EDITION 0006

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Space Domain Defence, Politics of Space, Lunar Exploration, and an EU Space Act

SPACE INDUSTRY REPORT

JUNE 2025

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CONTENTS

3. INTRODUCTION

Can space be maintained for peace? Legal considerations surrounding the use of weapons in space ---- 03

6. NEWS ANALYSIS

States and agencies diversify launch supply in the face of growing conflicts ---- 06

Diversifying applications in Earth orbit: manufacturing, blockchain and commercial stations ---- 08

A similar fate for iSpace, while others forge lunar infrastructure projects ---- 10

NASA budget proposals: Impact on ESA and international relations ---- 12

14. SPACE LAW REVIEW

Dissecting the Draft EU Space Act: binding laws for safety and sustainability, setting the stage for legal harmonisation? ---- 14

Setting standards of safety, sustainability and debris mitigation ---- 15

Security and resilience provision: reassurance for European space security and enabling growth ---- 17

Referenes ---- 21

23. IMPRESSUM

INTRODUCTION

Welcome to the June edition of our Monthly Space Industry Report, and as we head into the send half of the year, it is an opportune moment to reflect on some key legal and governance developments within the space industry so far in 2025. This comes as the UN Committee on the Peaceful Uses of Outer Space (COPUOS) held their 68th meeting, between 25 June and 2 July, while the European Commission has published its Draft Space Act, which proposes legally-binding rules upon Member States, governing areas such as safety and sustainability of activities in outer space. Meanwhile, space is increasingly reflecting the challenges being tested upon international relations, and becoming a contested domain for defence.

Can space be maintained for peace? Legal considerations surrounding the use of weapons in space

In January, President Donald Trump signed an executive order regarding the 'Golden Done for America', a '...layered defense shield, safeguarding the American homeland', according to Lockheed Martin. The initiative aims to defend against air and missile attacks, employing space-based sensors and interceptors, and comes with a price tag of $175 billion (although some expect this figure to be significantly higher). The matter has brought further focus to the subject of space militarisation, with the Chinese Foreign Ministry reacting to the Golden Dome initiative by accusing the US of undermining global strategic balance and stability (ABC News).

Furthermore, in May 2025, Russia submitted a draft UN resolution, titled 'Space Science and Technology for Promoting Peace', within which it considers that '...space science and technology as well as civilian and commercial systems, including their ground infrastructure, should be used exclusively for peaceful purposes...' This does not make reference to military assets in space, but rather interestingly refers to civilian and commercial systems, and perhaps the role that private entities, such as Starlink, can play in conflicts. After the Russian invasion of Ukraine, Konstantin Vorontsov, a member of the Russian Foreign Ministry, claimed that the use of civilian and commercial space assets amounted to '...indirect involvement in military conflicts', and that they '...may become a legitimate target for retaliation.'

This raises important questions, about whether a defensive space asset can also be classified as offensive, the extent to which such systems may be considered 'dual-use', and what legal frameworks govern these distinctions.

Firstly, leading space nations have already demonstrated their capabilities of direct kinetic attacks on satellites, known as anti-satellite (ASAT) weapons. In 1985, the US destroyed their

Solwind P78-1 satellite at 345 miles above the Earth, while in 2007, China carried out a similar demonstration. More recently, in 2021, Russia destroyed one of their own satellites, subsequently creating 1,500 trackable pieces of debris. However, a **UN Resolution adopted in 2022** aimed to prevent ASAT practices, calling on States '...not to conduct destructive direct-ascent anti-satellite missile tests'.

This then addresses a specific area of offensive space weaponisation, but does not seek to address the use of defensive, space-based systems, such as Golden Dome. A later **2024 UN Security Council Resolution** in April 2024, sought to reaffirm the Outer Space Treaty, notably Article 4, and prevent the placement of nuclear weapons in outer space or any weapons of mass destruction. This was, though, vetoed by Russia, and China abstained, who both then tabled their own amendment, which called on States to:

> "...prevent for all time the placement of weapons in outer space and the threat or use of force in outer space, from space against Earth and from Earth against objects in outer space..."

This would suggest a blanket ban on weapons of any kind, which could also include defensive systems. However, this amendment also failed, with seven votes in favour to seven against, with one abstention. It then requires a closer analysis of the existing principles of international law to decipher the legality of space militarisation, not classed as WMDs. The Outer Space Treaty firstly recognises the use of outer space for peaceful purposes, as well as the Article 4 provisions on WMDs, and also prohibits weapons testing on other celestial bodies. The latter provisions seem unambiguous, yet could 'peaceful uses' arguably allow for the development of defensive systems to be placed in outer space? Furthermore, could

space-based weapons be seen as a form of deterrent, and therefore striving to prevent conflict and maintain peace?

