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2024 Outer Space Security Conference Report

RITANSHU LOHANI · LUIZA DELAFLORA CASSOL

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UNIDIR is a voluntarily funded, autonomous institute within the United Nations. One of the few policy institutes worldwide focusing on disarmament, UNIDIR generates knowledge and promotes dialogue and action on disarmament and security. Based in Geneva, UNIDIR assists the international community to develop the practical, innovative ideas needed to find solutions to critical security problems.

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NOTE

This report constitutes both a summary and analysis of the discussions and exchanges that took place at UNIDIR's Outer Space Security Conference held at the Palais des Nations in Geneva on 10–11 September 2024. Where this document reports or refers to statements made by panellists, every effort has been made to provide a fair representation of their views. The actual content and flow of the report, however, may differ slightly from the panellists' delivery and their presentations. Videos of all sessions are available on UNIDIR's website at unidir.org/OS24.

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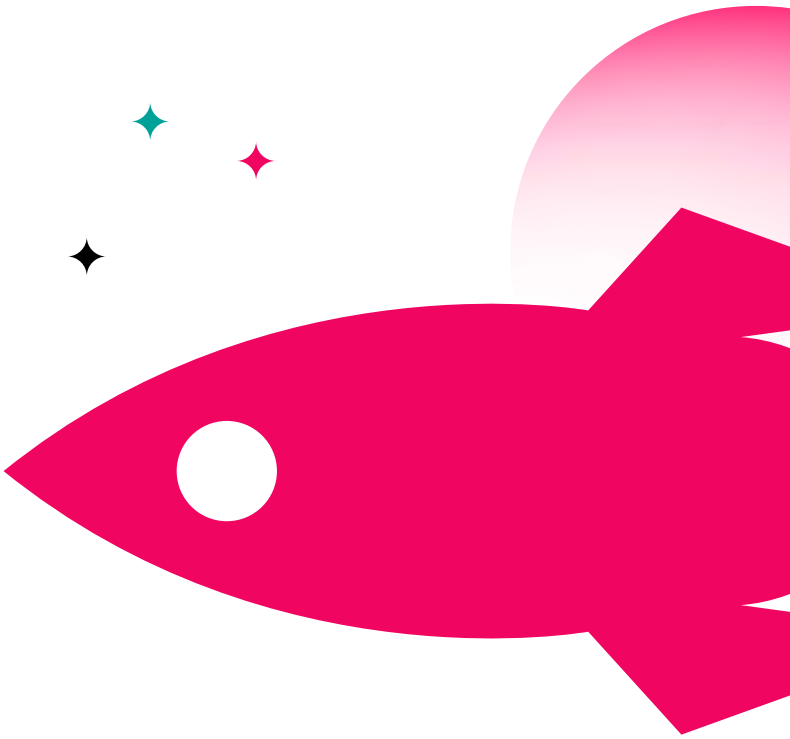

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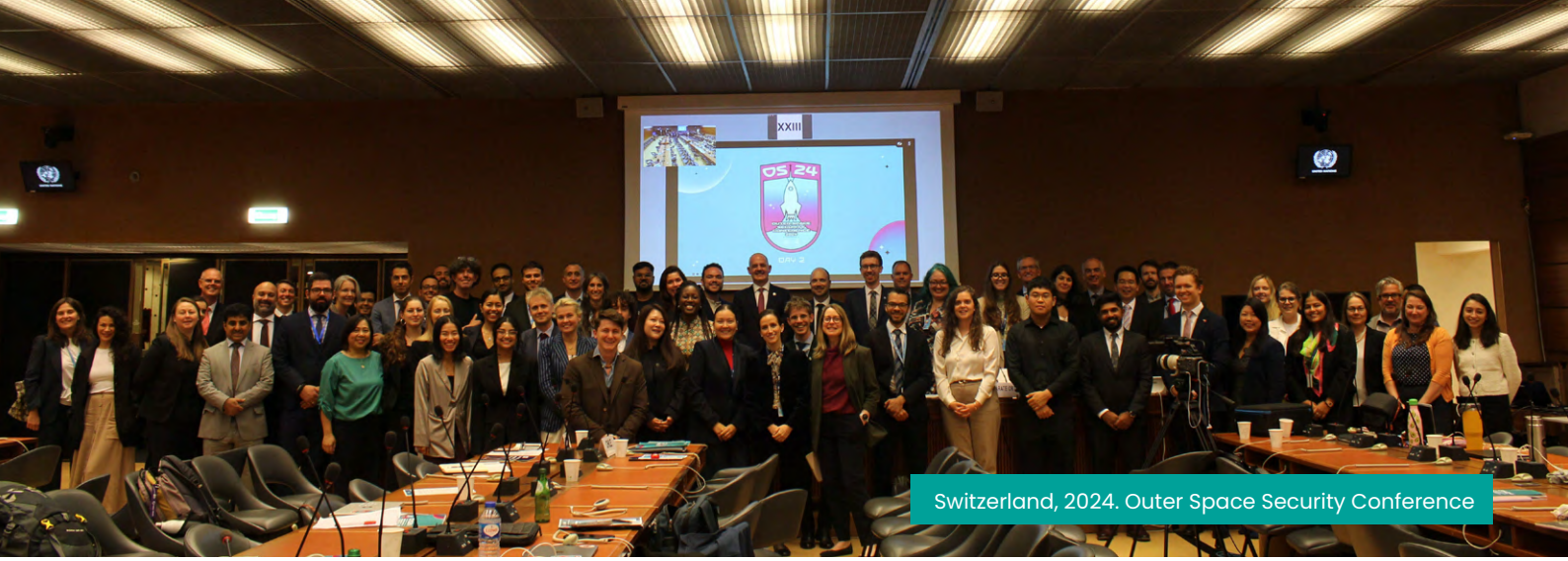
ACRONYMS AND ABBREVIATIONS

AI	Artificial intelligence
ASAT	Anti-satellite weapon
CONFERS	Consortium for Execution of Rendezvous and Servicing Operations
COPUOS	Committee on the Peaceful Uses of Outer Space
GGE	Group of Governmental Experts
HCoC	Hague Code of Conduct against Ballistic Missile Proliferation
IHL	International Humanitarian Law
ITU	International Telecommunication Union
LTS	Long-Term Sustainability
OEWG	Open-ended Working Group
OST	Outer Space Treaty
PAROS	Prevention of an arms race in outer space
PPWT	Draft treaty on the prevention of the placement of weapons in outer space, the threat or use of force against outer space objects
RPO	Rendezvous and proximity operations
SLV	Space launch vehicle
TCBM	Transparency and confidence-building measure
UNOOSA	United Nations Office for Outer Space Affairs

INTRODUCTION



Switzerland, 2024. Outer Space Security Conference

INTRODUCTION

UNIDIR's 2024 Outer Space Security Conference (OS24) was held on 10–11 September 2024, both virtually and in-person at the Palais des Nations in Geneva, Switzerland. This two-day flagship event provided a unique forum for the diplomatic community, along with experts from the military, industry, civil society, and academia to jointly consider challenges and solutions related to security in outer space.

