



2021 OUTER SPACE SECURITY CONFERENCE

CONFERENCE REPORT

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FOR DISARMAMENT RESEARCH

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2021 Outer Space Security Conference Report

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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 27–28 September 2021. 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:

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TABLE OF CONTENTS

ABOUT THE AUTHORS	vi
INTRODUCTION	2
PANEL I From the enactment of the Outer Space Treaty to now: how has the space domain changed?	4
PANEL II Space threats and challenges.....	7
PANEL III The dual-use nature of space assets and their potential impacts on outer space security	9
PANEL IV Non-binding norms and Transparency and Confidence-Building Measures (TCBMs).....	12
PANEL V Legally binding measures	15
PANEL VI Verification mechanisms: how technology can aid in ensuring compliance with space security regulation.....	18
PANEL VII Wider governance measures: the role of non-governmental entities and non-traditional stakeholders in contributing to space security.....	21
KEY TAKEAWAYS	24
RECENT UNIDIR PUBLICATIONS RELATED TO SPACE SECURITY	31

LIST OF ACRONYMS

CD	Conference on Disarmament
HCoC	The Hague Code of Conduct against Ballistic Missile Proliferation
OS21	UNIDIR 2021 Outer Space Security Conference
OST	Outer Space Treaty
PAROS	Prevention of an arms race in outer space
PPWT	Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects
SSA	Space situational awareness
TCBM	Transparency and confidence-building measure
3SOS	Safety, Security and Sustainability of Outer Space

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INTRODUCTION

INTRODUCTION

UNIDIR's 2021 Outer Space Security Conference (OS21) was held on 27 and 28 September 2021 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 and experts with military, industrial and academic backgrounds to jointly consider challenges related to security in outer space and to exchange ideas regarding solutions.

Participants at this event recognized that space is increasingly critical to modern life on Earth. However, there is growing concern that, as space becomes more economically and strategically important, tensions between different space actors could lead to conflict. Such a conflict could have devastating consequences for humankind.

To understand and address these issues, during Day 1 participants discussed key challenges in space, including the evolving nature of the domain, the drivers of a potential arms race and the implications of dual-use space technologies. During Day 2, participants focused on tools and approaches to enhancing security in outer space.

The discussion over the course of OS21 is summarized in this document, which also identifies key takeaway points.



PANEL I

FROM THE ENACTMENT OF THE
OUTER SPACE TREATY TO NOW:
HOW HAS THE SPACE DOMAIN CHANGED?

PANEL I – FROM THE ENACTMENT OF THE OUTER SPACE TREATY TO NOW: HOW HAS THE SPACE DOMAIN CHANGED?

The 1967 Outer Space Treaty (OST) was designed to prevent the tensions of the Cold War from spilling over into the space domain and to maintain a peaceful space environment. At the time of its negotiation, States faced fundamental questions about the establishment of regulations for space, what constituted responsible activities in space, and what arms control in this domain may look like.

Today, these questions persist, even though the landscape has changed substantially, with an increasing number of spacefaring States and commercial actors as well as ever-growing civilian dependence on space assets and developments in technology. Panel I considered how the domain has changed, and what lessons may be gained from the experiences of the Cold War in order to develop more measures to achieve the Prevention of an Arms Race in Outer Space (PAROS).

While the OST did not fully prevent Cold War geopolitics from entering the space domain, panellists agreed that it remains an important framework for space governance. The OST successfully set out broadly applicable principles for space activities that were further elaborated through the enactment of additional regulatory legislation.

Reflecting the balance of concerns and aspirations at the time of its negotiation, it was argued the OST is largely technologically agnostic: it leaves substantial freedom of action for actors in space, for instance, by not providing definitions of key terms. These include “peaceful purposes”, “harmful interference” and “due regard”. This freedom of action has encouraged the ingenuity of space actors, which has resulted in great feats of space exploration.

However, with more space users and an increasingly congested outer space environment, panellists contended the shortcomings of a continued laissez-faire approach are becoming increasingly apparent. Unfortunately, the failure to address these shortcomings—by providing finer detail or producing clearer definitions—has resulted in ambiguity surrounding the applicability of the treaty to new grey area technologies and other features of the contemporary space domain. As such, the perceived relevance of the OST has diminished over time, and little progress has been made towards the goals of PAROS.

To prevent arms racing and to maintain a peaceful space domain, panellists noted the value of a set of shared definitions of fundamental concepts, a common understanding of the applicability of the existing space law, and an exchange of State concerns and preferences regarding how to address them. Existing channels, such as United Nations General Assembly resolutions on PAROS, are already paving the way to better common understandings on space security. These allow States to put on record their perspectives on space governance, and help to identify common threads.

As space security has an impact on all States—whether spacefaring or not—as well as non-governmental entities, panellists contended that the negotiation of international

space legislation cannot be achieved by States alone. It will be essential to consider the input of new actors and to approach legislation from multiple levels of governance, including existing United Nations channels. One panellist even suggested the negotiation of an additional protocol to the OST.

It will also be important in the future to separate rhetoric from reality. Panellists expressed concern that the language that has emerged around recent technological developments and increased State engagement in space activities echoes the anxiety seen in the space domain during the Cold War. The use of language centring around warfighting, dominance, and achieving supremacy or hegemony in space may serve to increase tension, promote arms racing and hinder future policy development. It was argued that avoiding this rhetoric could facilitate unifying narratives on strategic restraint and foster intergenerational equity such as the narratives employed by smaller States during the Cold War that may again help to promote international cooperation towards arms control in space.

