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Artemis-II Returns, NASA Pivot to Lunar Base Development, More Talk of Data Centres, and Legal Consideration for Space Traffic Management

SPACE INDUSTRY REPORT

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INTRODUCTION

For the first time in more than half a century, human beings ventured to the Moon. NASA's Artemis-2 mission, carrying four astronauts aboard the Orion spacecraft, completed a 10-day lunar flyby that marked the first crewed journey beyond low Earth orbit since the Apollo programme concluded in 1972. While Artemis-2 did not land on the lunar surface, that milestone is reserved for the subsequent Artemis-4 mission, it represents an essential and historic step in NASA's broader ambition to establish a sustained human presence on the Moon.

The crew comprised NASA astronauts Reid Wiseman, Victor Glover and Christina Koch, alongside Canadian Space Agency astronaut Jeremy Hansen. Their 10-day mission was planned down to the minute, encompassing spacecraft manoeuvring demonstrations, scientific observations, medical monitoring, survival training and, at its centrepiece, a close flyby of the lunar surface.

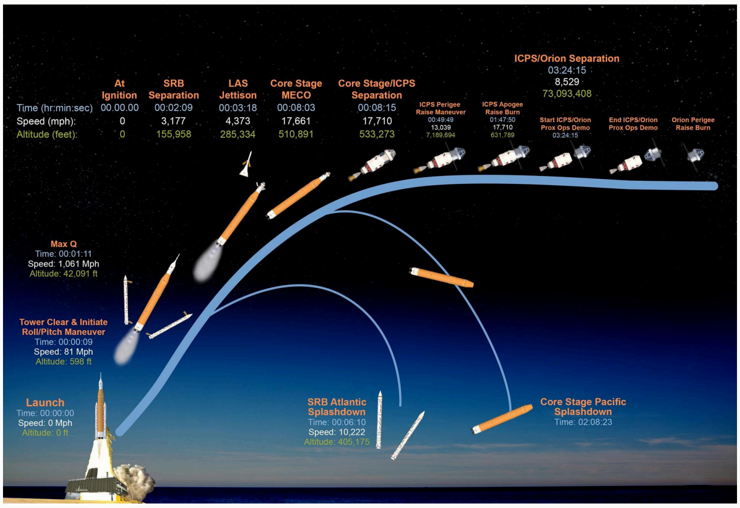
Artemis-II: Launch: Launch, Orbit and Trajectory Burn

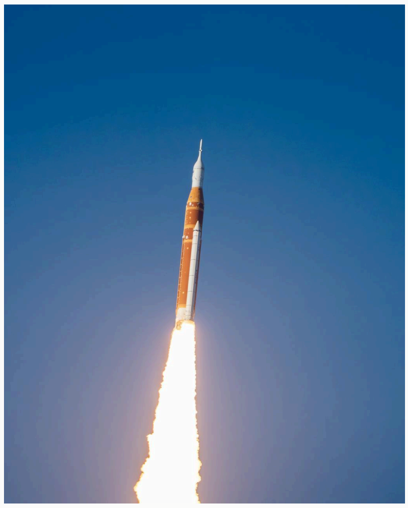
Image: NASA/Brandon Hancock (Left), NASA (Right

The mission began with eight of its most critical minutes. Orion launched atop NASA's Space Launch System (SLS) rocket, shedding its solid rocket boosters and first stage as it climbed toward orbit. Once in space, the spacecraft remained attached to the SLS Interim Cryogenic Propulsion Stage (ICPS), which performed a pair of burns to place Orion in a high elliptical orbit.

The crew then separated from the ICPS to conduct what is known as proximity operations, a series of carefully choreographed manoeuvres in which Orion is flown in close formation around the spent stage. The exercise is not merely procedural; it is a practical demonstration of Orion's ability to operate in tandem with another object in space, a capability which will be essential for future Artemis missions when the spacecraft must rendezvous with the lunar lander. With proximity ops complete, the ICPS performed a final burn to set itself on a trajectory toward re-entry, and the crew began preparing for their first sleep period.

The defining moment of Flight Day 2 arrived approximately six hours after the crew woke. The translunar injection (TLI) burn, a 30-minute firing of the Orion service module engine, committed the mission to its path around the Moon. The burn placed Orion on a free-return trajectory, a course which loops around the lunar far side and uses the Moon's gravity to slingshot the spacecraft back toward Earth, without the need for a further major engine burn. In this sense, the TLI is simultaneously the manoeuvre that sends the crew to the Moon and the one that guarantees their route home.