Over 700 people participated in OS24 in-person and online. The discussions acknowledged the growing dependence of society on space-based technologies for essential daily functions including communication, navigation and national security. As more actors – both States and non-governmental entities – benefit from the use and exploration of the space environment, the panellists emphasized the importance of ensuring a safe, secure, and sustainable space.

Panellists stressed the need for greater transparency to mitigate misperceptions and misunderstandings due to the increasing complexity of space activities and the rising geopolitical tensions. Panellists also underscored the important role of multilateral dialogue in addressing space security challenges and expressed a sense of optimism following the recent Group of Governmental Experts (GGE) consensus report on further practical measures for the prevention of an arms race in outer space (PAROS).[1] However, significant concerns remained over the future of multilateral space security governance.

During the first day of OS24, speakers focused on mapping threats and risks to space security, the thresholds of prohibited action in space, and multilateral efforts to build space security. On the second day of OS24, discussions focused on the links between space security and space safety, the practical implementation of transparency and confidence-building measures (TCBMs), and verification and monitoring for space security.

The discussions over the course of OS24 is summarized in this document, which also identifies key takeaway points.

1 GE-PAROS/2024/CRP.4, Final Report of the Group of Governmental Experts on further practical measures for the prevention of an arms race in outer space, https://meetings.unoda.org/gge-paros/group-of-governmental-experts-on-further-practical-measures-for-the-prevention-of-an-arms-race-in-outer-space-2023.

PANEL I

MAPPING THREATS AND RISKS TO SPACE SECURITY — A TECHNICAL AND POLITICAL PERSPECTIVE

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As space becomes ever more contested and congested, the danger of accidental, deliberate or natural incidents is likely to increase significantly. Space systems face multiple challenges which have to be properly understood in order to be effectively mitigated. This panel provided a technical and political perspective on the spectrum of dangers and its consequences to space assets and personnel, in space and on Earth.

The panel discussed a range of threats, from kinetic anti-satellite technology, to non-kinetic counterspace assets capable of cyber interference, which could result in temporary disruption or denial of the use of space systems. One panellist pointed out that national polices and strategies focused on space dominance also exacerbate threat perceptions and insecurity. The capabilities that allow dual-purpose objects to perform activities such as on-orbit servicing or rendezvous and proximity operations (RPO) were also observed to be perceived as threatening, particularly when operated in a non-transparent manner. Panellists identified the misperception of the actions of others in space as a key driver of insecurity and instability in space.

One panellist introduced the concept of the 'fog of peace' to describe the grey zone activities that fall below the threshold of use of force yet are still harmful, such as cyber interference or the dazzling of sensors. The panellist advised against dismissing these 'grey zone' activities as benign or ignoring such acts, arguing that they can disrupt vital satellite systems and disproportionately impact civilian populations. Another panellist emphasized the 'interchangeable nature' of space assets, where civilian systems are used for military purposes, blurring the line between peaceful and hostile actions, which undermines strategic predictability and stability. The issue of whether dual-use systems could be considered legitimate military targets was also raised by one panellist.

Some panellists' proposals to address space security threats referenced key initiatives, such as the draft treaty on the prevention of the placement of weapons in outer space and of the threat or use of force against outer space objects (PPWT) and discussions within the United Nations framework, including ad hoc processes and the Conference on Disarmament. Another panellist noted that a one-size-fits-all approach is inadequate. In this sense, the panellist stated that advancing space security and governance requires engaging with

different actors, addressing risks and threats, interpreting existing laws, strengthening norms around transparency, and developing institutions capable of managing uncertainties and dispute resolution.

Providing a technical perspective, one panellist highlighted the importance of understanding both the space environment and the technical characteristics of spacecraft —such as geometry, materials, surface charge, and movement— to better understand the potential risks presented by a spacecraft. Another panellist stressed the need for better understanding of how space supports critical services to assess the impacts of threats on the users, emphasizing the human dimension in developing effective protection measures. The panellist also mentioned the importance of new actors being aware of the prevailing security environment, as actions that they might view as peaceful, such as a technological demonstration, can nonetheless influence the overall security environment.

One panellist called for further research into the legal responsibility of commercial entities providing services used in military operations, as well as accountability of entities that engage in unauthorized space activities. Citing an example of a small company launching a satellite without proper authorization, one panellist underscored the need for robust safeguards to prevent nefarious actors from getting into orbit. Some panellists suggested that harmonizing processes across States to ensure clarity and predictability would aid in ensuring these safeguards and processes are effective without stifling innovation.

Some panellists discussed how transparency has a central role in both capabilities- and behaviour-based approaches to space security. Panellists cited information-sharing, direct lines of communication between space operators, and prior notifications as helpful measures to clarify intentions and reduce risks of misunderstanding. One panellist suggested feeding data into a model for space traffic management. However, another panellist cautioned that States may draw varying conclusions from the same dataset. However, a shared understanding of how to analyse and interpret data is crucial to prevent miscommunication. Additionally, one panellist highlighted the limitations to transparency due to national security and commercial interests.

Furthermore, it was noted that the technological gap between developing and developed countries must be addressed. One panellist suggested that emerging spacefaring States should receive training and capacity-building support to help them actively engage in space activities.

The panel underscored the importance of addressing security concerns holistically through continued dialogue and collaboration, assessing threats and risks through technical, political, and legal perspectives, and advocating for cooperation over competition to ensure space security for all.

