

**Saudi Arabia**

Centre for  
Space Futures

# The Future of Space Law

Operationalizing Space Governance

White Paper  
March 2026



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# Foreword



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*The Future of Space Law* series was conceived as a structured inquiry into a simple but consequential question: how can the foundational principles of the Outer Space Treaty remain effective in a space environment that has fundamentally changed?

The first paper examined international civil aviation, demonstrating how the Chicago Convention evolved from broad legal principles into a functioning global system through Standards and Recommended Practices (SARPs). The second paper expanded the lens to other global commons regimes, including Antarctica, the Law of the Sea, and telecommunications, identifying recurring governance functions that support stability in domains beyond national jurisdiction.

This third and final paper turns from analysis to implementation. While space governance is grounded in a robust and carefully balanced legal framework, the effectiveness of that framework increasingly depends on its practical implementation. The Outer Space Treaty provides enduring principles, yet the mechanisms needed to translate those principles into predictable and scalable operations in a rapidly commercializing and technologically dynamic environment remain underdeveloped.

The objective of this paper is not to propose new treaties, institutions, or binding authorities. It is to demonstrate how governance can evolve through functional architecture. By organizing legal responsibilities, technical standards, and operational protocols into a modular, voluntary structure, the multi-tiered SARPs Framework offers a pathway for states and operators to enhance transparency, coordination, and safety while preserving sovereignty and treaty integrity.

Operationalization is not a theoretical exercise, it is a practical necessity. Constellations are scaling, proximity operations are increasing, lunar missions are advancing, and private actors now shape most space activity. Predictability, interoperability, and incentive alignment must keep pace with this expansion.

This paper presents implementation pathways at national, regional, multilateral, and industry levels, recognizing that governance evolves through layered adoption rather than singular reform. SARPs are designed to be adaptable, allowing states to engage incrementally in accordance with their national priorities and capacities. Industry can align through market-based incentives, while multilateral forums may refine technical components over time. This layered flexibility enables governance to mature gradually without imposing uniform timelines or obligations.

The purpose of this work is not to conclude the debate on space governance, but to provide a structured platform from which it can progress pragmatically. The future of space governance will not be built solely through declarations. It will be built through coordinated practice.