The matter of potential 'dual use' space assets must also be considered. This can, for example, relate to on-orbit servicing (OOS), designed to dock with vehicles in orbit, to provide satellite life extension, repair and refuelling services. These technologies are being explored by companies such as Astroscale (Japan) and ClearSpace (Switzerland), while in January, India became the fourth nation to successfully achieve the docking of two vehicles in space. Furthermore, on 9 July, it was reported that China had achieved the same feat in geostationary orbit (GEO), with the Shijian-21 and Shijian-25 satellites. While this could be a test of OOS capabilities, *ARS Technica* also reported that this could be to test the ability to disable the satellite of another country, which could then classify OOS vehicles as a form of weapon.

The debate surrounding the militarisation of space is intensifying, as nations increase defence budgets, and space is increasingly identified as a critical domain of defence. It seems likely that there will be an ongoing trend of utilising space within conflict, but at the same time, it is critical to continue the debate, and fall back on the founding principles, enshrined within the OST, that the use of outer space is to be for peaceful purposes, and maintained as a province of all humankind.

Best wishes,

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NEWS ANALYSIS

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States and agencies diversify launch supply in the face of growing conflicts

SpaceX faced yet another setback in the development of their highly anticipated, reusable interplanetary space vehicle, Starship, after the second stage, the 'Ship', exploded during preparations for a static fire test, at Starbase, Texas. The explosion happened while on the test stand, as the company was preparing for the tenth test flight of Starship. After the explosion on 18 June, the company established the likely cause as a '...potential failure of a pressurized tank known as a COPV, or composite overwrapped pressure vessel, containing gaseous nitrogen in Starship's nosecone area...' (SpaceX). The company are though known to base their success on the 'fail fast' motto, utilising lessons learnt and applying them to an iterative design and testing process.

However, this setback comes in the wake of three other successive failures, which saw the Ship destroyed. Test 8 took off on 6 March, which saw a successful stage separation and another landing of the super heavy booster. However, while the Ship continued its ascent, it experienced '...an energetic event in the aft portion of Starship...', and contact was lost with

the Ship. It then exploded over the Atlantic, with debris from the explosion visible from the Caribbean and Florida space coast. A similar occurrence happened in test flight 7, when the Ship reached an altitude of 146 km, before reentering Earth's atmosphere and exploding.

Test flight 9 was launched on 27 May, which did see the first ever reuse of a super heavy booster, which previously launched on test flight 7. However, once in space, Starship was unable to relight a raptor engine, meaning it couldn't be correctly positioned for reentry. The Ship was then lost during reentry, after 46 minutes of flight.

There's no doubting the roaring success of SpaceX over the last decade, while in 2024 the company carried out 138 of the 263 global space launches, and Starlink now counts for 7,875 of the approximately 12,000 satellites in Earth orbit. However, while leading the pack, SpaceX are facing increasing, even though nascent, competition, also driven by the desires by States to diversify suppliers. European nations and ESA have indicated that they will aim for more non-dependent space capabilities, as outlined in their 2040 strategy, with one of the five goals aiming to establish 'European Autonomy and Resilience'. Musk's political relationship with the Trump administration has also impacted European relations, with Andreas Bovenschulte in November 2024 saying '...it's not really a reassuring thought being dependent on someone like Elon Musk.' The head of ESA, Josef Aschbacher, also called for more European space investment, in light of a '...a more volatile geopolitical situation...'

(**Creative commons license**, image from heute.at)

> The United States is only ever one political (or personal) disagreement away from losing access to low Earth orbit
>
> **Robert Brüll**

Writing for *Space News*, Robert Brüll also notes that even the US and NASA face the significant problems of reliance on one key supplier, especially since the deterioration of the relationship between Musk and Trump. He writes that 'the United States is only ever one political (or personal) disagreement away from losing access to low Earth orbit', considering that SpaceX launched 138 of the 145 US orbital launches last year (95%).

In light of this, there may be room made for competition to enter. In Europe, German

startup, Isar Aerospace, has noted recent success, with the debut launch of their Spectrum rocket from Norway, in March. The rocket cleared the launch tower, before pitching and falling to the ground after 25 seconds. This was though seen as a positive result from Isar, who will take lessons learnt and apply them to their next launch. Additionally, on 25 June, the company announced it had raised $150 million in funding, towards the expansion of their launch facilities and production capabilities.

