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## The Space Downstream Sector

### Challenges for the Emergence of a European Space Economy

Sebastien MORANTA



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# An Initiative on “European Space Governance”

This initiative is intended to provide analysis pertaining to the international competition in space 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 about 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 Franco-German relations (Cerfa) at Ifri.

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# Executive Summary

As the commercial anchor of the space sector, the downstream sector plays an essential role in Europe where industry focuses mainly on application markets and where socio-economic considerations have become the main driver of space policy. The European approach to space has been shaped by the success of public strategies and private businesses on these commercial markets, from satellite manufacturing and launch services to the provision of space-based services. Yet, forces at play in the space sector are changing, challenging Europe to adapt its approach to new commercial realities in competition, innovation, and market fronts. In this new ecosystem, the space infrastructure is increasingly steered toward its function of enabler of commercial applications and public services. The emergence of integrated business models such as SpaceX/Starlink is not only reshuffling the competition landscape but also changing the way space capabilities are being developed, exploited, and marketed, as part of a unified chain of activities optimized to deliver a service. This commoditization of the space infrastructure is, in part, the consequence of a new symbiosis between the space sector and the digital economy, where satellites are becoming a component of the broader digital infrastructure and where space-based data are mingled into the wider data value chain. Other trends are also nurturing a change of paradigm that is leading to a new kind of synergy between upstream space industry and downstream markets where space systems are becoming a technical means to a market end. While these trends are opening new opportunities for the European space sector, they are also raising serious challenges for private players to adapt to market shifts and international competition, and for public actors to foster new conditions for industrial and business development. Despite successful initiatives in Europe and major announcements at the recent Space Forum in Toulouse, the stakes remain high for Europe to find new ways to boost the development of the space sector and project it into a future governed by different dynamics. Ultimately, current developments are challenging the relevance and effectiveness of a space strategy focused principally on programs and industry, leaving aside applications and markets in the mists of an unclear objective of “maximizing the socio-economic benefits of space”. A change of mindset is necessary to ensure that development of the space sector answers not only to a logic of return on investment but fits with broader strategic and political concerns, from strategic autonomy to sustainable development.

# Résumé

L'aval du secteur spatial joue un rôle essentiel dans le développement des activités spatiales commerciales en Europe, dont l'industrie se concentre sur les marchés d'applications et où les considérations socio-économiques sont devenues le principal moteur de la politique spatiale. L'approche européenne en matière spatiale a été façonnée par le succès des stratégies publiques et des entreprises privées sur les marchés commerciaux, depuis la fabrication et le lancement de satellites jusqu'à la fourniture de services spatiaux. Pour autant, l'Europe est au défi d'adapter son approche aux nouvelles réalités commerciales en matière de concurrence, d'innovation et de marchés. Dans ce nouvel écosystème, l'infrastructure spatiale est de plus en plus orientée vers une fonction de facilitateur d'applications commerciales et de services publics. L'émergence de modèles commerciaux intégrés tels que SpaceX/Starlink modifie non seulement le paysage concurrentiel, mais également la manière dont les capacités spatiales sont développées, exploitées et commercialisées, dans le cadre d'une chaîne unifiée d'activités, qui ont été optimisées pour fournir un service. Cette banalisation de l'infrastructure spatiale est en partie la conséquence d'une symbiose entre le secteur spatial et l'économie numérique, dans laquelle les satellites deviennent une composante de l'infrastructure numérique et où les données spatiales sont intégrées à la chaîne de valeur des données au sens large. De nouvelles synergies se créent entre le segment amont de l'industrie spatiale et les marchés en aval, où les systèmes spatiaux sont conçus comme un moyen technique répondant à une finalité de marché. Ces évolutions posent de sérieux défis aux acteurs spatiaux privés européens, contraints de s'adapter aux évolutions du marché et à la concurrence internationale, mais aussi aux acteurs publics, qui doivent favoriser de nouvelles conditions de développement industriel et commercial. Malgré des initiatives réussies en Europe et des annonces majeures lors du récent Space Forum de Toulouse, l'Europe doit trouver de nouvelles voies pour dynamiser le développement du secteur spatial et le projeter dans un avenir régi par des dynamiques différentes. En définitive, les évolutions actuelles remettent en question la pertinence et l'efficacité d'une stratégie spatiale axée principalement sur les programmes et l'industrie, laissant de côté les applications et les marchés dans les brumes d'un objectif flou « d'optimisation des bénéfices socio-économiques de l'espace ». Un changement de mentalité est nécessaire pour que le développement du secteur spatial réponde non seulement à une logique de retour sur investissement mais s'inscrive dans des préoccupations stratégiques et politiques plus larges, allant de l'autonomie stratégique au développement durable.

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# Space Applications and Downstream: The Commercial Anchor of the Space Sector

“New Space” is often associated with the emergence of a new trend: the “commercialization of space”, usually stemming from the oversimplified idea that space is transitioning from a government-run sector to a market-driven business.<sup>1</sup> This is reductive and misleading. Although new trends are leading to a transformation of the space sector in terms of industrial structure, competition forces, innovation logic, market demand and public-private relationship, all these trends largely build on a fundamental pre-existing condition: space has long been driven, to a great extent, by commercial dynamics.

This commercialization of space, which started long before the New Space era, has been fully entangled with the emergence and development of a space services industry, which started almost immediately after the first successful satellite launches by the United States and the Soviet Union. After all, the first commercial satellite, Telstar 1, property of AT&T, was launched in 1962, only five years after Sputnik. The services provided by this rudimentary spherical microsatellite (80kg) included telephone, telegraph, and television transmissions. Although basic according to modern standards, Telstar 1 enabled the first publicly available live transatlantic television signal<sup>2</sup> and laid the foundations<sup>3</sup> for a space services industry specialized in exploiting space infrastructure capabilities (e.g., bandwidth, repeaters, signals, data) to offer a portfolio of value-adding solutions on commercial markets (e.g., satellite television, satellite phone, internet-by-satellite, geospatial products, satellite navigation). In this regard, if the collective memory tends to remember human spaceflight and exploration feats as the symbols of the Space Race, it is probably the accelerated development of space application technologies during the Cold War (e.g., remote sensing, telecommunication, navigation) that shaped more profoundly the space sector and economy, as we know it.

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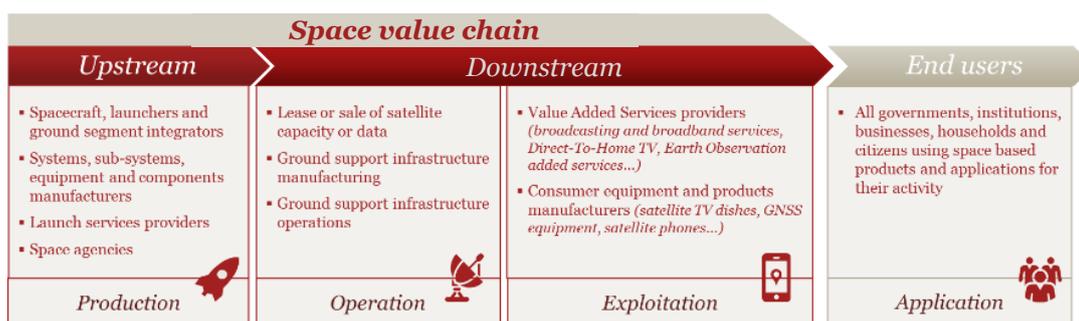
1. D. Paikowski, “What Is New Space? The Changing Ecosystem of Global Space Activity”, *New Space Journal*, Vol. 5, No. 2, 2017.