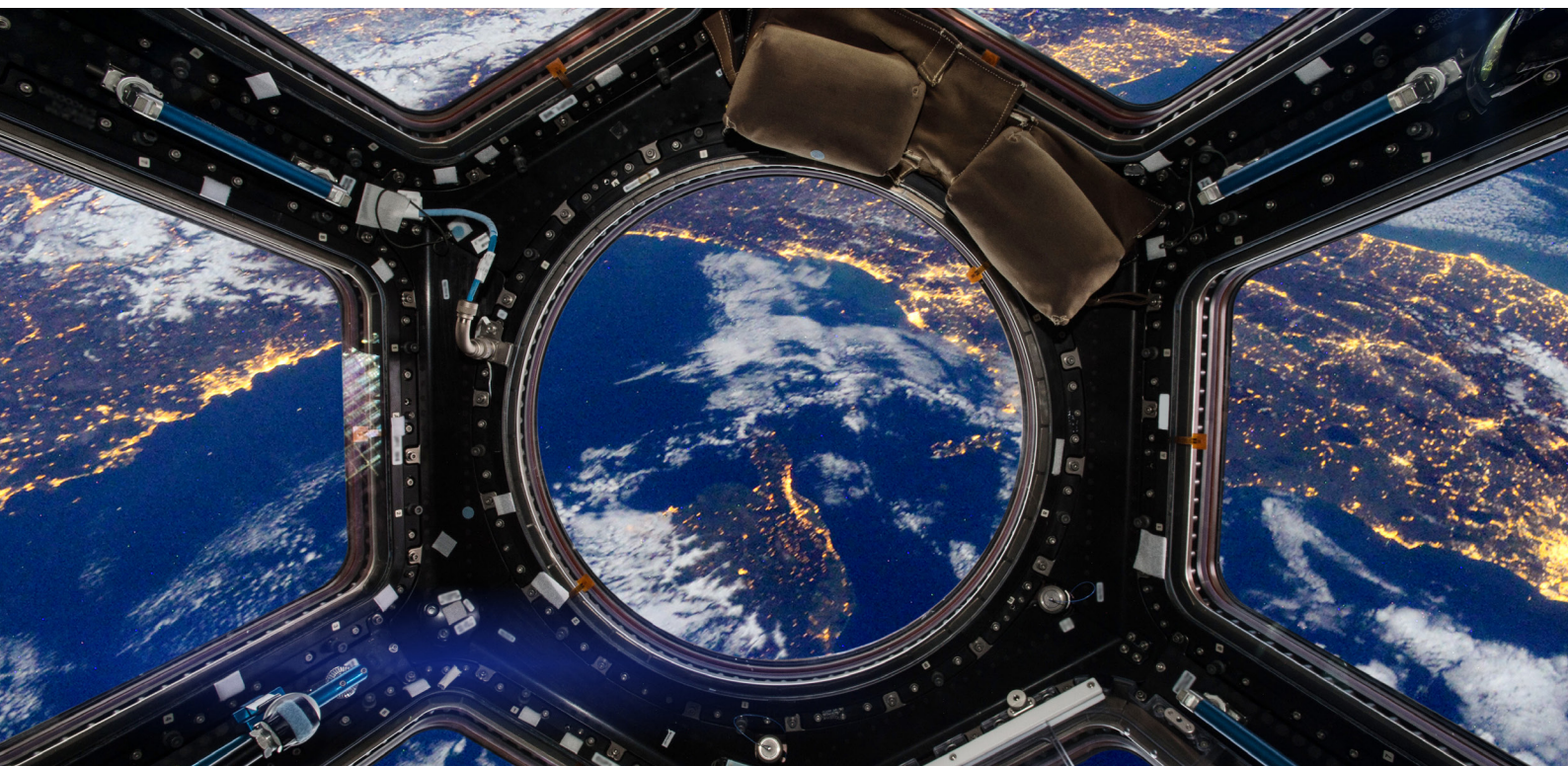
# Executive Summary

The growth of commercial space activity is reshaping the global space environment faster than current governance mechanisms can adapt. While the Outer Space Treaty establishes foundational principles, it does not provide the operational tools needed to manage modern missions involving autonomous constellations, lunar operations, on-orbit servicing, and private-sector leadership. Other global commons\* regimes, especially international civil aviation, demonstrate how predictable coordination can emerge without new treaties, using voluntary standards, shared procedures, and state-led oversight.

This paper builds on the previous two papers, which propose a practical, multi-tiered SARPs framework of Standards and Recommended Practices for outer space. The model draws from well-established governance systems across aviation, telecommunications, Antarctica, and the law of the sea, identifying the common elements that drive safe and interoperable behavior: transparency, registries, shared technical standards, supervision, liability, environmental safeguards, market access incentives, and mechanisms for dispute avoidance and resolution.

Section 3 presents a consolidated mapping of these global lessons into the SARPs structure. Section 5 outlines national, regional, multilateral, and industry-led implementation pathways, offering states and operators multiple templates for voluntary, scalable adoption without altering the OST or creating new binding obligations.

The result is a sovereignty-preserving, industry-compatible approach that supports safety, interoperability, and growth in the emerging space economy. SARPs provide a practical way to upgrade global space governance for the realities of the twenty-first century.



\*In this paper, the term “global commons” is used in a functional, non-legal sense to refer to physical domains or natural resources (e.g., outer space, the high seas, the radio spectrum) that are accessible to multiple nations and require shared management frameworks. This usage is distinct from the legal concept of “common heritage of mankind” and is intended to highlight governance challenges common to such shared domains beyond national jurisdiction.

# 01 | Introduction

Space activity is entering a new operational era defined by rapid commercialization, increasing mission complexity, and expanding participation by both spacefaring and emerging space actors. However, international governance mechanisms have not evolved at the same pace. The Outer Space Treaty (OST) of 1967 provides the foundational principles of peaceful use, non-appropriation, and due regard but it does not offer the operational procedures, technical standards, or coordination mechanisms needed to manage today's dynamic space environment.