PANEL II

SPACE SECURITY DOS AND DON'TS — THE THRESHOLDS OF PROHIBITED ACTION IN

PANEL II

SPACE SECURITY DOS AND DON'TS — THE THRESHOLDS OF PROHIBITED ACTION IN SPACE

The concept of PAROS emerged due to the limited space-security-specific provisions in existing United Nations space treaties, particularly the Outer Space Treaty (OST).[2] Understanding the international principles and regulations that already exist in international law from a security perspective, as well as the gaps and limitations, can aid in consolidating and reinforcing this regime as the international community continues to explore initiatives for PAROS.

The panel highlighted that the current legal framework does not establish a ban on placing weapons other than weapons of mass destruction in outer space. Moreover, it was underscored that the identification, interpretation, and application of relevant laws to specific scenarios can be difficult. Panellists also noted that clarifying the meaning of the use of force in the context of outer space remains a pressing challenge.

The panel discussed Article 2(4) of the Charter of the United Nations, a cornerstone of international law, which prohibits the threat or use of force, and affirmed its applicability to outer space.[3] One of the panellists explained that this prohibition applies to all States as customary international law and is applicable both in times of peace and conflict. Importantly, Article 2(4) was stressed as a peremptory norm – a fundamental principle that overrides other norms of non-peremptory character.

In addressing the question of how to determine a prohibited act in the absence of a universally agreed definition of use of force, one panellist referred to the three contextual requirements of Article 2(4): (i) the act must be carried out by a State or be attributable to a State; (ii) it must occur in the context of international relations; and, (iii) it must be against the territorial integrity or political independence of another State or be inconsistent with the purposes of the United Nations. The panellist also clarified the elements required for an act to meet the definition of prohibited use of force, which included means, effects, gravity and coercive or hostile intent. Furthermore, another panellist added that intent and evidentiary matter are relevant characteristics to assess a use of force.

2 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 27 January 1967, 610 UNTS 205.

3 Charter of the United Nations, 1945, 1 UNTS XVI.

In discussing what activities fall above or below the use of force threshold, one panellist indicated that actions such as targeting ground-based components of space infrastructure and disabling objects that impact critical systems —like disaster relief, public health and financial markets— could lie above the threshold. The panellist further explained that actions such as dazzling sensors or blinding surveillance satellites could be deemed below the threshold. Additionally, damage caused by debris created from a State destroying its own satellites also need to be considered. The panellist concluded that the 'temporariness' of harms or the duration of disablements could aid in determining whether an act falls above or below the use of force threshold.

One of the panellists also stated that Article 2(4) of the UN Charter is primarily focused on States and pointed out the challenges in attributing the actions of non-governmental entities to States in scenarios involving the use of force. In this sense, another panellist suggested that the concept of the prohibition of use of force could be defined in future treaties, enabling States to reach a common understanding of what constitutes the use of force through subsequent agreements or practices. However, such definitions could not alter the interpretation of Article 2(4) of the UN Charter, as Article 103 asserts that the UN Charter takes precedence over any other obligations arising from other treaties.

Building on the discussion of applicable international law, one panellist asserted that international humanitarian law (IHL) is applicable to outer space and emphasized the need to explore the specifics of its application through further discussion. The panellist also highlighted the growing need to examine the law of neutrality, particularly given the increasing involvement of non-governmental entities in space activities. One of the panellists also stressed that multilateral discussions on PAROS must consider the role of non-governmental entities, as many technologies are either obtained from or co-developed with non-governmental entities.

To address the gaps in the current legal framework, one panellist advocated for reaffirming existing obligations and adopting a behaviour-based approach, suggesting that voluntary, non-legally binding instruments could be effective. The panellist argued that a capabilities-based approach, as embodied in calls for a legally binding instrument, could constrain the development of new or innovative technologies. In contrast, another panellist contended that norms of responsible behaviour do not prevent the placement of weapons in outer space. The panellist pointed to the PPWT as a potential framework for establishing a legally binding instrument on PAROS. Yet another panellist emphasized that the UN Charter's prohibition on the threat or use of force provides a robust legal foundation for addressing space security challenges, that accommodates both capabilities- and behaviour-based approaches; moreover, it would achieve this without relying on the definition of space weapons.

One panellist drew parallels between space law and other fields, including air and sea, as well as other region-specific agreements, such as the Antarctic Treaty, noting that concepts like safety zones and specially managed or protected areas may offer guidance in addressing gaps within the existing space law framework. However, another panellist cautioned against automatically applying principles from these fields to space, as the contexts may be too different to allow for relevant and effective application.

The panel emphasized the importance of developing shared understandings and building trust between States and acknowledged the potential disagreements about what constitutes a prohibited action. The panel agreed on the importance of recognizing the limitations of the existing legal framework while acknowledging the important role of diplomats, researchers, and scholars in shaping discourse, generating common understanding around existing instruments, and establishing new measures for space security.

PANEL III

MULTILATERAL EFFORTS TO BUILD SPACE SECURITY — WHAT HAS BEEN DONE AND WHAT IS NEXT

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MULTILATERAL EFFORTS TO BUILD SPACE SECURITY — WHAT HAS BEEN DONE AND WHAT IS NEXT

In recent years, there have been various mechanisms to advance the goals of PAROS. This panel reviewed these initiatives, considered their impacts and proposals, and largely recognized the strong foundation laid by the 2024 consensus report of the GGE on further practical measures for PAROS. The panel also discussed the potential of merging two Open-ended Working Groups (OEWGs) on reducing Space threats through norms, rules and principles of responsible behaviours; and on further practical measures for the prevention of an arms race in outer space. As of the publication date of this report, the resolution to merge the OEWGs was successful. Additionally, the panellists explored the roles of regional organizations and the private sector in supporting international efforts.

One panellist referred to the GGE consensus report on further practical measures as a "glimmer of hope" and, paraphrasing Neil Armstrong's famous quote, indicated that the report was 'a small step' towards achieving space security but 'a giant leap' for a multilateral effort. In summarizing the report, the panellist highlighted the holistic and comprehensive approach adopted, which integrated diverse State perspectives, acknowledged the importance of a thorough understanding of threats, and outlined key elements for future work.

