# FutureEuropeJournal

*On Space* | **Issue #08** | *November 2026*



## EUROPE LOOKS TO THE STARS

*Its Mission to Become a True Space Power*

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# FROM THE EDITOR

## *New Ambitions*



**Maartje Schulz**

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Dear Readers,

It is my pleasure to introduce you to the first rebranded edition of the Future Europe Journal. On a spectacular topic I must say – Europe's race to space!

In a world marked by geopolitical competition, technological transformation, and growing uncertainty, Europe must unite and strengthen its capacity to shape its own future. The answer to this moment is to embrace innovation and build a confident, forward-looking Europe that "owns the future" by investing in the technologies and capabilities that will define global power in the twenty-first century.

Space is one of those defining domains – and one that is not talked about enough. Satellites and space infrastructure underpin our security, the modern economy, and the functioning of our societies, from navigation and telecommunications to climate monitoring and disaster response. They support critical sectors such as transport, agriculture, defence, and energy, while enabling new industries and technological breakthroughs.

The EU faces a moment of strategic decision when it comes to space: should it remain a junior partner to the United States and a passive observer of China's growing ambitions, or should it assert itself as a sovereign space power? At ELF, we want Europe to go for the latter. By developing its own space capabilities, Europe strengthens its ability to act independently when necessary while remaining a reliable partner for international cooperation.

For us liberals, space also embodies our vision of a confident and innovative Europe. Investments in space technology drive scientific progress, support thriving businesses, and open new opportunities for entrepreneurs, researchers, and citizens.

Stepping up our game in space requires something from us though. It requires us to be more ambitious, invest more, and to join our collective efforts. As Anselm Küsters argues in this edition, Brussels is writing the traffic rules while its rivals are staking their claims beyond them. And according to Defence and Space Commissioner Andrius Kubilius, we are still too fragmented in the space domain.

Space is not simply a scientific or technological field; it is a strategic and exciting pillar of Europe's future. A Europe that leads in space is a Europe that is stronger, more competitive, and more autonomous. By further investing in space today, Europe will take a decisive step toward becoming the confident global superpower that can secure prosperity, security, and freedom for the generations to come.

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# NURTURING A SHARED EUROPEAN SPACE AMBITION:

## *Europe as a Full-Fledged Space Power*




**ESPI**

*The European Space Policy Institute, founded in 2003, is Europe's independent think tank for space based in Vienna, Austria – the world's capital of space diplomacy.*
*Since July 2025, ESPI has operated as a Quasi-International Organisation within its host nation, Austria. Working in a non-profit capacity, ESPI:*

- *Promotes European space policy on an international and global level*
- *Provides independent analyses, proposals and recommendations to European decision-makers and institutions*
- *Raises public awareness on strategic space issues*

*In line with its policy vision, ESPI2040: Space for Prosperity, Peace and Future Generations, ESPI advocates for a strong Europe as a partner to the world.*

*Ph CREDIT*
*ESA-D. Ducros*

Europe's space-related ambitions have entered a new phase. Rising geopolitical competition, rapid technological and industrial disruption, and unprecedented levels of public investment are reshaping the role of space in European security, competitiveness, and sovereignty. Yet becoming a full-fledged space power requires more than increased budgets or additional capabilities: it requires the capacity and autonomy to define and pursue shared political, economic, and security objectives. Building on Europe's strong institutional, scientific, and industrial foundations, this article examines the challenges that continue to limit its space power, from fragmentation and strategic dependencies to global competition and insufficient private investment. It argues for a shared European vision that combines national and European capabilities while preserving their diversity, and identifies security and defence, international engagement, and exploration as key areas for stronger collective action.

## Introduction: From the policy value of space to elevated political ambition

Space data and services are a game-changing tech domain with far-reaching implications. Space is currently undergoing a revolutionary shift, comparable to the internet economy 20 years ago, the consequences of which affect every aspect of life.

Space underpins security and prosperity as never before, from surveillance and missile defence to mobility, agriculture, and broadband connectivity. Space policy, in turn, has a transformative, cross-sectoral impact on economic growth, peace and security, and on numerous key policy areas at the European level, such as the digital agenda, tech sovereignty, and climate action.

In contrast to the various tech revolutions of yesterday (the creation of the internet, semiconductors, AI, and so on), Europe can still actively shape this one. It must respond by scaling up its ambition, developing world-class capabilities, and leading globally.

Yet becoming a space power requires more than increasing budgets, launch cadence, or the number of satellites in orbit. Space power rests on the combination of capacity and autonomy: the ability to develop, deploy, operate, and benefit from space capabilities in support of independently defined political, economic, and security objectives. Europe possesses considerable capacity but has historically fallen short of the level of autonomy that characterises a full-fledged space power.

On the one hand, as of 2026 Europe finds itself embarking on a new trajectory, with security (supported by an unmatched volume of recently announced funding) becoming a core policy rationale underpinning Europe's public space investment. On the other hand, when it comes to its activities in space, Europe is blinded by the bright light of disruption of the global space ecosystem, driven by new industrial challengers such as SpaceX, the rise of space powers such as China, and broader transformations affecting even the most established institutional and industrial actors.

The race is on.

## Foundations for Europe's space power ambition

Europe has all the prerequisites to develop into a full space power, by bringing together, federating, and developing the excellence of its European, national, and industrial capacities. The governance of Europe's space sector is rooted in what is commonly referred to as the 'Governance Triangle', comprising the European Union (EU), the European Space Agency (ESA), and individual European states.

Europe's achievements in space have already produced unprecedented benefits, supporting and transforming other policy domains and sectors of the economy. These include:

- Europe's Earth observation and navigation capabilities (EU Copernicus, Galileo, and EGNOS), which empower modern precision farming and enhance global food security;
- satellite communications services provided by European satellite operators, which bring the internet to remote regions and help bridge the digital divide and connect people; and
- Europe's latest generation of satellite meteorology, dramatically improving weather forecasting and disaster preparedness and response.

Yet Europe's paradoxical reality is that the whole can appear smaller than the sum of its parts. World-class scientific, institutional, and industrial capabilities do not automatically translate into

space power when critical dependencies remain and capabilities are fragmented across different frameworks. The situation is compounded by a lack of ambition, especially evident when comparing Europe's vision for space with that of other powers.

Important questions remain across the spectrum of space power, including in human spaceflight and exploration, space situational awareness, and space control, as well as in the integration of space into security, defence, and foreign policies. Dependencies have also been historically visible in critical technologies, components, materials, and digital building blocks.

The cost of inaction, especially at times of mounting geopolitical and geoeconomic pressure, is considerable. Europe risks losing the heritage of excellence it acquired over past decades and becoming increasingly dependent on foreign solutions, as happened in the digital and semiconductor industries, where it has failed to reap the commercial benefits of industries it once helped develop and build.

### Challengers and disruptors

Once a global export leader across a spectrum of products and services, Europe is now facing a massive challenge in terms of receding market shares, low profitability, and an ecosystem that is no longer able to keep pace with global disruptions and evolving needs. This is not merely an industrial challenge: without the ability to innovate, scale, and compete internationally, Europe will struggle to sustain the capabilities and autonomy required to pursue its strategic objectives.

The US Golden Dome, the US–China race to the Moon, and global tech giants' hyper-scaling (as seen in SpaceX's IPO) each have the potential to outstrip European efforts to develop autonomy and digital sovereignty.

In terms of international cooperation, while European partnership with the US remains a central goal, the future is as uncertain as ever. On the other hand, powers like Canada, Japan, South Korea, and Australia – also vying to gain a foothold in space – increasingly seek to deepen ties with Europe, offering a significant opportunity to strengthen global influence through space-related activities.

Beyond programmatic cooperation and multilateral diplomatic engagement, economic diplomacy can also play an important role in bolstering Europe's position in global space markets. Compared to its competitors, Europe has so far made less systematic use of such instruments to support its companies in international markets. Japan, for example, has actively aided in the overseas expansion of its space industry by identifying opportunities in partner countries, promoting Japanese satellite-based services abroad, and linking industrial objectives with broader international cooperation. Europe could similarly make greater use of its diplomatic and economic instruments to enable European space companies to access global markets.

### Measuring European ambition: Following the money trail

Until 2025, Europe invested a mere 0.07% of its GDP (or €14 billion per year) in space activities, almost exclusively in the civil domain. The US has historically invested roughly five times more in absolute terms via NASA and the defence sector.

The trend shifted in 2025, with an unprecedented volume of new European investment. Some €35 billion was announced in space projects for security and defence in Germany, and €22.3 billion was pledged at the ESA's latest ministerial meeting in November 2025. Breaking down these budgetary numbers, roughly 80% of public space budgets in Europe still fall within national programmes and around 60% of European public funding is implemented through ESA.[1] An increase in EU space-related funding is likewise expected to materialise in the upcoming negotiations over the 2028–2035 Multiannual Financial Framework. These developments show that Europe has shifted its position on space to an extent almost unimaginable a year ago.

Stimulating entrepreneurial growth in space and attracting private capital at scale remains Europe's Achilles' heel. Europe's private investments in space ventures in 2025 amounted to €1.4 billion, accounting for only 12% of investment in the global space market. While the global figures showcase a 60% year-over-year increase, Europe's performance indicates a year-on-year decrease of 8%.[2]

2025 saw unprecedented European concern with the role of space for security and defence, reflected in a series of announcements and new programmes. Defence money is increasingly funding space infrastructures, a trend poised to continue, at least in the short and medium term. Moreover, Europe's defence industry is increasingly partnering with the

**"EUROPE RISKS LOSING THE HERITAGE OF EXCELLENCE IT ACQUIRED OVER PAST DECADES AND BECOMING INCREASINGLY DEPENDENT ON FOREIGN SOLUTIONS, AS HAPPENED IN THE DIGITAL AND SEMICONDUCTOR INDUSTRIES, WHERE IT HAS FAILED TO REAP THE COMMERCIAL BENEFITS OF INDUSTRIES IT ONCE HELPED DEVELOP AND BUILD."**

1. ESPI, 'A Field Guide on European Space Governance', 26 January 2026. https://www.espi.eu/reports/europe-an-space-governance/.

2. ESPI, 'Space Venture 2025: Global Investment Dynamics', 8 May 2026. https://www.espi.eu/reports/space-venture-2025/

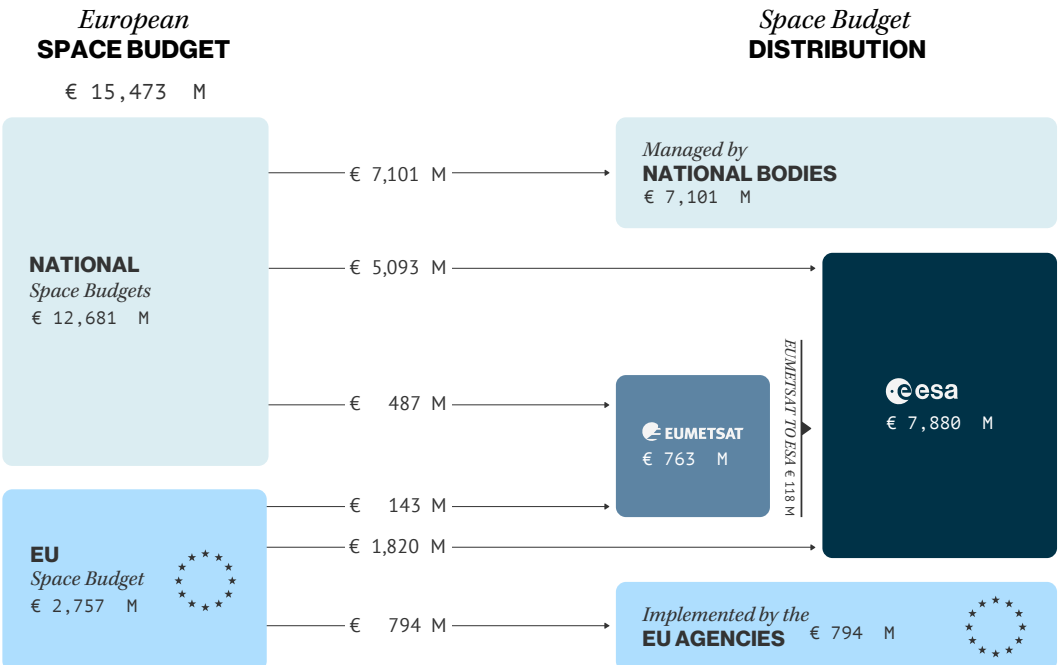



*Figure 1: Consolidated European space budget 2024. (Source: ESPI analysis)*

space industry through investments, acquisitions, or partnerships.[3] The military use of space continues to dominate policy debates in Europe, with space viewed not only as a shield but as a sword – a tool of deterrence.

Although Europe's security and defence awakening is omnipresent, space power cannot be reduced to military space power. Security capabilities are one pillar of space leadership, alongside economic competitiveness, technological autonomy, science, exploration, and international influence. A Europe that strengthens 'military space' while falling behind in launch capacity, digital infrastructure, exploration, or commercial innovation would remain an incomplete space power.

At the same time, the ongoing emphasis on security and defence raises important questions about civilian oversight, governance, and the risks associated with an increasingly contested and militarised space environment. Developing credible security capabilities should therefore go hand in hand with efforts to ensure responsible behaviour, manage escalation risks, and maintain Europe's commitment to the peaceful and sustainable use of space.

## National vs European channels of action

As a rising number of European countries increase their national space investments, striking the right balance between national ambitions and shared European objectives will become increasingly important. A whole-of-Europe approach should build on national programmes, flexible intergovernmental mechanisms and the EU Space Programme, while enabling capabilities developed and owned at different levels to work together effectively. Greater interoperability and pooling and sharing of assets can allow national and European systems to reinforce one another while remaining under the control of their respective owners.

A shared European space ambition does not, however, imply greater centralisation. Europe's diversity can become a true asset if national, ESA, EU, and commercial capabilities are increasingly designed to operate as parts of a coherent European architecture and vision. 'It takes a village' to translate a collective European vision into action, with each actor contributing according to their priorities and goals.