Furthermore, UK-based Pulsar Fusion have announced that it will expand into the US, opening offices in Texas. Pulsar also released a promotional concept video of their Sunbird propulsion system; fusion-powered tugs which attach to a client vehicle, and claims it will be able to halve travel time to Mars. The promotional video for Sunbird can be found on the **Pulsar website**. German-French company, The Exploration Company (TEC), also declared partial success of their Nyx vehicle reentry demonstration on 23 June. 'Mission Possible' was launched on a SpaceX rideshare, and was deployed in-orbit. It was due to perform a controlled reentry, splashdown in the Pacific, and later be recovered. All stages appeared to go well, including powering up client payloads in the vehicle, but contact was lost minutes before splashdown.

While TEC initially aims to develop cargo transport vehicles, they unveiled a model of their human-rated vehicle at the Paris Air Show. This will be used to transport crew to and from the ISS and future space stations, similar to the SpaceX Crew Dragon. A cargo version of Nyx is due to launch its first mission in 2028, while a crew version may take 10 years to develop.

Chinese launch startup, Landspace, has also taken significant steps towards the first flight of their own reusable launch vehicle, Zhuque-3, after completing static fire testing on 20 June. This follows first-stage testing of the booster stage last year, which saw it launched to an altitude of 10km, before landing again. The vehicle will enter the same category as the SpaceX Falcon-9, having a payload capacity of 21,000kg (when first stage is expendable).

The US may still lead the pack, but senior stakeholders should be ultimately aware of the pace at which its competitors can innovate, especially in light of potential internal political division and a rising global ambition to develop space capacity. Within and outside of the US, we are witnessing the diversification of space service providers and actors.

Diversifying applications in Earth orbit: manufacturing, blockchain and commercial stations

The determination to secure access to outer space is predominantly driven by global ambitions to utilise Earth orbit, a finite natural resource. As previously discussed, Starlink satellites now dominate the number of active satellites, while SpaceX have been granted permission to launch 12,000 satellites by the US Federal Communications Commission. Planned Chinese megaconstellations - Guowang (13,000 sats), G60 (14,000 sats) and Honghu (10,000 sats).

However, Earth orbit is also being utilised for other diverse applications. In previous months, we have noted significant growth in the use of space for defence applications, not least the planned 'Golden Dome' initiative from the Trump administration. In June, the US Space Force awarded a $1.2 billion contract to British Aerospace Systems (BAE) to develop 10 satellites for its Medium Earth Orbit Missile Warning and Tracking program. In May, it was revealed that L3Harris, Millennium Space Systems and Boeing may also play a role in developing this infrastructure.

Also, on 23 June, a collection of Ukrainian and European companies announced plans to raise $100 million towards the development of 70 imagery satellites to collect data on the Russian border. This comes amid speculation regarding the reliance upon the US, as the Trump administration pushes Europe to establish its own means to defend itself. The use of space data for defence is rapidly growing, with this being exemplified in the Ukraine War. As discussed in our May 2025 report, we are also seeing deeper engagement with the commercial sector within the space defence domain, which raises some concerns regarding the role of these actors within conflict, while arguably there could be questions surrounding to what extent these systems can be classed as 'peaceful uses' of outer space, and whether they are to be exclusively for defence purposes.

However, in June, there was also the development of other diverse applications in orbit. China have started to construct the world's largest supercomputer in space, after launching 12 advanced satellites on 14 May. These will perform in-orbit processing of space data, as opposed to sending and relaying data with Earth-based ground stations. The constellation is eventually expected to consist of 2,800 satellites and utilise AI processing to expedite the processing of huge amounts of downstream data, while reducing the delay or loss of data associated with traditional methods of raw data relay.

Thales Alenia (Italy/France) have also announced the deployment of the first blockchain network in space, in cooperation with 3IPK. The network is part of the ISS Mounted Accessible Global Imaging Nod-e (IMAGIN-e) demonstration, which aims to carry out '... multiple image-processing applications in orbit', utilising space edge computing, according to Thales. 3IPK's applications allow for the '...synchronization of blockchain nodes in orbit and on Earth', meaning that data can be effectively stored and authenticated on local blockchain nodes, and protected from being faked or replicated by AI. The utilisation of a transparent blockchain ledger in space could also be used for other applications, such as resource management, data sharing and mission registration, enabling more trust and transparency within international relations.