Drawing further from lessons of the OST as a Cold War-era treaty, panellists suggested that, instead of a focus on technologies, States should focus on building rules and regulations that target dangerous behaviours. This will aid in assuaging concerns relating to the ambiguity and limitations on the applicability of international law. Doing so will allow for more rapid negotiation of arms control agreements for the space domain. This will also support the longevity of new legislation by eliminating the need to reassess rules of engagement as new capabilities emerge.



PANEL II

SPACE THREATS AND CHALLENGES

PANEL II – SPACE THREATS AND CHALLENGES

Recent tests of counterspace technology and ambiguous space operations conducted by a number of States have raised fears over an emerging arms race in outer space. Panel II explored how these concerns have been augmented by the increasingly frequent portrayal of space as a warfighting or operational domain and by the extension of contemporary geopolitical rivalries into the space domain. In light of the threats to the objectives of PAROS, efforts must be taken to arrest such drivers of arms racing in the space domain.

Members of the panel argued that it will be important for States to reconsider inter-State rivalries and the lens through which they consider space. The manner in which States engage in space activities, make decisions and interact in this domain have changed substantially in recent years. As such, it is important that States do not apply Cold War logic to the contemporary space domain. Instead, States should engage in dialogue with one another in order to build more accurate understandings of intentions, activities and strategies in space, to raise concerns about them, and to avoid potential misperceptions. This may be done through existing channels, particularly those under United Nations auspices, and could serve as a productive step towards achieving the goals of PAROS.

States also need to build common understandings on space threats, how these threats may be addressed and how existing measures apply to these threats. Some panellists indicated that United Nations General Assembly resolution 75/36 on “Reducing space threats through norms, rules and principles of responsible behaviours”¹ serves as a positive step towards this end. By providing a platform for all States to express and document their concerns in the domain, it has already helped identify common perceived threats and concerning behaviours in outer space. Resolution 75/36 and similar future efforts could serve as a basis for discussion, clarification and development of potential regulation on many issues in the space domain. Another panellist argued that there was a need to negotiate a new legally binding instrument on PAROS.

Panellists generally agreed that States should prioritize threats posed by kinetic capabilities, as they are widely considered a particularly dangerous source of escalation. In addition, they pointed to the production of space debris, which is recognized by States and non-governmental entities alike to be one of the most pressing threats to space security. Addressing these threats may allow for more rapid progress towards arresting arms racing dynamics. Such dialogues may also help to create goodwill, trust and transparency, which will allow for more open engagement on non-kinetic threats in the future.

In considering future regulations, panellists argued that common understandings on the applicability of international space law and international humanitarian law to new space technologies and activities will be of paramount importance. The space domain is intricately tied to military activities; as such, space activity is not only constrained by the Outer Space Treaty and the United Nations Charter, but also by international humanitarian law. Any future developments in space arms control to restrict or limit activities or behaviours, whether through binding legislation or voluntary norms, must recognize States’ existing legal commitments.

¹ General Assembly, A/RES/75/36, 7 December 2020, <https://undocs.org/A/RES/75/36>.



PANEL III

THE DUAL-USE NATURE OF
SPACE ASSETS AND THEIR
POTENTIAL IMPACTS ON OUTER
SPACE SECURITY

PANEL III – THE DUAL-USE NATURE OF SPACE ASSETS AND THEIR POTENTIAL IMPACTS ON OUTER SPACE SECURITY

Dual-use capabilities have been present since the beginning of space exploration, as the development of space launch vehicles and ballistic missile technologies are deeply intertwined. States have come to rely on satellites that serve both civilian and military functions, a trend furthered by the emergence and growth in the number of commercial actors in space. In addition, it can be difficult to discern whether military capabilities of satellites serve offensive or defensive functions. While a majority of assets in orbit are not suited to weaponization, considerable ambiguity around the definition of dual-use capabilities and uses of dual-use technologies gives space actors considerable freedom of action. Panel III considered the implications of such technologies, including on threat perceptions, and how they might be approached.

While the potential military uses of dual-capable objects in orbit may pose threats to international security, the benign applications of such objects may have beneficial impacts for civilian populations, or the space domain writ large. Panellists noted that the threat of dual-use space assets lies not in their power or capabilities, but rather in the intent which may be inferred from the way in which they are used. Panellists suggested that States should concentrate on behaviours of concern (verbs) in the pursuit of arms control, not hardware and capabilities (nouns), which are harder to define.

The verification of potential behavioural restrictions will require monitoring of space activities and improved space situational awareness (SSA). Some panellists suggested that States should reconsider past proposals, including the PAXSAT by Canada² and the establishment of an independent international monitoring agency by France.³ Other panellists suggested that establishing an agency modelled on the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) and equipping it with space assets owned and operated by a diverse range of States to monitor weapon-related activities could establish an independent, globally shared source of SSA data. Such verifiable efforts to restrict concerning activity could be a positive step towards PAROS.