2. D. I. Dagleish, *An Introduction to Satellite Communications*, London: The Institution of Engineering and Technology 1989.

3. In the same year, US President John F. Kennedy signed the Communications Satellite Act, which dealt with the issue of commercialization of space communications.

Today, and very much in the same way that the digital economy relies on both digital infrastructures and digital services, the modern space economy relies on both a space infrastructure industry and a space services industry. The first enables and induces the latter. In this regard, these two industries cannot be dissociated as the two parts of the so-called “space value chain”, the sequence of value-adding activities that starts with the development and production of space systems and leads to the provision/sales of space-based solutions to end-users/customers. On a simplified linear space value chain, the space infrastructure industry is referred to as the “upstream”, which corresponds with the series of economic activities leading to an operational satellite system in orbit, and the space services industry is referred to as the “downstream”, which corresponds with all the subsequent economic activities related to the operation and exploitation of this satellite system for providing space-based products and services to end-users, including user equipment (e.g. satellite TV dishes, navigation devices, satellite phones).<sup>4</sup>

**Figure 1: Representation of the space value chain**



Source: "Socio-Economic Impacts from Space Activities in the EU in 2015 and Beyond", European Commission/PwC, June 2016 (adapted).

The downstream sector accounts for the largest share of the space economy. In 2020, the Space Foundation estimated that the sales of commercial space products and services yielded global revenues in the order of \$220 billion (approx. €190 billion).<sup>5</sup> To this must be added \$118 billion (approx. €100 billion) for the sales of user equipment such as satellite navigation devices, satellite TV dishes and satellite mobile phones, necessary for using some of these solutions. Altogether, the space downstream sector reportedly accounts for close to 80% of the global space economy.<sup>6</sup>

4. A “midstream” sector is sometimes also isolated between the “upstream” and “downstream” sectors. This midstream sector sets apart the first layer of the downstream sector corresponding to the operation of satellites and to the leasing/selling of satellite capabilities. It includes mainly satellite operators and ground-support infrastructure (e.g., network stations, data storage, processing centers). This analysis addresses the full range of actors and activities related to satellite services, including capacity/data markets, and therefore does not make this distinction.

5. *The Space Report*, Q3, Space Foundation, 2021.

6. A study by the Science and Technology Policy Institute (STPI) challenged the methodology behind these estimations and assessed that the space service business, including sales of user equipment, more

If the upstream sector delivers the infrastructure (public or private) and technical capabilities necessary for developing space-based solutions, it is the downstream sector that anchors them in commercial markets. By linking the space infrastructure to end-users, the downstream sector also plays a critical role in enabling the socio-economic impacts of space across the broader economy and society. For these reasons, the development of a dynamic, capable, innovative and competitive downstream sector is essential, not only to foster the growth of the space economy but also to maximize the impact of public investment in space application programs such as Galileo and Copernicus in Europe.

From this perspective, three characteristics of the current downstream sector should be underlined. This paper examines, *inter alia*, their evolution.

- **The public sector plays a central role in enabling and boosting the downstream economy.** A large share of downstream revenues directly depends on the availability of public space infrastructure, in particular for navigation and geospatial solutions. Telecommunication stands out as the only space application sector almost entirely run privately (at least in Europe and the United States), with some support from public R&D programs. Across all downstream markets, public demand plays an essential role in downstream business development, in particular when it is structured around anchor tenancy contracts. Last but not least, downstream activities are subject to public regulations. The role of public policies, programs and markets is therefore fundamental in the development of the downstream sector.
- **The downstream sector is not homogeneous but rather a sum of diverse space-induced businesses.** Space telecommunication, space imagery and space navigation account for most of downstream revenues. Each of these domains is comprised of multiple business lines addressing different markets, with different solutions, and driven by different forces. The development of downstream activities therefore requires both a transversal ecosystem strategy and tailored support actions.
- **The downstream activity also largely depends on innovation and developments in other sectors.** Much of the downstream activity involves companies whose core business is only partially related to space. In the downstream, the frontier between space and non-space business is thin and blurred. Synergies between space and non-space technologies and markets play a central role in the development of the downstream sector, which cannot be addressed in isolation.

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likely represents around 50% of the global space economy after consolidation. See: *Measuring the Space Economy: Estimating the Value of Economic Activities in and for Space*, IDA, 2020.

# The Downstream Sector: A Singular Challenge for Europe

Space applications and downstream markets hold a specific place for Europe, where they have become the main driver of industrial activity and where commercial and socio-economic considerations play a major role in space policy.

The development of space application technologies has long been a key driver of public space programs in Europe. In France, the Centre National d'Études Spatiales (CNES) started exploring space application technologies as early as the 1970s through flagship programs such as Météosat (meteorology), Symphonie (telecommunication), Argos (localization) and SPOT (earth observation). These national programs paved the way for European cooperation in developing space applications, which became a pillar of the mandate given by member states to the European Space Agency, already in the 1975 ESA Convention. In parallel with technology programs, which shaped the development of the European space industrial base, Europe also organized itself to operate and exploit space application systems, as illustrated by the foundation of satcom operator EUTELSAT in 1977 or the European meteorology agency EUMETSAT in 1986. Europe distinguished itself as a successful pioneer in the creation of a commercial space downstream ecosystem also in the satellite imagery domain. Following the successful creation of Arianespace, the first world's first launch services company, France also explored innovative approaches to foster the commercial exploitation of space capabilities through the creation of SPOT Image in 1982, the first commercial operator and dealer for space imagery. The public initiative had immediate success, with 30% annual growth, catching the interest of the US government, which was facing difficulties in commercializing images from the Landsat programme.<sup>7</sup>

Here, it is important to note that the creation of European organizations and companies specialized in operating application satellites and leasing/selling satellite capacity and data on commercial markets was largely driven by European governments eager to bring the benefits of space technologies development to the economy at large and to leverage commercial revenues to complement public investments. These initial steps paved the way for the development of a dynamic European space

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7. P. Molga, "Le lent envol de la société Spot Image", *Les Échos*, October 23, 1991.

downstream sector. Public objectives and strategies at the time echo today's situation, putting, here again, New Space trends in the continuity of previous public strategies that shaped the modern space sector. The importance and relevance of this public involvement will be examined later in the current context.