The conditions and environment of Earth orbit are also being explored by commercial companies for manufacturing applications. In-space manufacturing (ISM) has already been successfully demonstrated by private company, Varda Space Industries, which in 2024, for the first time, landed an ISM capsule after it successfully produced crystals of Ritonavir, an HIV drug, in outer space. On 24 June, UK-based Space Forge launched their own ISM test mission, after their initial demonstration was lost in the failed Virgin Orbit launch in January 2023. The company are aiming to carry out the manufacture of crystals, which, when

returned to Earth, can be grown larger to make semiconductors. The company hasn't yet received a license to return their demonstration vehicle back to Earth, and so it will be destroyed in the atmosphere once the mission is complete. The mission will though hopefully provide critical data to inform their next mission, ForgeStar-2, scheduled to return samples to Earth.

Illustration of Haven-1 space station (Image: Vast)

> ESA have signed agreements to work on both Haven and Orbital Reef commercial space stations
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Low Earth orbit is also to be soon populated with crew-rated commercial space stations, with the International Space Station (ISS) set for decommissioning in 2030. ESA and European nations, among other ISS partners, have faced to scenario of losing crewed access to Earth orbit, which was until Airbus announced the joint venture with Voyager Space to develop the Starlab commercial space station, again bringing together US and European space cooperation. Starlab Space also opened a European subsidiary in Germany, in January this year.

Additionally, last month, ESA announced it had signed a memorandum of understanding (MoU) with Blue Origin, as well as Thales Alenia, in order to cooperate on Orbital Reef, Blue Origin's planned commercial space station. The agreement aims to result in sending European payloads and astronauts to the station, and could also include ESA contributing to the hardware being installed there, according to *Interesting Engineering*. Similarly, ESA also signed an agreement with US-based company, Vast, to gain access to their 'Haven' space station. The first version of the station, Haven-1, is due to launch as early as 2026, potentially making it the world's first commercial space station.

A similar fate for iSpace, while others forge lunar infrastructure projects

Japan-based commercial lunar exploration company, iSpace, launched their second lunar landing attempt on 15 January 2025, on the same SpaceX Falcon-9 which launched the Firefly Aerospace Blue Ghost-1 mission. iSpace took a longer trajectory than Firefly, entering

lunar orbit on 6 May. The lander, named 'Resilience', was then set for a landing attempt on 6 June, aiming to deliver innovative and historic payloads, which included:

- The 'TENACIOUS' lunar rover - built by iSpace Europe, due to perform a lunar sample collection and transfer ownership to NASA, in a historic first commercial lunar transaction. The company also gained a world-first resources license under the Luxembourg Space Law (2017).

- Water electrolyser experiment (Takasago Thermal Engineering Co), to demonstrate the production of oxygen on the Moon

However, as the lander was set for launch on 6 June, it was announced that it had likely experienced a hard landing on the Moon, a fate similar to that of Mission 1 in April 2023. On 24 June, iSpace announced that 'through subsequent and further analysis of telemetry data acquired from the lander confirmed that the technical cause of the hard landing was an anomaly in the LRF (Laser Range Finder) hardware.' As with such events, the company will use this critical data to inform their next missions, and they will also consider that they did achieve 8 out of their 10 stipulated mission milestones. Mission 3 is scheduled for no earlier than 2027.

Meanwhile, space launch and infrastructure company Sierra Space have announced they have received a NASA contract to explore the use of its inflatable Large Integrated Flexible Environment (LIFE) habitats on the Moon. The contract was awarded under the agency's NextSTEP-2 Appendix R for Lunar Logistics and Mobility Studies, and will explore the use of LIFE for providing tunnels to connect lunar base modules, for storage, as well as '...integration of the entire framework for habitation on the lunar surface.' (Sierra Space) Furthermore, in April, Sierra completed hypervelocity impact trials of the LIFE modules, to '...optimize the structural integrity of Sierra Space's LIFE habitat space station technology,' a reminder that the company are also developing commercial space station technology, partnering with Blue Origin on the Orbital Reef project.

Australian company, Lunar One, is also preparing for the launch of their lunar research mission, sending plants and seeds to the Moon as part of the Intuitive Machines mission in March or April 2026. The mission will aim to experiment with how low levels of gravity interact with the plants, and will be held in a warm bio-capsule. The prototype built at the University of Melbourne is undergoing testing for launch. One of the key challenges for the mission is to keep the weight down to only 0.5 kg while still carrying all necessary equipment, such as the bio-module, heating system, sensors, electronics, and water. Once the payload is delivered, it will have around 72 hours to survive until the lunar day becomes too hot for the plants. Before then, and of course during the journey, the team will have the chance to understand how such payloads could withstand such extreme conditions, and work towards providing resources for human habitation on the Moon.