For non-governmental actors in space, dual-use capabilities and dual uses of space assets pose unique threats. Not only could non-governmental space assets be inadvertently damaged or their services interrupted by debris linked to hostile activities in space, but they may themselves be deliberately targeted during armed conflict in space. Panellists pointed out that, under international humanitarian law, there is no explicit reference to the

² The PAXSAT project (which stands for Peace Satellite) examined the feasibility of using satellite technology to verify a ban on space weapons. See P. Gasparini Alves, *Prevention of an Arms Race in Outer Space: A Guide to the Discussions in the Conference on Disarmament*, UNIDIR, 1991, <https://www.unidir.org/files/publications/pdfs/prevention-of-an-arms-race-in-outer-space-a-guide-to-the-discussions-in-the-cd-en-451.pdf>.

³ During the first Special Session of the General Assembly on Disarmament, France proposed the creation of an International Satellite Monitoring Agency that would participate in monitoring the implementation of international disarmament and security agreements, as well as in investigating specific situations. See General Assembly, "Monitoring of Disarmament Agreements and Strengthening of International Security", Report of the Secretary-General, 27 August 1979, <https://undocs.org/A/34/374>, pp. 12–13.

concept of dual-use assets; rather, objects become targetable military objectives by virtue of their nature, location, purpose or use.⁴ Hence, any space object serving dual military and civilian functions is considered to be a military objective and thus legally subject to military targeting. As such, industry actors have a vested interest in keeping the space domain peaceful and supporting initiatives towards PAROS. Under the OST, States are responsible for the activities of non-governmental actors in orbit; panellists noted that the best way to protect the interests of the space industry is through the pursuit of binding treaty negotiations and diplomatic efforts at the national level.

Another area of concern involves military capabilities with potential offensive and defensive capabilities, such as anti-ballistic missile (ABM) systems with space-based interceptors that may be used as anti-satellite (ASAT) weapons. The placement of strike capabilities in orbit or the launch of bodyguard systems —groups of smaller satellites that can be manoeuvred to protect a particular space object— is likely to be interpreted as an offensive move and to be perceived as problematic from the moment of their launch. These systems would become priority targets in the event of a conflict, and they have already contributed to the building of tensions in a manner that could lead to the rapid deterioration of relations in space. As such, these weapon capabilities must be given substantial attention before they are further pursued.

Despite concerns raised about the weaponization of dual-use technologies, little progress has been made on arms control in outer space. Panellists challenged the notion that space is like other military domains; arguing instead that space was distinct because it is difficult to contain the impacts of space conflict or to limit the theatre of war. It was further argued that States had thus far provided insufficient diplomatic effort to constrain space activity. Panellists agreed that State actors should engage in more diplomacy to advance towards the goals of PAROS and promote the interests of governments, the private sector and the public in space.

⁴ According to Article 52(2) of the 1977 Additional Protocol I to the 1949 Geneva Conventions relating to the Protection of Victims of International Armed Conflicts, military objectives are “those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage”. In order to assess whether an object is a military objective it therefore must pass a three-part test. First, the object must meet one of the following four criteria, whose meanings are detailed in the ICRC Commentary to Additional Protocol I: 1) Nature: “This category comprises all objects directly used by the armed forces: weapons, equipment, transports, fortifications, depots, buildings occupied by armed forces, staff headquarters, communications centres etc.” (para. 2020). 2) Location: “a site which is of special importance for military operations in view of its location”, such as a bridge, a road or a building (para. 2021). 3) Purpose: “the intended future use of an object” (para. 2022). 4) Use: the present function of an object (para. 2022). Second, it must make an effective contribution to military action. Third, attacking, capturing or neutralizing the object must offer a definite military advantage in the circumstances. See International Committee of the Red Cross (ICRC), “Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I)”, 8 June 1977: Commentary of 1987—General Protection of Civilian Objects”, 1987, <https://ihl-databases.icrc.org/ihl/COM/470-750067?OpenDocument>.



PANEL IV

NON-BINDING NORMS AND TRANSPARENCY AND CONFIDENCE-BUILDING MEASURES (TCBMS)

PANEL IV – NON-BINDING NORMS AND TRANSPARENCY AND CONFIDENCE-BUILDING MEASURES (TCBMS)

Many States and independent experts recognize that the existing governance structure for outer space is not well suited to address current challenges. However, States differ regarding what path to move forward on. Of particular note is an apparent division between those fostering a norms-based approach versus those advocating a law-based approach. Yet, voluntary and legally binding measures should not be seen as mutually exclusive. They reinforce each other and both are needed for, and conducive to, space security. Panel IV explored issues around norms and transparency and confidence-building measures (TCBMs).

In recent years, several States have proposed the implementation of non-binding norms to address space security-related issues. These include General Assembly resolution 75/36 as well as proposals around TCBMs in outer space activities,⁵ no first placement of weapons in outer space,⁶ and the European Union-led initiative on Safety, Security and Sustainability of Outer Space (3SOS).⁷ Also relevant are wider normative measures, such as the Hague Code of Conduct against Ballistic Missile Proliferation (HCoC).⁸

Some panellists argued that Non-binding norms and TCBMs could be considered transitional towards the ultimate goal of concluding legally binding treaties. For example, it was suggested that both General Assembly resolution 75/36 or the No First Placement proposal could lead to negotiations on binding instruments. Moreover, norms can provide guidance for States as they build their capabilities, and in time potentially turn into customary international law. They can also serve the implementation of legally binding instruments. Multiple arms control agreements have such practices built into them for dispute resolution and other processes.