As the final edition of *The Future of Space Law* series, this paper builds on the preceding publications to showcase how successful, existing global commons regimes convert high-level principles into practical tools for states and operators to apply consistently.<sup>1</sup> The International Civil Aviation Organization (ICAO) model of Standards and Recommended Practices (SARPs) epitomizes this capacity for functional governance, achieving global harmonization without creating novel treaty obligations, rather via a voluntary, layered system of standards.<sup>2</sup> Similar functional patterns appear across existing global governance regimes, including the Antarctic Treaty System's (ATS) transparency mechanisms, United Nations Convention on the Law of the Sea (UNCLOS) of 1982 and the International Seabed Authority's (ISA) licensing and environmental oversight structures, and the International Telecommunication Union's (ITU) technical coordination protocols.

This edition synthesizes these comparative insights and attempts to operationalize and provide an implementation pathway to the proposed multi-tiered SARPs.

## 1.1

### Purpose and Objectives

This white paper examines how established governance frameworks for global commons can inform a practical, operational approach to implementing the OST. It analyzes how these systems translate legal principles into effective mechanisms through institutional design, procedural standards, and incentives. The paper applies these lessons to propose a voluntary, three-tier framework of SARPs for outer space, integrating legal, technical, and operational dimensions of governance. The objective is to transform the OST principles into practical tools that strengthen transparency, safety, and equitable participation, while promoting a predictable, inclusive, and economically sustainable space environment consistent with international law.



# 02

## The Functional Architecture of Global Commons Governance

### 2.1

#### The Foundational Governance Dilemma

Space governance faces a challenge that is also present in other shared domains. States seek to enable cooperative use of an environment in which exclusive sovereignty is limited, while operational interactions among multiple actors continue to increase in scale and complexity. Similar conditions have been addressed in other domains governed at the international level, including civil aviation, Antarctica, the oceans, and global telecommunications.

Comparative examination of these frameworks shows that governance outcomes have been achieved through different institutional arrangements adapted to the legal and operational context of each domain. Across the regimes reviewed, emphasis has been placed on practical coordination mechanisms that support predictability, transparency, and cooperation, rather than on the adoption of identical institutional structures.

This observation provides a basis for examining how governance mechanisms may be organized for outer space without relying on direct institutional replication.

### 2.2

#### Recurring Governance Functions Across Comparative Regimes

Analysis across the examined regimes highlights a set of governance functions that appear consistently, despite differences in institutional form and legal context. These functions support coordination and stability in shared environments and are implemented through a variety of mechanisms:

##### 1. Functional Differentiation

Governance responsibilities are distributed across distinct roles, such as standard-setting, technical coordination, oversight, and dispute handling, allowing expertise to develop and reduce institutional concentration.

##### 2. Use of Technical and Procedural Criteria

Routine coordination is guided by standardized technical parameters and procedures, which limit reliance on political negotiation and support predictability among diverse actors.

##### 3. Transparency and Information Sharing

Public registries, data disclosure, and information exchange mechanisms support mutual awareness and facilitate coordination in the absence of centralized enforcement.

##### 4. Incentives Linked to Participation

Participation in governance mechanisms is supported through practical incentives, including access to markets, regulatory

facilitation, and operational coordination benefits.

## 5. Integration of Scientific and Technical Input

Scientific and technical expertise plays a role in informing standards, coordination practices, and environmental considerations across the regimes reviewed.

These functions are not presented as exhaustive or universally fixed. Rather, they reflect patterns observed across the comparative frameworks examined in *The Future of Space Law* series.

## 2.3

### Implications for Space Governance Design

Discussions on space governance have included consideration of whether existing institutional models from other domains could be applied to outer space. Comparative analysis in *The Future of Space Law* series indicates that, in other shared domains, governance arrangements have evolved through mechanisms adapted to domain-specific legal principles and operational conditions.

Consistent with these observations, the approach developed in this paper does not propose the creation of new international institutions or direct institutional analogues. Instead, it focuses on organizing governance mechanisms identified across the comparative regimes in a manner tailored to the characteristics of outer space, including remote operations, increasing commercial participation, dual-use technologies, and the continued application of the non-appropriation principle.