Another panellist indicated that the GGE report established a solid foundation for developing a legally binding instrument by addressing both its structure and content. In addition, the panellist noted that since discussions are not starting from scratch, the international community can expedite the negotiations for a legally binding agreement and further emphasized that while voluntary transparency and confidence-building measures (TCBMs) can complement this framework, they cannot replace an effective legally binding regime. Conversely, another panellist pointed out that, historically, many legally binding agreements have been based on non-legally binding measures including United Nations resolutions, commitments, and norms – an approach which the panellist suggested could still be useful today.

Panellists observed that efforts from different fora should complement and reinforce each other and provided examples of complementarity between the work on, inter alia, TCBMs undertaken by the Disarmament Commission, political commitments to not conduct destructive direct-ascent ASAT tests and the pledge on no-first placement of weapons in outer space, multilateral efforts on norms of responsible behaviour, and future legally binding instruments. Some panellists suggested that effective measures can be a combination of non-legally binding measures and legally binding instruments, which must work together in a mutually reinforcing manner. Indeed, on approaches, one panellist asserted that it is difficult to divorce behaviour and capabilities in the context of space security as both are important aspects that need to be addressed by PAROS.

In discussing the role of regional institutions and policies in supporting multilateral processes, one panellist underscored the importance of diversity, inclusivity, and transparency, citing examples of partnerships that provide free and open access to navigation and Earth-observation data, along with capacity-building initiatives for using such data in emergency services. The panellist also noted that regional institutions contribute intellectually to multilateral efforts, for example, through their participation in processes such as OEWGs.

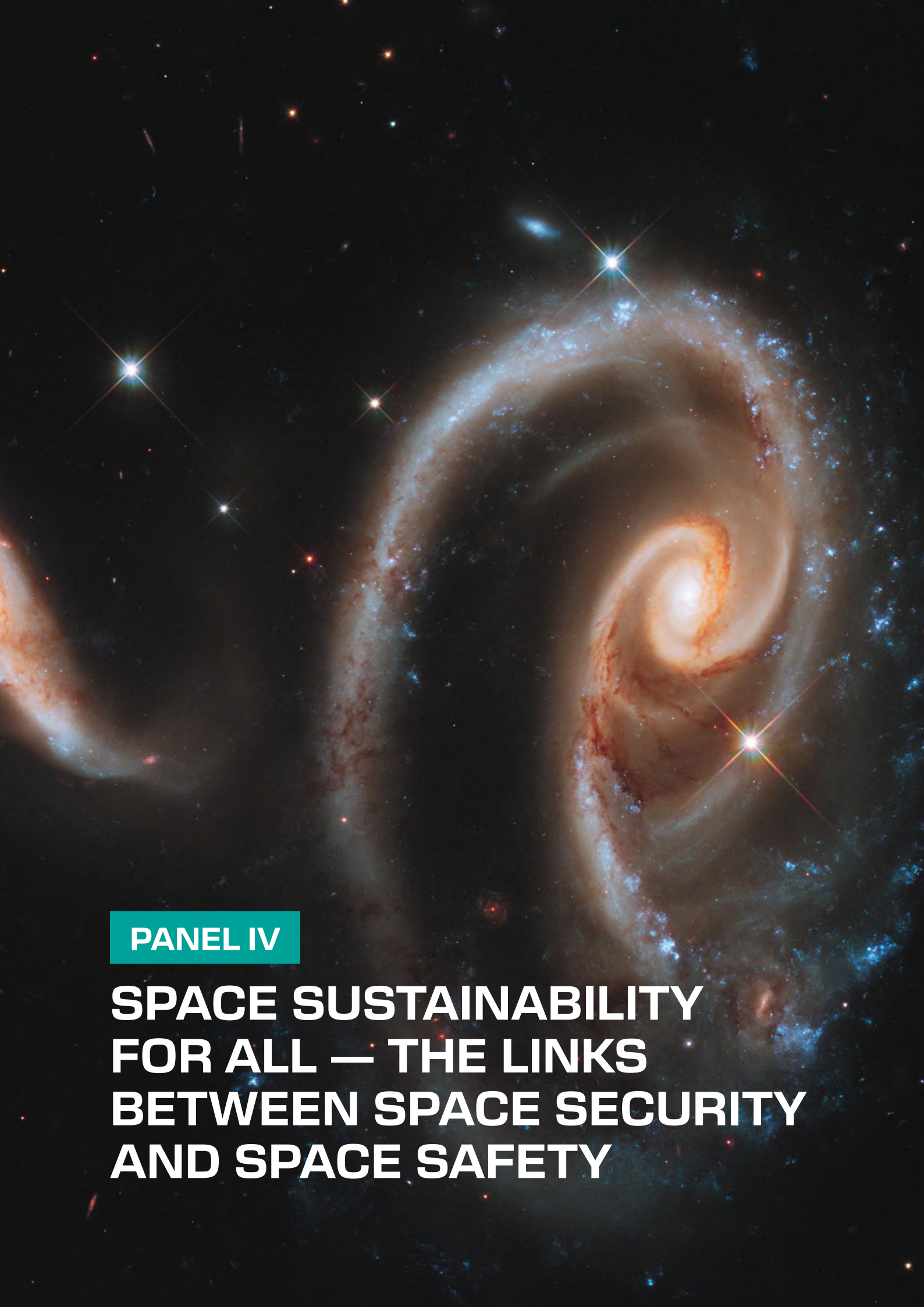
Regarding the role of the private sector in multilateral processes, one panellist noted that private sector involvement has introduced new topics in past discussions and will continue to do so in future deliberations and suggested no massive changes are needed in how the private sector is included. Another panellist cautioned that while the private sector may appear to be engaging in self-governance as technology is advancing faster than diplomatic regulation efforts, it remains the responsibility of States to keep private companies informed of developments and ensure that their activities align with global efforts to address challenges. Reaffirming this view, a panellist cited article VI of the OST, which places responsibility on States as regulators to ensure national-level implementation of their obligations under the treaty. Another panellist also highlighted the importance of effectively implementing the Guidelines for the Long-term Sustainability of Outer Space Activities (LTS Guidelines) at the national level.[4]

During the discussion on the possibility of merging two proposed OEWGs, one panellist cautioned that parallel OEWG processes could polarize the international community, potentially leading to a fragmented and more contested regime, which could itself become a source of conflict. The panellist also observed that, for many States, it would be challenging to participate meaningfully in two simultaneous processes, reducing their chances of success. A participant from the floor mentioned that the GGE report on further practical measures refers to both OEWGs on equal footing and stressed the need to unify these processes, calling for support for the draft resolution to merge them.[5]

4 Guidelines for the Long-Term Sustainability of Outer Space Activities of the Committee on the Peaceful Uses of Outer Space, 2021.