As things stand, Artemis missions and Chinese-led lunar projects are due to return human beings to the surface of the Moon before the end of the decade, in anticipation of the

establishment of a sustained lunar presence. As a result, there is a growth in infrastructure projects, designed to validate and demonstrate the technology required to enable our future on the Moon. At the beginning of July, the State Council Information Office of the People's Republic of China reported that the Deep Space Exploration Laboratory had demonstrated a breakthrough technology enabling the 3D printing of bricks using simulated lunar soil. Such technology could be applied on the Moon, exploring in-situ resource utilisation (ISRU) methods for the construction of infrastructure, such as roads and housing, part of the Chinese-led International Lunar Research Station (ILRS) project.

Heading into the second half of the decade, the uptick in lunar activity can be observed; possibly 7-8 commercial lunar missions between 2023-25, the fourth and fifth nations to land on the Moon, the first commercial lunar resources license issued, the US DARPA 10-year commercial lunar economic study, first far-side lunar samples returned by China. One could go on. In the months and years to come, we expect this growth to continue.

NASA budget proposals: impact on ESA and international relations

While growth seems set for the lunar domain, relations are still impacted by the White House proposal for NASA budget cuts. As discussed in our previous reports, the Trump administration's 'skinny budget' would cut NASA science funding by half, and call for an end to the SLS lunar rocket after Artemis III, as well as cancel the planned Lunar Gateway space station. Though the Trump strategy may be to rely more on commercial systems, there has also been a continued degradation of the relationship between Trump and SpaceX CEO, Elon Musk.

Illustration of NASA SLS (Image: Terry White/SLS)

> NASA budget cuts could spell the end of the SLS lunar rocket after the Artemis III mission
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This perhaps indicates a desire for more diversity in procuring space launch and satellite systems. However, it also potentially presents a stumbling block in US lunar exploration and development. Although Blue Origin is also developing a Human Landing System (Blue Moon)

for the Artemis missions, which could be an alternative to the SpaceX Starship landing variant, there are no other commercial systems which match the launch payload capacity of a stacked Starship.

The budget proposals also continue to provide a stumbling block for US international space relations. The European Space Agency (ESA) nations are key partners on the Artemis and SLS programmes, providing the European Service Module (ESM) for the Orion spacecraft, which would take astronauts to the Moon. Furthermore, ESA are providing modules for the Lunar Gateway, while also providing their Argonaut lunar lander within the Artemis architecture. On 12 June, the head of ESA, Josef Aschbacher, said that the agency is 'doing its homework' to assess what impacts NASA cuts could have, and how to use ESA funds most efficiently. He added that ESA is 'well-prepared' to react.

Concerning ESA's Artemis contributions, Daniel Neuenschwander, ESA's director of human and robotic exploration, said that the Argonaut lander and other technologies on the programme would also be used to support European space missions.

NASA are also due to provide components for the planned 2028 ExoMars mission, due to send the European Rosalind Franklin rover to drill into the Martian surface. However, Neuenschwander stated that while the NASA parts aren't available in Europe, ESA could rely on other partners, such as the Canadian Space Agency, and that Europe would also eventually build their capacity to produce them. (Euro News)

However, what will be irreplaceable is the relationship across the Atlantic, especially as new leaders are emerging and expanding in the sector. This comes particularly in the wake of Chinese scientific leadership, with China offering its Tiangong space station as a platform for international research, and last month announcing that they aim to develop their '555' policy for the ILRS Moon station; to gain 50 countries, 500 institutions and 5000 researchers under the project. Furthermore, on 17 June, experts from China's manned space programme said that the country offers a larger platform for cooperation. China has carried out significant scientific missions, such as the 2024 Chang'e-6 far-side lunar sample return mission, and according to Sun Wei, deputy chief designer of the manned space program's landing site system, China is providing standardised and internationalised telemetry, tracking and command capabilities, which provides '...convenience for global space cooperation.' (China Daily)

White House efforts seem to be aimed at reducing costs, and furthermore increasing efficiency through commercial innovation, the latter having been a beacon of success over the past decade. However, this tactic might have first exploited an over-reliance on individual powerful private actors, such as SpaceX. Furthermore, the cuts have the potential to damage US global leadership, should ESA and other partners' contributions to scientific and lunar research be cancelled. If a leadership void is created, other leaders are still emerging, and more new partnerships are being made elsewhere.