## 2.4

### The SARPs Framework as an Organizational Structure

The multi-tiered SARPs Framework is presented to organize governance mechanisms observed across the comparative regimes into a structured format suitable for outer

space activities. It possesses a granularity that permits adaptability to differing space missions such as earth observations and satellite communications. The framework separates governance elements into legal and economic foundations, technical standards, and operational practices, reflecting functional differentiation rather than institutional hierarchy. Each tier addresses a distinct aspect of coordination while remaining connected to the others, allowing states and operators to engage with the framework in a modular and voluntary manner.

Space transportation represents a functional evolution of air transportation. As operational boundaries increasingly converge, aeronautical governance logic based on shared data, technical protocols, and state-led oversight remains a resilient blueprint for ensuring safety and interoperability while preserving sovereign autonomy.

However, unlike aviation, space governance is institutionally distributed. SARP development would likely emerge through coordinated roles across COPUOS, the ITU, national regulators, and relevant international standardization processes, including interaction with the Long-Term Sustainability (LTS) Guidelines.<sup>3</sup>

This organizational structure is predicated on the recognition that space transportation constitutes a functional and operational evolution of air transportation. As mission cadences increase and the boundary between traditional airspace and orbital altitudes becomes an operational continuum, the aeronautical governance logic remains the most resilient template for ensuring safety and interoperability while respecting sovereign autonomy.

**Table 1** Alignment of Recurring Governance Functions with the SARPs Framework

Recurring Governance Function (as identified in Section 2.2)	SARPs Architectural Embodiment	Observed Organizational Role within SARPs
Functional Differentiation	Tiered structure comprising Tier 1 Legal and Economic Foundations, Tier 2 Technical Standards, and Tier 3 Operational Protocols.	Distributes governance responsibilities across legal, technical, and operational layers while maintaining linkage between them.
Use of Technical and Procedural Criteria	Tier 2 includes standardized technical requirements, interoperable data formats, and defined coordination parameters.	Provides common technical reference points to support coordination through standardized procedures.
Transparency and Information Sharing	Integration of Tier 1 registries with Tier 3 information exchange and notification mechanisms.	Facilitates mutual awareness of activities through accessible information and structured disclosure practices.
Incentives Linked to Participation	Cross tier mechanisms include regulatory facilitation, insurance related differentiation, and access to coordination processes.	Connects participation in coordination mechanisms with practical regulatory and operational considerations.
Integration of Scientific and Technical Input	Embedded within Tier 2 standard development and participation criteria, including data contribution and technical review processes.	Incorporates scientific and technical expertise into standards development and coordination practices.



# 03

## Mapping Global Lessons to a SARPs-Based Space Governance Model

The previous papers in *The Future of Space Law* series showed a consistent pattern across successful global commons frameworks: stability, safety, and predictability emerge when broad legal principles are translated into practical procedures that operators and regulators can readily apply. Within the space sector, Consortium for Execution of Rendezvous and Servicing Operations (CONFERS)<sup>4</sup> is an example of an industry body that has developed widely followed standards for rendezvous and proximity operations, demonstrating that bottom-up, mission-specific standards are already emerging in practice.

Among these systems, international civil aviation offers the strongest and most applicable model for space governance.

Aviation's SARPs framework demonstrates that global coordination does not require new treaties. Instead, it relies on three simple building blocks:

- (1) clear state responsibilities,**
- (2) shared technical standards, and**
- (3) harmonized operational practices.**

This structure allows thousands of operators to safely operate across sovereign airspace daily while preserving national regulatory authority.<sup>5</sup> For example, in ICAO's experience, the domination of private sector actors in airspace necessitated stronger safety and compliance measures which led to the development of the audit program. The multi-faceted structure of the program improved aviation safety and sustained Member State commitments, in contrast to the previous loose reliance on national mechanisms and without the need for international treaties. For space, where the

OST also depends on national supervision, this approach fills the operational gap that the Treaty was not designed to address.

Other global commons regimes reinforce this logic:

- **The Antarctic Treaty System** maintains stability without sovereignty through transparency, inspections, and environmental safeguards.
- **UNCLOS and the UNCLOS/ISA** turn a shared-resource principle into practice through licensing, clear responsibilities, technical commissions, and environmental review.
- **The ITU** effectively coordinates scarce global resources (frequencies and orbits) using filings, registries, and interference-avoidance procedures without an enforcement body.