The development of the European Union flagship programs Galileo and Copernicus (previously GMES) added a new facet and a new dimension to the development of the European space downstream sector. By providing new public and open capabilities (signals, data), these programs not only offered new application opportunities; they raised new stakes for Europe to maximize the value of public investment through the emergence of a new business ecosystem for value-adding products and services. This challenge is accentuated by the availability of Galileo and Copernicus capabilities to all, including actors outside Europe. In the case of Copernicus for example, it is essential that the commendable decision of a free, full, and open (FFO) data policy induce, first and foremost, business and economic development in the European downstream sector to support European policies and European user needs. In this regard, a recent consultation report argued the relevance of the FFO data policy adopted by the European Union,<sup>8</sup> but the European Court of Auditors underlined the need to do more to foster the uptake of space services and harness the full potential of EU programs, recalling the substantial public investment and highlighting the unclear impact.<sup>9</sup>

Nevertheless, from a macro-economic perspective, European strategic choices and investments largely paid off with the emergence of top global industry leaders competing on sizeable and profitable commercial markets. According to the last available public statistics, the European downstream economy was estimated at between €34 billion and €44 billion, corresponding to between 23% and 26% of the global downstream economy.<sup>10</sup> The fast development of space application technologies and the success of Europe on the commercial downstream market has profoundly shaped the European space industry at large, including upstream manufacturing and launch service sectors, which rely massively on space application systems markets. In 2020, the development of such systems and associated R&D activities accounted for 72% of European satellite manufacturing industry revenues.<sup>11</sup> Telecommunication and earth observation systems each represent 45% of these revenues, and navigation systems the remaining 10%.<sup>12</sup> Despite growing demand from European

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8. "Study on the Copernicus Data Policy Post-2020", NextSpace-SC5, April 2019.

9. "EU Space Programmes Galileo and Copernicus: Services Launched but the Uptake Needs a Further Boost", European Court of Auditors, April 2021.

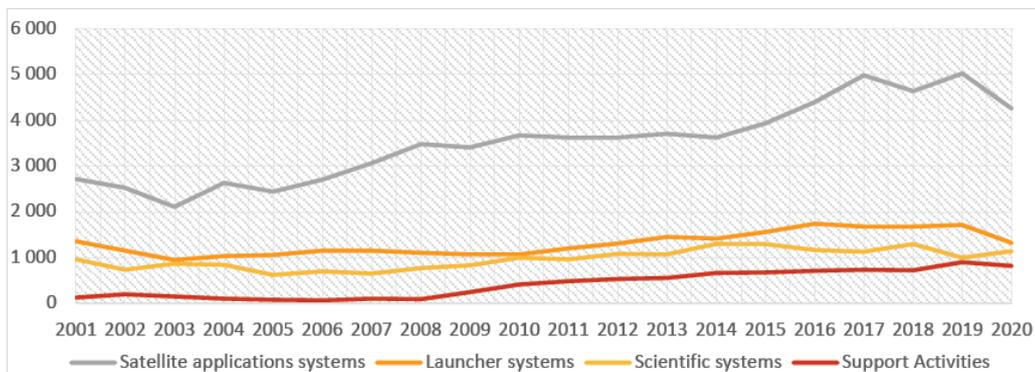
10. "Socio-Economic Impacts from Space Activities in the EU in 2015 and Beyond", European Commission/PwC, June 2016.

11. "Eurosace Facts & Figures", ASD Eurospace, 2021.

12. While sales of telecommunication and navigation systems remained rather stable over the last decade, sales of Earth observation systems almost doubled, largely due to the Copernicus program.

institutions, largely driven by the Galileo and Copernicus programs, commercial and export, markets still represent 44% of space application systems sales by European industry, mainly for satcom systems. The European launcher sector is also largely driven by space application systems demand. Over the last three years, telecommunication, earth observation and navigation systems accounted for 90% of the mass launched from Kourou (i.e., Ariane, Soyuz, Vega included), of which 85% related to commercial and foreign systems.

**Figure 2: Evolution of European space manufacturing industry revenues, by system category**



Source: Eurospace.

As a result, a large share of the European space industry revenue relies directly or indirectly on space applications-related markets. The success of the highly competitive European companies on these markets, largely driven by commercial dynamics, enabled the development of a capable industry at very affordable conditions for European governments, with only 15% of the global space public budget. In turn, the European space industry faces a dependence on commercial markets that is unique in the world. The satcom sector, which prospered on a sizeable market on which European satcom manufacturers and operators are still worldwide leaders, is at the heart of this dependence. In this regard, downstream developments have clear industrial implications for the European space sector at large.

From a space policy perspective, the development of a dynamic downstream sector continues to be a central concern for Europe also with regard to the strategic objective to maximize the socio-economic benefits of public space programs. It has been estimated that more than 10% of European Union gross domestic product (GDP) depends today on space-based services.<sup>13</sup> In the European Union, the total economic benefit for downstream actors and end-user sectors is estimated to be as large as €50 billion per year in gross value added, supporting directly and indirectly about one million jobs in the European Union. From this perspective,

13. "Study to Examine the Socioeconomic Impact of Copernicus in the EU – Report on the Socio-Economic Impact of the Copernicus Programme", European Commission/PwC, October 2016.

space-based services actively contribute to the economic development of Europe by improving the competitiveness and productivity of other European economic sectors (e.g., defense, agriculture, energy, insurance, banking). Today, much of the European space policy narrative revolves around this socio-economic value of space, which has grown to become the main driver of and justification for public investment in the sector. In this regard, Europe stands out from other space powers. Although socio-economic and commercial considerations are also high on their policy agendas, these dimensions are subordinate to other strategic priorities such as national security, military superiority, and international prestige and global leadership in human spaceflight and space exploration.<sup>14</sup> This translates in the distribution of budgetary allocations as well as in the development and governance of space programs, which both give preeminence to civil and commercial dimensions in Europe. The rise of security and sovereignty concerns in European policy agendas will likely lead to a more strategic orientation of future developments in the space sector. Nevertheless, recent developments suggest that such strategic orientation will more probably motivate new activities to foster synergies between defense and civil space activities than lead to a redefinition of priorities underlying European public investments in the space sector – at least in the short term.

The issue of downstream sector development is therefore highly strategic for Europe. First, because of the preeminence of socio-economic and commercial considerations in European space policy, related to an objective of return on public investment, the downstream sector is critical to fully achieving European space strategy objectives. Second, because of the unique dependence of the European space sector at large on space application systems, downstream markets contribute to an increased demand for space systems and launch services on which the industry relies.<sup>15</sup>

As a result, the stakes are particularly high for Europe to continue ensuring the development of a successful and dynamic downstream sector that 1) contributes to developing the space industry at large, 2) maximizes the socio-economic impacts of public investment in the sector and 3) guarantees an adequate level of strategic autonomy for Europe. Yet, the global landscape of space activities is undergoing profound changes. In this fast-changing international, commercial, technical, and political landscape, Europe must adapt its approach to new space commercial realities both on the competition and market fronts and find new ways to foster the conditions for the business development and technological advancement of the European space downstream sector.

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14. “European Space Strategy in a Global Context”, ESPI, October 2020, pp. 6-7.

15. This second aspect is more specifically related to the satcom segment of the downstream sector, but, in this regard, the earth observation segment is poised to play a growing role in the future with the rise of private systems.