The objective should not be to eliminate national ambition but to ensure that nationally owned capabilities can support European scale, resilience,

3. ESPI, 'Rising Together? The (Re)Convergence of Europe's Space and Defence Industries', 28 March 2025. https://www.espi.eu/reports/rising-together-the-re-convergence-of-europes-space-and-defence-industries/.

and strategic effect through interoperability, pooling, and sharing.

In terms of concrete domains within the broader realm of space policy and space power, the following three areas are crucial for collective Europe action, transcending national boundaries.

- Science and exploration – addressing the need for a coherent political narrative and rapid development of Europe's capabilities.
- Security and defence – addressing the need for impactful federation and integration of capabilities for shared continent-wide benefit.
- Competitiveness and innovation – addressing the need to nurture talent and develop ecosystems in which innovation can flourish.

### From space economy to space for the economy

Emerging markets for space technology, such as direct-to-device connectivity or space-based data centres, showcase the transformative potential of space for the wider economy, and leading global initiatives, public or private, are frequently pursued outside of Europe's borders. Speed and innovation will be critical for international success.

The value of space as a public good in the wider economy has long been underestimated in Europe, preventing fiscal justifications for further investment. At the same time, US Big Tech firms (Google, Amazon, and SpaceX) and China are increasingly betting on space as one of the economic drivers for the future, primarily focusing on communications but also considering the potential for in-space compute and networking (including data centres, optical and quantum communications). Europe must acknowledge that competitiveness and sovereignty are mutually dependent.

### The way forward

Becoming a full-fledged space power will require Europe to combine robust sovereign capabilities with a competitive and innovative space industry, backed by the political will and autonomy to define and pursue its own objectives.

Europe's ability to remain a credible global space power will depend on its capacity to act collectively, think strategically, and modernise its institutional framework to meet the ambitions of the next decade. Space policymaking in Europe must strengthen coordination among the EU, ESA, and national actors, streamline decision-making processes, and secure renewed political commitment at the highest level.

A call for a shared European vision should not be read narrowly as an EU project. The United Kingdom, Norway, and Switzerland are integral to Europe's space capability and are long-term members of the ESA. The same logic applies at the regional level: initiatives like the increasing Arctic cooperation in space at the political level show how subgroups of states are already organising around shared geographic and strategic interests. The challenge for European policymakers is to design a pragmatic model of cooperation and synergies and leverage it at speed and scale to stay competitive in global terms.

Space power has an important external dimension. Europe should translate its technological capabilities, economic weight, and reputation as an international partner into diplomatic influence, enabling it not only to participate in international initiatives but also to shape agendas, partnerships, standards, and rules.

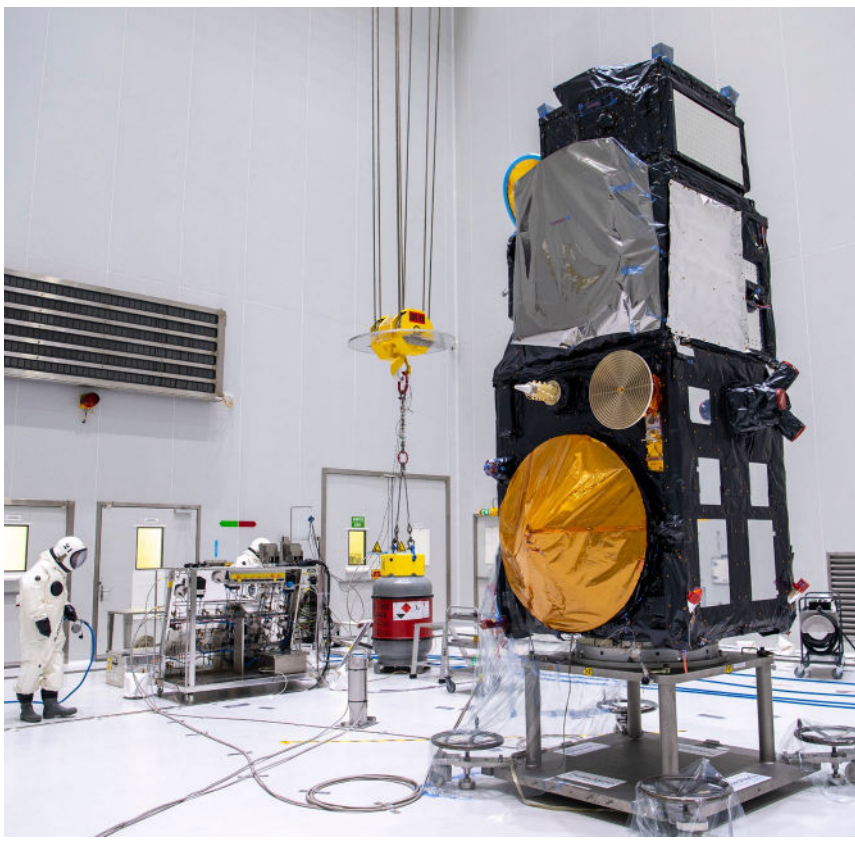
To this end, we propose the following three concrete space policy recommendations to European legislators.

- Agree on measures to foster the federation of national and European space developments, particularly for security and defence. Europe should develop practical mechanisms for interoperability, pooling, and sharing that allow nationally owned and European capabilities to operate as part of a more coherent architecture. The objective should not be centralisation but the ability to combine distributed assets and capabilities at European scale when common interests require it.
- Define a shared international strategy to give Europe a leading role on the global stage. Europe should make more systematic use of space as an instrument of international cooperation and economic diplomacy, identifying priority partners and aligning diplomatic, institutional, and industrial engagement. This would help Europe translate its technological and economic capabilities into greater influence over international partnerships, markets, standards, and rules.
- Define Europe's own goals for exploration and the emerging cislunar economy. Europe needs to take a clearer political stance about where it intends to lead, which capabilities

**"THE VALUE OF SPACE AS A PUBLIC GOOD IN THE WIDER ECONOMY HAS LONG BEEN UNDERESTIMATED IN EUROPE, PREVENTING FISCAL JUSTIFICATIONS FOR FURTHER INVESTMENT."**

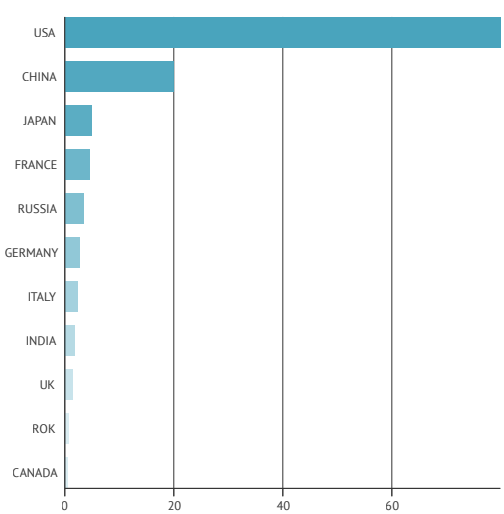
it considers strategically important to retain or develop autonomously, and where cooperation with international partners offers the greatest value. Such a strategy should also identify the principles, rules, and standards that Europe wants to help shape as economic and institutional activity beyond Earth orbit expands.

The unprecedented shift in European space ambition over recent years is a starting point, signalling an interest in participating in a wider ecosystem. Increased budgets alone will not make Europe a space power. Yet the newfound momentum behind space-related activities is evident. The decisive test will be whether Europe can translate this momentum into greater capacity, autonomy, and collective action – and ultimately into the freedom to define and pursue its own objectives in and through space. ■



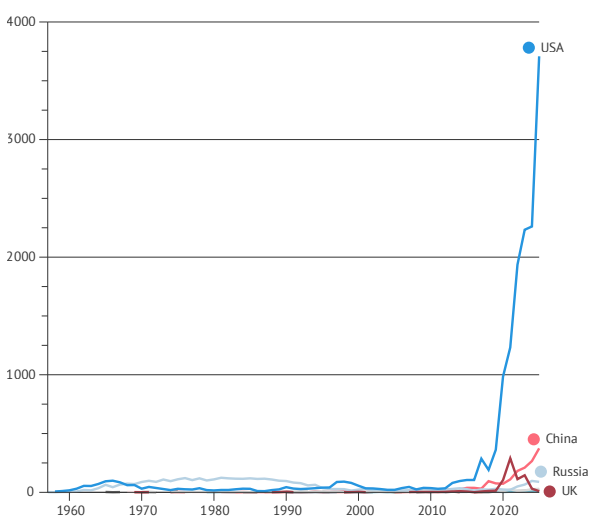
*Right: Fuelling Copernicus Sentinel-3C satellite Ph CREDIT ESA-CNES-AVIO/Optique vidéo du CSG–JM. Guillon*

*Figure 2:*
*Space budget (billion dollars).*




*(Source: https://orbitalradar.com/space-economy/government-space-budgets)*

*Figure 3:*
*Annual number of objects launched into outer space.*




*(Source: https://ourworldindata.org/space-exploration-satellite)*



## ESA'S RAMSES SPACECRAFT

*In 2029, ESA's Ramses mission will accompany asteroid Apophis during its rare close flyby of Earth, studying how our planet's gravity affects it and helping improve planetary defence.*

*Artist's impression of ESA's proposed Rapid Apophis Mission f or Space Safety (Ramses).*
*Ph CREDIT*
*ESA-Science Office*

# AN INTERVIEW WITH



## *Andrius Kubilius*

European Commissioner
for Defence and Space

*Andrius Kubilius is the European Commissioner for Defence and Space, leading EU efforts to strengthen European defence cooperation alongside Member States. A former two-time Prime Minister of Lithuania, he served in the Lithuanian Parliament from 1992 to 2019, chaired the Homeland Union party, led the opposition on several occasions, and was a Member of the European Parliament.*

**"SPACE IS ESSENTIAL FOR OUR STRATEGIC AUTONOMY – WE NEED A STRONG SPACE SECTOR TO BE ABLE TO OPERATE INDEPENDENTLY IN THE WORLD."**

**You have both defence and space in your portfolio. How do you see the relationship between the two?**

Space is decisive on the battleground, allowing armed forces to communicate, observe and navigate. Space is also itself a target, and can be subject to cyber and physical attacks such as radio frequency interference or proximity operations. In short: "Defence of Space and Space for Defence." We must use our space assets for defence while at the same time protect our space systems.

Space is essential for our strategic autonomy – we need a strong space sector to be able to operate independently in the world. And as the Draghi and Letta reports show, strong space and defence sectors are also vital for our European competitiveness.

By its very nature, space can be dual use for both military and civilian users. The same assets that track wildfires can also monitor critical facilities or the effects of military mobility. Space is a crucial strategic enabler – a capability that makes it possible to defend and deter.

At the same time, defence and space face many of the same challenges: national fragmentation, vulnerable supply chains, need for innovation and highly skilled staff.

One difference: while we have built very successful European space projects – Galileo for navigation, Copernicus for observation, and soon IRIS² for connectivity, we are only now starting to build pan-European projects for defence, like the Eastern Flank Watch or Drone defence initiative.

In our Roadmap for Defence Readiness 2030, we also announced a European Space Shield. This is the first time, Europe embarks on such an endeavour. I want our successes in space to inspire our efforts in defence, including the European Space Shield!

### Looking 20 years ahead, what should Europe's place in space be?

By 2046, I will be a young man of 90 years old. Europe will be leading in the space revolution and will be a driving force in the global space economy, which will have surpassed the trillion euro mark by then, creating jobs and growth here in Europe.

Europe will be present in the orbital and lunar economy. Europe already today masters the Earth-Moon system. It is only a matter of acceleration. Our in-space operations and services will have expanded with many industrial spin-offs thanks to infrastructure in orbit and on the Moon. Europe will have dramatically improved its position in access to space, addressing challenges such as reusability, resilience, and responsiveness with a network of space ports. We will be launching and returning rockets from and to European soil.

Space will be present in all sectors of our economy as the new digital. Because Europe will have a complete suite of operational space systems in all space domains for services on Earth.

Efforts in space will transform life on Earth: bring internet to every corner of Europe, make self-driving cars the rule and not the exception, help our farmers grow food, help business to trade, save lives at sea and help to deal with climate change – much that we are already doing today and much more that we can't yet imagine. And we will have effective defence of space and defence from space.

### What concrete political choices and investments are needed now for Europe to achieve that ambition?

All of this will only happen if we take the right decisions today. If we create a single Space market with the Space Act. If we tackle our governance and fragmentation challenges to work in unity: the European Union and the European Space Agency together with all other national and European actors.

If we carefully target industrial competitiveness and talent attraction and retention with our universities and research organisations. If we invest as a Union 131 billion in space and defence – as the Commission proposed – for the next multi-annual EU budget (MFF). Concretely in the short term, that means the EU Council and European Parliament need to approve the Space Act and ambitious space spending for the next MFF. ▸

If we continue to improve Galileo and Copernicus – for example with the low Earth orbit positioning navigation and timing (LEO PNT) and the Earth Observation Governmental System; if make IRIS$^2$ a massive success, if we invest in revolutionising our rocket launchers and space ports; if we strengthen our space situational awareness capacities, both on the ground and in orbit; if we invest in critical space technologies, in-space operations and services and accelerate the orbital and lunar economy.

We are at the start of a space revolution – if we want to lead in that space revolution we need the political courage to be ambitious and act European. We can be proud of our great European space systems and we should not shy away from changing the paradigm, work in unity and accelerate our ambition!