Across these domains, a common governance pattern emerges such as state-led oversight, shared data, transparent registries, technical standards, operational protocols, and incentive-based compliance.

These lessons map directly onto the proposed multi-tiered SARPs Framework for space. By adapting the core aviation model and integrating transparency tools from the Antarctic Treaty System, supervisory logic from the UNCLOS/ISA, and registry-based coordination from the ITU, SARPs can provide the practical, scalable, and sovereignty-preserving system needed to make the OST workable for today's commercial and technological environment.

The table below summarizes the key governance elements drawn from these regimes and shows how each one translates into the three tiers of the SARPs model.

**Table 2** Summary Mapping Table: Global Lessons Aligned to SARPs Tiers

Core Element	Governance Source	Relevant Space Activities	Tier 1 – Legal & Economic Foundations	Tier 2 – Technical Standards	Tier 3 – Operational Protocols
Enabling the Space Economy	ICAO – ITU – UNCLOS/ISA	Commercial launches; satellite services; in-orbit operations	Predictable licensing; clear market access rules; transparency for investors	Performance standards enabling commercial interoperability	Reliable coordination procedures; stable operating environment reducing business risk
Transparency	ATS – ICAO – ITU	Orbital operations; landing; surface missions	Mission registration; disclosure requirements; non-appropriation affirmation	Standard orbit and maneuver data formats	Real-time maneuver alerts; early-warning notifications
Unified Registries	ITU – UNCLOS/ISA	Satellites; landers; exploration assets	Harmonized registries supporting asset identification, legal traceability, and secured transaction certainty	Encourage efforts under COPUOS such as 2025 United Nations Toolkit on Good Registration Practices <sup>6</sup> to strengthen procedural consistency and lifecycle data management in national registry systems	Incident-driven updates; anomaly reporting
Incentive-Based Compliance	ICAO – UNCLOS/ISA	Launch; satellite and in-orbit operations; proximity ops; surface activities	Mutual recognition; simplified licensing; compliance-linked benefits	Technical conformity certifications; standardized risk/safety files	Priority access to coordination channels; accelerated deconfliction
Due Regard	OST – UNCLOS – ICAO	Orbital operations; proximity maneuvers; constellation management; shared surface sites	Legal obligation to respect other operators; prior consultation when risk of interference exists	Safe-separation standards; Space Situational Awareness (SSA) data-sharing; interference-avoidance thresholds	Coordination procedures; advance notifications; conflict-avoidance actions
Preventing De facto Appropriation	ATS – UNCLOS	Lunar surface sites; resource areas; sustained presence	Prohibition of exclusive undeclared use; disclosure of intent and activity	Defined operational footprints; environmental and safety limits	Shared-use protocols; coordinated scheduling of surface operations
State Supervision, Responsibility and Liability Allocation	UNCLOS/ISA	Commercial missions; Public-Private Partnerships (PPP); high-risk operations	State oversight; due-diligence duties; insurance and liability rules	Establish safety benchmarks that inform risk assessment while ensuring that governance integrity is not contingent on fluctuations in commercial insurance markets. Insurance mechanisms can complement, but cannot substitute for effective State authorization and supervision	Joint investigation procedures; coordinated claims; incident reporting
Environmental Safeguards	ATS – UNCLOS/ISA	Launch and landing; drilling; surface mobility	Environmental protection commitments; harm-prevention obligations	Environmental assessment templates	Pollution-mitigation procedures; safe surface-movement rules