5 A/C.1/79/L.61/Rev.1, Open-ended working group on the prevention of an arms race in outer space in all its aspects, https://documents.un.org/doc/undoc/ltd/n24/320/22/pdf/n2432022.pdf.

The panel concluded that the consensus reached in the recent GGE demonstrates that broader consensus can be achieved when discussions are carried out in good faith and through constructive negotiations. Some panellists also emphasized the importance of including different United Nations bodies, civil society, and commercial actors in the discussions.



PANEL IV

SPACE SUSTAINABILITY FOR ALL — THE LINKS BETWEEN SPACE SECURITY AND SPACE SAFETY

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SPACE SUSTAINABILITY FOR ALL — THE LINKS BETWEEN SPACE SECURITY AND SPACE SAFETY

The increasing number of space actors, assets, and debris-causing activities creates a growing risk to the long-term sustainability of outer space. These challenges can jeopardize the safety and security of the outer space environment for generations to come. This panel examined the nexus between space security and space safety, alongside the implications and potential dangers for space sustainability.

Panellists indicated the necessity of distinguishing between the concepts of space safety and space security, as they reflect two different approaches. One panellist defined safety as a state achieved through measures that safeguard people and assets from accidents, while security involves protection against attacks. The panellist further noted two sources of risks to the safety and security of space activities: one arising naturally from space operations, such as carbon emissions, and the other resulting from the policies and intentional actions of States.

Although security and safety entail different priorities, there is spillover. One of the panellists highlighted that emerging space activities are cross-cutting on peaceful uses and security of space, such as on-orbit servicing and RPO. The panellist also illustrated that kinetic ASAT tests implicate discussions on safety and security, as the act of the test is a security matter, while the fallout is typically a matter of sustainability and remediation of the impact on the orbital environment.

One panellist explained how national policies can help to create and maintain conditions for sustainable space programmes, stressing the importance of preventing activities in outer space that threaten the ability to sustain these space programmes. Another panellist called attention to the potential impact of space activity in terms of climate sustainability. Since the 1970s, Point Nemo in the South Pacific Ocean has been used as a designated area for the controlled re-entry of space platform components, leading to debris accumulation on the ocean floor. Due to Antarctica's isolated geographical position, the panellist cautioned that any disruption of space capabilities could have significant environmental effects in the region, impacting the climate and maritime ecosystems, as well as humanitarian consequences, such as impairing search and rescue operations. The panellist indicated the need for agreements to ensure responsible management of space activities, including guidelines for end-of-life disposal, so as to protect Antarctica and its surrounding ecosystems from space-related harms.

For long-term sustainability, panellists suggested that States should focus on finding common ground on policy issues that can be addressed collectively, despite the deteriorating geopolitical climate. One panellist proposed that establishing internationally agreed definitions could be beneficial, such as one for space debris.

One panellist indicated that implementing global governance and translating 'paper into practice' are crucial for addressing key issues of space security, safety, and sustainability. In this regard, the Committee on the Peaceful Uses of Outer Space (COPUOS) plays a central role in developing international governance of outer space. Panellists cited ongoing activities to implement international guidelines and cooperation mechanisms, noting that COPUOS aims to support States in adopting guidelines and developing solutions at the national level. Regarding the development of norms and standards, one panellist also suggested that a possible avenue could be the internationalization of best practices, particularly by examining how other States implement the LTS Guidelines.

Some panellists acknowledged the need to promote education on the potential benefits and consequences of conducting space activities, regardless of the level of spacefaring capacity. When asked how emerging spacefaring States can benefit from strategic partnerships and develop national space programmes, one panellist stated that not every State requires its own space programme or satellites. What is essential for all States, however, is access to space data.

The panel also underscored the potential for collaboration with non-governmental entities in addressing space safety and security, as these actors are developing relevant capabilities and technologies for safe and sustainable operations. While decisions are ultimately made by the Member States, the industry is an important stakeholder. One panellist suggested there is potential for cooperation in identifying space objects that could be deorbited to eliminate hazards. Additionally, another panellist noted the importance of including the growing commercial space sector in ongoing discussions, citing the Consortium for Execution of Rendezvous and Servicing Operations (CONFERS) as an example of industry engagement.

PANEL V

SHINING A LIGHT ON SPACE ACTIVITIES — CLARITY AND TRANSPARENCY FOR PEACE AND SECURITY

PANEL V

SHINING A LIGHT ON SPACE ACTIVITIES — CLARITY AND TRANSPARENCY FOR PEACE AND SECURITY

To maintain space as a secure and peaceful environment, it is necessary to foster transparent space activities to reduce ambiguity. This panel provided an overview of the opportunities and limits of existing tools and frameworks in improving transparency. It further addressed areas for developing new TCBMs and incentives to implement and report on existing ones.

One panellist highlighted the importance of transparency in space activities to (i) enhance security and prevent escalation on the ground; (ii) reassure parties by limiting worst-case scenario assessments; and (iii) enable safe participation of an increasing number of non-governmental entities in space activities. Another panellist cautioned that the absence of transparency could jeopardize communication and hinder efforts to address challenges on the future of space activities.

Furthermore, one panellist explained that transparency plays a key role in clarifying the nature of activities conducted, such as distinguishing between the development and launch of space launch vehicles (SLVs) and ballistic missiles. For example, the Hague Code of Conduct (HCoC) serves as a multilateral framework for promoting transparency for both types of objects entering orbit, with 145 States subscribing to its principles.[6] Although technological advances are blurring the lines between SLVs and ballistic missiles, the panellist affirmed that the HCoC remains effective in addressing these evolving similarities. Moreover, several TCBMs exist within the HCoC, including launch notifications, annual declarations on space and ballistic missile policies, and voluntary invitations to visit launch sites.