Images: NASA/Bruce Hudgins (Left), NASA/Brandon Hancock (Right)

Toward the Moon: Leaving the Pull of Earth's Gravity

Flight Days 3 and 4 were dedicated largely to rehearsal, with the crew practising the observation tasks they will carry out during their brief window at closest lunar approach. This included familiarising themselves with performing those tasks in microgravity, where the physical experience of moving and positioning within the spacecraft differs substantially from ground-based simulation.

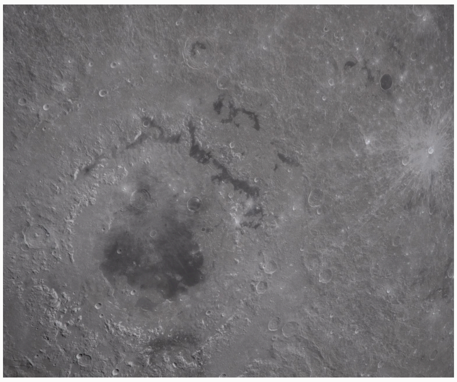
Flight Day 5 carried particular symbolic weight. On this day, the Moon's gravitational influence on Orion became stronger than Earth's, formally placing the crew in lunar space. It is a threshold which no human being has crossed since the final Apollo mission in 1972, and it made the Artemis-2 crew the first people to enter the gravitational sphere of the Moon in over 50 years. Before the day ended, the crew completed spacesuit donning exercises, testing the team's ability to rapidly pressurise their suits and strap into their seats, a critical safety drill given that the suits are designed to protect the crew for up to six days in the event of cabin depressurisation.

The Lunar Flyby

Flight Day 6 was the centrepiece of the mission. Orion's closest approach brought the spacecraft 6,545 kilometres above the lunar surface. For approximately three hours, the crew conducts an intensive programme of observations, capturing imagery, tracking specific geological formations and recording data for scientists on the ground.

Orion's swing around the far side of the Moon carried the crew further from Earth than any crewed spacecraft in history (252,756 miles/406,771 km), a remarkable distinction for a mission that is, in NASA's programme architecture, essentially a precursor flight. The far side passage also temporarily severed contact with mission control, placing the crew in a period of 40 minutes of communications blackout as they transited the region of the Moon shielded from Earth. While carrying the lunar flyby, astronauts '...photographed and described terrain features, including impact craters, ancient lava flows, and surface cracks and ridges formed as the Moon slowly evolved over time. They also noted differences in colour, brightness and texture, which provide clues that help scientists understand the composition and history of the lunar surface.' (US Embassy)

Furthermore, the crew observed an "Earthset", as the Orion travelled beyond the lunar horizon, and an "Earthrise", when it emerged from the opposite edge of the Moon, and an hour-long solar eclipse as the Moon and the Sun aligned. The Crew also observed light flashes on the surface as meteorites impacted the Moon.



Images: NASA

Heading Home: Science, Demonstrations and the Final Approach

As Orion exited lunar space on Flight Day 7, the crew began transmitting observational data back to Earth, covering everything from the spacecraft's technical performance to the physiological and psychological state of the astronauts. The day also featured a moment of symbolic significance: a live audio call between Orion and the crew currently aboard the International Space Station. It was be the first time that astronauts flying beyond low Earth orbit knew that others were simultaneously in space, a small but telling marker of how far human spaceflight has come.

Flight Days 8 and 9 were dedicated to further demonstrations of systems and procedures that will be critical for deeper space missions. The crew practised radiation shielding techniques, positioning themselves within Orion using the spacecraft's water tanks and heat shield as barriers, simulating the response to a solar radiation event. Orion's attitude control systems were also put through their paces, with the crew testing both the six-degree-of-freedom configuration, which auto-corrects any course deviation caused by thruster firings, and the more fuel-efficient three-degree mode. By Flight Day 9, the focus shifted to preparations for re-entry: compression garments are fitted to help the crew's bodies readjust to gravity after 10 days in microgravity, equipment is secured, and the spacecraft was readied for its final day.