SPACE LAW REVIEW

SPACE LAW & POLICY

SUSTAINABLE & PEACEFUL USES OF OUTER SPACE

Discussing the challenges, threats and opportunities to international space law and governance, arising out of evolving international relations, geopolitical dynamics and more

Key terms: Draft EU Space Act; OST; LTS Guidelines; UK Space Industry Act; ESA 2040 Strategy; ESA; Sustainability; Space Debris; ADR; OOS; Space Resources; COPUOS; Recommended Principles for Space Resource Activities; Artemis Accords

Dissecting the Draft EU Space Act: Binding Laws for Safety and Sustainability, Setting the Stage for Legal Harmonisation?

The European Union is on the verge of establishing its own space legislation, after this week publishing the draft space legislation, titled the 'Regulation of the European Parliament and of the Council on the safety, resilience and sustainability of space activities in the Union'.[1] The draft aims to harmonise European space governance, align partnerships on European values, and tackle growing problems such as space debris and enhance sustainable activities. Furthermore, according to Naomi Pryde, partner and global co-chair for space exploration and innovation at DLA Piper, the proposed legislation could provide an '...orbital equivalent of GDPR',[2] which firstly would force actors to comply with EU law when conducting business in Europe, as well as potentially aim to set global standards of behaviour in outer space.

In what will likely be a pivotal moment for European companies, States and all stakeholders, this paper will explore the key elements that make up the draft, consider its key aims, and

consider how it will adhere to other national regimes and international governance mechanisms. The research will also discuss what the draft omits and what barriers it might face, especially within a rapidly growing and competitive space industry, and a currently challenging dynamic of global politics and international relations.

Setting standards of safety, sustainability and debris mitigation

European nations have been at the forefront of sustainable initiatives in outer space. The European Space Agency (ESA) is co-funding a debris removal demonstration by Astroscale, to demonstrate debris remediation, and remove a OneWeb satellite in 2026.[3] Also, ESA is preparing a mission to remove an inactive satellite named PROBA-1, initially launched in 2001, as a demonstration of active debris removal (ADR), planned for 2029. The agency also adopted its Zero Debris Charter in 2023, a non-binding set of principles, designed for States and organisations to reduce the probability of debris generation,[4] and put '...Europe at the forefront of sustainability on Earth and in space.'[5]

The EU Draft Space Act (the 'Act') strives to promote similar sustainable initiatives, which would bind Member States (MS) to such practices. Describing the reasons for its proposal, the Act states that 'Disparities in national approaches to protecting the safety, resilience and environmental sustainability of space infrastructure can adversely impact the provision of space-based data and space services in the Union.'[6] Furthermore, it specifically aims to calculate '...the environmental impact of space activities in the Union, thereby enhancing the sustainability of space activities', and to reduce the environmental impact of space activities.[7] Additionally, setting EU standards could also be used as a means of establishing new global standards, being that all actors would need to comply with the provisions of the Act when working within the Union (the so-called 'Brussels Effect').

Provisions relating to safety and sustainability are contained within Title IV, providing technical requirements that providers must comply with, which include compliance with launch safety plans, flight safety systems, collision avoidance, reentry of spacecraft, and more. The Act also makes specific provision for mitigating debris, firstly under Article 61, which calls for the limitation of the creation of debris, and end-of-life disposal of space objects.[8] Furthermore, the Act, in what could be a seminal moment for sustainable law-making, outlines provisions to limit light and radio pollution, set out in Article 72. The Article requests that actors '...establish a plan containing measures that are adequate to limit light and radio pollution...', which will include '...a description of the technical and operational measures implemented by the Union spacecraft operator to reduce the visible brightness...', as well as limiting '...disruptions for radio astronomy observatories and to minimise the impact of satellites on astronomical

observations…'[9] Such measures would be a significant step towards the protection of 'Dark & Quiet Skies', a subject of discussion at the UN COPUOS,[10] which aims to protect the skies for observation, as well as for cultural heritage, from satellite light and noise pollution.

The Act furthermore outlines rules on traffic management within Article 68, while Article 71 applies to mission extension application, or on-orbit servicing (OOS). Overall, these provisions would broadly align with established frameworks and non-binding guidelines, such as the UN Long-Term Sustainability Guidelines (LTS Guidelines), and place them within a binding mechanism. For example, LTS Guideline A.1(1) requests that States should '…consider the need to ensure and enhance the long-term sustainability of outer space activities' when implementing regulatory frameworks,[11] a provision which would be met by binding MSs to EU to the Act. Furthermore, the Act would implement debris limitation measures also set out in Guideline A.2(2), which asks States to 'implement space debris mitigation measures, such as the Space Debris Mitigation Guidelines (SDMG) of the Committee on the Peaceful Uses of Outer Space.'[12] The Act could also align with the SDMGs principle to remove vehicles from LEO after the end of their missions within 25 years.[13] (However, the Act does not yet include a specific timeframe for LEO).