For satellite launches, panellists identified the sharing of tracking information and orbital specifications as particularly helpful in monitoring activities, avoiding collisions, and building trust. Acceding to and ratifying United Nations treaties were cited as measures that encourage transparency. Additionally, the UNIDIR Space Security Portal was acknowledged by both panellists and participants as a valuable TCBM tool.[7] An intervention from the floor also recalled the 2013 GGE report on TCBMs,[8] which continues to be reaffirmed in multilateral fora.

6 Hague Code of Conduct Against Ballistic Missiles Proliferation, 2002, https://www.hcoc.at.

7 Space Security Portal, UNIDIR, https://spacesecurityportal.org/.

8 UN Doc. A/68/189*, Report adopted by the Group of Governmental Experts (GGE) on Transparency and Confidence-Building Measures in Outer Space Activities, 29 July 2013, https://www.unoosa.org/oosa/oosadoc/data/documents/2013/a/a68189_0.html.

One panellist underscored that multilateral cooperation must be the cornerstone of space security, citing the OST as an example of mitigating risks and promoting international cooperation. The panellist indicated that States must demonstrate a clear and sincere commitment to sharing information on space activities, as transparency is key to resolving several challenges.

Nonetheless, it was noted by panellists that some States may indeed intentionally choose not to be transparent. One panellist explained that some States may avoid engaging in TCBMs due to concerns about potential restrictions on technology acquisition, while others may lack the capacity to participate. Panellists further indicated that although national security considerations might limit participation in TCBMs, being transparent could nevertheless serve a State's national interests. In addition, as new mechanisms like open-source intelligence make it harder to conceal capabilities, deliberate transparency measures can help to avoid misunderstandings and foster trust and cooperation.

One panellist reflected that transparency measures must also account for cultural, geopolitical, and contextual factors, cautioning that neglecting these considerations could be counterproductive in diplomacy. Another panellist echoed this, noting the challenges of operating in an environment of mistrust and worsening geopolitical conditions. Despite this, the panellist asserted that transparency remains possible and that geopolitical challenges should not be used as an excuse.

In terms of other TCBMs, one panellist suggested that small island nations could share their expertise in maritime security to help address space security, as the two domains share similar challenges. The panellist further proposed that localized and contextualized discussions in different regions could effectively raise awareness among States about the importance of space, its relevance to their circumstances, and their potential contributions to space security discussions. The panellist stressed the crucial role of space assets for small island nations, noting that managing national interests, especially in disaster response and addressing the climate crisis, would be difficult without them. In this sense, the panellist highlighted the need to differentiate in discussions between strategic and operational implications of space security. Small island nations rely heavily on space systems, leaving them particularly vulnerable if these systems were to be compromised; thus, ensuring the operational security of space is critically important.

On the subject of TCBMs, one panellist explained that while transparency is essential for confidence-building, it is not an end in itself. Another panellist noted that confidence-building measures can originate from both State and non-governmental entities, although transparency is primarily expected from States. In addition, one panellist emphasized that effective confidence-building measures require proactivity, dialogue, and diplomacy.

PANEL VI

A VERIFICATION AND MONITORING TOOLBOX FOR SPACE SECURITY

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A VERIFICATION AND MONITORING TOOLBOX FOR SPACE SECURITY

Verification and monitoring have long been an important and often complex topic in arms control and disarmament, including in space. This panel explored the opportunities presented by new technologies and tools for monitoring and verifying space activities. The panellists also addressed several of the technical, political, and financial challenges to verification.

One panellist provided an overview of verification issues, explaining that the process involves three phases: (i) monitoring and collecting data on State activities; (ii) conducting a technical analysis of the information gathered; and (iii) reaching a judgment about a State's compliance with its obligations. Verification is inherently a technical and political process; and although no verification regime is perfect, it should facilitate timely detection of violations and deter non-compliance. The panellist noted that several provisions in the international legal space framework, such as articles IX–XII of the OST can aid verification efforts. Moreover, there are various data collection approaches and methods that support verification, including space situational awareness (SSA), data exchanges, declarations, notifications, Earth observation, on-site activities, and open-source data. However, limitations in these capabilities and political barriers may hinder information-sharing and cooperative verification arrangements.

Although verification is a State-led process, non-governmental entities and individuals are stakeholders that can assist with monitoring efforts, contributing to the creation of a global network of space data sources. Providing a perspective from industry, another panellist underscored the importance of persistent monitoring, as streaming data provides real-time insights into space activities. On space security, the panellist explained that threats are defined by the objects' characteristics and behaviour. To verify behaviours or characteristics of space objects, the panellist suggested building a body of data using open-source intelligence and breaking down the object information into five Ps (power, pointing, propulsion, processing, and payload). This approach could help to inform assessments and mitigate cognitive biases. In this sense, the panellist noted that fact-based analysis can assist the verification process and the safety, security, and sustainability of space – as space security cannot be addressed in isolation.

Regarding the implications of advancements in artificial intelligence (AI) and other emerging technologies, one panellist reflected on the limits and possibilities of delegating

responsibilities to AI. The panellist emphasized that AI should not be used for decision-making. Instead, AI could be useful for filtering large data sets, learning from them, and then having the information verified by experts. The panellist further explained the difference between AI and automation, asserting that AI can be used to maximize tasking, although human intelligence must be used for decision-making.

Another panellist presented the perspective of a national space agency, highlighting the dual utility of monitoring space objects for both sustainability and security. This particular space agency was created with a primary focus on space sustainability. The panellist indicated that once national policies were in place, it became easier for industries to engage in space activities, which are an important asset for the economy.

Another panellist provided an academic perspective on verification and monitoring, explaining that rule-following and rule-making have important roles in space safety and sustainability, as they help to prevent collisions and harmful interference. In this context, observing the implementation of rules is important. The panellist presented an overview of the International Telecommunication Union Compliance Assessment Monitor (ITU CAM) tool, which was created to monitor how often Member States' satellites adhere to their orbital prescription, issuing daily assessments of satellite compliance along with a historical record of compliance data. The panellist also provided examples of several cases of non-compliance identified through the ITU CAM process. The panellist suggested that the ITU CAM and similar tools can instigate a critical interrogation of rule-following, and through the review of existing mechanisms to ensure their effective implementation, these tools can also encourage the development of better rules for the future.

