspect of such a system.[16]

Beyond the short-term business plan, there is a growing awareness of the strategic importance of such a constellation, a judgement that has been influenced by the starting of the deployment of Space X Starlink constellation. Economic actors such as Space X and Blue Origin are beneficiating from the internalization of their launch costs which can enable them to propose their constellations with reduced prices. Even if it can appear as a classic aggressive take-over of the market, the strategic implications linked to the development of those constellations are huge.

Starlink has already 800 satellites orbiting and is declaring an objective of 42,000 to achieve its constellation.[17] Furthermore Starlink has showcased its operational capabilities providing high speed internet during the September 2020 fire emergency in the US, also stepping as a potential DoD provider.[18] Starlink shall not be considered as a "pure" telecom player able to disrupt the phone/internet market as a whole,[19] but it could reproduce the "falcon" model where public contracts, for example from DoD which has enormous data transmission needs on a worldwide basis, can provide the necessary batch to develop a commercial market based on the capacity to integrate vertically all data.

This strategic implication has been understood by US DoD when the Defense Advanced Research Projects Agency (DARPA) is developing its "blackjack" program of a "mesh" network based on a LEO satellite constellation, being able to test the capabilities for future constellations. Nevertheless, the need of a global and resilient data architecture for the US DoD might put Starlink in a good position to compete for those services.[20]

14. See S. Leesa-Nguansuk, "Shot in the Dark", *Bangkok Post*, August 17, 2020.
15. See "Gates Buys into Satellite Antennas", Advanced Television, August 27, 2020.
16. Seen A. Bauer, "Faillite de One Web : l'Europe en passe de perdre une nouvelle bataille spatiale", *Les Échos*, June 24, 2020.
17. See S. Rouat, "Starlink, le projet fou d'Elon Musk ; Le patron de SpaceX envisage de lancer 42 000 satellites en orbite basse pour fournir l'Internet à haut débit à toute la planète. Les oppositions à cette constellation hors norme sont nombreuses », *Science et Avenir*, November 21, 2019.
18. See D. Coldewey, "Starlink Puts Towns Devastated by Wildfires Online for Disaster Relief Workers", Tech Crunch, September 29, 2020.
19. See K. Bode, "SpaceX's Starlink Won't Fix America's Broken Broadband Market", Motherboard, Septembre 24, 2020.
20. See G. Rich, "SpaceX Eyes Mars but Could Be God of War as Key Pentagon Enabler", *Investors Business Daily*, September 15, 2020.

On the private side, it is worth recalling the partnership established between Microsoft's Azure Space and Space X for worldwide access to broadband services, where Microsoft matches its cloud offer with a global data access, capable not only to provide services outside cable network ranges, but also to provide a secure backup.[21] This partnership is quite significant because it potentially integrates Space X with one of the main IT platforms. We might not know who will rule between the platform (Microsoft's Azure) and the space infrastructure (Space X) but for sure it is a clear sign of the way ahead.

Space X seems to succeed on the financial market, not that its business model is so different from the one of One Web. But its success in the launching sector and with the backing of US public authorities, which became a key customer for Falcon launches and is showing interest for Starlink, is creating a mix able to seduce investors, also aiming to boost their gains with a future IPO, already spoken as a possibility.[22]

To that extend, Amazon's example might be even more significant. Amazon plans to invest 10 billion US dollars in its constellation project Kuiper (3,000 satellites for high-speed internet LO).[23] Amazon, which had a revenue of 280 billion US dollars in 2019, seems not to have problems in sustaining such and investment with its own resources, also meaning that this project could have a major resilience compared to other competitors.

Again, even if Amazon insists on a potential market for a broadband connection worldwide, this project will have another strategic value for this company, which is probably tempted to develop its own global data network, being able to free itself from telecom companies but also from companies such as Alphabet of Facebook which are building their own optical fiber network. Such an autonomous satellite-based network could provide the company a proprietary data backbone able to further enhance the integration of its services, a holistic approach which pursue a concept of monopoly when speaking of data gathering, transmission and processing, which could furtherly strengthen the position of Amazon on the global data and services market.[24]

21. See V. Guillemard, "Une inexorable montée en puissance", *Le Figaro*, November 14, 2020.
22. See J. Stutman, "Forget SpaceX: Invest in This Instead", *Wealthdaily*, August 8, 2020.
See also G. Rich, "You Can't Buy SpaceX Yet but These Space Stocks Are Up for Grabs", *Investor's Business Daily*, August 6, 2020.
23. See D. FitzGerald and A. Pasztor, "Amazon Preps for Internet Satellites", *The Wall Street Journal*, August 14, 2020.
24. See A. Clark Estes, "The Pandemic Is Speeding Up the Space Internet Race", Re/Code, September 28, 2020.

On the other hand, let us not forget that in China the Hongyun project from China Aerospace Science and Industry Corp, aims at providing a LEO high speed connectivity constellation with more than 800 satellites.[25] Other projects of LEO high speed connection are under development, like the project led by the Chinese company GW which could aim at a 12,000 satellites deployment.[26]

These different examples clearly indicate that the broadband LEO constellation deployment goes far beyond the "simple" business plan to provide internet in area not covered by land networks.