Several panellists underscored that voluntary measures and TCBMs cannot substitute for a legally binding treaty, as enshrined in the final report of the 2012–2013 group of governmental experts on PAROS. However, others contended non-binding norms and TCBMs still have value of their own. Their flexible nature could prove valuable in the context of a dynamic space security environment and with dual-use assets. They can support trust building, lower perceptions of threats and serve as escalation-management tools. The range of options for possible non-binding norms and TCBMs can cater to the different needs and priorities of different actors.

Participants recognized that there are also limitations to non-binding norms compared to legally binding measures. To overcome this, some panellists suggested that States

⁵ General Assembly, A/RES/75/69, 7 December 2020, <https://undocs.org/A/RES/75/69>.

⁶ General Assembly, A/RES/75/37, 7 December 2020, <https://undocs.org/A/RES/75/37>.

⁷ 3SOS is a public diplomacy initiative by the European Union, introduced in September 2019, to promote ethical conduct in space amid concerns about debris.

⁸ International Code of Conduct against Ballistic Missile Proliferation, The Hague, 25 November 2002, <https://www.hcoc.at/what-is-hcoc/text-of-the-hcoc.html>

incorporate and clearly define in their proposals rules of behaviour in space that are observable (verbs), rather than relying on subjective interpretations of what “responsible” behaviour is or focusing arms control efforts only on hardware and capabilities (nouns).

Another consideration for establishing norms is the importance of an inclusive and thorough process to successfully articulate norms. This includes balanced engagement with key stakeholders, particularly those with relevant technologies, and a focus on generating trust through discretion in order to maintain a cooperative atmosphere. The HCoC was identified as a successful example in that regard.

Panellists suggested that it is also essential for stakeholders to work towards consensus on key issues in order to pursue and sustain non-binding norms and TCBMs, as values and principles form the backbone of norms. States might not have a clear and common understanding on the values, principles and objectives of existing initiatives like PAROS. It could be necessary to revisit these in order to move forward more effectively on either norms or laws on outer space.



PANEL V

LEGALLY BINDING MEASURES

PANEL V – LEGALLY BINDING MEASURES

Legally binding measures have traditionally been viewed as the gold standard for arms control and disarmament mechanisms, particularly in the nuclear, biological and chemical regimes. Panel V explored past proposals for treaties designed to prevent an arms race in outer space.

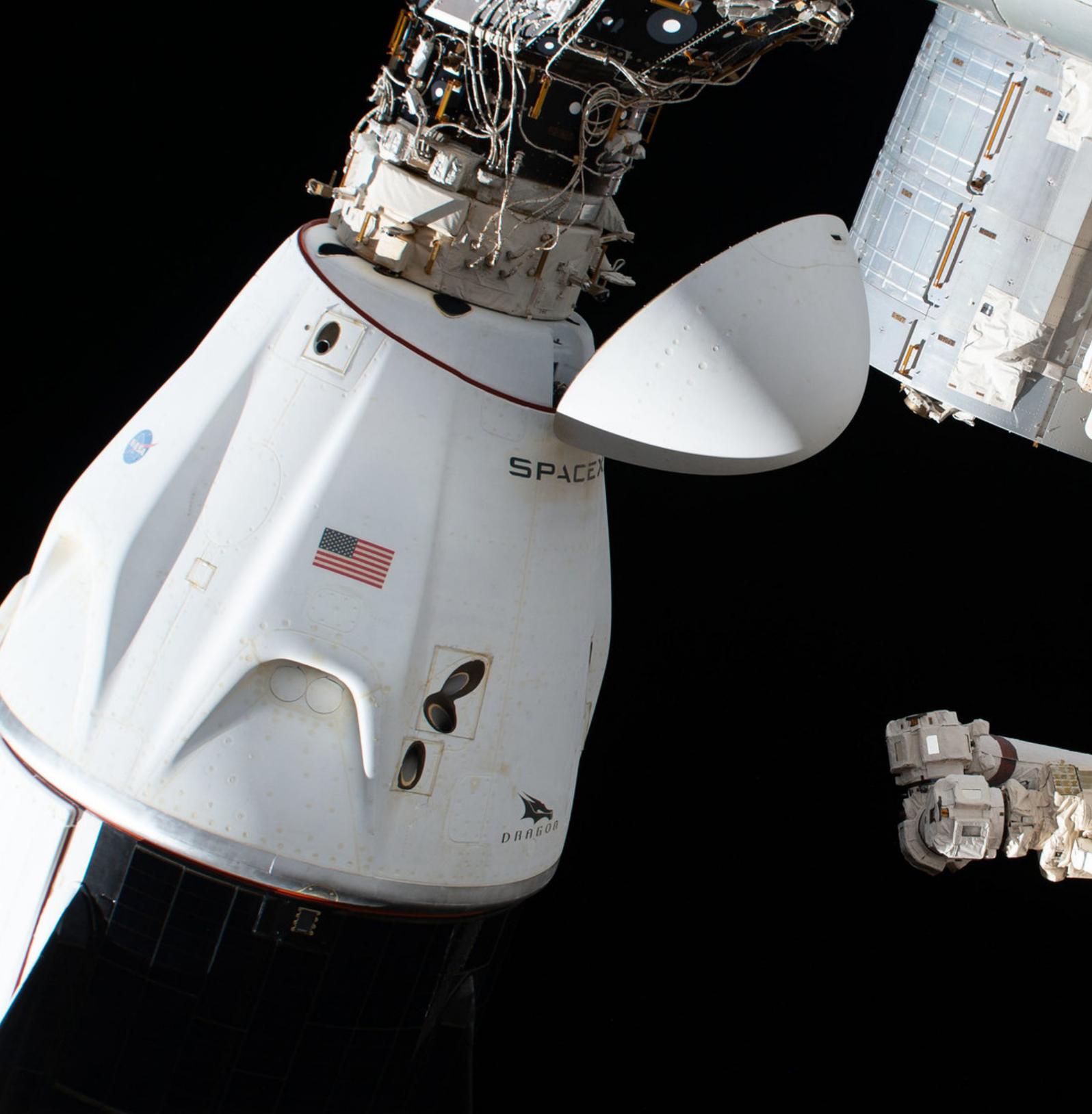
Panellists indicated that, historically, there have been difficulties in achieving agreement on such measures, in part due to lack of political will and insufficient trust among States, particularly spacefaring States. This is linked to concern that a legally binding treaty might disadvantage compliant States, as non-compliant States would be able to act outside the bounds of the treaty without major consequences.