Sustainability provisions within the Act would also forward the aims set out within the UN Pact for the Future (the 'Pact'), adopted in September 2024.[14] Action 56 of the Pact outlines outer space as a specific area for sustainable development, calling for new governance frameworks for space traffic management and space debris.[15] Furthermore, the Pact calls for full adherence with the foundational space law framework, the Outer Space Treaty (OST),[16] while the Act recognises the need for 'consistency with existing policy provisions in the policy area',[17] including the OST requirements of State responsibility, notably of State and non-State actors, regarding authorisation, supervision and liability for their actions. The Act can then tie together these initiatives and bind them upon all actors within the EU.

Regarding the OST, while it does not make specific provision concerning, say, traffic management and debris mitigation or remediation, Article 9 does ask that States act with '… due regard to the corresponding interests of all other States Parties to the Treaty.'[18] Furthermore, the Article requires that exploration of outer space shall be done so as to avoid '…harmful contamination…', which the Act could enable through Section IV provisions.

The Act then provides a means of implementing sustainability measures, previously set out in non-binding legal frameworks, while also adhering MSs to established international space law. It is though to be seen how these measures would be met by industry, and to what extent any cost and technical burdens might be perceived. However, iSpace, a Japanese-based lunar exploration company with headquarters in Luxembourg, welcomed the Act as a 'positive and needed step' for Europe, and a '…commitment to supporting innovation.'[19] Conversely, Güneş Ünüvar, a post-doctoral researcher in international space law at the

University of Luxembourg, said that there may be some sceptical reaction, '...because it will probably seem like a lot of regulation coming their way and a lot of additional administrative requirements.'[20]

Security and resilience provision: Reassurance for European space security and enabling growth

Another seminal component of the Act is that of aiming to provide the safety of European space infrastructure, namely through the adoption of cybersecurity measures. Detailing the reasons for this provision, the Act aims to '...create a risk assessment framework that is tailored to the specific cybersecurity needs of space infrastructure, thereby enhancing the resilience of space activities',[21] while it would also align with the ESA Strategy 2040, which calls for strengthening European autonomy and resilience, as well as '...ensuring cybersecurity —especially for space assets—and bolstering security capabilities.'[22] Space assets are becoming growing targets of cyber warfare, especially as space technology becomes an increasingly valued asset for defence, seen not least in the Ukraine conflict, which has seen battlefield advances in the use of satellite technology, and has been dubbed as the 'first commercial space war'.[23]

To implement this, the Act calls for MS operators to '...identify cybersecurity and physical vulnerabilities and incidents...', and to '...establish dedicated risk treatment plans for all the cybersecurity vulnerabilities...',[24] while operators are to assess '...whether the cybersecurity risk-management measures taken are effectively implemented and maintained'. Furthermore, cybersecurity obligations will also apply to non-EU entities, unless their respective legal frameworks are deemed as equivalent to the EU Act. The means of establishing and setting norms for safety and resilience of space systems is also tailored to '...strengthen protection of European space infrastructure and ensure business continuity', according to the European Commission.[25]

The Commission points out that current EU space law is fragmented across 13 different national approaches, increasing complexity and costs for business. Additionally, a harmonised approach to issues such as safety and cybersecurity could also provide more confidence for investors and insurers, through establishing a level playing field among actors. Alignment on traffic rules could also assist in establishing a rulebook for traffic management and collision avoidance, with Chapter 5 addressing 'Orbital Traffic Rules' and collision avoidance services, which '...introduces a 'right of way' approach, designed to facilitate the resolution of collisions between multiple manoeuvrable spacecraft.'[26] This includes strategies on collision avoidance events, as well as establishing rules on the sharing of space traffic data, with, for example, Article 64 stating that spacecraft operators shall provide data on any

planned changes to the operation, the beginning of any disposal phase, or any unplanned changes to the operation, to a Collision Avoidance space services provider.[27]

Transparency of operations could also align with a greater global ambition of information-sharing, such as the US-supported initiative of establishing Transparency and Confidence Building Measures (TCBMs); '...the means by which governments can address challenges and share information with the aim of creating mutual understanding and reducing tensions', according to Frank A Rose, US Department of State.[28] The Act would though legally bind some of these approaches upon States, establishing groundbreaking legislative measures to improve safety through transparency, and also aligning with similar aims at COPUOS, such as the recent adoption of the Global Expert Group on Space Situational Awareness.[29]