Images: NASA

Re-entry and Splashdown

Flight Day 10 brought the mission to its conclusion in dramatic fashion. The service module was jettisoned and Orion's heat shield was pointed toward the atmosphere as the capsule descended at speed toward Earth, enduring temperatures of approximately 1,650 degrees Celsius generated by atmospheric friction. A canopy of three parachutes deployed in the final minutes of descent, slowing the spacecraft to around 27 kilometres per hour before splashdown in the Pacific Ocean off the coast of San Francisco, where a US Navy recovery vessel and supporting assets were positioned to retrieve the crew.

Artemis-II and the Future

Artemis-2 is, by design, a test. It did not land humans on the Moon, establish outposts or extract resources. What it did do is validate, in the most demanding operational environment possible, the spacecraft, systems and human performance capabilities upon which all subsequent Artemis missions depend. In that sense, it occupies a role not unlike that of Apollo 8 in 1968, which also sent a crew around the Moon without landing, demonstrating the viability of the mission architecture before the final commitment was made.

Given the pace of lunar ambitions across the space sector, with commercial landers, robotic prospectors and competing national programmes all advancing in parallel, Artemis-2 arrives at a moment of genuine momentum. Its success will not only validate NASA's hardware, but also send a broader signal about the readiness of the United States to lead the next era of human lunar exploration. We may now look forward to Artemis-III (2027) and the first Artemis crewed landing in 2028. In the meantime, we can also observe how NASA and its commercial partners strive to develop the technology required to establish a long-term presence on the Moon, with upcoming missions in 2026 from Astrobotic, Intuitive Machines, Firefly Aerospace and Blue Origin.

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NEWS ANALYSIS

Lunar Infrastructure Plans, Reusability Developments, Growing Focus on OCDs, and More

Intuitive Machines IM-2 landing (Image: Intuitive Machines)

Lunar Ambitions Accelerate: NASA Pivots, Commercial Sector Expands

(For a full overview of the Artemis-II mission, please see page 3)

In a significant shift in policy, NASA has cancelled the Lunar Gateway programme, opting instead to redirect approximately $20 billion toward the development of a permanent Moon base and a nuclear-powered Mars spacecraft. The decision reflects the broader strategic direction set by the Trump administration's Executive Order late last year, which called for the establishment of initial elements of a permanent lunar outpost by 2030. NASA administrator, Jared Isaacman, has further signalled the ambition of this agenda, announcing plans for monthly uncrewed lunar landings beginning in 2027, a cadence which would mark a dramatic escalation in operational lunar activity.

The commercial sector is rallying to meet this demand. Intuitive Machines has secured a $180.4 million CLPS award to expand its lunar surface operations, and lunar lander developers more broadly have indicated readiness to scale up in response to anticipated increased NASA requirements. Firefly Aerospace, fresh from the successful launch of Alpha Flight 7, is also positioning itself in the lunar data services market, reflecting a trend of launch providers diversifying into broader lunar infrastructure offerings.

The economic potential of the Moon continues to attract serious analytical attention. A recent PwC report has projected a $127 billion lunar economy, identifying nuclear power and mobility as among the key challenges to be addressed, but omits data on the potential for lunar resource utilisation. These findings are consistent with the broader infrastructure developments underway. Astrolab has highlighted a multi-rover strategy for emerging lunar surface services and has attached what is being described as the Moon's first AI brain to its rover, providing autonomous decision-making capabilities in the challenging lunar environment. ESA, meanwhile, has selected Venturi Space to conduct a study into future lunar rover technologies, underscoring European interest in contributing to surface mobility solutions.

China's lunar programme is also advancing on multiple fronts. Beijing is reportedly developing low-cost lunar cargo options to support its expanding Moon programme, while Chinese engineers have unveiled a dexterous wheeled robot concept designed to support operations at the planned Chinese International Lunar Research Station (ILRS). China is also reportedly considering a volcanic site for its first crewed Moon landing, a choice which could carry scientific significance given the potential for resource extraction in such geologically active regions. Further reflecting the increasingly global nature of the lunar economy, iSpace has announced the establishment of a Saudi subsidiary to expand its lunar business activities, while Black Moon Energy has signed a contract with the US Department of Energy for the purchase of lunar helium-3, marking a notable step toward a commercial supply chain for this strategically important isotope.