All panellists shared a sense of urgency around advancing legally binding measures after decades of stalemate. Yet, panellists disagreed on what would constitute the most pragmatic way to proceed. Some expressed support for the existing draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT) presented at the Conference on Disarmament (CD); others focused on building on TCBMs; yet others encouraged fostering the creation of smaller technical instruments, including bans on different types of activity (i.e. testing, cyber, electronic, etc.).

Some panellists argued that the PPWT proposal reflects the pressing need to negotiate a legally binding instrument on PAROS, which is seen by many as fundamental for space security. It was contended this laws-based approach, which targets certain actions in outer space, would prohibit the placement of weapons as well as the use or threat of use of force against outer space objects. Some stated advantages of the PPWT include a unified vision on addressing certain issues through an authoritative instrument, creating a sustainable atmosphere of trust and predictability, and ensuring effective implementation, including through a verification system. Some felt that this approach was stronger than normative approaches, which one panellist argued, were “loose, vague and subjective”. Others argued the lack of a verification mechanism in the current draft PPWT (for which an additional protocol could be negotiated afterwards) was problematic; and cited further issues missing from the scope of the draft treaty including, among other things, ground-based missiles and space debris.

In the absence of consensus, some panellists suggested that a way forward for the PPWT would be for the CD to commence substantive work to develop the agreement potentially addressing a broad range of topics through subsidiary bodies or expert groups. Supportive States could also craft a mobilization strategy involving industry and academic actors to build momentum for the treaty. It was suggested that the proposed open-ended working group on “responsible behaviours in outer space” under PAROS should discuss the PPWT as well. A discussion of alternative ways forward highlighted the need to, first of all, engage in political confidence-building activities among States to pave the way for further discussions on legally binding measures. Previously agreed TCBMs and other norms could also serve as the foundation for legally binding measures, as was also suggested in panel IV (see

above). In that regard, it was suggested that a wider approach to legally binding measures would entail shifting the current paradigm from “security from space” (as in the PPWT and in the concern of PAROS with strategic stability) to “security in space” (protection of all assets in space for a sustainable use). This would entail focusing on rules of behaviour for different actors present in outer space, including private commercial actors.



PANEL VI

VERIFICATION MECHANISMS:
HOW TECHNOLOGY CAN AID IN ENSURING
COMPLIANCE WITH SPACE SECURITY
REGULATION

PANEL VI – VERIFICATION MECHANISMS: HOW TECHNOLOGY CAN AID IN ENSURING COMPLIANCE WITH SPACE SECURITY REGULATION

Despite limitations, technological advances —particularly in the field of space situational awareness— are enabling a clearer and more detailed picture of space activities, especially in geosynchronous orbit. Through the use of these evolving technologies, it is possible to better understand the actions of others in space, develop trust and more effectively verify certain types of agreement around space security. Panel VI explored the promise of such verification mechanisms.

Opportunities for SSA in verification are ripe but entail considerable challenges. The first challenge centres on rising complexity: outer space activities involve increasingly higher numbers and different types of objects, as well as novel forms of operation. A second challenge is ambiguity: this not only applies to the dual-use nature of objects, but to the different interpretations of the data obtained. A third challenge is uncertainty: all sensors have limited capabilities and provide partial data, as there are no high-fidelity models through which to monitor every object in outer space. The fourth, and perhaps biggest, challenge is validating methods and data and ensuring participation of States in verification systems

Given these conditions, relevant actors must not only ensure that they are correctly evaluating data quality but will probably need to rely on multiple data sources. Panellists suggested that they should consider aggregating data from independent observations made by different sensors and technologies. Yet, panellists acknowledged that there are significant technical challenges in aggregating such heterogenous data and in ensuring the interoperability of data.