It is though to be seen just how other States, especially leading space nations, might commit to or align to such rules. Operators are only bound by the EU Act when operating from MS jurisdictions, and will not apply (in its current form) to assets launched before January 2030. Furthermore, given the fact that most space assets are being launched and operated from the US and China, there would be no legal requirement for these actors to be bound by European rules. However, what the Act can do is create European alignment, an issues increasingly pressing given the nascent launch industry in European nations, and an ESA strategy to establish and build European space autonomy. There could therefore also be an interesting dynamic emerging between the EU and UK, with the latter aiming to become a hub of European launch activity,[30] and EU companies looking to launch from there; for example German launch startup, Rocket Factory Augsburg, gained a launch licence from the UK Civil aviation Authority (CAA) earlier in 2025, to carry out the first vertical launch from British soil.[31] The UK is also still a member of ESA, and is also embracing its sovereign space industry, becoming the second most attractive place for private investment in space, according to a 2023 PwC report.[32]

The UK Space Industry Act ('SIA') was also established in 2018, which does share commonalities with the EU Act. The SIA requires the regulator (CAA) to grant a license to allow for space activities to take place,[33] while the EU Act asks operators to obtain '...an authorisation to carry out space activities...' from a MS;[34] both broadly aligning with Article 8 of the OST,[35] and the Registration Convention.[36] The SIA also outlines that the regulator may take into account space debris mitigation guidelines when issuing a license, and also may consider '...any space debris mitigation guidelines issued by an international organisation in which the government of the United Kingdom is represented,' matching with the EU aims of safety and sustainability. However, it must be noted that the EU Act does go into far greater technical details and scenario-based plans for limiting the risk of debris. Nevertheless, with the UK Labour government looking to build closer working ties with EU, areas such as safety,

sustainability and business stimulation could be what brings these two sides together, setting a precedent on global legal harmonisation.

Conclusion: more areas to explore?

The Act then strives to establish foundational provisions relating to safety and security, providing harmonisation, thus enabling a more transparent and rigid legal framework for industry to work from. In particular, the provisions relating to standards of safety for collision avoidance and debris mitigation could be a curtain-raiser in establishing a legally-binding mechanism for sustainable uses of outer space.

However, another key area to consider might be that of the use and exploitation of space resources; those on other celestial bodies, such as the Moon and asteroids. This was also referenced within the Pact for the Future, calling for the establishment of new governance frameworks for space resources.'[37] The Act does refer to resources in the preamble, from a sustainability perspective, stating 'a shift towards circular economy-based and sustainable practices in space should support the long-term sustainable use of resources in space activities.' While this could apply to the circular use of in-situ resources, the circular economy could also refer to '... long-term orbital sustainability through in-orbit servicing, in-orbit assembly, in-orbit manufacturing, and eventually in-orbit recycling',[38] according to ESA.

The Act makes no direct provision in regard to natural resources, while in Europe, Luxembourg is the only State to have national legislation, which establishes a licensing system in order to exploit space resources.[39] Leaving the issue of resources out of the Act may then provide States with the ability to interpret and apply international law into their own national legislative systems, and also allow the matter to be addressed firstly via COPUOS and the Working Group on Legal Aspects of Space Resource Activities, who recently published their initial set of recommended principles for space resource activities.[40] The Pact for the Future also calls for the issue of governance of resources (as well as debris and traffic management) to be discussed '...through the Committee on the Peaceful Uses of Outer Space.'[41]

Much as the LTS Guidelines have set the groundwork for the establishment of the sustainability provisions within the Act, the recommended principles on space resources, and other initiatives, such as the establishment of the Action Team on Lunar Activities Consultation (ATLAC), may provide guidance for the EU to implement a resources framework in future. The EU will also need to consider the growing number of Artemis Accords signatories within the EU,[42] a non-binding framework which provides principles on space resources, and clarifies that such activity does not '...constitute national appropriation under Article II of the Outer Space Treaty...'[43] They may also note that, should the recent lunar

landing mission from iSpace have been successful, it would have deployed a European-built rover, in order to collect lunar regolith and then transfer ownership to NASA, in a historic first commercial transaction of lunar resources, licensed under the national law of Luxembourg.[44]

There is a growing lunar mission cadence, and many of those missions will be focused on resource exploration and utilisation. COPUOS members are grappling with establishing new guidance on these activities, and while the proposed Act does not directly deal with resource activities, the foundational principles of sustainability, transparency and information-sharing could provide valuable norms of behaviour when establishing new governance for resources in the near and long-term future.

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7 July 2025

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ANASDA GmbH Monthly Space Report June 2025

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ISSN 3052-217X