*Top: Spectrum takes flight from Andøya Spaceport. Ph CREDIT ESA, Isar Aerospace, Wingmen Media– S. Fischer*

# THE PERSPECTIVE



***Pim van Strien***

*Alderman of Noordwijk with responsibility for Economy, Finance, Mobility and Space, including the NL Space Campus. A former VVD Member of the Dutch House of Representatives, he has worked extensively on innovation, industrial policy and economic development, with a particular interest in the role of space in Europe's future competitiveness.*

## FROM GRASSLAND TO STRATEGIC AUTONOMY

### *What Noordwijk Can Teach Europe About Turning Innovation into Companies*

Europe is very good at research. We are much less good at turning research into companies and industrial capacity that grow here. Too often, European ideas find their investors, customers, or production elsewhere. Mario Draghi's 2024 report on European competitiveness has put that problem back at the centre of the debate in Brussels. In Noordwijk, we see what that means every day.

Our municipality is home to ESA's European Space Research and Technology Centre (ESTEC), one of Europe's largest concentrations of space expertise. Around it, Noordwijk and our partners are building the Space Campus, with ESTEC as its anchor. We want to turn that expertise into new companies and strengthen Europe's autonomy, security, and future economic growth.

**Building an ecosystem**

We started by creating the conditions an ecosystem needs. This means connecting the curious by creating places. It's very simple: bricks. Labs, coffee machines, and organising network events and workshops. CometLab gives scientists and entrepreneurs a place to test early ideas. New multi-tenant buildings create space for young companies. Short-stay housing helps international engineers settle in. EUSPA's Galileo Reference Centre is already located on the campus. The Eagle-1 Optical Ground Station follows soon. Next comes Basecamp, the meeting place at the heart of the campus.

That matters because ecosystems thrive on everyday contact. A founder with an idea bumps into an ESA Engineer and knows where to go next. A shared coffee machine can matter more than people think. Serendipity matters. Today, the ecosystem already consists of 90 companies employing 4,500 people.

Government should not decide which company succeeds. But it can create the conditions in which success is possible. And there lies the real challenge. In today's global competition, land, infrastructure, and stable rules may no longer be enough. Governments may need to step up. That means doing more than facilitating: choosing where to build strength, investing for the long term, and using procurement, capital, and infrastructure to help ecosystems scale.

**Let's get rid of the sheep**

Case in point: between ESTEC and the rest of the campus lies space. Literally. A patch of green land where sheep still graze. For years, it was seen as undeveloped land, but that is changing. Around the field, the campus is taking shape: the first facilities are open, companies are moving in and the ecosystem keeps growing.

Land is scarce in our busy part of the country, and there are good reasons to protect open space. Even so, Noordwijk, the province, and the Ministry of Economic Affairs have chosen to reserve this area for the space sector. Not an easy choice, politically or financially, but it is starting to pay off.

So, when I say "let's get rid of the sheep", I mean something concrete. The next step is to speed up the conversion of this field into a vibrant extension of the European space ecosystem, with labs, clean rooms, classrooms, and meeting facilities, built with proper care for the landscape. That step needs investment and commitment beyond what a single municipality can provide.

Leaving it underused would be a strategic mistake. Europe wants to become less dependent on others for critical technologies, data, communications, navigation, and security. That ambition will not be achieved on paper in Brussels or national capitals. It will be built where Europe already has unique capabilities, and Noordwijk is one of those places.

Governments are often better at waiting than deciding. After years of discussion, waiting starts to look like caution, when it is simply a choice not to choose. In Noordwijk, we chose not to wait.

**What we have learned**

Building a campus takes patience. It takes ten years or more, while budgets and political priorities change every few years. Agreements therefore have to outlast a single budget cycle. That means



*Ph CREDIT Finn Hechenberger, Unsplash*

long-term commitment, investment in infrastructure, procurement opportunities, and access to risk capital.

At the same time, companies cannot wait. A promising start-up will not sit out years of permits, procurement decisions, or investment rounds. Faster permitting, simpler procurement, and easier access to risk capital matter now.

Europe also has to resist the urge to give every region a share of every programme. Strategic autonomy requires focus. In Noordwijk and the surrounding region including Leiden, Delft, Den Haag, that focus already exists: in earth observation, optical communication, and launcher components. A few kilometres away, the autonomous systems cluster in Katwijk adds to that regional strength. Knowledge and talent feed off each other when they are close together. Europe gets more value for its money by helping existing strong ecosystems grow.

**A task for member states**

Countries hosting major European research institutions carry a particular responsibility. The Netherlands hosts ESA's largest establishment and should invest in turning that knowledge into companies, scale-ups, jobs, and strategic industrial capacity here. If it does not, someone else will offer those companies the space, capital, or infrastructure they need.

Europe has plenty of knowledge. The question is whether we can turn it into the companies, technologies, and industrial capacity on which our future autonomy depends. Strategy documents alone will not do that. It takes places, investment, and governments willing to make decisions that pay off only years later, willing to choose, and to stay the course.

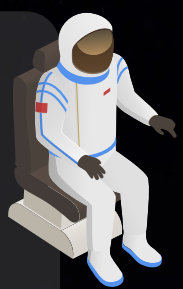
In Noordwijk, one of those choices is right in front of us: a field between ESTEC and the growing Space Campus where sheep still graze.

Let's get rid of the sheep. ■

# MOON EXPLORATIONS

Key Achievements by Country

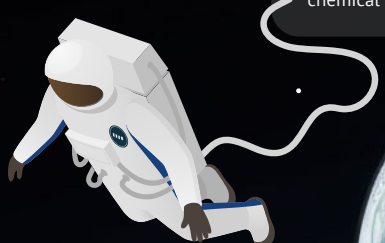
1. **1966**
   Luna 9: First soft landing on the Moon
2. **1969–1972**
   First humans and footprints on the Moon
3. **2003–2006**
   SMART-1: Europe's first spacecraft in lunar orbit
4. **2019**
   Yutu-2 rover on the far side of the Moon

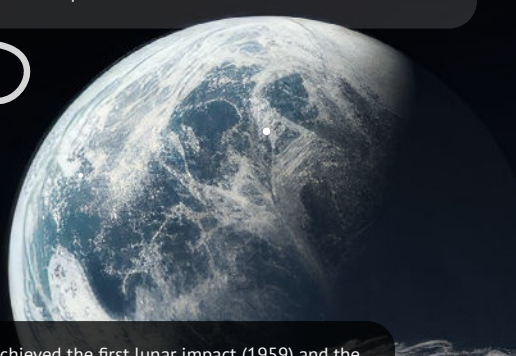




4. **China's Chang'e Program**: Pioneering in robotic exploration. First to land on the far side of the Moon (2019) and first to return soil samples from it (2024).

3. **ESA's SMART-1 (2003)**: Europe's first lunar mission. It tested a pioneering ion propulsion system and mapped the Moon's chemical composition before its controlled crash in 2006.

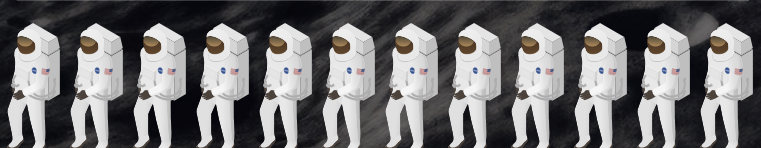




1. **USSR**: Soviet pioneers achieved the first lunar impact (1959) and the first robotic rovers (1970). After nearly five decades, Russia's modern return attempt (Luna-25) ended in a crash in 2023.



## 2 Astronauts who walked on the Moon



Apollo 11 1969 | Apollo 12 1969 | Apollo 14 1971 | Apollo 15 1971 | Apollo 16 1972 | Apollo 17 1972

In total, **12 American astronauts** (all US citizens and part of NASA's Apollo program) walked on the surface of the Moon between 1969 and 1972



*Top: Where no European has gone before, a mighty drill will. This bold tool is set to search for water ice beneath the Moon's surface in 2027.*
*Ph CREDIT*
*ESA-A. Conigli*

*Bottom: Artist's impression of a Moon exploration scenario. The Terrae Novae 2030+ strategy roadmap has ambitious goals for each of the three exploration destinations low Earth orbit, Moon and Mars.*
*Ph CREDIT*
*ESA–ATG*

# THE BIG DILEMMA

## *Should Europe Build Its Own Capabilities In Space—Or Rely On Pragmatic Partnerships With Others?*

Should Europe invest in strategic autonomy in space, even when developing and maintaining European capabilities may be more expensive and less competitive? For example, should Europe develop the independent capacity to launch its own astronauts and pursue ambitions such as the Moon? Or should it prioritise spending on pressing needs on Earth and take a pragmatic approach in space, relying on strong and potentially cheaper cooperation with partners such as NASA and commercial actors such as SpaceX?



**Sergey Lagodinsky**

*Member of the European Parliament for the German Greens and serves as Chair of the Parliament's Delegation to the Euronest Parliamentary Assembly. A lawyer and expert on democracy, foreign affairs and digital policy, he is also the Greens/EFA rapporteur on the EU Space Act, where he advocates for a more integrated, secure and competitive European space sector.*

**Greens/EFA MEP Sergey Lagodinsky, shadow rapporteur for the EU Space Act:**

Strategic autonomy has become a central theme in Europe's debate on digital sovereignty, and space policy is now part of it. The Commission has proposed a €131 billion Defence and Space Window under the European Competitiveness Fund, five times the previous budget. It has doubled the budget and powers of the EU Agency for the Space Programme (EUSPA). And with the EU Space Act, it is finally building a common market for space services, putting EU and non-EU operators on equal footing. The Satellite Regulation, which reallocates frequencies away from SpaceX, is the clearest sign yet of this shift.

In all of this, Europe's space sector is growing. New companies are joining global supply chains, and Isar Aerospace has completed successful launches. But against the bigger picture, Europe is nowhere. Starlink dominates satellite broadband, Amazon is building its own constellation, and China has ambitious plans of its own. Europe remains a marginal player, dependent on others, with payloads still being shipped to French Guiana.

This failure is the legacy of a world we are no longer living in. We grew up believing another country's strength was our advantage too. We now find that another country's strength has become our dependence, and a lever others can pull against us. This shift runs through every digital market, and space, at the heart of the sovereignty debate, sits right at its centre.

But for every failure there is an opportunity for change, and that change for Europe requires building a strategic parallelism in its space policy: to pursue sovereignty and competitiveness together by deepening integration. On one side, back domestic industry fully: more funding for launch sites, a single market for EU space activities, a stronger EUSPA working with ESA, an EU space exploration programme, EU preference rules in the Space Act, and a Union Registry for Space Activities that makes safety central, since unsafe activity only rewards those already in orbit. On the other side, hold non-EU operators to the same rules as EU ones, the true purpose of the Space Act, and the reason it has drawn fierce opposition from the Trump administration and Elon Musk.

Autonomy and competitiveness are not rivals; they are one goal, achievable only if Europe builds the real scale for both the industrial and geopolitical reality of our times. Germany and Italy, by trying renationalising space policy and keeping it a narrow military affair, are choosing irrelevance instead. The moment is now. Acting as one Europe, or drifting into division, will decide which future we get.

# THE EUROPEAN SPACE ACT GOVERNS ORBIT, NOT AMBITION:

## *While Brussels Writes the Traffic Rules, Its Rivals Are Staking Their Claims Beyond Them*





**Anselm Küsters**
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*Ph CREDIT SpaceX, Unsplash*

The EU Space Act treats orbital congestion as a management problem when, in reality, the more significant issue is who will soon own and control economic and military activity in space. At a time when private capital and geopolitical rivals are racing towards the Moon and orbital computing infrastructure, the regulation focuses on safety, cybersecurity, and environmental rules for satellites. An ordoliberal approach would instead set enforceable rules on property, liability, and market access. Before its rivals' regimes harden into fact, Europe should work towards a companion framework for lunar and cislunar rights, paired with a competition-oriented industrial policy that turns prototypes into mass production.

## Introduction

Picture what tech billionaire and SpaceX founder Elon Musk has promised investors this year: a constellation of solar-powered satellites, each carrying racks of the specialised chips that already fill data centres on Earth. Rather than drawing power from an increasingly strained terrestrial grid, these satellites would radiate their waste heat straight into space and generate their own electricity from the sun, permanently and independently. That would make them a source of artificial intelligence (AI) quite literally above the cloud. Musk claims that, within two or three years, 'orbital computing' will be the most cost-effective location for AI.[1]

Achieving cost parity with terrestrial data centres would depend heavily on SpaceX's Starship, the company's experimental mega-rocket, becoming fully reusable. That would allow launch costs to drop from today's rate of roughly $1,500 per kilogram to approximately $100.[2] Even then, a broken chip in orbit cannot be replaced as it could be by a technician on Earth, so operators would need to launch far more chips than necessary just to cover for future failures. And since satellites cannot yet exchange data fast enough to work as one linked computer, the concept would be most relevant for running an already-trained model.

Despite these challenges, Musk realised his ambition in February 2026 by merging SpaceX with his AI company xAI, valuing the combined entity at $1.25 trillion. Four months later, SpaceX went public in the largest initial public offering in history, raising $75 billion for Musk's dream of making humanity an interplanetary species. In other words, Musk pitched the idea of orbital computing to investors while raising capital for it, which gave him a financial interest in making the technology sound imminent. His track record of predictions also warrants some caution: a 2026 review of 150 public commitments made by Musk regarding SpaceX found that 19% were more than a year late or remained unfulfilled, with half of the goals being too vague to be verified at all.[3]

But whether or not orbital data centres arrive on schedule, taking them seriously is useful because it raises a broader question that European policy has so far mostly avoided: what does Europe want space to be for? What is the vision beyond a well-regulated traffic system?

The EU Space Act, proposed by the European Commission in June 2025, was still being negotiated when Musk began discussing orbital AI.[4] Its objective is to harmonise safety, cybersecurity, and environmental rules for satellites in low Earth orbit, the crowded band of space within about 2,000 kilometres of Earth. With more than 7,000 satellites and new mega-constellations now sharing that orbit with over 36,500 debris fragments,[5] this is certainly a good idea, as current collision-avoidance practices are rapidly becoming obsolete. But the Act's horizon stops at low Earth orbit, despite the United States, China, and Russia already staking out claims on the Moon and beyond.