# **New Drivers and Challenges for the Development of the European Downstream Sector**

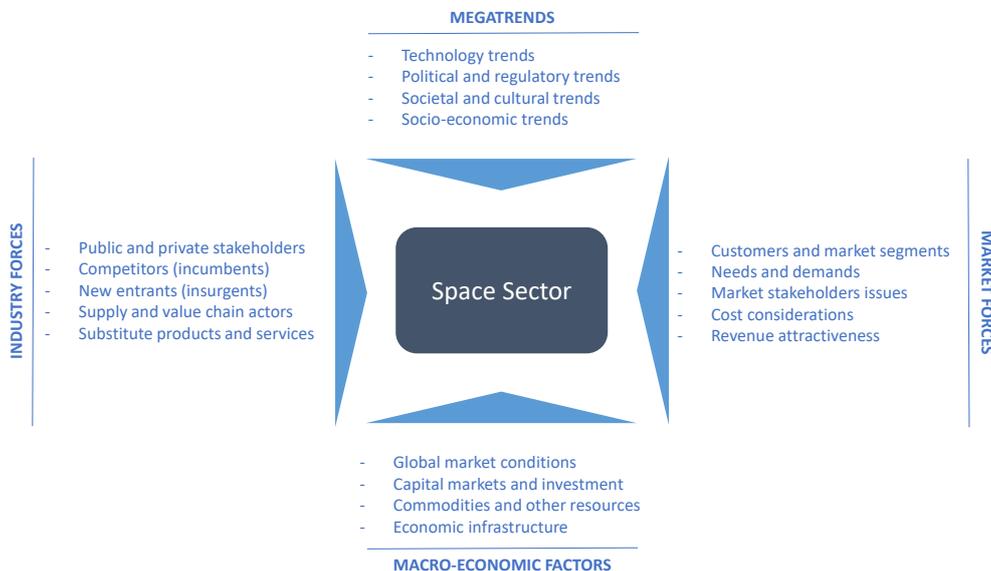
Ultimately, the development of a dynamic space downstream sector in Europe has been the result of a successful combination of 1) fast and bold space technology developments nested in the broader global technological evolution, 2) innovative public strategies and risk-taking initiatives, and 3) favorable commercial and investment conditions for establishing profitable business. This set of conditions echoes the drivers and challenges of the “New Space”.

Although it is somewhat of a catch-all concept that encompasses a quite broad range of trends that may not be all as “new” as one would think, New Space does embody a tangible evolution of the space sector that Europe has challenged for a long time. Bringing all these trends under a single roof also has the merit of highlighting their interrelation as part of a movement affecting all dimensions of space activities and converging towards a more service and business-oriented space sector, also more deeply rooted in global technological and economic trends.

As part of this movement, the underlying dynamics of the space downstream sector are profoundly changing, while new challenges for its development are emerging. Understanding current and, more importantly, future challenges for the development of the downstream sector requires considering all forces at stake. This includes not only new internal sectoral dynamics (industry forces) and new commercial opportunities and challenges (market forces) but also new business environments stemming from transformative trends (megatrends) and global economic conditions (macro-economic factors).

The following parts explore how the evolution of these forces is shaping new transversal challenges for the development of the European space downstream sector. After all, as the commercial anchor of the space sector and at the crossroad between space technology, user markets and broader socio-economic developments, the downstream sector faces the greatest challenge of New Space: fulfilling its promises.

**Figure 3: Space sector business environment**



Source: adapted from Alexander Osterwalder's Business Environment Canvas.

### ***A New Downstream Ecosystem Increasingly Centered on Connectivity and Data***

Recent years have been marked by an intense entrepreneurship supported by considerable private investment as well as the entry of new actors, in particular information technology companies, eager to explore new opportunities offered by space for their business. Many of these “insurgents” are both the consequence and the catalyst of a new symbiosis between the space sector and the digital economy.<sup>16</sup> This symbiosis, admittedly still at an early stage, is leading the downstream sector toward a more data-centric ecosystem. The involvement of GAFAM (Google, Apple, Facebook, Amazon, and Microsoft) in the space sector is certainly the most striking illustration of this evolution. Investment after investment, project after project, they highlight the growing role of space in the digital business strategy across two complementary facets: connectivity and data.

First, on the *internet everywhere, all the time* paradigm, connectivity remains a fundamental challenge for digital economy actors, in terms of not only coverage but also ever-increasing traffic. In this regard, it is not surprising that Amazon, leader in e-commerce, cloud computing and digital streaming, is developing its own satellite broadband constellation (Kuiper) while Google, leader in internet-related services, is massively investing in SpaceX and its Starlink constellation. Their strategic interest is two-sided: while new connectivity capabilities contribute to their business outreach,

16. See J.-P. Darnis, “Space as a Key Element of Europe Digital Sovereignty”, *Notes de l’Ifri*, Ifri, December 2020, available at: [www.ifri.org](http://www.ifri.org).

it also contributes to increasing the value of their services. In this regard, space has become somewhat of a showpiece of the raging war in the fast-growing cloud computing market.<sup>17</sup> Recent announcements of partnerships between Starlink and cloud service providers Google and Microsoft give a taste of their ambitions. By installing ground stations at Google data centers, Starlink will allow users to run applications quickly using Google's cloud services and to rely on Google's private fiber-optic network.<sup>18</sup> In parallel, Microsoft is also working with SpaceX to bring Starlink internet connectivity to modular Azure cloud data centers that customers can deploy anywhere. These partnerships take place in a context of rapid growth of the cloud computing market, expected to double in the next five years to reach \$950 billion by 2026.<sup>19</sup> Driven by a service model offering virtualized computing capabilities over the internet,<sup>20</sup> new generations of cloud computing solutions are expected to become one of the next major disruptions that will shape future digital infrastructures as well as the digital environments and practices of governments, businesses, and households. The integration of space-based capabilities in this new digital architecture is, of course, fundamental. In this perspective, recent developments are an excellent signal for the space sector but not necessarily a good omen for Europe. Apart from a few companies capturing a small share of the market, Europe is largely absent from the cloud computing competition. In the meantime, SpaceX is already rolling out Starlink services while US cloud computing leaders compete for multibillion contracts for the US Department of Defense (DoD) and the National Security Agency (NSA). In this fierce competition, space-enabled connectivity in challenging environments is a clear competitive advantage for the contestants. The integration of space-based connectivity in the architecture of future digital solutions to serve strategic needs through sizeable long-term contracts is a powerful combination that will be challenging to replicate in Europe without an ambitious and coordinated response.

If connectivity is one side of the growing synergy between space downstream and digital ecosystems, data is the second. It is now well established that satellites provide more and more data, in particular for remote sensing missions. With more than 12 terabytes per day and counting, Copernicus is the largest space data provider in the world.<sup>21</sup> The increasing amount of data collected in space raises challenges regarding their processing, storage, dissemination and, more importantly, their exploitation for value-adding services and products. Here again, the

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17. See X. Pasco, "Faire converger spatial et numérique : quels enseignements pour la constellation satellitaire européenne ?", *Défense & Industries*, n° 15, April 2021.

18. J. Novet, "Google Wins Cloud Deal from Elon Musk's SpaceX for Starlink Internet Connectivity", CNBC, May 13, 2021.

19. *Cloud Computing Market Report*, Research and Markets, 2021.