This aspect also appears with the question of frequencies.

The International Telecommunication Union (ITU) is the international body able to attribute the frequencies very much needed for those satellites' deployment. The race towards constellations hides a game to be able to use frequencies, a valuable if not the most strategic asset of those constellations.[27]

A strategic issue in terms of digital sovereignty

The idea to provide internet in non-covered area might just partially justify the investments needed to develop broadband constellations. Analyzing the position of the main actors, we see that each of them pursue a global approach to be able to integrate earth based and space-based data, but also to appear as a potential "unique" data system. If we follow this prospective, the realization and the management of a LEO broadband constellation could be a key feature of a more global digital sovereignty. It might not be directly profitable, but it would be for sure a problem for Europe to rely on non-European space data backbones without being able to control and play a role on the different sides of a project. For example, a network managed by a US company falls under US jurisdiction, which can turn to be a problem for EU privacy and data management laws. On another hand we can express some doubts about the potential misuse of information that would transit through a Chinese system.

While Europe is starting to develop its GAIAX cloud initiative,[28] a way to gain influence by setting up a European standard for cloud, which can also lead to develop European cloud infrastructures, we must carefully monitor

25. See B. He, "Low-Orbit Satellites to Enable Internet for All", *China Daily Global*, July 24, 2020.
26. See L. Press, "A New Chinese Broadband Satellite Constellation", CircleId, October 2, 2020.
27. See A. Bauer, "La reprise de One Web confirme l'engouement pour les constellations", *Les Échos*, July 8, 2020.
28. See "Cloud une nouvelle terre promise", *Le Quotidien*, November 26, 2020.

the development of all data-related technologies searching not to be completely vassalized by a lack of vision and investments.

This is what is at stake regarding the space sector in Europe. We must project ourselves into a geopolitical struggle in order to maintain and develop already existing space capabilities and to be able to master autonomous space-based network of technologies, thus avoiding a total dependence from non-EU countries.

The EU Position Towards Space and Digital Sovereignty

Digital sovereignty, a priority for the EU

From the early stage of the von der Leyen European Commission (EC), the technological and digital sovereignty has been high on the agenda,[29] a political priority also strongly advocated by the French president Emmanuel Macron.[30] This concept appears clearly in February 2020 when the EC unveils its plan to restore "technological sovereignty", also insisting on the digital dimension.[31] On the data side, the main idea of the early Commission was to create an EU data market able to foster the development of data-based industries in Europe, and to cope with the absence of European tech giants. During the Covid-19 crisis, the concept of technological sovereignty has gained even more importance, surfing on the critics about the disruptions of supply chains for goods coming from China.[32] The crisis has triggered an autarchic reaction from different voices asking to take back the control of the production on the EU soil. So, the technological and digital sovereignty is now at the top of the agenda. It might be tricky to ensure its development to all sectors. It is rather a political drive that can be used to favor some cooperative spin-off in critical sectors. For example, the launch of the European raw material alliance in September 2020 indicates the type of initiative that could be developed.[33]

The digital dimension of space international competition today should mobilize further attention of stakeholders in Europe.

Impact for space

In a pre-COVID world, Space was growing as a key enabler for all kinds of services. The integration of space-based data within the digital value chain

29. See "Digital 'von der Leyen' Commission's Major Project", *Bulletin Quotidien Europe*, October 19, 2020.
30. See "Macron Ponders Options for EU Commissioner", EUobserver.com, October 23, 2019.
31. See H. Boland, "Europe Outlines Plans to Restore 'Technological Sovereignty'", *The Telegraph Online*, February 19, 2020.
32. See J.-P. Darnis, "European Technological Sovereignty: A Response to the Covid-19 Crisis?", *Note de la FRS*, n°45, Fondation pour la Recherche Stratégique, 2020.
33. See "INDUSTRY; European Commission Launches European Raw Materials Alliance", *Bulletin Quotidien Europe*, September 30, 2020.

was clearly indicating that space technologies were not to be considered anymore as stand-alone but conceived as a key part of a data retrieval, processing, transmission chain. The fact that Europe has maintained a good level with space technologies, covering all the spectrum from launchers to services, would indicate that Europe has a card to play in ensuring that its space sector can pursue its development. Up to now Space industry in Europe does not suffer from the lack of a big tech actor, a data integrator.

But the COVID-19 pandemic has accelerated some already existing processes, pushing for further uses of digital technologies. While the worldwide economy is shaken, we can observe the growth of big tech companies which appear as digital platforms able to compensate the obstacles raised by the pandemic situation, providing digital solutions to face the different sides of the pandemic.

This acceleration puts further pressure on the space sector in Europe because it also means a fastening of the digital investments in space, clearly indicated by the speeding up of the broadband constellation programs.