One panellist recalled that during the 2023 OEWG on reducing space threats[9] some States expressed concerns that the establishment of new legal mechanisms for space could complicate access to space and compliance with obligations. The panellists pointed out the importance of equitable legal and normative frameworks, as the use and exploration of space is the province of all humankind. One panellist further stressed the importance of cooperation and partnerships for the acquisition and dissemination of space data.

The panel discussed how a State's spacefaring capabilities influence its approach to verification, monitoring, and prioritizing space issues. One panellist questioned the feasibility of verification for States considering new agreements, while another suggested that States can benefit from existing verification mechanisms. Threat perceptions were noted as shaping a State's priorities, often introducing bias. Some panellists highlighted geographic advantages of certain territories to carry out space-related activities, such as hosting radars, which can enhance a State's role in observing space objects. Panellists also reiterated that COPUOS offers Member States, including non-spacefaring States, an opportunity to have an active voice and to influence norms, even as observers. Middle powers, in particular, can lead in rule-making efforts and establishing State practice.

9 2023 Open-ended Working Group on Reducing Space Threats through Norms, Rules and Principles of responsible Behaviours, https://meetings.unoda.org/open-ended-working-group-on-reducing-space-threats-2022.

OS24 YOUTH VIDEO COMPETITION

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UNIDIR in partnership with CIGI organized the OS24 Youth Video Competition to provide younger generations and future leaders a chance to actively participate in OS24, to highlight the importance of youth participation in multilateral space security discussions.

During the second day of the Conference, a compilation of videos submitted by participants was premiered alongside the winning entries. Addressing the Conference, CIGI recognized the importance of fostering diverse perspectives and the significance of both the Competition and the Conference itself to this end. In addition, CIGI underscored that decision-makers have a duty to consider the impacts of their decisions on future generations. The organizers expressed gratitude to everyone who supported the competition and to the participants for their insightful videos.

Takeaways from the Video Competition

The videos addressed several key themes, particularly the inclusion of diverse perspectives in multilateral dialogues on space security and the necessity of maintaining outer space as a secure, safe and sustainable environment for future generations. One participant defined space security as a complex issue that impacts various fields, including environmental protection and sustainable development. One of the participants expressed concern over rising geopolitical tensions, which could increase military activities in outer space. Challenges related to the lack of diversity in the aerospace field were also raised by one of the participants, particularly the underrepresentation of women in aerospace engineering. Participants further called for robust security measures, highlighting that space entails cooperation among States.

The videos advocated for fostering the inclusion of contributions from all States and stakeholders, highlighting the roles of youth, women, the Global South, and emerging spacefaring States. A few participants expressed the need for equitable access to and sharing of space infrastructure and opportunities, specifically regarding the disproportionate impacts on marginalized and indigenous communities, and the significance of space for regions most vulnerable to climate change. Considering the growing debris problem, one participant advocated for the use of environmentally friendly alternatives in satellite construction. Another participant emphasized the need for consensus amid the considerable transformation of space and its uses. Furthermore, participants pointed out the need for multilateral discussions to enhance transparency and called on global leaders to address space security issues. As one participant stated, “space connects us and protects us, and in turn, we must protect it”.

KEY TAKEAWAYS

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Communication fosters transparency and strengthens space security

Amid escalating geopolitical tensions, effective communication was recognized as a fundamental pillar for enhancing space security. Across both days of the Conference, discussions emphasized the role of communication in fostering transparency, mitigating misperceptions, and reducing risks associated with misunderstandings of stakeholders' actions and capabilities. Panellists stressed the importance of open dialogue and information-sharing for monitoring compliance with international obligations and ensuring the peaceful uses of outer space.

The discussions referred to various mechanisms, such as the LTS Guidelines, which call for establishing contact points for communication with relevant authorities. Diplomatic avenues including dialogues, conferences, and workshops were also acknowledged as valuable platforms for stakeholders to exchange perspectives and to foster mutual understanding. Several panellists cited specific measures like launch notifications and sharing national space policy and doctrines through the HCoC as practical steps to increase transparency. Additionally, the UN Office for Outer Space Affairs (UNOOSA) Register of Objects Launched into Outer Space was cited as a useful resource to support transparency efforts. Other tools, such as UNIDIR's Space Security Portal, were also recognized. Furthermore, panellists acknowledged that constructive dialogue and communication in multilateral fora can lead to incremental progress in space security, as exemplified by the 2024 GGE consensus report on PAROS. Communication was acknowledged not merely as an operational necessity but as the cornerstone of transparency and cooperation in space security efforts.

Holistic and comprehensive understandings of space issues are important to build common ground

Discussions emphasized the need for a holistic approach to space security as space becomes increasingly utilized by a growing number of actors for diverse purposes. Such an approach requires a comprehensive understanding of several interrelated factors, including the space environment, space systems, and the evolving nature of threats and risks. Panellists noted that recognizing the interplay between these elements is essential for attributing cause and effect, particularly when addressing incidents of harm or disruption. Additionally, for facilitating a shared understanding of key topics and terms, UNIDIR and Secure World Foundation's Lexicon for Outer Space Security was cited as an example by several panellists.

The discussions further reflected on the interconnectedness of space security and space safety, recognizing both as fundamental to ensuring the long-term sustainability of space. Activities such as kinetic anti-satellite tests, RPO, and space launch notifications were noted as cross-cutting concerns that impact both safety and security of space. Although multilateral United Nations discussions on safety and security occur in separate fora, the discussions recognized the complementarity of these topics and the potential for addressing them more effectively.