20. This includes concepts such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

21. Available at : [www.copernicus.eu](http://www.copernicus.eu).

US digital giants are on the lookout. As part of the emerging business of Ground Stations as a Service (GaaS), they are seeking to better connect and integrate their infrastructure and services with space systems and data, working toward a unified solution for satellite operation and data processing and storage. Amazon and Microsoft are investing massively with the development of the Amazon Web Services Ground Station and Microsoft Azure Orbital solutions. In addition to the obvious cross-fertilization that will emerge between their involvement in both connectivity and data dimensions, this approach provides new ways to combine space-based data with other data streams and processes in view of offering enhanced solutions. Airbus GEO and Microsoft Azure Space recently signed a partnership for the provision of satellite imagery to be integrated into Azure Maps, Microsoft's geospatial services platform.<sup>22</sup> To demonstrate the power of combining space data with artificial intelligence and cloud computing, the company launched SpaceEye, which increases resolution to make it comparable to aerial imagery and allows users to create live, cloud-free imagery.<sup>23</sup>

Bit by bit, digital actors' stakes in connectivity and data are shaping a new ecosystem for space services, one where satellites become a component of the digital infrastructure and where space-based data are mingled in data streams, processes, and products as another input in the wider data value chain. This integration raises challenges, not necessarily new but probably more decisive. On the connectivity front, true integration entails a seamless interoperability of space-based connectivity solutions with future network generations. On this front, stakes are high for space in the development of a hybrid 6G architecture and in the optimization of spectrum allocation between ground and space service providers. On the data front, unlocking the potential of space downstream solutions entails working more openly on synergies between space-based data and digital services through big-data and data science technologies. On both fronts, the involvement of European digital actors will be decisive in developing the role of space in the digital economy and strategy of Europe.

Beyond the (narrow) objectives of bridging the connectivity gap or developing new space applications for niche markets, the US digital giants are sketching a future where space becomes an enabler of their global ambitions and business strategies. Much more discreetly, China is lying in ambush and preparing for this future through its Belt and Road Space Information Corridor, which leverages space applications for navigation, remote sensing and telecommunication to support China's global strategy.<sup>24</sup> Europe cannot ignore the global and strategic dimensions that space

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22. T. Keane, "New Satellite Connectivity and Geospatial Capabilities with Azure Space", December 9, 2021.

23. D. Werner, "Microsoft Expands Azure Space Ecosystem", SpaceNews, December 9, 2021.

24. M. S. Chase, "The Space and Cyberspace Components of the Belt and Road Initiative", The National Bureau of Asian Research, 2019.

solutions are gaining as a result of their assimilation by the digital economy. Beyond geopolitical and economic interests, the pervasive dependence on digital infrastructures and services also comes with cybersecurity risks that translate into additional technology and sovereignty challenges. While connectivity and data-related dimensions are currently taking the lion's share, other roles could emerge for space in the digital economy, for example, as a critical component of a quantum information network. In this context, Europe's plans for a space-based secure connectivity initiative are certainly welcome, not only to complement the Galileo and Copernicus services but also to pave the way for a new symbiosis between the space sector and the digital economy in Europe – first at the service of the European digital strategy, and only then of the European space strategy.

### ***A Space Value Chain in Mutation***

The emergence of new actors, new business models and new industrial set-ups is profoundly changing the structure of the space sector at large, bringing it toward a more vertically integrated value chain. A large share of new space ventures relies on a rather disruptive approach to the development of market solutions that also covers the development, in-house, of the space systems that will provide these solutions. Or the other way around, new entrants are developing technical concepts and business models covering activities up to the provision of turnkey services and products. In any case, this vertical integration of space technology developments and space service provision nurtures a new kind of synergy between upstream industrial set-ups and downstream service markets, centered on integrated business models.

The most striking example of this trend is SpaceX, which now integrates all activities, from system development and launch to satellite operation and service provision, up to ground terminals production. This expansion, involving organic and inorganic growth largely supported by massive private investment, is a gamechanger for the business model of the company. While SpaceX emerged as a new competitor to Arianespace, first mocked and now feared, the business of the company is increasingly turned toward Starlink. The launch of the constellation represented more than 80% of the total mass launched by SpaceX in 2020 and 2021, largely offsetting the reduction of commercial launch demand, which accounted for 70% of SpaceX launch activity in 2018. With only three launches out of the 25 performed by SpaceX in 2020, the provision of launch services to NASA as part of the Commercial Orbital Transportation Services program has become marginal. In this regard, SpaceX has taken major steps (and risks) to mobilize its resources toward downstream service provision. Today, SpaceX is still the competitor of Arianespace but also soon of European satcom operators and tomorrow, perhaps, of European satellite manufacturers, should SpaceX decide one day to open its factories to interested third parties. Besides a radical optimization

of the supply chain, this approach also allows SpaceX to foster a virtuous dynamic across its industrial and business structures. In this context, the relevance of launcher reusability takes a new dimension where the intense launch pace contributes to reducing individual launch costs, which eventually leads to a significant competitive advantage in both launch and satellite service businesses.

If SpaceX/Starlink is the pinnacle of vertical integration, it is not the only example. Companies OneWeb, Planet and Spire, and in Europe Iceye and Kinéis also follow an integrated approach to service provision, although through different business structures. These various examples show that vertical models are not exclusive to a single space application domain and can prove relevant for a diverse range of space-based solutions including broadband, imagery, Internet of Things (IoT) networks, and vessel and flight tracking. Despite their differences, these ventures share commonalities related to an industrial activity based on mass production, miniaturization, and simplification. Overall, this industrial and business approach is driven by a desire to drastically reduce system development and production costs, and therefore market prices. In this sense, vertically integrated models are motivated, first, by the objective to provide the necessary conditions to market an innovative space technology concept. These models also provide new ways to develop a value proposition that meets market needs.<sup>25</sup> For this purpose, control over the entire value chain provides additional means to quickly adapt to market developments and opportunities through tailoring the underlying technical solution. In this domain, Spire offers an interesting track record of business pivots; the most recent involves the use of its constellation to detect GNSS signals interference in conflict zones after the company realized that its solution could be adapted to this growing military need.<sup>26</sup>

As is usually the case with New Space trends, legacy actors are not completely left out of the trend. In the geospatial service segment, the transfer of responsibilities toward the private sector initiated by SPOT Images continues. After a first investment in SPOT 6 and 7, Airbus reinforced its role and commitment to delivering imagery services through a considerable investment (reportedly at least €550M) in four Pléiades-NEO satellites,<sup>27</sup> two of which have already been launched. Eric Even, head of marketing and sales at Airbus DS underlined the disruption during an interview: “For the first time we invest as Airbus completely in our own constellation which is not only a technological breakthrough but also a

25. J. Foust, “With ‘Mission 1’ Complete, Planet Turns Focus to Data Analysis”, Space News, September 17, 2017.

26. T. Hitchens, “Spire Pivots Weather CubeSats to SIGINT Missions”, Breaking Defence, August 31, 2021.

27. P. B. de Selding, “Airbus Invests in 4 High-Resolution Optical Earth Observation Satellites – With No Government Net”, Space News, September 16, 2016.

business breakthrough”.<sup>28</sup> The involvement of large satellite integrators in innovative projects is also developing through own investments and shareholding in the projects, as illustrated by the Airbus partnership with OneWeb through the joint venture OneWeb Satellites or the investment of Thales Alenia Space in NorthStar, for which it will also provide 40 satellites. The integration of satellite manufacturing, operation, and exploitation, however, is still limited in comparison to new actors.