The flaw is one of ambition, yes, but also of regulatory philosophy: while Brussels is fine-tuning orbital traffic, it should be focusing on questions of market access, ownership, and liability, as better rules of the game would enable a European space economy to compete in the frontier that will actually matter.

## Fine-tuning traffic, EU-style

Once the EU Space Act has been enacted, operators would need to register with a 'Union Register of Space Objects', obtain e-certificates, and undergo inspections.[6] A single certification regime replacing national audits could help small firms and space startups looking to expand their operations across the internal market. However, the aerospace industry has warned that double structures and unnecessary bureaucracy would hinder the sector rather than help it.[7] For example, large constellations of hundreds of satellites would be subject to daily collision screening and orbit-selection analysis.

1. Alexander Saeedy et al. (2026), 'Inside Elon Musk's $1.25 trillion AI and space megamerger', Wall Street Journal, 5 February, https://www.wsj.com/tech/elon-musk-xai-spacex-merger-2896ae1e.

2. A. Parrack and F. Moorhouse (2026), 'Will we really put data centers in space?', Forethought, 12 May, https://www.forethought.org/research/will-we-really-put-data-centers-in-space.

3. K. Grind, J. Ewing, A. Krolik, and L. Boyce (2026), 'Elon Musk laid out 602 goals: We counted how many he hit', New York Times, 2 June, https://www.nytimes.com/interactive/2026/06/02/technology/elon-musk-promises-spacex-ipo.html.

4. European Commission (2025), Proposal for a Regulation of the European Parliament and of the Council on the Safety, Resilience and Sustainability of Space Activities in the Union (EU Space Act), COM 2025/335 final (European Commission: Brussels), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52025PC0335.

5. E. Ancona et al. (2025), 'Technical, Legal and Policy Aspects of an International Space Traffic Management Framework', Acta Astronautica, 232 (July), 356–363. https://doi.org/10.1016/j.actaastro.2025.02.028.

6. A. Küsters and M. Kullas (2025), EU Space Act, cepPolicyBrief no. 6/2025 (Beckesepp: Centrum für Europäische Politik (cep)), https://www.cep.eu/fileadmin/user_upload/cep.eu/Analysen/COM_2025_335_EU-Space_Act/cepPolicyBrief_EU-Space-Act_COM2025-335_Long_Version.pdf.

7. C. Visser (2025), 'Space Act: ESA warns against duplicate structures', Table.Briefings, 7 November, https://table.media/en/europe/news/space-act-esa-warns-against-duplicate-structures.

The parallel with Europe's approach to another new frontier, AI, is instructive here. Despite its admirable, human-centric intentions, the AI Act has introduced legal uncertainty and high reporting burdens, which is why critics have called for a shift 'from global rule setter to strategic technological leadership'.[8] The same critique applies to space: the Commission estimates that manufacturing costs could increase by up to 10% due to the requirements of the Space Act, while launch providers could pay €1.5 million for authorisation of a heavy launch and around €100,000 for authorisation of each product.[9] A continent that measures its ambition by the sophistication of its certification schemes rather than by what it can build risks repeating the pattern from the digital platform era: meticulous rules but limited capacity.

Europe's recent experience serves as a cautionary tale. When Russia withdrew its Soyuz launch services in response to EU sanctions imposed following the invasion of Ukraine, Europe's dependencies became clear. Due to subsequent delays to Europe's main heavy-lift rocket, Ariane 6, and the in-flight failure of the smaller Vega C launcher, Europe found itself in a 'launcher crisis'.[10] While the plans for today's €2.4 billion IRIS$^2$ secure-connectivity constellation and the legal harmonisation envisaged under the Space Act are sensible responses to Europe's market fragmentation and security risks, neither addresses the bigger picture, such as the lack of reusable launchers. The continent's main weakness lies in scaling up, not inventing: it can build sophisticated prototypes, from Ariane rockets to high-end satellites, but lacks the industrial and procurement capacity to produce them on a large scale.[11] This leaves programmes such as Galileo, Europe's GPS alternative, dependent on SpaceX. ▸

**Where the real contest has moved**

While Brussels finalises its rulebook, the frontier is moving. In late 2025, a SpaceX rocket carried the

**"WITHOUT A MEANS OF ACQUIRING ENFORCEABLE TITLES TO LAND OR RESOURCES ON THE MOON, MARS, OR ASTEROIDS, LONG-TERM INVESTMENT, FINANCING, AND EXTRACTION LACK A SECURE FOUNDATION."**




*Ph CREDIT SpaceX, Unsplash*

8. Cappelletti et al. (eds) (2025), Designing Europe's Future: AI as a Force for Good, European Liberal Forum, Techno-Politics Series, no. 4, https://liberal-forum.eu/wp-content/uploads/2025/11/Designing-Europes-Future_ELF-Study.pdf.

9. European Commission, Proposal for a Regulation of the European Parliament and of the Council on the Safety, Resilience and Sustainability of Space Activities in the Union (EU Space Act). 25 June 2025.

10. A. Küsters et al. (2024), Strategic Autonomy in EU Space Policy: Securing Europe's Final Frontier Through Launches, Laws, and Space Mining, cepInput no. 4 (Beckesepp: Centrum für Europäische Politik (cep)), https://www.cep.eu/de/eu-themen/details/strategic-autonomy- in-eu-space-policy-cepinput.html.

11. Kevin Thiele (2026), 'Von Der Manufaktur Zur Massenherstellung: Wie Europa Bei Der New Space Economy Aufholen Kann', Europe. Table, 29 July.

first ever NVIDIA H100 chip sent into space, which allowed the startup Starcloud to train a small language model entirely in orbit. Not to be outdone, a few months later, a Chinese aerospace company uplinked Alibaba's AI model, Qwen, to its orbiting satellite computing centre. From start to finish, the process of sending a query from Earth and returning an answer took less than two minutes.[12]

A separate state-linked programme completed nine months of testing 'orbital edge AI' shortly afterwards.[13] While these attempts do not resolve the physical constraints (such as thin bandwidth and the need for repairable hardware) they illustrate how quickly it has become possible to dream of orbital AI.

Unlike the Cold War rivalry, this new 'space race' involves states and private companies competing simultaneously.[14] By July 2026, 70 states had signed the Artemis Accords, the US-led framework governing lunar conduct. Meanwhile, China and Russia are planning to build a joint International Lunar Research Station. Construction is expected to begin in the late 2020s, with the station becoming operational in 2036. To experts, these two initiatives signal 'the progressive bifurcation of the international space community around two contending – and potentially conflicting – pathways for future lunar exploration activities'.[15] Europe has signed the Artemis Accords, but it has no independent lunar resource framework of its own.

## The wrong kind of rules

To fill this gap, Europe must first decide what its rules should be aimed at. One helpful guide is ordoliberalism, developed by the German economist Walter Eucken and his colleagues from the Freiburg School amid the collapse of the 1930s and 1940s. After the war, Germany had to determine how a state could establish a functioning market economy from the ruins of totalitarianism.

The approach that was eventually adopted combined firm rules on money, competition, and property with minimal interference in how firms operated within these parameters. This framework of the 'social market economy' helped transform a defeated economy into the 'economic miracle'.

Transferring the ordoliberal approach to space extends its logic to a setting that its authors never considered, which raises some challenges. Eucken wrote for a state that could enforce property and competition rules within its own borders, whereas space has no sovereign authority. Article II of the Outer Space Treaty rules out national appropriation. However, this has not stopped states from legislating around the prohibition. Consider, for instance, the US Commercial Space Launch Competitiveness Act of 2015, which gives American citizens and companies the right to own and sell any resources they extract from celestial bodies, or Luxembourg's 2017 space resources law, which states that 'space resources are capable of being appropriated'. De facto rules of possession will emerge from this kind of unilateral legislation and the custom it generates, making it a race between jurisdictions.

Applying the Freiburg programme beyond Earth shows that an economic order works better when the rules are set deliberately and in advance than when they emerge from whomever acts first. Indeed, German publicist Rainer Zitelmann argues that the main constraint on commercial space activity will be institutional not technical.[16] Without a means of acquiring enforceable titles to land or resources on the Moon, Mars, or asteroids, long-term investment, financing, and extraction lack a secure foundation. Kelly and Zach Weinersmith offer a more sceptical version of this concern, arguing that the physiological, legal, and psychological obstacles to permanent settlement are severe enough to produce sovereignty disputes long before anyone settles anywhere.[17] Whether one leans towards Zitelmann's optimism or the Weinersmiths' caution, both views converge on the same institutional gap: property, liability, and governance rules must be established early on, rather than being left to whoever plants a flag first.

There are some Freiburg School-style levers for enforcement. Articles VI and VIII of the Outer Space Treaty oblige states to supervise their private operators and grant the state of registry jurisdiction over its objects. Combined with conditional access to the European market, this would enable the EU to govern conduct in space without claiming any part of it. The ordoliberal lesson was not that the state should do less but rather that it should focus on setting the conditions for competition – a distinction worth revisiting at a moment when Europe's space plans are caught between US commercial dominance and aggressive Sino-Russian planning.

However, thus far, the EU has chosen not to number among the authors of these kinds of rules.

12. Xinhua News Agency (2026), 'China's tech firm deploys AI model in orbit, unveils massive space computing plan', 27 January, https://en.people.cn/n3/2026/0127/c90000-20419386.html.

13. SatNews (2026), 'China completes in-orbit testing of the "three-body" AI computing constellation', 16 February, https://satnews.com/2026/02/16/china-completes-in-orbit-testing-of-three-body-ai-computing-constellation/.

14. S. M. Pekkanen (2019), 'Governing the New Space Race', AJIL Unbound, 113, 92–97. https://doi.org/10.1017/aju.2019.16.

15. A. Jones, 'China, Russia reveal roadmap for international Moon base', SpaceNews, 16 June, https://spacenews.com/china-russia-reveal-roadmap-for-international-moon-base/.

16. 16 R. Zitelmann and G. Kofler (2026), Weltraumkapitalismus (Munich: LMV).

17. K. Weinersmith and Z. Weinersmith (2023), A City on Mars: Can We Settle Space, Should We Settle Space, and Have We Really Thought This Through? (New York: Penguin Press).

Given that a dominant space settlement could perpetuate the values of its founders for billions of years, the stakes of this omission are high. While the Space Act's incident reporting deadlines and environmental footprint declarations may be technically sound, they only address a small part of Europe's wider challenge. Establishing rights to orbital slots, lunar resources, and liability when something goes wrong would enable European market participants to compete in this new arena and help allocate orbital and lunar assets efficiently – much as the Industrial Revolution depended on secure property claims.

**What Brussels should fix instead**

Orbital data centres and lunar mining deserve more techno-optimism, not dismissal as science fiction. Sociologist Ruha Benjamin argues that societies caught between exhausted narratives need new stories of shared prosperity to move past them.[18] Maarten Hajer and Jeroen Oomen make a similar claim about environmental policy, which too often fails to envisage futures that differ from the present.[19] Societies that cannot narrate a future that is different from the present tend to reproduce earlier failures, and space policy is no exception. The difficulty for Europe is not a lack of technical competence – the success of Ariane and the precision of its science missions prove otherwise – but rather that debate about space rarely moves beyond defensive language about 'strategic autonomy' and 'resilience'.

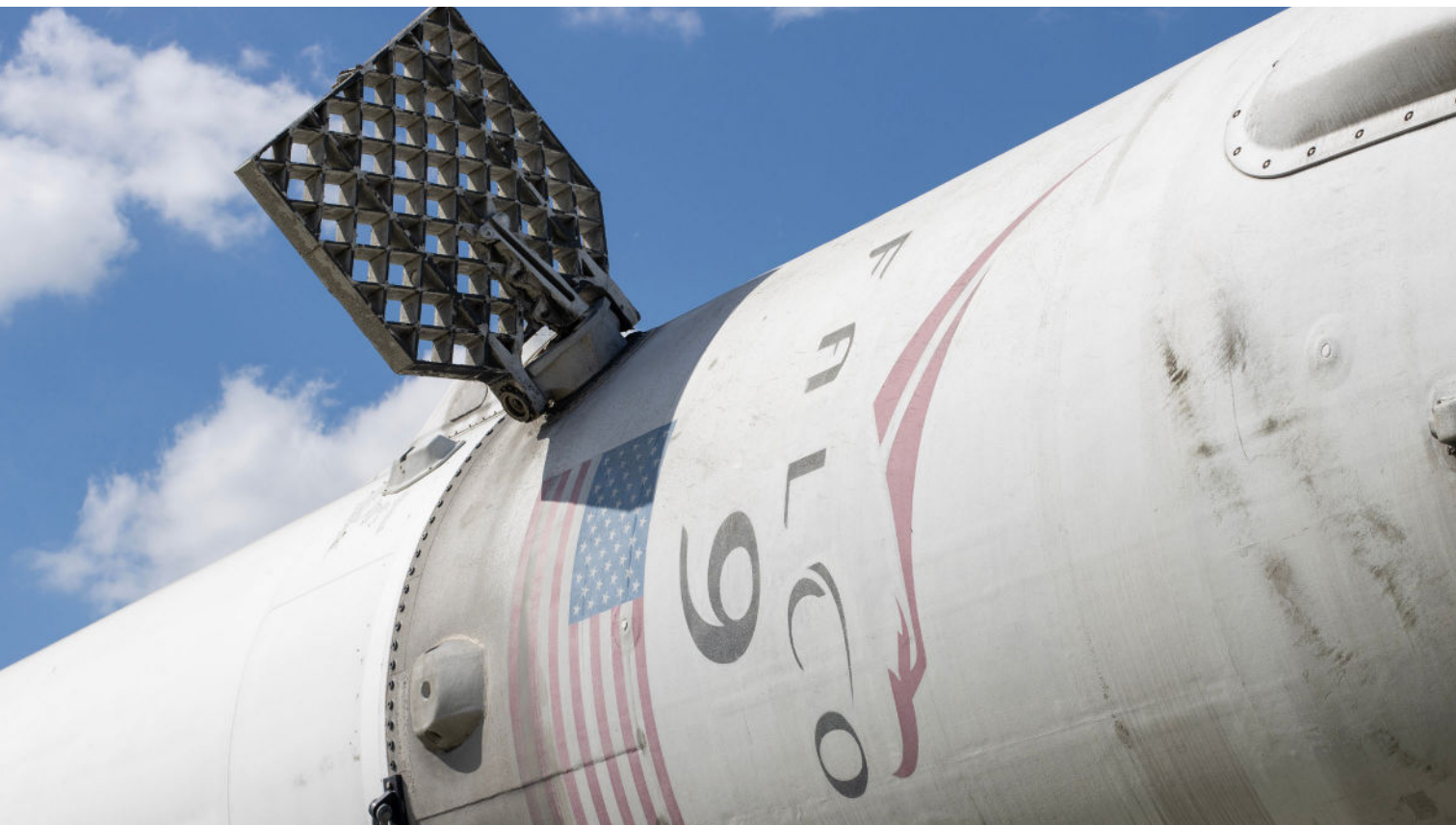
Instead of prescribing how satellites behave, Brussels should focus more on a positive vision for space and broader questions of ownership and competition. Firstly, the Commission should develop its own framework for space resources before the informal norms established by US and Chinese actors become tomorrow's reality. Secondly, the traditional principle that industrial contracts flow back to each Member State in proportion to its funding should give way to competitive award across launcher and satellite programmes, so that pooled public demand can build an industry capable of mass production.[20] While this principle of 'geographical return' has long been a condition of French, German, and Italian cooperation, these states have already begun to move beyond it: the recently pioneered 'fair contribution' model first runs the competition and then allows them to subscribe – in the knowledge of which national firms have won. Extending 'fair contribution' to satellite programmes and applying ordinary competitive procurement to EU-funded