Launch & Reusability: European Entrant, Chinese Surge, SpaceX Eyes IPO

The global launch market continues to evolve rapidly, with new entrants, renewed ambitions and record valuations defining the month's activity. In Europe, ArianeGroup and ESA are targeting Spring 2026 for the first hop test of the Themis reusable launcher, a milestone which would mark a significant step toward European autonomous and reusable launch capability, a stated goal of the ESA 2040 Strategy. From the UK, HyImpulse (Germany) has agreed a deal for a suborbital launch from the SaxaVord Spaceport in Scotland later this year, adding to the momentum behind the UK's ambitions as a launch nation.

Chinese launch activity remains on an upward trajectory. Landspace is targeting a Q2 2026 orbital launch and recovery attempt for its Zhuque-3 rocket, following the partial success of its debut flight late last year, in which the booster successfully reentered but experienced an anomaly on landing. Another Chinese private firm, Astronstone, has raised $29 million to develop a reusable rocket featuring a chopstick-style recovery mechanism, directly mirroring SpaceX's approach with its Starship programme. More broadly, China is targeting 140 orbital launches in 2026 amid a broader commercial space surge, a figure which, if achieved, would represent a significant step toward closing the gap with the United States.

SpaceX, though, continues to dominate, with the company now eyeing a record IPO as it seeks a €1.75 trillion valuation. The company has also scheduled a 2027 launch of a 1,200-satellite mobile constellation, further extending its presence across the satellite services market.

(Image: SpaceX)

> SpaceX is seeking a $1.75 trillion valuation in its forthcoming initial public offering.
>
> **Economic Times**

Space-Based Infrastructure: Data Centres, Stations and the Physics Problem

One of the most prominent and ongoing emerging themes is the rapid growth of ambitions around space-based computing and orbital data centres (OCDs). Blue Origin has applied to launch a constellation of 51,000 data centre satellites, a figure which, if realised, would represent one of the largest constellation deployments in history. Rocket Lab has linked rapid launch capabilities with solar power provision for space-based data centres, reflecting the growing recognition that energy supply is a central challenge for orbital computing. Sophia Space has raised $10 million to accelerate the development of orbital computing systems, while Intuitive Machines has launched a private stock sale to fund its own orbital data centre ambitions, raising $175 million in the process.

However, significant technical challenges remain. A SatNews analysis has highlighted what it terms the 'Physics Wall' facing orbital data centres, namely the formidable cooling challenges posed by the vacuum of space, where heat cannot be dissipated through convection. This is an important counterpoint to the wave of investment and ambition in this segment, and suggests that considerable engineering validation will be required before orbital computing infrastructure becomes commercially viable at scale.

Beyond computing, investment in broader in-space infrastructure continues. Vast has raised $500 million to develop its Haven commercial space stations, positioning itself for the post-ISS era. LambdaVision has tapped Starlab as its manufacturing partner for post-ISS operations, and Space Forge has announced the completion of the UK Space Agency-funded National Microgravity Research Centre, providing dedicated infrastructure for in-space manufacturing research. Furthermore, Starcloud has launched what it describes as orbital bitcoin mining using solar-powered satellites, a development which, while novel, speaks to the broadening range of commercial use cases being explored in the orbital environment.

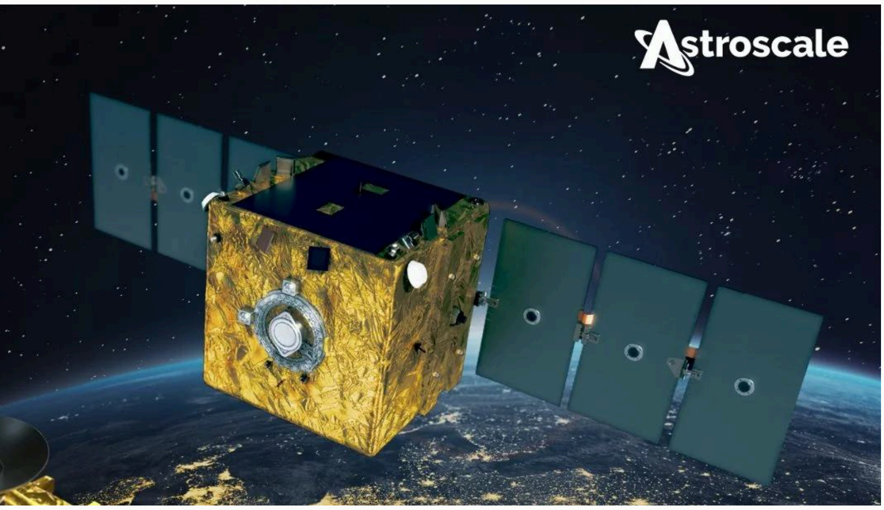
Space-Based Solar Power Gains Commercial Traction