Ultimately, the verticalization of business models nurtures a commoditization of the space infrastructure, which is no longer a final product but a technical mean to a market end. Such commoditization culminates in the new concept of *Satellite-as-a-Service*, which allows customers to benefit from space assets to develop customized applications, specifically tailored to their needs, without the burden of designing, building, and launching their own systems. Such an approach, which also leverages vertical integration of activities, provides new options to market space-based capabilities, with each party focusing on their respective expertise, need and job. Here again, this trend is both a consequence and a catalyst of the digital transformation discussed previously. It also dips into various concepts of Industry 4.0.<sup>29</sup>

Integration of activities has obvious merits in terms of technology marketing, process flexibility and supply chain optimization to reduce costs and delays. However, the business relevance of vertical integration is up to debate in all sectors and eventually depends on various internal and external factors specific to each business. The point here is not to be dogmatic about the benefits of vertical integration, but it is essential to take stock of the impact of this disruptive trend on competition and market landscapes as well as on the structure of value creation between upstream and downstream, which may become somewhat obsolete in terms of segmentation of actors and activities. In this new context, challenges for the upstream and downstream space sectors end up blending and can no longer be considered in isolation.

If the digital transformation calls for a more open space strategy, vertical integration calls for a more comprehensive approach to developing the space sector and economy. It also raises new questions for European public policies and programs, which have been structured so far around the procurement of space infrastructure on one side, and on targeted actions to foster market uptake on the other. The public demand for space-based services through anchor tenancy contracts is widely recognized as a key driver for the development of new space businesses in the United States, with the additional merit of providing more freedom for optimizing

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28. Eric Even interview during Airbus Trade Media Briefing, Pléiades Neo, 2021.

29. “Industry 4.0: Building the Digital Enterprise”, PricewaterhouseCoopers, 2016.

business and industrial structures.<sup>30</sup> However, the organization of a public demand in Europe has been so far rather limited, in part due to European and national industrial policy stakes in the space sector. Here again, the EU space-based secure connectivity initiative offers fresh ground to address some of these questions. Focused on services but with clear industrial policy implications, the program will require a new approach to meet both institutional and commercial objectives (and conditions). In this regard, the initiative will provide a concrete case for institutions, manufacturers, and operators to build a joint approach not only to support European digital strategy objectives but also to foster the emergence of a service offering, able to compete with actors leveraging a fully integrated structure. In this context, serious challenges will arise in optimizing the overall industrial and business setup between various actors and their respective interests.

The rise of vertical actors necessarily raises the question of mergers between manufacturing industry players and satellite operators in Europe to optimize value and decision chains in support of business development and competitiveness on international markets. Alliances with European and/or international digital economy actors will also probably be essential to foster the integration of space-based capabilities in the value proposition of future digital solutions. These scenarios come with risks of monopolistic positions that Europe actively sought to avoid until now, to ensure some level of internal competition. National governments' vested interests in space industrial policy, which seem to find renewed strength in the New Space context, would also be an additional challenge to address in Europe. Other space powers do not seem bothered by such considerations, focusing instead on global ambitions. Ultimately, the development of the international competition landscape and the growing concerns over European sovereignty and weight on future global markets suggest that the emergence of a vertical European actor might prove to be a necessary condition for Europe to secure a leading position on future space markets. This would be, at least, a relevant option to consider, requiring new arrangements at policy and industry levels.

### ***Market Evolution, New Opportunities and New Risks***

The demand for space-based solutions is developing rapidly, shaped by various short- to long-term market trends,<sup>31</sup> many of which were accelerated by the Covid-19 crisis. In Europe, trends related to the digital transformation, to climate change and to security-related issues have taken

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30. G. Denis, X. Pesco and H. Huby, "The Challenge of Future Space Systems and Services in Europe", *Défense & Industries*, n° 4, June 2015.

31. See for example: ESA Mega Trends Initiative, 2018, available at: [www.esa.int](http://www.esa.int); "The Future of Space, 2030 and Beyond: Mega Trends on the Space Industry – Connectivity and Surveillance Enabling a Global Migration to Next-Gen Technology", Research and Markets, 2018.

a whole new strategic and geopolitical dimension in the aftermath of the pandemic. The realities and weaknesses that the Covid-19 crisis exposed in Europe raised serious concerns that shook up political lines and sharpened Europe's focus on economic resilience, strategic autonomy, and geopolitical power. In turn, these concerns strengthened Europe's ambitions to become a more autonomous actor in the digital economy,<sup>32</sup> a leader in sustainable transformation,<sup>33</sup> and a security provider for its citizens, protecting Europe's values and interests.<sup>34</sup> Strategic stakes and political developments in these areas, associated with technological and socio-economic drivers already at play, will foster major market forces across all economic sectors in Europe. These trends will deeply affect space downstream markets as satellites are in pole position to provide specific solutions on digital, green, and security-related markets.

Analysts seem confident that future market developments, coupled with an intense innovation dynamic in the space sector, will translate into considerable commercial opportunities for space-based solutions. Prospects in the areas of the Internet of Things, Ubiquitous Connectivity, Mobility, Smart Everything, Digital Twins, and Metaverse and augmented reality (among many others) have motivated some analysts to talk about space as a future trillion-dollar industry.<sup>35</sup> Although such a hopeful forecast is certainly welcome, it must be taken with a pinch of salt. Such a development would entail the emergence and rapid growth of multiple mass-market applications, even though most space solutions, despite promising prospects, are still confined to niche markets. This scenario also somehow downplays the challenges faced by the space downstream sector in adapting to the very same trends that are called on to drive its future growth.

While the digital transformation is certainly offering new market opportunities for space-based connectivity and data, as discussed previously, it also disturbs the mature satcom markets on which Europe has prospered. New digital technologies and services such as IPTV and Over The Top services (e.g. Netflix, Disney+, Amazon Prime Video) are changing how media content is distributed and consumed, challenging the satellite TV business which represents a majority of the satcom market and a large share of the space economy at large. While satellite TV is certainly not dead and can count on various factors to support its business case,<sup>36</sup> it would be excessively optimistic to wave aside the threats that loom over the horizon of vital markets for the satcom sector in the long run. From this perspective, the digital transformation still makes it a challenge to adapt satcom

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32. "2030 Digital Compass: The European Way for the Digital Decade", European Commission, March 2021.

33. "The European Green Deal", European Commission, December 2019.

34. "A Strategic Compass to Make Europe a Security Provider", European External Action Service, Foreword by HR/VP Josep Borrell.

35. Morgan Stanley, Bank of America.

36. "Satellite TV Is Not Dead", SES, May 15, 2019, available at: [www.ses.com](http://www.ses.com).

solutions to new market realities that are increasingly driven by ubiquitous connectivity needs. In addition to consumer and business needs for solutions offering uninterrupted connectivity, the development of various promising technologies will depend on the capacity of the telecommunication infrastructure to always connect people and objects everywhere, and at all times. Future space-based connectivity markets will be affected by two key technology trends. First, the connection of countless smart objects as part of an Internet of Things is a prerequisite for the development of new solutions for Smart Cities, Smart Grids, Smart Agriculture, etc, which themselves offer new prospects for sustainable development. Second, mobility-related trends and in particular the development of connected and autonomous vehicles will raise new needs for seamless, reliable, and secure connectivity on-the-go and will certainly open up new prospects for value-adding services. Although the unique capabilities of space systems fit these future market needs particularly well, some serious technology and business challenges remain on the way to affordable and adapted satellite connectivity services, which will require a considerable investment. Furthermore, the emergence of mass markets for space-based connectivity as the next space economy growth engine will require going beyond the current model where satellites mainly offer a complement to ground infrastructures in underserved areas. This will require reconsidering the relation with ground infrastructure actors, both as necessary partners and unavoidable contestants, as illustrated by the quarrels among satellite operators, mobile network operators and regulatory authorities about the repurposing of the C-band spectrum by the US Federal Communication Commission in 2020.<sup>37</sup> In this regard, the partnerships between Starlink, Microsoft and Google suggest that the solution lays not in direct competition with ground operators but rather in stronger cooperation with digital service providers to ensure that space-based capabilities become an enabler of future digital solutions. Such an approach builds on the change of mindset nurtured by digital giants: infrastructure is a means, not an end.