**"SOCIETIES THAT CANNOT NARRATE A FUTURE THAT IS DIFFERENT FROM THE PRESENT TEND TO REPRODUCE EARLIER FAILURES, AND SPACE POLICY IS NO EXCEPTION."**

18. R. Benjamin (2025), Imagination: A Manifesto (New York: W. W. Norton & Company, Inc.).

19. M. A. Hajer and J. Oomen (2025), Captured Futures (Oxford: Oxford University Press).

20. Thiele, 'Von Der Manufaktur Zur Massen-herstellung'.





*Top: Space launch preparation. Spaceship SpaceX Crew Dragon, atop the Falcon 9 rocket, inside the hangar, just before rollout to the launchpad. Ph CREDIT Adobe Stock*

*Opposite page: Closeup of the SpaceX Falcon 9 two-stage reusable rocket on display at Space Center Houston in Texas. Ph CREDIT Adobe Stock*

**"INSTEAD OF PRESCRIBING HOW SATELLITES BEHAVE, BRUSSELS SHOULD FOCUS MORE ON A POSITIVE VISION FOR SPACE AND BROADER QUESTIONS OF OWNERSHIP AND COMPE-TITION."**

programmes would be an efficient pathway forward. Thirdly, the European Union Space Programme should have its own foresight unit to anticipate techno-economic scenarios for lunar and orbital infrastructure. Finally, the EU should negotiate international liability rules for resource extraction and orbital AI infrastructure before projects reach that stage. Taken together, these four steps do what the Space Act does not: set clear market boundaries and then get out of the way. ■

# THE NEW HIGH GROUND:

## *How China Is Challenging Western Dominance in Space*




*Long march rocket ready for launch at Xichang-Center. Ph CREDIT Adobe Stock*



***Connor Horsfall***

*Policy adviser focused on space policy and strategy. He is also a China specialist and has written extensively on China-related issues, including Beijing's space ambitions, artificial intelligence development and Britain's China policy.*

Beijing views its space development as central to its national security and political legitimacy. China's ambition is to challenge US dominance and establish control over critical infrastructure. Through its Military-Civil Fusion strategy, Beijing is integrating commercial innovation into its defence requirements. Its lunar programme – to harvest south pole resources and build the International Lunar Research Station – is a direct challenge to US leadership. Space is a key domain for geopolitical competition and China's goal is to capture a dominant share of the lucrative space economy and the geopolitical leverage it offers. The country's space development offers lessons for Europe, whose space architecture remains constrained by fragmented national budgets and risk-averse procurement. The continent is at risk of becoming a secondary actor reliant on non-European technology. To avoid strategic lock-in, Europe must articulate a vision that leverages its comparative advantages and builds sovereign resilience.

## Introduction

Beijing is clear on the strategic importance of space. Ye Peijian, chief commander of China's Lunar Exploration Programme, explicitly outlined the reasoning behind this drive: 'If we don't go now when we can, future generations will blame us. If others go first, they will take control, and we won't be able to go even if we wanted to.'[1] There is a fundamental belief that those who establish an early foothold in space will dominate its vast resources, which are crucial for long-term national security.

Success in space provides the Chinese Communist Party with domestic legitimacy and international soft power. Unlike the ideological competition of the Cold War, today's space race focuses on controlling a domain that underpins modern civil infrastructure and defence. Space-based assets power communications, navigation, and climate monitoring; protecting these capabilities while maintaining the ability to disrupt an adversary's assets is now essential to modern warfare.

China's overarching ambition is to establish itself as the dominant global space power (Hangtian Qiangguo).[2] Through its Military-Civil Fusion strategy, Beijing is removing barriers between commercial innovation and its defence sector with the goal of rapidly building advanced military capabilities.[3] Core priorities include constructing the Guowang and Qianfan low Earth orbit (LEO) constellations, scaling commercial reusable launch capabilities, landing astronauts on the Moon by 2030, and building the International Lunar Research Station to challenge the US-led International Space Station.[4]

The situation is clear to both Beijing and Washington. NASA administrator Bill Nelson sums it up, 'It is a fact: we're in a space race.'[5] Beyond the relevance of national security, there are economic factors at play: the global space economy is projected to reach $1 trillion, offering vast returns across Earth observation (EO), launch services, and in-orbit manufacturing[6] Through the Belt and Road Spatial Information Corridor, Beijing is extending its satellite navigation, remote sensing, and communications networks to new markets across Africa, Asia, and Latin America.[7] These markets are becoming a commercial battleground between US and Chinese providers, which will have geopolitical consequences.

## Earth observation (EO) and remote sensing

China's EO landscape has developed rapidly. EO provides critical, real-time data essential for tracking a wide range of changes on Earth, from climate monitoring and predicting natural disasters to defence capabilities like monitoring troop movements.

Beijing had relied on the state-owned Gaofen (high-resolution EO system) network and military-grade Yaogan satellites to provide sub-metre optical and synthetic aperture radar reconnaissance. However, state-backed commercial providers are quickly transforming the ecosystem. Most notably, Chang Guang Satellite Technology (CGST) has deployed its commercial Jilin-1 constellation. This 108-strong constellation supplements state networks with enhanced revisit capabilities, offering greater flexibility and generating Earth.[8]

China's state capabilities are now competitive with US military-grade remote sensing performance. Yet Beijing is still striving to match the commercial sensor density and near-real-time refresh rates delivered by a small number of US commercial players. The US commercial market maintains an

1. M. Davis (2018), 'China, the US and the race for space', ASPI, 12 July, https://www.aspistrategist.org.au/china-the-us-and-the-race-for-space/.

2. 'China's Space Program: A 2021 Perspective' (White Paper) (2021), 29 January, https://www.cnsa.gov.cn/english/n6465684/n6760328/n6760333/c6813193/content.html.

3. U.S. Department of State, 'The Chinese Communist Party's Military-Civil Fusion Policy', https://2017-2021.state.gov/military-civil-fusion/.

4. The State Council Information Office (2021), 'China's Space Programme: A 2021 Perspective', http://www.scio.gov.cn/zfbps/32832/Document/1719693/1719693.htm.

5. B. Bender (2021), "We better watch out": NASA boss sounds alarm on Chinese moon ambitions', Politico, 1 January, https://www.politico.com/news/2023/01/01/we-better-watch-out-nasa-boss-sounds-alarm-on-chinese-moon-ambitions-00075803.

6. World Economic Forum and McKinsey & Company (2024), 'Space: The $1.8 trillion opportunity for global economic growth', https://www.weforum.org/publications/space-the-1-8-trillion-opportunity-for-global-economic-growth/.

7. The State Council Information Office (2016), 'China's Beidou navigation satellite system', https://english.www.gov.cn/archive/white_paper/2016/06/17/content_281475373666770.htm.

8. K. A. Bingen et al. (2026), Blurred Orbits: Inside China's Commercial Space Expansion (Washington, DC: CSIS). https://csis-website-prod.s3.amazonaws.com/s3fs-public/2026-07/260728_Bingen_Blurred_Orbits.pdf.

edge in real-time analytics, rapid global re-imaging, and broad international data distribution.

There is growing international demand for EO data to support critical state activities –including climate monitoring, agricultural management, urban planning, and pursuing national security aims – yet the upfront capital cost of building sovereign space assets remains too great for most nations. This forces many states into the binary choice between Western and Chinese space ecosystems for essential geospatial infrastructure. China's rapid EO development could offer Beijing geopolitical leverage in key regions and dominance in a strategically important domain. The necessity of EO data to a country means whoever owns and controls the data will have significant leverage.

**Satellite constellations (Guowang and Qianfan)**

Satellite constellations provide the global, low-latency broadband internet coverage and strategic communication redundancy essential for society to function. To secure critical sovereign infrastructure, China is deploying two LEO mega-constellations: the state-led Guowang (State Network) and the municipal–commercial hybrid Qianfan (Thousand Sails). Initiated to capture scarce radio frequency spectrum and orbital slots under the 'first-come, first-served' regulations of the International Telecommunication Union (ITU), these networks provide an alternative to US systems such as Starlink and Amazon Leo.

Guowang, managed by the state-owned enterprise China SatNet, aims to deploy roughly 13,000 satellites.[9] It functions as a national flagship programme prioritising secure military communications, rural broadband, and integrated space–ground infrastructure. Qianfan targets a 15,000-satellite architecture managed by Shanghai Spacecom Satellite Technology. While operating on a commercial business model focused on high-speed internet and direct-to-cell services, it receives strong strategic backing from the Shanghai municipal government and the Chinese Academy of Sciences, the world's largest research organisation.[10]

The state plays a crucial role by financially supporting this manufacturing ecosystem. Regional authorities in Shanghai and Beijing's Yizhuang Economic–Technological Development Area, one of China's leading commercial space clusters, directly fund and subsidise private satellite assembly lines and flat-panel production facilities, slashing unit manufacturing costs dramatically.

Starlink maintains a large capacity advantage with thousands of operational satellites, whereas China is actively scaling up its initial LEO batches. Because China's launch capability remains constrained compared to SpaceX's reusable Falcon 9 cadence, Beijing's focus is on locking down ITU spectrum allocations.[11] Beyond domestic coverage, China is packaging Qianfan and Guowang connectivity to capture international export markets across developing markets via Belt and Road partnerships. China's mega-constellations therefore provide both commercial broadband opportunities and geopolitical benefits.

**Launch capability and reusability**

China's launch ecosystem – the physical transport needed to deploy satellites, conduct scientific research, and enable space-based infrastructure and exploration – is undergoing a dramatic structural transformation. The state-owned China Aerospace Science and Technology Corporation occupies a leadership role in several areas: human spaceflight (through the Shenzhou spacecraft), the Tiangong space station, and lunar exploration (via its heritage Long March rocket family,[12] the latter named after the Red Army's military retreat during the Chinese Civil War).

However, to service forthcoming LEO mega-constellations – such as Guowang and Qianfan – Beijing is fostering a commercial launch sector to lower costs to SpaceX-like levels. Centred around Beijing's 'Rocket Street' innovation hub in Yizhuang, commercial and state-adjacent firms like LandSpace, CAS Space, Galactic Energy, and Space Pioneer are competing against one another for constellation deployment contracts.[13]

Despite this rapid industrial scaling, total launch capacity remains a key operational bottleneck. While China leads globally in traditional, state-driven annual launch cadence growth, it trails the US in total mass-to-orbit capability. This disparity is largely driven by SpaceX's operational dominance. The rapid reusability of the Falcon 9 – paired with the large payload capacity Starship will offer – allows the US to orbit thousands of satellites annually, while international competitors like Rocket Lab, Relativity Space, Blue Origin, and ULA are still scaling their operations.[14]

9. J. Suess (2023), 'Guo Wang: China's answer to Starlink?', RUSI, 3 May, https://www.rusi.org/explore-our-research/publications/commentary/guo-wang-chinas-answer-starlink.

10. P. Garretson et al. (2025), 'Thousand Sails: Why low Earth orbit is the next frontier for great power competition between the U.S. and China', AFPC, 3 February, https://www.afpc.org/publications/policy-papers/thousand-sails-why-low-earth-orbit-is-the-next-frontier-for-great-power-competition-between-the-u.s-and-chinathum.

11. C. Swope et al. (2025), Space Threat Assessment 2025 (Washington, DC: CSIS), https://www.csis.org/analysis/space-threat-assessment-2025.

12. U.S.–China Economic and Security Review Commission (2023), 2023 Annual Report to Congress (Washington, DC: U.S. Government Publishing Office), https://www.uscc.gov/annual-report/2023-annual-report-congress.

13. Y. Cheng and G. Yangqi (2026), '"Beijing Rocket Street": A launch-pad for accelerated development', China Daily, 26 January, https://global.chinadaily.com.cn/a/202601/26/WS6976c201a310d6866eb35aeb.html.

14. Center for Strategic and International Studies (2024), Space Threat Assessment, CSIS Aerospace Security Project (Washington, DC: CSIS.), https://www.csis.org/analysis/space-threat-assessment.



Chinese commercial providers are trying to bridge this gap. LandSpace's methane-fuelled Zhuque-3 and CAS Space's Kinetica-2 represent efforts to transition from expendable rockets to reusable medium- and heavy-lift platforms.[15] Achieving routine booster recovery and rapid turnaround will determine whether China can break free of its domestic launch constraints and challenge US dominance in the global commercial launch market.