Space-based solar power (SBSP) is moving from concept toward early commercial reality. A UK study has concluded that small-scale SBSP could become economically competitive by 2040, providing a credible timeline for the technology's maturation. Helio has signed an agreement with its first customer for SBSP services, a significant milestone in demonstrating commercial demand. China, meanwhile, is developing a space solar plant intended not only to generate power but also to charge satellites and potentially assist in taming typhoons, reflecting a broader and more ambitious vision for the technology than is typically discussed in Western contexts.

On-Orbit Servicing and Debris: A Growing Imperative

The on-orbit servicing sector continues to mature, with Astroscale selecting Isar Aerospace to launch its ELSA-M debris removal mission, a further step toward operationalising active debris removal. Infinite Orbits has gone on what European Spaceflight has described as a ‘spending spree’ following its €40 million funding round, while Lux Aeterna has raised $10 million to develop reusable satellites under what the company describes as 'the future of the space economy'. A single mission has recently demonstrated inspection services for two separate clients, suggesting the commercial model for on-orbit servicing is beginning to mature.

These developments arrive against a backdrop of continued debris incidents. Starship debris has washed ashore in Madagascar, debris from an Indian space launch was found on a remote uninhabited island, and a nearly 600kg NASA satellite re-entered over the eastern Pacific Ocean. Taken together, these incidents underscore the urgency of robust debris management frameworks, a point which is likely to feature prominently in ongoing discussions around the EU Space Act and other regulatory initiatives.



Astroscale's ELSA-M (Image: Astroscale)

> Astroscale to launch ELSA-M to 'capture and remove an end-of-life Eutelsat OneWeb satellite
>
> **Astroscale**

Defence, Security and Geopolitics

The militarisation of space continues. Intuitive Machines has been selected by L3Harris to support the Space Development Agency's Proliferated Warfighter Space Architecture Tranche 3 Tracking Layer, reflecting the growing commercial role in US defence space programmes. SpinLaunch has introduced Meridian Defense, a purpose-built LEO constellation for secure and sovereign communications, while the European Defence Agency has awarded a contract for the first VLEO military satellite concept, reflecting European ambitions for dedicated defence space capabilities at very low Earth orbit.

Ukraine has filed for its own satellite constellation as it eyes a potential replacement for Starlink, a development which reflects both the strategic dependence on satellite communications demonstrated by the conflict and the desire for sovereign capability. Russia, meanwhile, has launched its first internet satellites into orbit, providing what has been described as an analogue of Starlink for its own use. China's mysterious Shenlong space plane has launched on its fourth mission, with its activities remaining opaque to outside observers, a reminder of the significant grey zone activity in the space domain.

Investment, Policy and International Affairs

Investment in the space sector remains strong. VC firm Seraphim is raising a $100 million-plus spacetech fund, harnessing corporate investors alongside traditional venture capital. Europe has invested €100 million in satellite networks, and Canada has committed $200 million to a space launch pad in Nova Scotia, signalling Canadian ambitions in the commercial launch market.

On the policy front, Ireland has joined the Artemis Accords, marking a new chapter in its relationship with the US space programme, while Cyprus has joined ESA as an Associate Member, further expanding the agency's European footprint. ESA has also outlined objectives for a Mars communications orbiter, and the joint Europe-China SMILE mission is set for launch to tackle space weather, a rare example of continued scientific cooperation between the two blocs.

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.

(Image: ESA)

Key terms: Space Traffic Management; STM; Outer Space Treaty; LTS Guidelines; IADC Space Debris Mitigation Guidelines; COPUOS; Legal Subcommittee; Scientific Subcommittee; Space Debris; Space Situational Awareness (SSA); Space Domain Awareness (SDA).