It would be short-sighted to totally reject the scenario of a trillion-dollar space sector even if a more pragmatic perspective would suggest that it not be made a success criterion. Let's keep in mind the popular saying: we always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten. In this regard, this scenario has the merit of reminding us that there is a growing need for a more forward-looking mindset and strategy to tilt the balance in favor of exploring new business prospects, in addition to fostering competitiveness on existing markets. Such a strategy necessarily involves a greater number of risk-taking initiatives. Opportunities remain, after all, another type of risk. Paving the way toward future market opportunities will prove capital-

37. "C-Band, Satellites and 5G", *ESPI Brief*, No. 42, European Space Policy Institute, June 2020.

intensive and venturesome for downstream companies overall. In this context, the public sector has an essential role to play in increasing investment capacity, steering developments in line with policy objectives, easing business and reducing risk. As far as Europe is concerned, the fragmentation of markets and the limited public demand are also growing issues that must sooner or later be addressed.

Ultimately, the future of space downstream markets cannot be considered in isolation from other markets. As illustrated previously with the examples of ambitious GAFAM partnerships, future space applications will not be standalone. Addressing new downstream markets will require better integration of space solutions in future concept architectures as a building block of single-value propositions. It is difficult to assess the full potential of space technologies for autonomous vehicles without some level of cooperation with car manufacturers (an issue that Starlink will not face with Tesla). Additional efforts will be required to foster synergies across industries as part of public development strategies.

### ***A New Logic of Investment and Innovation***

Last but certainly not least, the future of the European space downstream economy is also affected by a new innovation logic that places the business model on a par with technology development. This new logic of innovation gave rise to intense entrepreneurship supported by considerable investment from various sources and financial instruments (e.g., venture capital, private equity, loans, prizes, crowdfunding).

Contrary to common belief, Europe is actually doing quite well in this domain. Investment in European space start-ups skyrocketed over the past few years, from €50m in 2014 to €610m in 2021.<sup>38</sup> Investment in Europe even reaches €2bn when including OneWeb, acquired after its bankruptcy in 2019 by a consortium led by the UK government and Bharti Global. When comparing with the massive \$5bn invested in US companies in 2020,<sup>39</sup> it is important to remember that the European space budget is 5 to 6 times smaller than that of the United States, which drastically changes investment prospects, and that 30% of US investment relates to SpaceX, now a well-established company, which continues to raise capital on private markets because it is not publicly traded. Europe is therefore actually doing quite well and now features a growing number of success stories, focusing on scaling up their business. These achievements have been largely supported by new policies in Europe aiming to boost entrepreneurship and investment in the space sector. In this respect, the CASSINI initiative

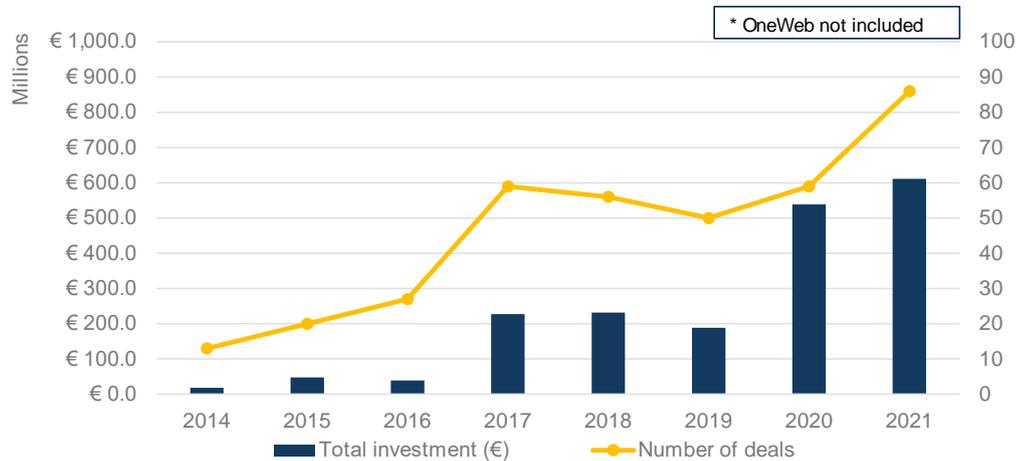
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38. "Space Venture Europe 2020 – Entrepreneurship and Investment in the European Space Sector", ESPI, May 2021 (figures exclude investment in OneWeb).

39. "Start-Up Space Report 2021", Bryce Tech, (US investment data for 2021 not available).

launched by the European Commission will likely provide further impetus to this trend in Europe.

**Figure 4: Private investment in European space start-ups**



Source: ESPI.

Investment in the downstream is particularly difficult to track given the broad range of companies with varying ties to the space sector. With growing cross-fertilization between space and other technologies, the distinction between investment within and outside the space sector is poised to become increasingly blurred. In the downstream, the development of applications probably also largely benefits from investment in other sectors. Space Capital, which tracks investments in all space-induced businesses, reported a total investment volume as high as \$28.4bn in 2020.<sup>40</sup>

The growth of private investment provides a great complement to public budgets and offers new options to explore venturesome concepts, but it also influences the orientation of public policies. The objective of stimulating private investment is now high in the European space policy agenda, pushing public institutions to consider a new role of fostering the conditions for entrepreneurship and business development in the space sector. The more prominent place given to these issues also raises new questions regarding the alignment of institutional and commercial objectives, on one side, and synergies between public and private funding instruments on the other. If the rise of private investment and entrepreneurship in the space sector has been mostly a discrete objective in Europe, the progress of this trend is now putting pressure on public institutions to further reflect on how to leverage these developments to support other public objectives. In this regard, the situation in Europe contrasts greatly with that in the United States where entrepreneurship and private investment emerged initially to address new business opportunities offered by the more service-oriented procurement policy of US agencies,

40. "Space Investment Report", Space Capital, available at: [www.spacecapital.com](http://www.spacecapital.com).

from launch services to geospatial data. A comparable change has yet to occur in Europe, by creating a very different market ecosystem for new business ventures. However, the materialization of market prospects will be essential to continue attracting investment in the future and to support the scale-up of promising European ventures. In this regard, the growth of public demand, in particular through anchor tenancy contracts, is the main support that start-ups expect from European institutions, well before support for raising capital.<sup>41</sup> In this context, Europe will have to find new ways to integrate new ventures in public programs. This will become a central concern in the future.