Coordination & Collision Avoidance	ICAO – ITU	Proximity operations; docking; congested orbits	Pre-mission coordination expectations	SSA data-exchange standards; harmonized maneuver-plan formats	Collision-avoidance actions; operational deconfliction channels
Dual-Use Technology Governance	UNCLOS (Tech Transfer)	Remote sensing; propulsion; servicing capabilities	Peaceful-use declarations; responsible tech-transfer principles	Security engineering; misuse-prevention safeguards	Operational verification; use-confirmation protocols
Market Access Incentives	ICAO	Launch services; satellite operators; data-network providers	Licensing advantages linked to SARPs compliance	Performance and compatibility criteria	Reliability metrics; adherence to shared procedures
Voluntary Technical Arbitration	ITLOS – UNCLOS	Interference disputes; operational overlap; resource conflicts	Agreement to non-binding technical arbitration	Standard evidence formats; technical review methodologies	Expert-panel operational resolutions
Private Sector Participation	ICAO – ITU – UNCLOS/ISA	Launch providers; constellation operators; in-orbit servicers	Legal recognition of industry roles; accountability; licensing routes for commercial actors	Industry-driven standards; certification programs; compliance badges	Operator-to-operator coordination; joint emergency channels

# 04

## What the multi-tiered SARPs Framework Is

The multi-tiered SARPs Framework is a voluntary, modular system that translates high-level principles of the OST into practical legal, technical, and operational tools that states and operators can use consistently across missions. The framework may be operationalized through mission-category modules, allowing differentiated technical standards for specific operational segments. Unlike treaties, SARPs do not impose obligations. Instead, they offer a flexible structure that helps regulators and industry align expectations, reduce uncertainty, and coordinate behavior without limiting sovereignty.

The framework is organized into three complementary tiers:

### Tier 1

#### Legal and Economic Foundations

Tier 1 establishes baseline information, transparency, and supervisory practices that enable predictability in space activities. It covers areas such as mission registration, due regard, prevention of de facto appropriation, basic safety filings, market-access clarity, licensing and mutual recognition, insurance and liability alignment, and recognition of private-sector responsibilities.

### Tier 2

#### Technical Standards

Tier 2 provides the engineering and data-format specifications needed to ensure interoperability among diverse space actors. This includes SSA data standards, maneuver-plan formats, environmental-assessment templates, safe-separation criteria, dual-use safeguards, and performance metrics that enable consistent technical understanding. Tier 2 evolves through expert review, mirroring the aviation and telecommunications models.

### Tier 3

#### Operational Protocols

Tier 3 focuses on real-time behavior in orbit and on planetary surfaces. It includes collision-avoidance procedures, proximity operations conduct, emergency coordination, surface operations rules, anomaly notification channels, and operator-to-operator communication pathways. Tier 3 delivers the practical mechanisms that reduce risk and prevent disputes during active mission phases.

The three tiers create a scalable structure that preserves sovereignty, supports commercial growth, and enhances safety and transparency without requiring new binding treaties.



# 05

## Implementation Pathways

Enabling voluntary, scalable, sovereignty-preserving adoption of SARPs. The multi-tiered SARPs Framework is designed for incremental, voluntary adoption. States may implement individual mechanisms or full tiers depending on their national priorities, regulatory capacities, and commercial landscape. The pathways below outline practical routes for integrated SARPs into national, regional, and multilateral processes without creating new legal obligations or altering the OST.

### 5.1

## National-Level Pathways

National adoption serves as the foundational entry point, allowing states to retain full regulatory autonomy while leveraging SARPs to enhance predictability and reduce international misalignments. States may also consider cooperative expert-driven coordination models, like the Joint Authorities for Rulemaking on Unmanned Systems (JARUS),<sup>7</sup> to facilitate voluntary technical convergence outside formal treaty amendment processes.

### 1. Integration into National Licensing Process

States may incorporate Tier 1, Tier 2, or Tier 3 elements into existing licensing systems by:

- Updating application templates to include SARPs-aligned transparency and technical data fields.
- Using SARPs standards as reference criteria in mission-review processes.
- Offering fast-track or simplified licensing for operators aligned with SARPs benchmarks.
- Establishing standardized reporting of orbital maneuvers, anomalies, mission status changes, and disposal activities.

### 2. Voluntary National Registers Aligned with Tier 1 and Tier 2

States can publish:

- Pre-launch filings
- Maneuver plans
- End-of-life commitments
- Operational data

In a national public registry structured according to SARPs' recommended formats.