## In-space servicing, assembly, and manufacturing

Previously, everything sent into space had to be fully built and launched from Earth. In-space servicing, assembly, and manufacturing (ISAM) has removed those physical limits. It is best defined as a suite of capabilities that enables spacecraft to be refuelled, repaired, and manufactured directly in space rather than relying on pre-assembled payloads launched from Earth.

China's ISAM ecosystem is centred around the Tiangong (Heavenly Palace) space station, a testbed for long-duration orbital logistics, module manipulation, and autonomous servicing. Tiangong's exterior features a sophisticated pair of crawling robotic arms – measuring 10 metres and 5 metres – capable of carrying out delicate structural transpositions, relocating multi-tonne payloads, and assisting 'taikonauts' (Chinese astronauts) during extravehicular activities.[16] China plans to periodically dock its upcoming Xuntian optical space telescope directly to Tiangong for routine maintenance, refuelling, and hardware upgrades, creating a low-cost servicing framework.[17]

China has also developed its Shijian-series satellites for its Rendezvous and Proximity Operations. The Shijian-21 satellite has successfully grappled a defunct BeiDou navigation satellite in geostationary orbit and towed it into a graveyard orbit, while newer assets like Shijian-25 are making progress on-orbit refuelling, life-extension technologies, and orbital inspections.[18]

The US maintains an advantage in commercial and military servicing, as shown by NASA's ISAM initiatives and Northrop Grumman's SpaceLogistics Mission Extension Vehicles (MEVs).[19] But the Shijian satellites and the Tiangong space station's continued success show that China is catching up. ISAM technologies designed for debris mitigation and orbital refuelling are inherently dual use. They can be easily adapted for counterspace activity such

15. Xinhua (2026), 'China launches Zhuque-3, achieving its first rocket recovery on land', https://english.news.cn/20260819/ffd1899a335a4819b4bb87e12443d-4f1/c.html.

16. X. Wang, Q. Zhang, and W. Wang (2023), 'Design and Application Prospect of China's Tiangong Space Station', Space: Science & Technology, 3. https://spj.science.org/doi/10.34133/space.0035.

17. A. Jones (2025), '2 private satellites undock after pioneering life-extension mission', Space, 18 April, https://www.space.com/space-exploration/satellites/2-private-satellites-undock-after-pioneering-life-extension-mission.

18. State Council of the People's Republic of China (2025), 'China launches test satellite for orbital refuelling', 7 January, https://english.www.gov.cn/news/202501/07/content_WS677c6feec6d-0868f4e8ee8fa.html

19. Jones, '2 private satellites'.

*Top: Sichuan Province China: Circular Radio Telescope Array in Remote Mountain Valley. Ph CREDIT Adobe Stock*

as satellite grappling or disabling adversary assets during a conflict. We should therefore expect the ISAM sector to continue its rapid growth trajectory as more state funding is put into related projects.

### Lunar architecture

China's lunar ambitions are primarily aimed at developing the infrastructure required for long-term resource extraction. The Chang'e series – named after the Moon goddess in Chinese mythology – shows the progress that has been made. Chang'e 4 completed the first far-side landing in 2019, while Chang'e 5 (2020) and Chang'e 6 (2024) successfully returned lunar samples from the near and far sides of the Moon. The next robotic phase – Chang'e 7 (probing south pole water ice) and Chang'e 8 (testing in-situ 3D printing with lunar regolith) – will lay the technical groundwork for base construction. This infrastructure will support China's crewed ambitions, which rely on the Long March 10 heavy-lift rocket, the Mengzhou crew capsule, and the Lanyue lunar lander.[20]

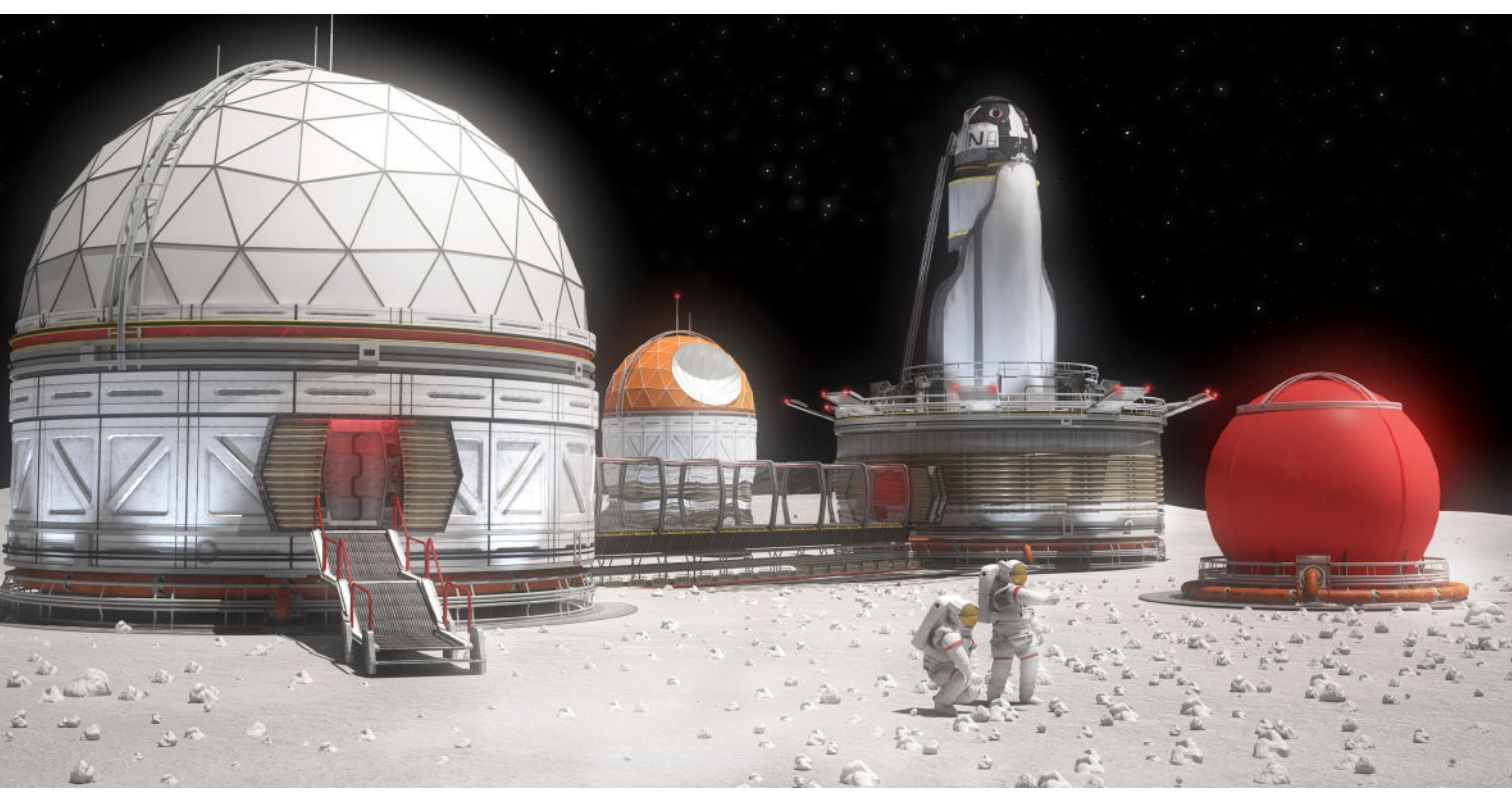
The primary geopolitical target is the lunar south pole. Permanently shadowed craters hold deep reserves of water ice, key for life support and conversion into hydrogen–oxygen rocket fuel for future Mars missions. The surface regolith offers energy-rich helium-3 for potential nuclear fusion reactors. There's also significant soft power to gain from lunar leadership.[21] China has created the International Lunar Research Station coalition as a direct institutional counterweight to the US-led Artemis Accords.

Washington maintains its early advantage in super-heavy hardware testing via SLS and SpaceX's Starship HLS. However, NASA's Artemis landing schedule faces persistent friction from commercial lander development delays.[22] In contrast, China benefits from centralised planning that insulates its space budget from short-term political cycles. With key hardware validation progressing smoothly toward a pre-2030 crewed landing target, Beijing's consistent prioritisation of its space programme is a major reason for its success.[23]

### Lessons for Europe

China's space development offers strategic lessons for Europe. Beijing's success stems from clear strategic direction, predictable long-term funding, and tightly integrated supply chains centred around innovation hubs like Beijing's Yizhuang district. Europe's space architecture remains constrained by fragmented national budgets and a risk-averse procurement ecosystem. This leaves the continent ▸

**"EUROPE MUST ADOPT A PRAGMATIC APPROACH: BUILDING SOVEREIGN RESILIENCE IN CRITICAL AREAS WHILE BRIDGING REMAINING GAPS THROUGH ACTIVE COLLABORATION WITH ALLIES SUCH AS CANADA, AUSTRALIA, AND JAPAN"**



*Bottom: 3D concept design of a Chinese base on the Moon's dark side. Ph CREDIT Adobe Stock*

at risk of becoming a secondary actor reliant on non-European technology.

To avoid this strategic lock-in, Europe must articulate a unified vision that leverages its comparative advantages. Pursuing strategic autonomy does not require embracing isolationism, especially as developing fully sovereign capabilities across every domain is not economically and technically feasible. Instead, Europe must adopt a pragmatic approach: building sovereign resilience in critical areas while bridging remaining gaps through active collaboration with allies such as Canada, Australia, and Japan. Prioritising operational realism allows Europe to address resource constraints through targeted international alliances.

While the EU's IRIS$^2$ constellation is a positive step towards sovereign satellite communications, more must be done to cultivate a competitive industrial ecosystem. Treating space infrastructure as fundamental to European economic resilience will generate demand signals and streamlining procurement processes will helping market entry for innovative SMEs. Europe must prioritise developing sovereign, reusable heavy-lift launch capabilities, easing market entry for SMEs, and moving away from national defence silos towards a unified continental space command with the goal of optimising resource pooling.

## Conclusion

China's rapid ascent as a space power reflects a long-term strategic ambition by the state, which has played an essential role in harnessing success in the sector. This is true for the US space sector too, which without state backing would not be in the position it is today. China's space strategy is rooted in securing domestic political legitimacy, benefiting from the growing space economy, and leveraging space capabilities for geopolitical rewards.

Beijing fundamentally believes its national security relies on successfully challenging the US in space capabilities. By integrating commercial innovation with defence priorities through its Military-Civil Fusion strategy, Beijing is building the critical infrastructure required to maintain sovereign control over its communication channels whilst also offering alternative technological ecosystems to emerging markets across the globe. As China's space capabilities continue to develop, nations are faced with a procurement choice between Western and Chinese providers for launch, EO, and communication satellites. This has created a new geopolitical frontier, which will see some nations procuring from historical allies and others turning to the providers that offer the best service and lowest prices.

There has been limited partnership between China and the West in space, reflective of the broader bilateral relationship. The recent launch of a joint space mission between the European Space Agency and Chinese Academy of Sciences to study how the Earth's magnetic field shields the planet from solar radiation is a small but positive first step.[24] As space debris increases and likelihood of conflict within the domain rises, space governance will become increasingly important. The current rules remain woefully inadequate and their improvement will require both sides to come to the table. This remains unlikely in the short term, but US–Soviet cooperation during the Cold War shows what is possible when nations – even rivals – share a common goal. ■

20. Bingen et al., Blurred Orbits.

21. European Space Agency (n.d.), 'Helium-3 mining on the lunar surface', https://www.esa.int/Enabling_Support/Preparing_for_the_Future/Space_for_Earth/Energy/Helium-3_mining_on_the_lunar_surface.

22. U.S. Government Accountability Office (2023), 'NASA Artemis Programs: Crewed Moon landing faces multiple challenges', GAO-24-106256 (Washington, DC: GAO, 2023), https://www.gao.gov/products/gao-24-106256.

23. U.S. Department of Defense (2024), Military and Security Developments Involving the People's Republic of China. Annual Report to Congress (Washington, DC: Office of the Secretary of Defense), https://www.defense.gov/News/Publications/Search/china/.

24. C. Cookson and I. Bott (2026), 'China and Europe launch rare joint space mission', Financial Times, https://www.ft.com/content/a2f-d6a17-4e0a-4db8-b0f4-9a1289f220b3?syn-25a6b1a6=1.

# CYBERSECURITY:

## *The Launchpad of European Space Sovereignty*




*Potential European-led orbital station. Ph CREDIT ESA/Artist's impression*



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Space power goes beyond launches. It is the capacity to operate, secure, and recover the systems, in orbit and on the ground, on which a society depends – and to do so independently. Europe learned this the hard way: a single cyberattack, in the opening hour of a war, disabled satellite terminals across six Member States. Strategic autonomy in space depends on closing two gaps: the first across the lifecycle of Europe's space systems, the second in the institutions that govern them. Cyber resilience is not an additional feature that is simply useful to have: it is central to space sovereignty.

## Introduction

Space power cannot be measured in launches. It is the capacity to operate, secure, and recover the systems, in orbit and on the ground, on which a society depends.

On the morning of 24 February 2022, roughly an hour before Russian tanks crossed into Ukraine, a wiper malware attack struck the KA-SAT satellite network operated by Viasat.[1] Tens of thousands of modems across Europe were rendered inoperable within hours.[2] Although the primary target appeared to be Ukrainian command-and-control infrastructure, the impact extended far beyond the battlefield: some 5,800 German wind turbines lost remote monitoring capabilities overnight, and broadband users were disconnected across France, Italy, Hungary, Greece, and Poland.

For Europe, this was a direct demonstration that space is no longer a separate domain. It is critical infrastructure serving civilian and military interests alike, and its attack surface is vast. A strike against the ground segment can reverberate across a continent within minutes.