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41. "Space Venture Europe 2020", *op. cit.*

# Toward a European Strategy for the Space Downstream Economy?

French economist Nicolas Bouzou theorized that space is poised to play a bigger role in the next innovation and economic cycle, with the space sector becoming increasingly dominated by demand and market logics.<sup>42</sup> This long-term perspective is taking shape through commoditization of the space infrastructure, increasingly steered toward its function of enabler of commercial applications and public services. This trend is marked by vertical integration of business models covering the development of new space solutions, from system design up to service provision, and by the emergence of new concepts such as Satellite as a Service. These developments are profoundly changing the way space capabilities are being developed, exploited, and marketed, offering new options for users to benefit from these capabilities. In this new context, challenges for upstream and downstream developments are blending with the implications for the space sector at large.

This change of paradigm takes place in a context of market shifts and growing international competition, which is also reshuffling the forces at play on both competition and market fronts. The stakes are high for Europe to find new ways to foster the conditions for the business development and technological advancement of the space sector. The challenges ahead resonate particularly loudly in Europe where space applications have become the main driver of industrial activity and where commercial and socio-economic considerations play a major role in space policy. Adapting to this new ecosystem will require new approaches to spur and drive the development of space applications, associated with clearly defined governmental and commercial needs and objectives. So far, public strategies and programs in the space sector have focused principally on the offer side through system procurement and technology programs, with some consultation of public user groups and private industry. Recent developments in the United States, where public agencies are embracing and encouraging the development of a more service-oriented ecosystem, suggest that new public strategies should involve a greater focus and effort on the demand side, tilting the balance toward ends rather than means as appropriate. This

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42. N. Bouzou, "Could the Next Long Term Economic Cycle Be That of Space? Schumpeter Applied to Space Economics", *Voices from the Space Community*, No. 81, ESPI, November 2017.

is a matter of reinforcing processes to assess users' needs, aggregating demand to support a European single market for space applications, enabling long-term anchor contracts and shifting requirements from systems to services.<sup>43</sup> Paving the way for future market opportunities will eventually prove capital-intensive and venturesome for European companies. The public sector also has an essential role to play in increasing investment capacity, easing business, supporting competitiveness on international markets, and reducing risk overall. With the growth of private investment, new challenges are also emerging to ensure synergies between public and private interests. The emergence of public markets and aggregated demand for commercial solutions will be decisive to ensure that the growth of private investment will stand the test of time.

It would be unfair to say that Europe has remained passive. New initiatives to support the emergence of New Space trends in Europe are already showing great results in terms of boosting investment and entrepreneurship. Europe is taking successful steps. However, the need for a major leap is becoming more pressing. In this regard, a change of mindset will also be necessary to embed challenges for space downstream applications into broader strategic stakes for Europe that go far beyond the space sector. Paradoxically, the development of New Space trends and the rise of new opportunities and challenges for the space sector seem to have revived national ambitions and strategic interests in Europe. Although the recent Space Summit organized in France demonstrated that European leaders are taking stock of the rising stakes for Europe to remain a key global space player, with major announcements in the fields of secure connectivity, space traffic management and synergies between space and defense, the effort to accommodate national interests in common programs was evident. In this regard, reconciling the wants of national governments on the industrial policy front with the needs of European cooperation to structure offer and demand will probably be a central challenge that will require new arrangements. The fair distribution of activities across EU member states has always been a central concern of European industrial policies, not only in the space sector. So far, the preferred approach seems to rely on addressing these questions on a case-by-case basis while calling for broader agreements such as for the European Launcher Alliance, which has been on the table for more than two years, with little progress. If such an approach has the merit of enabling Europe to progress, as demonstrated during the Space Summit, it also tends to “gather dust under the rug”, with the risk of threatening the success of the ambitious programs that Europe is launching during their implementation.

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43. “Evolution of the Role of Space Agencies”, *ESPI Report*, No. 70, ESPI, October 2019.

The digital transformation is profoundly affecting industries and markets, making technology and business ecosystems increasingly centered on connectivity and data. In this context, a new symbiosis between the space sector and the digital economy is emerging, where satellites are becoming a component of the digital infrastructure and where space-based data are mingled in the wider data value chain. Regrettably, Europe is not best equipped to foster and leverage these new synergies while the United States and China are progressing apace as part of determined global strategies. In this regard, it is essential that space become an integral dimension of the renewed European ambitions in the domain of the digital economy and sovereignty. Paving the way for future space applications will require a new type of involvement from European actors in the digital economy as well as closer cooperation across industries to foster synergies for developing new concepts and architectures. Climate change and rising security challenges will also be central drivers for the future of space applications, and similar considerations apply.

Ultimately, the current developments are challenging the relevance and effectiveness of a space strategy focused principally on programs and industry, leaving aside applications and markets in the mists of an unclear objective of “maximizing the socio-economic benefits of space”. A recent report from the European Court of Auditors underlined that the European Union lacks a strategy to foster the uptake of space services.<sup>44</sup> Beyond this, Europe is probably lacking a strategy for developing the space downstream economy overall. The lack of a consistent European approach supported by a tailored action plan is hindering Europe’s capacity to tackle several challenges that are becoming increasingly more pressing, including: fostering synergies between space and other relevant economic sectors, ensuring that space is adequately integrated in other European strategies, consolidating European and national interests around a coherent vision, organizing public demand, and structuring European marketplaces, etc. Overall, a core objective of such a downstream strategy should be to provide additional steps toward developing a more user-oriented and market-driven approach to space in Europe. Eventually, the preparation and adoption of a dedicated downstream strategy would support a change of mindset in Europe and ensure that the development of space applications answers not only the logic of return on investment but dovetails with broader strategic and political concerns.

The European Union and its member states have already acknowledged these issues. In its conclusions on “Orientations on the European contribution in establishing key principles for the global space

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44. “EU Space Programmes Galileo and Copernicus: Services Launched but the Uptake Needs a Further Boost”, *op. cit.*

economy”,<sup>45</sup> the Council of the European Union already “HIGHLIGHTS the need for the space industry to make full use of the rapidly developing opportunities as well as for the public sector to promote market-based approaches”. The document also “STRESSES the essential role of the downstream sector for evaluating and implementing public policies, in particular the green and the digital transition of economies and societies [...] and ACKNOWLEDGES the importance of fostering cooperation between space and non-space sectors in areas such as energy, environment, agriculture, health, connectivity and mobility”.

It is now urgent that these conclusions be translated not only into new initiatives but also into a coherent and consistent European strategy for space downstream applications. This complement to the current European strategy would enable moving beyond the logic of socio-economic benefits and addressing new challenges with a coherent and integrated European approach and action, from space programs to markets and from space systems to applications. Such an integrated European strategy is also necessary to address the full dimension of new sovereignty issues that Europe is facing, and which are not limited to the availability of an infrastructure but also to its exploitation to address the strategic needs of Europe, from economic resilience and sustainable development to security and defense. In this respect, such an integrated space strategy should probably give a more central place to international ambitions and, as a minimum response to the global ambitions of the United States and China, underline how European sovereignty and strategic autonomy can become a driver of joint institutional and commercial developments in the space sector.

The transformation of the space sector calls for a transformation of public action.

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45. Conclusions of the Council of the European Union on “Orientations on the European Contribution in Establishing Key Principles for the Global Space Economy”, November 2020.





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