A human-centric approach to space security is essential to safeguard our common interest in space

The exploration and use of outer space is the province of all humankind. Conference discussions highlighted the central role of space in supporting fundamental human needs. Discussions also underscored the need for both States and non-governmental entities to better understand real-world consequences of space-related threats and risks for the users of space services. Adopting a human-centric approach to space security acknowledges the critical importance of space-based services in communication, economic development, and enabling access to information, particularly for vulnerable populations. For instance, space technologies are indispensable for those populations most affected by climate change, which rely heavily on space for emergency services, early-warning systems, and search and rescue operations. Moreover, panellists emphasized the importance of raising awareness and educating stakeholders on the diverse uses and benefits of space. All stakeholders, from States to individual citizens, share a common interest in space as a peaceful and accessible domain. Framing space security through this human-centric lens reinforces the collective responsibility to safeguard the long-term sustainability of space activities for future generations.

Inclusivity and diversity in discussions aid in navigating space security challenges

As the number of stakeholders in space continues to grow, discussions at the Conference reaffirmed the importance of including diverse perspectives from academia, industry, military, civil society, youth, and the Global South, alongside ensuring gender and geographical balance in space-related dialogues. Recognizing the unique challenges and vulnerabilities faced by different stakeholders, panellists noted that such engagement is essential for broadening understanding of new and evolving threats. In particular, international cooperation was identified as crucial for developing practical solutions that can accommodate the concerns and priorities of all stakeholders.

Discussions further reflected on the role of diversity in fostering innovative and effective solutions to space security challenges, especially when commercial and technical experts collaborate. To support wider inclusion, panellists suggested that tailored capacity-building programmes focused on technical expertise could increase participation from a broader range of States, particularly from emerging spacefaring States. Additionally, lessons from other sectors and experiences could be adapted to ensure space remains secure, sustainable, and accessible for all.

ANNEX:

CONFERENCE PROGRAMME

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2024 OUTER SPACE SECURITY CONFERENCE

DAY 1 – 10 September 2024

Conference Opening

Opening Remarks

- Robin Geiss (Director, UNIDIR)

Keynote Address

- Yi Soyeon (Astronaut)

Panel I — Mapping Threats and Risks to Space Security – a Technical and Political Perspective

Speakers

- Andrey Yurievich Malov (Senior Expert, Centre for Military and Political Studies, Moscow State Institute of International Relations (MGIMO))
- Éric Cézzane Cólen Guedes (Chief, Space Operations Center, Brazilian Air Force)
- Jessica West (Senior Fellow, Centre for International Governance Innovation and Senior Researcher, Project Ploughshares)
- Russell Boyce (Managing Director, Mission Assurance)
- Shen Jian (Deputy Permanent Representative and Ambassador for Disarmament Affairs, Permanent Mission of the People's Republic of China to the United Nations Office at Geneva and Other International Organizations in Switzerland)

Moderator

- Victoria Samson (Chief Director, Space Security and Stability, Secure World Foundation)

Panel II — Space Security Dos and Don'ts – the Thresholds of Prohibited Action in Space

Speakers

- Andrey Belousov (Minister Plenipotentiary, Deputy Permanent Representative, Permanent Mission of the Russian Federation to the United Nations Office and other international organizations in Geneva)

- Erin Pobjie (Assistant Professor, Essex Law School and Senior Research Affiliate, Max Planck Institute for Comparative Public Law and International Law)
- Jessica Tok (Senior Space Multilateral Affairs Advisor, Office of the U.S. Secretary of Defense, Space Policy)
- Jinyuan Su (Professor, Wuhan University Institute of International Law)
- Julia Selman-Ayetey (Dean, Faculty of Law, University of Cape Coast and Partner, Ashong Benjamin & Associates)

Moderator

- Sarah Erickson (Research Assistant, Space Security and WMD Programmes, UNIDIR)

Panel III — Multilateral Efforts to Build Space Security – What Has Been Done and What Is Next

Speakers

- Bassem Hassan (Ambassador, Director of the Department of Disarmament and Peaceful Uses of Nuclear Energy and Chair GGE on Further Practical Measures on PAROS)
- Clive Hughes (Head of Space Security and Advanced Threats, Foreign Commonwealth and Development Office and UK expert to the GGE on Further Practical Measures on PAROS)
- Marjolijn van Deelen (EU Special Envoy for Space, European External Action Service)
- Noelle Riza Castillo (Director, Space Policy and International Cooperation Bureau, Philippine Space Agency and Philippines expert to the GGE on Further Practical Measures on PAROS)
- Sergey Belousko (Special Coordinator of the Ministry of Foreign Affairs of the Russian Federation for the International Cooperation in the Peaceful Uses of Outer Space)

Moderator

- Almudena Azcárate Ortega (Researcher, Space Security and WMD Programmes, UNIDIR)

DAY 2 – 11 September 2024

Youth Video Competition – Videos' Premiere

Panel IV — Space Sustainability for All – The Links Between Space Security and Space Safety

Speakers

- Andrew Peebles (External Relations Officer, UN Office for Outer Space Affairs)
- Chris Blackerby (Chief Operating Officer, Astroscale)
- Vasily Gudnov (Head of Multilateral Cooperation Division, State Space Corporation (Roscosmos))

- Victoria Fernanda Valdivia Cerda (Global Fellow, European Space Policy Institute and Professor, Academia Nacional de Estudios Políticos y Estratégicos (ANEPE))

Moderator

- Jessica West (Senior Fellow, Centre for International Governance Innovation)

Panel V — Shining a Light on Space Activities – Clarity and Transparency for Peace and Security

Speakers

- Emmanuelle Maitre (Research Fellow, Fondation pour la recherche stratégique)
- Emma Gatti (Editor in Chief, SpaceWatch.Global)
- Felipe Cousiño (Ambassador of Chile to Denmark and Chilean expert to the GGE on Further Practical Measures on PAROS)
- Madin Maseeh (President, Maldives Space Research Organisation)

Moderator

- Victoria Samson (Chief Director, Space Security and Stability for Secure World Foundation)

Panel VI — A Verification and Monitoring Toolbox for Space Security

Speakers

- Darren McKnight (Senior Technical Fellow, LeoLabs)
- Hugo André Costa (Executive Board Member, Portuguese Space Agency)
- Sarah Erickson (Research Assistant, Space Security and WMD Programmes, UNIDIR)
- Thomas González Roberts (Postdoctoral Fellow, Georgia Institute of Technology)

Moderator

- Almudena Azcárate Ortega (Researcher, Space Security and WMD Programmes, UNIDIR)

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