More than four years on, the lesson has been only partly learned. The European Commission has proposed an EU Space Act;[3] the NIS2 Directive is being transposed across Member States;[4] the Cyber Resilience Act has entered the implementation phase;[5] and IRIS$^2$, the Union's secure connectivity constellation, is under development.[6] Yet the cybersecurity of Europe's space systems still rests on an architecture that is fragmented across institutions, incomplete across its lifecycle, and slow to adapt to emerging threats.

This article argues that European strategic autonomy in space depends less on infrastructure and more on bridging two critical gaps: a lifecycle gap and a governance gap.

## A computer in orbit is difficult to protect

Satellites are, at their core, software-defined computers in orbit. They send and receive data, execute commands, run operating systems, and depend on networked ground infrastructure to function. This makes them indispensable to modern life, but also vulnerable to many of the same cyber threats as other digital infrastructure. The difference is that a satellite cannot simply be taken into a workshop and fixed when something goes wrong.

That vulnerability begins long before launch. A satellite designed today may remain in service for two decades, while cyber threats evolve much faster. Although some software can be updated from Earth, every update must itself be transmitted securely. Decisions made during design and procurement can therefore determine the security of a mission for years to come.

Furthermore, the risks don't stop at the satellite. Space services depend on ground stations, software, suppliers, and user terminals. A weakness anywhere in that chain can disrupt the wider system. The attack on the Viasat network showed how an incident on the ground could interrupt satellite services across Europe without requiring an attack on a satellite in orbit.

The distinction between civilian and strategic infrastructure is also becoming harder to maintain. European systems such as Galileo, Copernicus, and IRIS$^2$ support public, commercial, and security-related purposes. This creates a governance problem: the infrastructure crosses sectors and borders, while regulatory responsibilities remain divided between EU institutions and national governments.

Cybersecurity in space therefore cannot be reduced to protecting individual satellites. Europe needs common safeguards covering the entire system, from design and procurement to ground operations and decommissioning a satellite at the end of its working life. Without that lifecycle approach, even an advanced European satellite is susceptible to issues stemming from the vulnerable infrastructure upon which it is dependent.▸

**"THUS, THE GAP IS NOT A COMPLETE ABSENCE OF CAPACITY, BUT THE LACK OF SECTOR-WIDE COORDINATION ACROSS PROGRAMMES, COMPANIES, AND NATIONAL JURISDICTIONS."**

### Europe's cybersecurity rules do not yet cover the whole space lifecycle

Protecting a space system requires securing its entire lifecycle, from design and procurement to operations, incident response, and decommissioning. Europe now has rules covering much of this lifecycle, but the obligations remain uneven and fragmented.

The proposed EU Space Act is an important step forward. Title IV, Chapter II, Articles 75–95 would establish a dedicated resilience framework for space infrastructure, covering risk management, access controls, cryptography, recovery planning, and incident reporting. Key provisions include Articles 78–79, 84–87, 91, and 93.[7] The difficulty is timing. Many satellites expected to launch in the early 2030s are already being designed, while some of the Act's detailed technical requirements will be defined later through delegated or implementing acts. The framework may therefore arrive too late to shape some of the systems it is intended to protect.

The gaps are most acute within procurement. European space procurement is dispersed across institutions including the European Commission, European Space Agency (ESA), EU Agency for the Space Programme (EUSPA), Member State defence ministries, and a growing number of commercial prime contractors. Needless to say, cybersecurity clauses may differ markedly across these channels and their supply chains. Operators of essential services cannot yet rely on a common European security baseline when purchasing space-based services. The memorandum of understanding signed by Airbus, Leonardo, and Thales in October 2025, welcomed as an industry consolidation measure, does not standardise procurement-level cybersecurity requirements.[8] Nor does the wider reform of EU purchasing rules close the gap.

Horizontal reform may narrow part of the gap on the buyer side. The Public Procurement Act proposed by the European Commission on 9 September 2026 introduces explicit security and resilience provisions, including cybersecurity, harmful strategic dependencies, and security-of-supply requirements for critical entities and infrastructure.[9] It is, however, a horizontal procurement instrument rather than a space-specific cybersecurity baseline, and therefore does not by itself harmonise the requirements applied across the different institutional channels through which European space systems are acquired. ▸

1. Viasat (2022), 'KA-SAT network cyber attack overview', 30 March, https://news.viasat.com/blog/corporate/ka-sat-network-cyber-attack-overview.

2. J. A. Guerrero-Saade and M. van Amerongen (2022), 'AcidRain: A modem wiper rains down on Europe', SentinelLabs, 31 March, https://www.sentinelone.com/labs/acidrain-a-modem-wiper-rains-down-on-europe/.

3. European Commission (2025), 'Proposal for a regulation of the European Parliament and of the Council on the safety, resilience and sustainability of space activities in the Union (EU Space Act)', COM/2025/335 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52025PC0335.

4. European Parliament and Council of the European Union (2022), 'Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union (NIS2 Directive)', Official Journal of the European Union, L 333, pp. 80–152.

5. European Parliament and Council of the European Union (2024), 'Regulation (EU) 2024/2847 of the European Parliament and of the Council of 23 October 2024 on horizontal cybersecurity requirements for products with digital elements (Cyber Resilience Act)', Official Journal of the European Union, https://eur-lex.europa.eu/eli/reg/2024/2847/oj.

6. European Parliament and Council of the European Union (2023), 'Regulation (EU) 2023/588 of the European Parliament and of the Council of 15 March 2023 establishing the Union Secure Connectivity Programme for the period 2023–2027', Official Journal of the European Union, L 79, https://eur-lex.europa.eu/eli/reg/2023/588/oj.

7. European Commission, 'Proposal for a regulation' (COM/2025/335 final), Title IV, Chapter II (Articles 74–95).

8. Airbus, Leonardo, and Thales (2025), Airbus, Leonardo and Thales sign Memorandum of Understanding to explore the creation of a European space champion [Press release], October, https://www.airbus.com/en/newsroom/press-releases/2025-10-airbus-leonardo-and-thales-sign-memorandum-of-understanding-to.

9. European Commission (2026), 'Proposal for a regulation of the European Parliament and of the Council on public contracts and concessions (Public Procurement Act)', COM/2026/590 final, 9 September, https://data.consilium.europa.eu/doc/document/ST-12969-2026-INIT/en/pdf.

These concerns are not merely juridical assessments. The stakes became clear in December 2025, when a threat actor claimed to have exfiltrated more than 200 gigabytes of ESA development assets – including private code repositories, build pipelines, and credentials – from servers operating outside ESA's corporate network. After the incident, ESA confirmed a breach affecting a small number of external collaborator servers and stated that only unclassified information was involved; the attacker's claims about the extent of the data stolen are yet to be independently verified.[10] The significance of the incident does not lie in the sensitivity of the information involved but in what it reveals about the wider system. A mission can be jeopardised before a satellite ever reaches orbit. If development systems, software, or credentials are compromised, the consequences can extend to future missions built using them.

Until the Space Act is agreed and applied, operators must navigate several overlapping frameworks, including national implementation of NIS2, ESA standards, European guidance, and programme-specific rules. In other words, while Europe does have cybersecurity regulation, the responsibilities and requirements of existing rules do not yet form a coherent system.[11]

Three risks cut across this patchwork: older satellites may rely on less secure communications, critical ground systems can depend on foreign cloud providers, and user terminals are often easier to attack than satellites themselves. The Viasat incident showed that compromising equipment on the ground can disrupt satellite services on a large scale.

The domino effect is easiest to see in positioning, navigation, and timing. Aviation, maritime traffic management, balancing the energy grid, time synchronisation of financial transactions, and emergency response all depend on Galileo and the Global Navigation Satellite System, with Galileo positioned as Europe's sovereign alternative. Sustained jamming and spoofing along the EU's eastern flank (in the Baltic, the Gulf of Finland, Poland, and Romania) already show what sort of disruptive consequences can be.[12] A sustained loss of signal would undermine air traffic management, raise the probability of maritime incidents, disrupt payment systems through timing errors, and complicate search-and-rescue coordination. Critically, and worth reiterating, an attacker would not necessarily need to compromise a satellite. Disrupting the signal received on the ground could be enough.

The European Commission's incident response proposal introduces a 12-hour early warning for significant incidents affecting Union-owned assets, with a 24-hour track for other assets, the former stricter than the general NIS2 threshold.[13] Whether this proposal survives the legislative process is uncertain: the Council's December 2025 compromise confines the 12-hour track to Union-owned assets,[14] while the Parliament's Industry, Research and Technology draft report proposes removing the timeline regime altogether.[15]

More fundamentally, Europe still lacks a sector-wide space computer emergency response team (space-CERT) charged with coordinating actions in the wake of cyber incidents across the full public and commercial space ecosystem (although existing bodies already monitor and deal with threats within their respective mandates). Thus, the gap is not a complete absence of capacity, but the lack of sector-wide coordination across programmes, companies, and national jurisdictions.

The final stage of the space system lifecycle also receives too little attention. The Space Act would extend cybersecurity risk management to satellite decommissioning and disposal. What remains missing is a sufficiently detailed, EU-wide approach to retiring old software, credentials, ground systems, and security keys without leaving behind new vulnerabilities. Europe is producing rules at volume; what it has not yet produced is a legal framework that works as a coherent system.

This is the test of what has been defined as 'strategic legislation': laws and regulations aligned with an overarching strategic vision, designed to enhance collective capabilities and to project power within and beyond the Union's governance system.[16] Measured against that standard, Europe's space cybersecurity framework is legislation in volume but not yet legislation as strategy: the individual instruments are sound, while the capability they are meant to create – a resilient and sovereign space ecosystem – is not yet what the system delivers. ▸

10. S. Gatlan (2025), 'European Space Agency confirms breach of "external servers"', BleepingComputer, 30 December, https://www.bleepingcomputer.com/news/security/european-space-agency-confirms-breach-of-external-servers/.

11. ENISA (2025), Space Threat Landscape (Luxembourg: Publications Office of the European Union). Digitised copy available at: https://www.enisa.europa.eu/publications/space-threat-landscape.

12. ENISA, Space Threat Landscape.

13. European Commission, 'Proposal for a regulation' (COM/2025/335 final), Article 93.

14. Council of the European Union (2025), 'Regulation on the safety, resilience and sustainability of space activities in the Union (EU Space Act): Presidency compromise text', doc. 16437/25, 5 December, https://data.consilium.europa.eu/doc/document/ST-16437-2025-INIT/en/pdf.

15. European Parliament, Committee on Industry, Research and Energy (2026), Draft report on the proposal for a regulation of the European Parliament and of the Council on the safety, resilience and sustainability of space activities in the Union (PE784.432v01-00; Rapporteur: E. Donazzan), 3 March, https://www.europarl.europa.eu/doceo/document/ITRE-PR-784432_EN.pdf.

16. F. Cappelletti and V. Papakonstantinou (2025), 'A Question of Strategic Legislation: Can the EU Deal with Cybersecurity Issues in Space?', Telecommunications Policy, 49(5), Article 102954. https://doi.org/10.1016/j.telpol.2025.102954.

## Space governance in pieces

Space cybersecurity in Europe sits at the intersection of at least seven institutional mandates: the Directorate-General for Defence Industry and Space, leading EU policy in the area of its purview and advancing the Space Act; EUSPA, overseeing operational security of the EU Space Programme; ENISA, responsible for cybersecurity standards and threat analysis; the High Representative and the European External Action Service, managing external dimensions; national defence ministries; sectoral NIS2 authorities at national level; the private sector for satellite communications; and ESA, which maintains close ties with the EU, but operates as an entirely independent organisation.[17] The Galileo Security Monitoring Centre adds another actor to an already crowded field. So does NATO, through its Space Centre at Ramstein.[18]

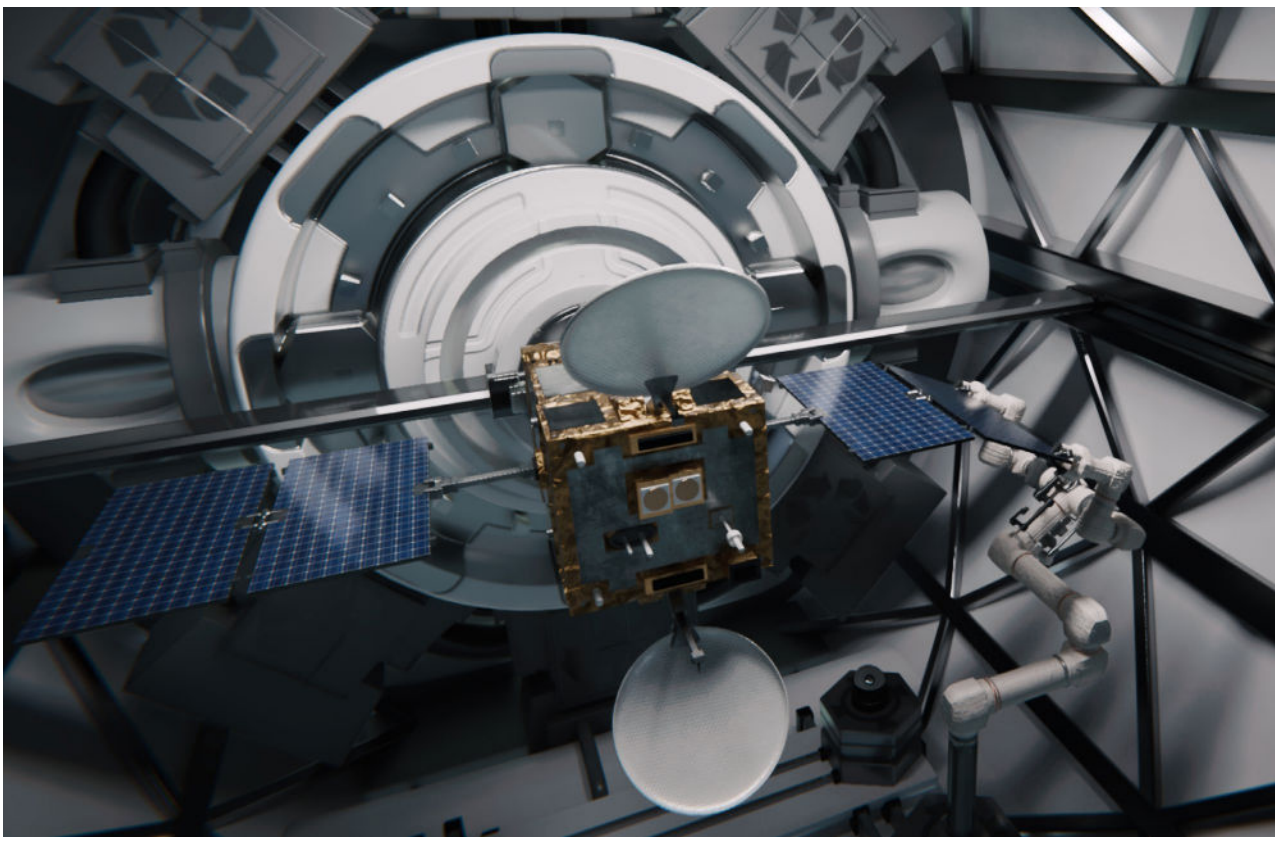
Three gaps are particularly important: the treatment of defence assets, the relationship between overlapping regulations, and the coordination of incidents across the sector. ▸

*Bottom: ESA's first and fourth deep space antennas. The European Space Agency (ESA) is expanding its deep space communication capabilities with the construction of a new 35-metre deep space antenna – the fourth of its kind. It will be joining the existing one (on the left-hand side) at New Norcia station, Australia, to help meet the Agency's fast-increasing data download needs. Ph CREDIT ESA*

17. European Commission and High Representative of the Union for Foreign Affairs and Security Policy (2023), 'European Union Space Strategy for Security and Defence', JOIN/2023/9 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=-JOIN:2023:9:FIN.