COPUOS and the Needs for Space Traffic Management Governance in the Age of an Increasingly Congested Earth Orbit

Currently, there are almost 15,000 active satellites in orbit,[1] with a record number of 4526 objects being launched into space in 2025.[2] The number of objects launched has increased dramatically in the last decade alone, from just 237 in 2015, and the years ahead promise further exponential growth, particularly in low Earth orbit (LEO). Of the active satellite population, Starlink accounts for two-thirds, while in January this year, the US Federal Communications Commission (FCC) granted permission for an additional 7,500 Gen2 satellites, doubling the size of the Gen2 fleet to 15,000.[3] SpaceX also has an application for an additional 15,000 next-generation Starlink satellites, on top of their original 2018 filing for a total of almost 12,000 satellites.[4] This is potentially dwarfed by Elon Musk's recent intention to launch one million AI orbital data centres (ODCs).[5]

Competition is also rapidly accelerating. Blue Origin is reportedly aiming to launch 51,600 data centre satellites, known as 'Project Sunrise',[6] while in February, Amazon Leo was granted FCC permission to launch an additional 4,500 internet satellites.[7] Also in February, Logos Space (US) were approved to launch a constellation of 3,960 broadband satellites,[8] and Starcloud, an Nvidia-backed startup, announced that it plans to seek authorisation to launch a constellation of 88,000 AI OCDs. China is also providing growing competition, with the constellations Guowang,[9] Spacesail,[10] and Honqing constellations[11] each to consist of at least 10,000 satellites.[12]

This comes as China has also reportedly filed with the International Telecommunications Union (ITU) for more than 200,000 satellite frequencies, and according to Chinese state media, this systemic advancement is part of '...planning its space deployment over the next decade and beyond, rather than focusing on short-term launches.'

These spiralling advances and innovations add to what Peter Martinez, Chief Executive of Secure World Foundation, describes as an increasingly congested, contaminated and contested orbital environment.[13] Rapidly growing numbers of orbital objects have led to a marked increase in collision-avoidance manoeuvres, with Starlink carrying out over 144,000 such manoeuvres between December 2024 and May 2025, an increase from 25,000 in the same period in 2022-23.[14]

Collision probabilities are compounded by the growing problem of space debris. ESA reports that there are 1.2 million pieces of space debris between 1cm and 10cm, with satellite collisions increasing the proliferation of debris. In January this year, the Russian reconnaissance satellite 'Luch' was completely destroyed after colliding with space debris, subsequently breaking into fragments of debris.[15] Efforts are being made to both remediate and mitigate orbital debris, such as through the active debris removal (ADR) work of companies such as Astroscale, and through the application of guidelines such as the UN Long-Term Sustainability (LTS) Guidelines,[16] and the IADC Space Debris Mitigation Guidelines (SDMGs).[17]

However, more applied efforts may now be being made in mitigating collisions and enhancing space safety through Space Traffic Management (STM), industry and national practices, and expert discussions at COPUOS. The latter will soon culminate in the establishment of a Study Group on STM at the COPUOS Legal Subcommittee this year, which was agreed upon at the COPUOS Plenary meeting in 2025.[18] This brief article will aim to uncover what frameworks and mechanisms are being developed, and indeed what already exists, in order to better enhance STM practices within the increasingly congested space domain.

What is STM, and what is the Current Framework?

Firstly, it is necessary to establish the meaning of STM, in comparison to the closely related fields of Space Situational Awareness (SSA) and Domain Awareness (SDA). According to the European Union Satellite Centre, SSA refers to '...the knowledge of the space environment, including location and function of space objects and space weather phenomena,'[19] including space surveillance tracking (SST) of human-made objects, space weather monitoring, and tracking near-Earth objects (NEO), such as asteroids. UNIDIR describes SDA as the capability of SSA activities, as well as '...assessment of the intent of actors, space policies, and strategies.'[20]

While these, then, refer to an actor's ability to physically monitor movements in space, as well as understand the broader strategic understanding of the space domain, STM moreover means '...the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from outer space to Earth free from physical or radio-frequency interference,' according a 2006 report from the International Academy of Astronautics (IAA);[21] or perhaps the 'rules of the road for space'. Following the report from IAA, in 2016, STM was added as an agenda item at the COPUOS Legal Subcommittee (LSC), titled the 'General Exchange of Views on the Legal Aspects of Space Traffic Management',[22] and seeks to provide member States with '...a forum to discuss legal issues concerning space traffic management...', according to the COPUOS Briefing Book.