In addition, stakeholders should consider supplementing their analysis with other sources of information. Satellite sensors might provide information on the physical, functional and operational characteristics and capabilities of an object. But stakeholders can use other sources and social science methodologies to more effectively determine intent and other relevant aspects of behaviours in outer space. Panellists noted that new developments in natural language processing and human-based behaviour studies can help determine if differences in behaviour are a function of cultural variations in the interpretation of norms, guidelines and key concepts in regulations, rather than of malign intent.

Cooperation and coordination are essential in the context of verification mechanisms. Establishing effective cooperation for SSA infrastructure is necessary not only for technological and security reasons, but to lessen the high costs of sensors and ensure effectiveness through wider geographical coverage. This requires the involvement of a variety of actors. One panellist suggested a model for this could lie in the European Space Surveillance and Tracking Programme, which shares SSA data through a dedicated catalogue and provides operational SSA services to 130 organizations in Europe.⁹

Some on the panel suggested that the international community could move towards

⁹ See EU SST <https://www.eusst.eu/>.

a distributed model for data collection and compilation, rather than a single repository or source. This, it was argued, could increase trust in the aggregated data. Participatory networks built from the bottom up, for example, could constitute a burden-sharing model in which the different capabilities of different actors are complementary. States or non-State actors that do not have SSA capabilities would still be able to join (and develop those capabilities) through tailored contributions in other areas such as algorithm development, applied mathematics or decision making.

A more immediate opportunity in SSA and verification highlighted by one panellist involves the capabilities of commercial actors. For example, one panellist highlighted that the United States-based company LeoLabs is working on enhancing a global network of coordinated sensors that can contribute to a rapid understanding of objects and actions on low Earth orbit (LEO). Commercial capabilities can fill gaps in data availability, which in turn can help establish historical patterns of behaviour and inform governmental discussions on trends in space, which in turn could shape the development of space governance measures.

Regarding a potential future treaty, panellists raised the need to implement transparency measures ahead of any effort to verify specific actions pertaining to any particular event. Panellists also identified a need for a regime capable of measuring, knowing and managing the complex and crowded SSA system. In the meantime, States can demonstrate good faith through evidence of their efforts to make space activities among all actors more transparent, predictable and accountable.



PANEL VII

**WIDER GOVERNANCE MEASURES:
THE ROLE OF NON-GOVERNMENTAL ENTITIES
AND NON-TRADITIONAL STAKEHOLDERS IN
CONTRIBUTING TO SPACE SECURITY**

PANEL VII – WIDER GOVERNANCE MEASURES: THE ROLE OF NON-GOVERNMENTAL ENTITIES AND NON-TRADITIONAL STAKEHOLDERS IN CONTRIBUTING TO SPACE SECURITY

States are no longer the only stakeholders in space. Non-governmental entities, such as commercial space companies, have become particularly prevalent. Panel VII explored the ways in which collaboration with these stakeholders, including academia, could support more robust, sustainable and effective approaches to ensuring space security. Accordingly, their active contribution to intergovernmental deliberations could provide great value to PAROS objectives and could help to identify the drivers of an arms race in order to manage and mitigate them.

The industry participants on this panel agreed that the notion of social responsibility should be embraced by non-governmental actors in space, even if States continue to bear special responsibility for safety and security in space. Industry actors have long highlighted concerns over developments such as mega constellations, space debris, and dual-use and dual-purpose technologies that could feed into an arms race. Responsible space behaviour from all stakeholders, regardless of their nature or size, was argued to be key in the context of PAROS.

To achieve those goals, panellists argued that transparency and collaboration should be the norm. They emphasized the need for better cooperation, especially in data-sharing related to SSA. More transparency is also needed in the space activities of bigger actors, who could otherwise put smaller actors at risk.

Some panellists also acknowledged the role of intergovernmental institutions, such as the International Telecommunications Union (ITU), for their coordination efforts with the private sector regarding issues such as jamming. This kind of engagement, it was argued, could be replicated in intergovernmental deliberations on space security, facilitated by UNIDIR, the United Nations Office for Outer Space Affairs (UNOOSA) and the United Nations Office for Disarmament Affairs (UNODA).¹⁰

For companies, the desire to foster transparency stems not only from a willingness to be socially responsible. It was observed that information-sharing and transparency are also good for business, especially in the light of the growing number of objects and actors in outer space. Engagement in intergovernmental deliberations about space governance is relevant to the thinking of industry actors about the long-term future of their enterprise and there is interest from industry actors in providing their views in space security processes. Moreover, discussions on threats such as space debris have helped to raise awareness on an issue that is detrimental to all.

In moving forward, panellists suggested that rules —either binding or non-binding— could be pursued in order to create a safe and sustainable environment for private actors to

¹⁰ A. Azcárate Ortega and J. Revill, Space Industry Workshop Report, UNIDIR, 5 November 2021, <https://www.unidir.org/publication/space-industry-workshop-report>.

carry out their activities. Industry actors on the panel generally supported international legally binding measures as long as they make the space environment sustainable and ensure a level playing field between industry actors. At the same time, they also expressed the need for norms on responsible behaviour, indicating that these can play an important role, such as by enabling cooperation on SSA or on-orbit servicing.



KEY TAKEAWAYS

KEY TAKEAWAYS

THE OUTER SPACE TREATY REMAINS CRITICAL BUT THERE IS WORK TO BE DONE

The OST has successfully established a framework of principles for the conduct of space activities by all actors. However, it remains a treaty of principles, which are insufficient on their own to prevent the growing geopolitical tensions and competition in outer space from eventually resulting in the outbreak of conflict there.