### 3. Domestic Incentive Structures

Governments may align national incentives with SARPs participation by offering:

- Reduced regulatory review timelines
- Access to government procurement opportunities
- Eligibility for national insurance or reinsurance programs
- Qualification for innovation funds or public-private partnerships

#### Outcome:

Predictability improves, regulatory costs decrease, and domestic commercial actors gain a competitive advantage.

## 5.2

### Bilateral and Regional Pathways

Many SARPs mechanisms lend themselves to regional clusters and bilateral partnerships that reduce duplication and build trust among close partners. Clusters of states can accelerate harmonization and build trust through targeted cooperation.

#### 1. Mutual Recognition Arrangements (MRAs)

Two or more states may agree to:

- Recognize each other's licensing decisions for SARPs-compliant missions
- Align supervisory expectations
- Coordinate on technical reviews for shared mission profiles

#### 2. Shared Technical Infrastructure

Regional partners may share:

- SSA data and tracking capabilities
- Emergency coordination channels
- Technical advisory panels
- Environmental or contamination-assessment workflows

#### 3. Recognition Demonstration Missions

Clusters of states can jointly test:

- Data-sharing standards
- Proximity operations protocols
- Environmental reporting templates
- Surface coordination frameworks

These pilot initiatives provide low-risk mechanisms for testing SARPs elements prior to wider international adoption.

#### Outcome:

Reduced regional duplication, harmonized licensing processes, and increased cross-border commercial opportunities.

## 5.3

### Multilateral and COPUOS Pathways

SARPs are voluntary, treaty-compatible systems, and their multilateral implementation should reflect this. The goal is not to create new binding obligations, but to provide shared tools that states can draw from. Voluntary multilateral processes can foster broad legitimacy and technical coherence.

#### 1. COPUOS-Endorsed Technical Working Groups

Under the COPUOS Science and Technical Subcommittee (STSC), states may:

- Draft standard templates for Tier 1 filings
- Develop reference models for Tier 2 technical assessments
- Explore behavior protocols under Tier 3
- Review national demonstration results

These groups expand technical capacity and ensure global relevance.

#### 2. Voluntary Reporting Mechanisms

States may submit:

- SARPs-aligned transparency data
- Technical updates
- Experience from national implementation to existing UN registers or future complementary registries

#### 3. Multilateral Coordination Channels

UN-affiliated bodies could host:

- Crisis-coordination nodes
- Technical advisory committees
- Peer-support centers for emerging actors

#### Outcome:

Broad legitimacy, shared technical capacity, and potential lower-cost interoperability for states.

## 5.4

# Industry-Led Implementation Pathways

Commercial actors have strong incentives to adopt SARPs mechanisms independently of government mandates.

### 1. Voluntary Compliance Badging

Industry associations may develop:

- A SARPs-aligned “Sustainable Operator” designation
- Tier-based compliance indicators

This drives market differentiation.

### 2. Insurance-Driven Alignment

Recognizing the small and fragile nature of the Third-Party Liability (TPL) market, SARPs can serve as a common risk assessment benchmark. This enables the limited number of underwriters to more efficiently evaluate complex risks, supporting the long-term sustainability of insurance capacity:

- While insurance premiums are subject to global market capacity, compliance with Tier 2 and Tier 3 standards provides underwriters with the necessary technical transparency to maximize available capacity and stabilize coverage terms during volatile market cycles
- Require SARPs data for higher-risk missions
- Use SARPs-based behavioral criteria in pricing models

### 3. Operator-Led Coordination Networks

Commercial operators may:

- Share data on maneuvers
- Participate in emergency-response simulations
- Align proximity-operations expectations

#### Outcome:

Industry self-organization enhances operational safety and lowers financial risks.

## 5.5

# Phased Adoption Model

To avoid overwhelming regulators or operators, SARPs can be implemented in three progressive phases:

**Phase 1 – Foundation:** Focus on Tier 1 adoption by updating national licensing, establishing voluntary registries, and initiating bilateral mutual recognition pilots in addition to establishing principles for legal, economic & commercial guidelines at the COPUOS level.

- National licensing updates
- Voluntary registries
- Mutual recognition pilots
- Tier 1 uptake

**Phase 2 – Technical Integration:** Encouraging Tier 2 convergence through the widespread adoption of SSA data standards, environmental reporting templates, and the integration of SARPs criteria into insurance models.