While this item has recently resulted in a recommendation for the establishment of a first 'Study Group' on STM,[23] which begins work in 2026 (and will be discussed in more detail in section 2 of this article), it is also apt to examine what frameworks can currently be utilised for better STM. Firstly, Lyall and Larsen point to a near-collision between the Chinese space station and Starlink satellites in 2021, when the former had to take evasive action, and the US responded by outlining measures it has published to avoid such problems.[24] In a note to the UN Secretary General, the US Mission in Vienna encouraged States to '...provide updated contact information on designated entities authorized to engage in timely exchanges of appropriate information on on-orbit human spacecraft operations...', and offered States to register for no-cost accounts on the website www.space-track.org.[25] The website, administered by the US government, provides a registration platform '...to provide access to the United States space catalogue, as well as to disseminate additional spaceflight safety assessments and information to spacecraft operators.'[26] However, Lyall and Larsen make the critical point that China does not make use of it '...probably for political reasons.'[27]

The US Delegation, though, also point toward the use of the UN LTS Guidelines as a framework for improved STM. The note refers to Guidelines under Section B, including B.1)

Provide updated contact information and share information on space objects and orbital events; B.2) Improve accuracy of orbital data on space objects and enhance the practice and utility of sharing orbital information on space objects; B.3) Promote the collection, sharing and dissemination of space debris monitoring information; B.4) Perform conjunction assessment during all orbital phases of controlled flight; and B.8) Design and operation of space objects regardless of their physical and operational characteristics.

The LTS Guidelines culminate a decade-long process of discussion at COPUOS and provide a foundational set of practices and normative principles to enhance space traffic and sustainable activities in outer space.

Also, a Working Group on the Long-term Sustainability of Outer Space Activities has been established at COPUOS since 2010,[28] and it was renewed in 2019.[29] According to Theresa Hitchens, former director of UNIDIR, the LTS Working Group was only accepted by the US in 2019 as a trade-off for Russia accepting the adoption of the Guidelines, with the US originally wary that Russia might use the Working Group as a platform to '...serve only as a forum for complaints about US positions...',[30] and to push the Russia-China 'Prevention of the Placement of Weapons in Outer Space (PPWT)'[31] Treaty.

However, though the LTS Guidelines were adopted by consensus at COPUOS,[32] this process highlighted some fragmentation in approaches to new governance-making. While the Guidelines were adopted in 2019, in 2018 the LTS Working Group was not able '...to reach consensus on its final report or on how to refer the preamble and guidelines to the General Assembly.'[33] This was because Russia sought to add an additional seven guidelines, which included '...a proposed draft guideline to define "self defense" in space...', despite the fact that '...Moscow had been warned that the issue was considered a non-starter, partially because COPUOS does not deal with military space issues.'[34] Furthermore, the LTS Guidelines remain a voluntary set of principles, with the US reluctant to place binding laws in place which might limit its space activities.

Through LTS, it will then be a case of States willingly adopting and implementing the Guidelines, which can, in turn, begin to establish international norms of behaviour or customary law.

While the Guidelines provide a genuine platform to establish parity on issues such as STM, more focused efforts are also being developed this year at the LSC, through the establishment of the STM Study Group.

What is Proposed in the Study Group?

In response to a proposal from Germany at the 63rd session of the Legal Subcommittee in 2024, and after discussions at the 64th session, this year, the LSC will begin discussing the 'Proposal for a Study Group on Legal and Policy Aspects of Space Traffic', under the Agenda Item 'General exchange of views on the legal aspects of space traffic management'.[35] The formation of the group also comes after being requested through a UN General Assembly (UNGA) Resolution, which recognised COPUOS' role in '...discussing the establishment of new frameworks for space traffic...', as well as space debris and resources.[36] Furthermore, STM was also highlighted in Action 56(a) of the Pact for the Future, which calls for '...full compliance with the 1967 Outer Space Treaty and discuss the establishment of new frameworks for space traffic, space debris and space resources through the Committee on the Peaceful Uses of Outer Space.'[37]

Firstly, it is critical to establish the foundational principles within the space Treaties which relate to the establishment of STM governance. The report from the IAA establishes that '...general principles of space law provide a basis and rationale to establish a space traffic management regime',[38] which could firstly include principles of the Outer Space Treaty (OST).[39] Article I of the OST allows free access and use of outer space by all States, while Article IX limits that freedom and puts an onus on States to act with 'due regard' to the interests of others, and requests that States should also take steps to prevent the harmful contamination of outer space (such as debris). These principles, then, establish the foundations for an STM regime, while the OST is binding upon 118 States, including all leading space nations.[40] Furthermore, the Registration Convention (1976) provides traceability for 'Launching State' liability and responsibility over governmental and non-governmental entities,[41] while the Liability Convention establishes absolute liability on the Launching State for damage caused on Earth, and fault-based liability for damage caused in space.[42]