Current space law is particularly silent on space security matters, which has enabled the development of counterspace technologies. This has exacerbated tensions among space actors and highlights the need for further rules and regulations that directly address this topic. To this end, space actors and stakeholders need to reach common understandings on space security matters. This would encourage the de-escalation of tensions and reduce the incentives for an arms race.

PROPOSED MEASURES TO ADDRESS SPACE SECURITY ARE COMPLEMENTARY

Under PAROS, there have been several proposals that have sought to ensure space security. Some of these involved legally binding instruments; others have suggested the use of non-binding norms. While these approaches have often been viewed as irreconcilable, they are, in fact, complementary. Much-needed trust can be built with measures such as the norms on responsible behaviours in outer space that General Assembly resolution 75/36 seeks to foster, or initiatives such as No First Placement as well as TCBMs and wider yet related measures such as the HCoC —these can all encourage States to reach common understandings on space security matters. This in turn could pave the way to achieving the gold standard of legally binding measures on these issues either via the formation of customary international law or the negotiation and enactment of a treaty.

EFFECTIVE POLICIES INCREASINGLY REQUIRE COOPERATIVE USE OF TECHNOLOGY

Space technology such as SSA can play an important role in better understanding the actions of others in space, fostering trust and ensuring that the domain is kept peaceful and secure. However, to maximize the effectiveness of these tools, cooperation is essential, not just between States but also with non-governmental entities, in particular the space industry. The greater the degree of cooperation, the more accurate the verification and monitoring of compliance with regulations. Such cooperation would lead to increased transparency in space activities, which is a prerequisite to building the trust that will ensure that the goals of PAROS are achieved.

EFFECTIVE POLICIES REQUIRE INPUTS FROM ALL STAKEHOLDERS

A greater number of States than ever before are active in outer space. Even those that are not yet spacefaring have interests in outer space or benefit from the services that space technology provides. Furthermore, States are no longer the only actors in the space domain: space exploration and technological developments are being driven by commercial actors and academia alongside governments.

It is logical for all of these stakeholders to want to contribute to processes relating to space security. Proposals negotiated within a small group and then shared with the international community at large have been criticized for their lack of inclusiveness from the beginning. Cooperation between different actors can be beneficial for all parties and can optimize space governance measures, thereby contributing to keeping space peaceful and secure. It should therefore be encouraged.



ANNEX

CONFERENCE PROGRAMME

DAY 1, 27 SEPTEMBER 2021 – KEY CHALLENGES IN OUTER SPACE

Conference opening, 11:00–11:30 CEST

- Opening remarks:
Robin Geiss, Director, UNIDIR

Keynote addresses:

- **Why the international community needs to build a sustainable space security architecture**
Izumi Nakamitsu, Under-Secretary-General and High Representative for Disarmament Affairs, United Nations Office for Disarmament Affairs (UNODA)
 - **The importance of a peaceful space domain**
Sirisha Bandla, Vice President of Government Affairs and Research Operations, Virgin Galactic
-

Panel I – From the enactment of the Outer Space Treaty to now: how has the space domain changed? 11:30–13:00 CEST

Speakers:

- Aaron Bateman, PhD candidate, Johns Hopkins University
- Cassandra Steer, Senior Lecturer, Mission Specialist with Australian National University (ANU) Institute for Space, ANU College of Law
- Guoyu Wang, Associate Professor and Dean of the Academy of Air, Space Policy and Law, Beijing Institute of Technology

Moderator:

- Ruth Hill, Counsellor, Disarmament, Permanent Mission of Australia to the United Nations in Geneva
-

Panel II – Space threats and challenges, 14:00–15:30 CEST

Speakers:

- Wen Zhou, Legal Adviser, International Committee of the Red Cross
- Benjamin Silverstein, Research Analyst, Space Project, Carnegie Endowment for International Peace
- Haiyang Lai, Deputy Director, Ministry of Foreign Affairs, China

Moderator:

- Victoria Samson, Washington Office Director, Secure World Foundation
-

Panel III – The dual-use nature of space assets and their potential impacts on outer space security, 16:00–17:30 CEST

Speakers:

- Dmitry Stefanovich, Research Fellow, Primakov National Research Institute of World Economy and International Relations (IMEMO), Russian Academy of Sciences
- Laura Grego, Stanton Nuclear Security Fellow, Laboratory for Nuclear Security and Policy, Massachusetts Institute of Technology

Moderator:

- Almudena Azcárate Ortega, Associate Researcher, Space & Missiles, UNIDIR
-

DAY 2, 28 SEPTEMBER 2021 – TOOLS AND APPROACHES TO ENHANCE SECURITY IN OUTER SPACE

Panel IV – Non-binding norms and Transparency and Confidence-Building Measures (TCBMs), 10:00–11:30 CEST

Speakers:

- Amb. Aidan Liddle, Ambassador and Permanent Representative, United Kingdom Delegation to the Conference on Disarmament in Geneva
- Amb. Gustavo Ainchil, Ambassador and Permanent Representative of the Argentine Republic to the International Organizations in Vienna, HcoC Chair
- Jessica West, Senior Researcher, Project Ploughshares
- Jinyuan Su, Professor of International Law, Wuhan University
- Konstantin Vorontsov, Acting Deputy Director, Department for Non-Proliferation and Arms Control, Ministry of Foreign Affairs, Russian Federation