- Conjunction data standards
- Shared environmental reporting templates
- Tier 2 uptake
- Insurance incentives

**Phase 3 – Operational Maturity:** Full operationalization of Tier 3 protocols by embedding behavioral norms into routine operations, establishing robust multilateral coordination channels, and achieving deep integration of SARPs into regional and global space governance frameworks.

- Behavioral norms
- Crisis-Coordination pathways
- Tier 3 uptake
- Integration of SARPs into regional frameworks

#### Outcome:

States adopt SARPs at their own pace without creating new legal obligations.

# 06

## Structural Challenges

### Limits of standardization across diverse missions

SARPs function best in environments where the underlying activities are relatively uniform. Civil aircraft largely share a common baseline function, transporting passengers and cargo. ITU radio regulations address a single physical resource, the radio spectrum. Maritime vessels, while varied, also operate within broadly comparable operational profiles.

Space systems, by contrast, are highly mission specific. Satellite design parameters vary significantly depending on the mission type, orbital regime, and operation concept. Achieving broad standardization across such a diverse asset class is therefore more challenging than in aviation, maritime, or spectrum management contexts.

### Blurred civil and state distinctions

Under ICAO and UNCLOS, SARPs and similar standards are generally designed for civil or commercial activities, not directly acknowledging the dual-use nature pronounced in space technologies. This overlapping function further highlights the importance of regulatory clarity, especially with the rapid emergence of commercial actors to improve the classification and predictability of practices.

### Lack of natural enforcement interfaces

SARPs in aviation and maritime contexts ultimately rely on enforcement by sovereign authorities where aircraft or vessels must physically enter territory, such as airports or ports. This creates a natural compliance interface. For radiocommunications, the risk of harmful interference, and the loss of interference protection, acts as a natural

counterbalance to operators that do not follow ITU coordination procedures.

In space, the analogy to market access or landing rights is more limited. For satellites, market access typically depends on the telecommunications link between the satellite and the ground segment. In practice, what states license is the ability to transmit radio signals into their jurisdiction or downlink to a ground station. These aspects are already extensively regulated through the ITU Radio Regulations.

As a result, many states do not examine or regulate spacecraft itself beyond the communications link when issuing licenses. This may limit the extent to which market access can realistically be tied to compliance with broader SARPs-style operation standards.

Despite limited enforceability mechanisms, the establishment of a multi-tiered SARPs Framework would incentivize global coordination amongst commercial actors. Taking such action at this stage would act as a preemptive measure promoting benefits to the global space economy as it evolves, in a way that outweighs the risk of non-compliance.



# 07

## Conclusion

The future trajectory of space governance hinges on the international community's capacity to translate principled declarations into functional systems for day-to-day operations. While the OST provides an enduring legal foundation, its implementation now requires contemporary mechanisms to navigate an environment increasingly defined by commercialization, orbital congestion, and technological complexity.

The multi-tiered SARPs Framework proposed in this series offers one such pathway forward. The framework is derived from a functional analysis of successful global commons regimes, including specialization, neutrality, transparency, incentive alignment, and scientific oversight that underpin cooperative stability. The multi-tiered structure represents the intentional reassembly of these functions into a coherent architecture for space governance.

The framework's utility lies in its ability to convert broad OST obligations, including due regard, non-appropriation, and state responsibility into concrete, actionable protocols such as standardized mission registration, quantifiable safety metrics, predefined coordination procedures, and incentive structures aligned with responsible conduct. Its voluntary, tiered, and modular design enables gradual, differentiated adoption by states and operators, respecting sovereign autonomy while fostering interoperable and predictable practices.

As such, the SARPs Framework is presented not as a final blueprint, but as an adaptable platform that the international community can adopt in whole, in part, or use as a reference to inform the development of governance systems that meet the evolving demands of a dynamic space environment.



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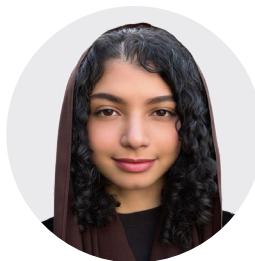
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