Under the pressure of the COVID-19 crisis, the last EU budget has reduced the amount of resources for space programs if we compare with the requests coming from the Commission.[34] This could seem contradictory but at the very same time several voices have called for a specific and further investment to create an EU broadband space constellation.

Charles Michel, the president of the EU council, has declared in October that Europe shall have is own high speed internet constellation.[35] This ramping up of high-level political capabilities comes a few months after Europe failed in mobilizing for a takeover of One Web constellation. This is often presented as a missed opportunity for Europe, also having in mind both the role played by European groups such as Airbus or Arianespace in One Web, but also the priority given to already attributed One Web frequencies compared to followers such as Starlink or Kuiper.[36]

The question of a third European space infrastructure able to provide broadband services after Galileo and Copernicus is emerging in the EU space policy debate, an initiative being pushed by Thierry Breton.[37]

It appears to be a key question. The constellations are not only about ensuring that Europe technological production remains at a comparable

34. See D. Messier, “EU Space Budget Request Slashed”, Parabolic Arc, July 28, 2020.
35. See “ESPACE ; Charles Michel appelle de ses vœux la création d’une constellation de satellites en orbite basse”, *Bulletin Quotidien Europe*, October 1, 2020.
36. See A. Loesekrug-Pietri, “Souveraineté technologique : arrêtons les grands discours !”, *La Tribune*, September 8, 2020.
37. See A. Bauer, “Agence Spatiale Européenne, vers la fin d’une chasse gardée franco-allemande ?”, *Les Échos*, November 26, 2020.

level with the other space players, but it also triggers a wider concept of space-based data sovereignty. It can be considered as a rule of law/regulatory aspect when Europe wants its data not to be processed and store elsewhere. But we can also observe a rather monopolistic approach from the big players, aiming at creating worldwide proprietary data ecosystems, fed and supported by strong space-based backbones. This will obviously create some market problems for the one who cannot rely on its own ecosystem, but it will also trigger some sovereignty and strategic issues, for example if these constellations turn to be required for future security and defense applications, as the interest coming from US DoD already indicates.

We already mentioned the fact the US DoD is showing first sign of interest for Starlink constellation. If this trend should be confirmed through extensive data service contracts with those companies, it would not only strengthen the business plan with a resilient anticyclic demand, but it would also clearly indicate that those systems are to be considered as strategic assets from a military point of view. This insertion of a global broadband capacity through satellite constellation as a potential key service for Defense organizations is a sign that shall be carefully monitored by the European Union, also being able to prepare some sovereign type of reply.

There is a potential interest for Europe to enter the broadband constellation deployment. This could also be developed with partners sharing the same vision as regards the protection of personal data and the rule of law.

Autonomy as a prospect for the EU, also in terms of access to space?

The “new space” model has created a more competitive scenario on the launcher market. This represents a problem for Europe. While US competitors can rely on a strong anti-cyclic demand, batch of launches for NASA or DoD, there is no such thing in Europe at a time when US private players can be even more competitive on the international commercial market. This is indeed a major issue to maintain an access to space autonomy in Europe. As we have analyzed before, there is an ongoing vertical integration of the space and data sectors. To that regard, securing autonomous launching capabilities is even more strategic than before, as it is a key to be able to manage the organization of future constellations.

This fastening of the space within the data eco system adds up a layer to the well-known elements in favor of an autonomous access to space capabilities. It is an issue of capability, resilience but also to maintain and develop technological skills that could easily be lost in case of disruption of

the demand. As the whole space sector, launching technologies are at a crossroads of high-end competencies in terms of propulsion, material, electronics, all key sectors to be developed.

A decent level of strategic autonomy can only be achieved if Europe can rely on its own access to space capabilities. This could be a direct consequence of this "constellation" model which has to be carefully monitored, also to keep European capabilities working in place. A European constellation could strengthen the European space capabilities, by contributing to enhance the European demand.[38] Europe should be able to resist to the extremely efficient vertical integration developed for space technologies by US tech players such as Space X and Blue Origin on one side, which is potentially replicated, even to a lesser extent, by China. This integrated offer cannot be achieved without an autonomous and efficient launching capability. The disruption of the international launching market coming from the US is a striking parameter which shall be evaluated also considering its strategic implications.

It is probably time to achieve what has been underlined for decades, the creation of a European act for launchers.[39] It is just absurd that space programs, largely financed with European tax money, shall be launched by Russian or US rockets. Indeed, it is a rather ingenuous position and Europe would strongly benefit from a deal creating a "buy European Act for launchers" a very much needed reply to the existing captive markets provided to competitors. Again, this defense of "classic" space capabilities shall not be perceived as a repetition of a "stand alone" exercise, but as a key component of an upcoming integrated space infrastructure and data chain which is and will be a key component of sovereignty in a scenario of geopolitical competition.

38. See C. Crouzel and V. Guillemard, "L'espace est un bien public mondial, entretien avec Stéphane Israel", *Le Figaro*, February 21, 2020.
39. See "Le vol inaugural d'Ariane 6 est reporté au second semestre 2021", *Bulletin Quotidien Europe*, July 11, 2020.

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