18. North Atlantic Treaty Organization (2022), 'NATO's overarching space policy', https://www.nato.int/cps/en/natohq/topics_175419.htm.





The first gap is in defence. The proposed EU Space Act does not apply to space objects used exclusively for defence or national security. Assets used partly for defence may also fall outside its scope while they are under military operation and control, with Member States deciding whether the exemption applies.

The gap is understandable because defence remains primarily a national responsibility. It does create a paradox, however: some of Europe's most strategically important space assets, and some of the most attractive targets for state-backed attacks, may sit outside the Union's resilience framework.

On top of this, regulatory ambiguity remains a problem. The Commission proposal would make the Space Act sector-specific only for the cybersecurity risk-management measures of Article 21 NIS2, while NIS2 reporting obligations would continue to apply; the Council compromise abandons the lex specialis construction altogether, recasting the relationship as 'without prejudice' to NIS2.[19] Which operators will fall under which regime remains unresolved and is unlikely to be clarified before the trilateral talks conclude. In the interim, operators are already building parallel compliance pathways, absorbing legal uncertainty at the cost of operational focus.

This disagreement has practical consequences. Until the relationship between the Space Act and the NIS2 Directive is settled, operators may need to prepare for overlapping requirements and different supervisory authorities. Legal uncertainty risks diverting attention and resources from the security measures that the rules are intended to improve. Last but not least is the persistent issue of strategic dependency. When Ukrainian forces required resilient satellite communications under sustained electronic and cyberattack, the solution came from a US commercial provider whose service terms could be, and were, modified unilaterally. The European Union could do little more than observe from the sidelines.

IRIS$^2$ is now the structural response to such situations. Following the implementation

*Top: The future of in-orbit satellite servicing. Ph CREDIT ESA*

19. European Commission, 'Proposal for a regulation' (COM/2025/335 final), Article 75(1); Council of the European Union, 'Regulation on the safety, resilience and sustainability' (doc. 16437/25).

**"THE GAPS IS UNDERSTANDABLE BECAUSE DEFENCE REMAINS PRIMARILY A NATIONAL RESPONSIBILITY"**

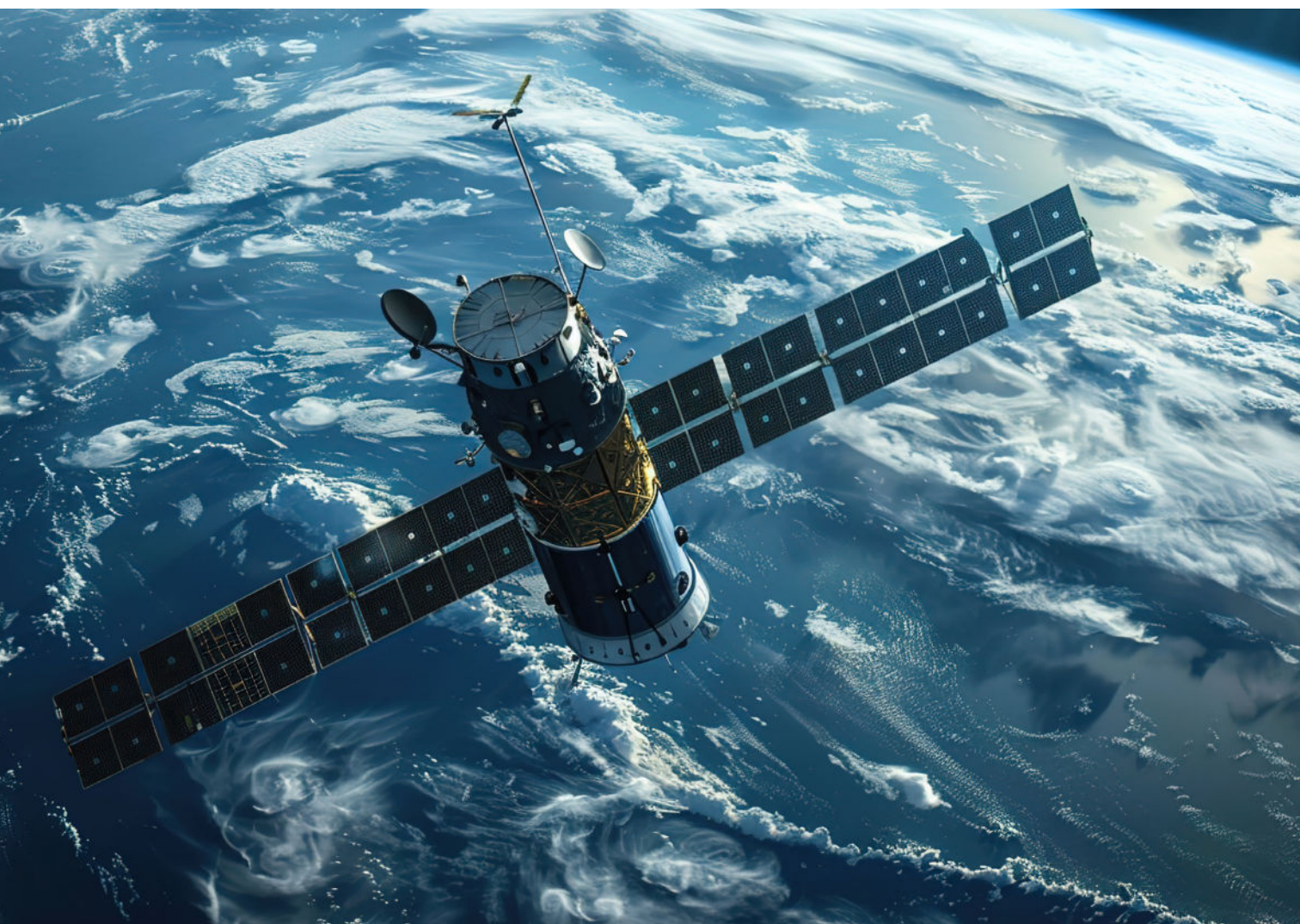
agreement concluded between the Commission and the SpaceRISE consortium in August 2026, the programme has moved from planning into full-scale deployment, with services expected to become available from 2029 onwards. In the meantime, however, a European operator relying on non-European cloud infrastructure, launch capacity, or backup constellations retains dependencies that domestic regulation alone cannot fully mitigate.

**Sovereignty is resilience**

The Viasat attack is often told as a story about military vulnerability. It is also, and perhaps more usefully, a story about interdependence. A single cyberattack on a commercial satellite network, aimed primarily at military command infrastructure, simultaneously darkened thousands of wind turbines and disconnected civilian broadband users across six Member States. The target was Ukrainian; the consequences were European. No framework existed at the time to coordinate a response to an event of that character.

Europe's regulatory output has since grown substantially, and the advances are real. But a sovereign satellite that relies on a compromised ground segment, controlled through inadequately encrypted command links, hosted on foreign cloud infrastructure, and operating without coordinated incident response is not a sovereign asset in any meaningful sense. It is a sophisticated liability.

Europe will not achieve sovereignty in space by building satellites alone. It can achieve such sovereignty only by ensuring that every layer of the system – from the components procured in 2026, to the terminals deployed in 2030, to the cryptographic materials decommissioned in 2045 – meets standards that reflect the strategic importance of space. Cyber resilience is not an additional feature that is simply useful to have: it is central to space sovereignty. ■



*Satellite in space. Ph CREDIT Magnific*

## AN AGENDA FOR SPACE RESILIENCE

Closing these gaps does not require new agencies, new subsidies, or a retreat into technological autarky. To be sure, money helps. Sovereignty, however, is not the complete absence of dependency but the capacity to choose one's dependencies and to survive their failure. Europe's space sector needs what a free-market approach has always argued that the single market requires: common rules, open competition under those rules, and institutions capable of enforcing them. The existence of 13 national space regimes serves neither security nor competitiveness – a harmonised baseline serves both.

Based on the analysis presented here, we offer the following recommendations, which would help strengthen the EU space system's resilience and eliminate legal/regulatory ambiguities.

1 ) Establish a European space-CERT function within EUSPA. A dedicated body for space-specific incident coordination, threat intelligence aggregation, and response support would address the most immediate gap. The EU Space Act's proposal of Union Space Resilience Network provides a coordination forum but not the operational response capability a space.[20]

2) Establish a common procurement baseline. Minimum cybersecurity standards should be harmonised across all EU-level procurement channels and reflected in the contracts binding commercial primes. A single baseline, risk-tiered and aligned with the delegated acts under the Space Act, lowers compliance costs for industry while raising the floor for security. Harmonisation, here as elsewhere in the single market, is the pro-competitive option.

3) Introduce cyber resilience baselines for defence-adjacent assets. The defence exclusion should not become a regulatory void. Member states should agree, at minimum, on shared baseline standards for dual-use and defence-adjacent space systems, developed through existing mechanisms such as the EU Cyber Diplomacy Toolbox and NATO coordination channels.

4) Mandate dependency mapping for critical space-service operators. Critical operators should map and disclose their dependencies on non-EU cloud infrastructure, foreign launch providers, and commercial constellations, feeding national and EU-level risk assessments. Transparency about dependency is not protectionism; it is the precondition for choosing dependencies deliberately rather than inheriting them.

5) Institutionalise cross-border cyber exercises for space events. No amount of regulation is a substitute for practised coordination. Annual cross-border exercises, co-designed by ENISA, EUSPA, national CSIRTs, and private operators, would build the muscle memory needed to respond to incidents that transcend national boundaries.

20. European Commission, 'Proposal for a regulation' (COM/2025/335 final).

# 3 QUESTIONS TO



***Olivier Lemaitre***
*Secretary-General of ASD-Eurospace.*

*Eurospace is the trade association of the European space industry. Founded in 1961, they bring together Europe's leading space companies, representing over 90% of space systems sales and about 60% of industry employment in the sector.*

**"THE COPERNICUS PROGRAMME IS THE MOST WIDELY USED SPACE INFRASTRUCTURE THAT MOST EUROPEANS HAVE ALL TOO RARELY HEARD OF – FEEDING CLIMATE SCIENCE, AGRICULTURE, MARITIME SURVEILLANCE AND DISASTER RESPONSE, WITH OPEN DATA, FOR FREE, EVERY DAY."**

### What is the biggest obstacle holding European space companies back from growing faster?

Roughly 70% of our revenue comes from European public customers, and Europe is about 8% of global government space spending. We then split that 8% across the EU, ESA, and a couple of dozen national programmes, each with its own rules, priorities, and timelines. The result is a patchwork of undersized programmes, duplicated capabilities, and no visibility beyond the next procurement. Over five years European industry put 222 tonnes into orbit; China put a thousand. We do not have (yet) a capability gap, we have a volume gap, and industry cannot vote itself more demand, nor more coherence in the demand.

### If Europe could make just one major policy change to strengthen its space industry, what should it be?

It's actually two things, that go together: enforce a European preference and aggregate European institutional demand. European institutional actors must define the strategic capabilities where European sourcing is the default, and buying outside Europe requires an explanation. In parallel, strengthening the European space industry requires a genuine "demand pact" between the EU, ESA, and Member States: joint priorities, multi-year planning, and minimum volume commitments on key capabilities. I'd suggest institutions to start with a handful of flagship areas and a coalition of the willing. And a small but radical addition: rethink what the geo-return actually returns; a work package is not a capability, and a viable industrial base in 2040 is worth more than a guaranteed share of a dead-end programme.

### Which European space innovation do you find particularly inspiring – one that you think deserves more attention?

This is quite personal but I'd answer the Copernicus programme. It is the most widely used space infrastructure that most Europeans have all too rarely heard of – feeding climate science, agriculture, maritime surveillance and disaster response, with open data, for free, every day. The innovation was not the sensors; it was the decision to design an EU operational public-service infrastructure, recurring and long-lived, and then actually sustain it. That is precisely a model the industry is asking for everywhere else: infrastructures, not one-off missions. Copernicus proves Europe knows how to do it. It deserves attention less as a monument than as a template – and, frankly, a better marketing department. IRIS$^2$ (the EU space-based secure connectivity programme) offers a perfect opportunity to build on this template at an even much, much larger scale.

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