However, there is nothing in the Treaties which amounts to a clear and binding set of guidelines on operational STM principles. This is perhaps where the Study Group can provide a vision. The proposed mandate of the Study Group, at its core, is to study, within two years, '...legal and policy aspects related to space traffic, taking into account regulations, policies, best practices and requirements at the national and regional levels.'[43] Furthermore, in order to avoid duplication of work, the Group will '...coordinate closely with a possible Expert Group on Space Situational Awareness of the Scientific and Technical Subcommittee, including through sharing working documents, having representatives from the other group participate in its meetings, providing co-facilitators' summaries after each meeting to the other group and holding joint meetings at the sessions of the main Committee.'

Furthermore, COPUOS already requested the UNOOSA to share questionnaires among member States and permanent observers in order to gather feedback on national and regional STM regulations and best practices, which were distributed in October, 2025.[44] So far, 23 States/observers have returned responses to the office, which provide some vision on what practices might form the basis of a draft report, potentially scheduled to be delivered to the LSC in 2027. Responses vary, from highlighting national legislative and licensing frameworks, to national space strategies, and licensing procedures for space objects, among others. However, the UK highlights '...that an increasing number of States are introducing "rules of the road" and other space traffic management measures through domestic legislation', and that '... they carry the risk of divergence, inconsistency, and operational friction if developed in isolation.'[45] The work of the Study Group can hopefully exist as a mechanism to unite and harmonise the best of these practices for enhancing STM principles.

The Cologne Manual on Space Traffic Management Guidelines: A Way Forward?

Lastly, Brazil, a cosponsor of the Proposal for the Study Group, refers to the publication from the Institute of Air Law, Space Law and Cyber Law of the University of Cologne and the German Aerospace Center (DLR), titled the 'Cologne Manual on Space Traffic Management Guidelines (CM-STM).'[46] While the CM-STM provides another set of non-binding guidelines, they are primarily focused on issues related to STM, whereas the LTS Guidelines provide a broader focus on the long-term sustainability of activities, and the IADC guidelines relate primarily to debris mitigation. The CM-STM, on the other hand, seeks '...to formulate scientifically grounded yet practical guidelines akin to a "traffic code" for outer space.'[47]

The Manual specifically strives to provide a framework for STM, and it encompasses the foundational legal principles from the Outer Space Treaty of 1967, the Registration Convention of 1975, and the Liability Convention of 1972. Furthermore, it strives to bring together perspectives of different stakeholders, '...including with international organisations, in particular the International Telecommunication Union (ITU) to mitigate harmful interferences; secondly, examination of emerging technologies in space debris remediation and their relevance to STM; thirdly, military uses of outer space, ensuring that the principles of transparency and safety are maintained without compromising security interests.'[48] This approach, then, seems to align with the approach of the Study Group, in seeking to remain compliant with international law, while also establishing a multi-stakeholder narrative, which is also outlined in the 2024 Pact for the Future.[49]

As a snapshot, the Manual provides guidelines on 1(1)) Pre-launch activities, such as performing a conjunction analysis, an orbit insertion analysis and a space debris modelling;

1(2)) In-orbit activities, including pre-manoeuvre notification and planned trajectory; and 1(3) Reentry, All planned re-entry activities should be notified beforehand. It also iterates the need for States to implement STM rules upon non-governmental actors, making object registries accessible for the public, and encourages communication between States and operators. Critically, the Manual also provides guidelines on space traffic coordination, stressing the need for identifiable contact information, and establishing an '...internationally agreed standard for priorities to minimise the risk of collision.'

According to Peter van Fenema, 'The absence of international space traffic management rules can at least partially be explained by the fact that there is neither an international governmental organisation or specialised agency, nor a trade association that feels responsible for the creation of international "rules of the road"'.[50] Perhaps as the LSC prepares to convene for its 2026 meeting, and in light of all that has been achieved in the Working Group, as well as considering the views from more stakeholders, this could be about to change.

Joseph Holden | Senior Strategist
2 April 2026

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