Moderator:

- Xavier Pasco, Fondation pour la Recherche Stratégique
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Panel V – Legally binding measures, 12:00–13:30 CEST

Speakers:

- Amb. Li Song, Ambassador Extraordinary and Plenipotentiary for Disarmament Affairs and Deputy Permanent Representative, Permanent Mission of the People’s Republic of China to the United Nations Office at Geneva and Other International Organizations in Switzerland
- Kazuto Suzuki, Professor, Graduate School of Public Policy, University of Tokyo
- Raji Rajagopalan, Director of the Centre for Security, Strategy and Technology, Observer Research Foundation
- Andrey Belousov, Minister Plenipotentiary, Deputy Permanent Representative of the Russian Federation to the United Nations in Geneva

Moderator:

- Patricia Lewis, Director, International Security Programme, Chatham House
-

Panel VI – Verification mechanisms: how technology can aid in ensuring compliance with space security regulations, 14:30–16:00 CEST

Speakers:

- Moriba Jah, Associate Professor, Department of Aerospace Engineering and Engineering Mathematics, Oden Institute for Computation Engineering and Sciences, University of Texas at Austin
- Regina Peldszus, Senior Policy Officer (seconded from German Space Agency at DLR), Federal Ministry for Economic Affairs & Energy, Germany
- Curtis Hernandez, Director for Government Relations, LeoLabs

Moderator:

- Daniel Porras, Director of Strategic Partnerships and Communications, Secure World Foundation
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Panel VII – Wider governance measures: the role of non-governmental entities and non-traditional stakeholders in contributing to space security, 16:30–18:00 CEST

Speakers:

- David Bertolotti, Director of Institutional and International Affairs, Eutelsat
- Nobu Okada, Founder and CEO, Astroscale
- Abimbola Alale, Managing Director, Nigerian Communications Satellite Ltd (NIGCOMSAT)
- Hui Du, Senior Engineer, Office of the President, China Academy of Space Technology
- Jorge Del Rio Vera, Scientific Affairs Officer, United Nations Office for Outer Space Affairs (UNOOSA)
- Michael Newman, Legal Officer, UNOOSA

Moderator:

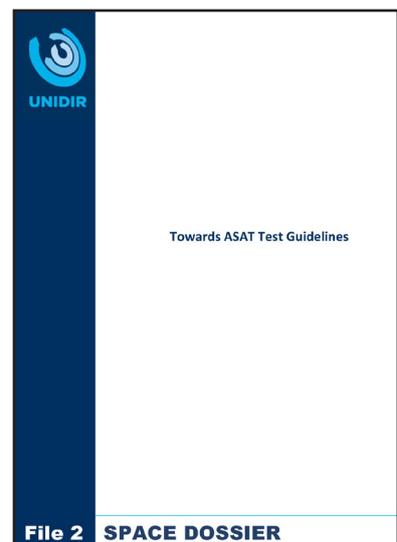
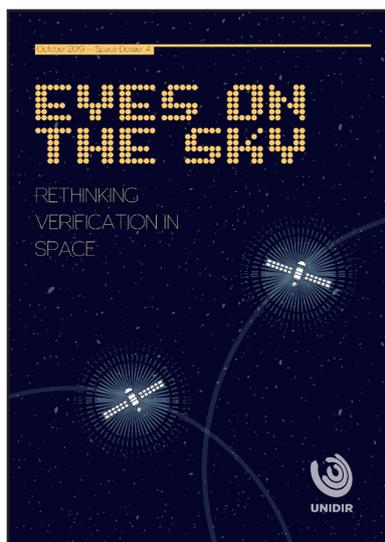
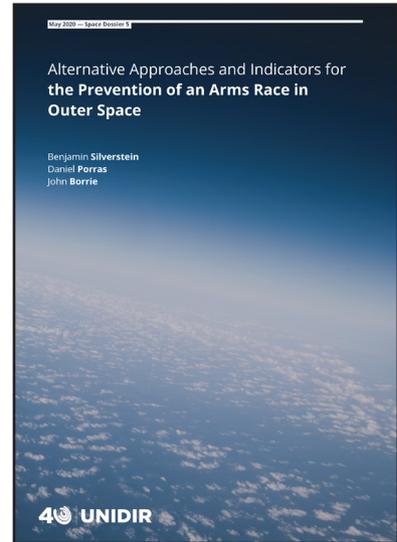
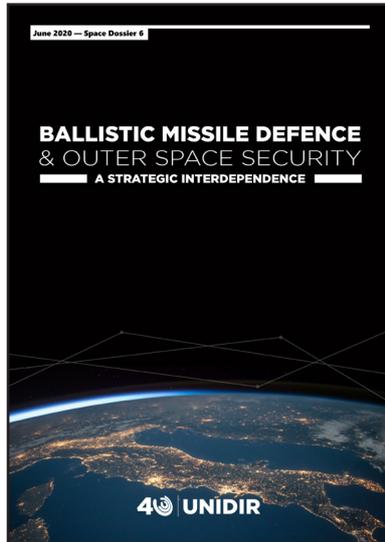
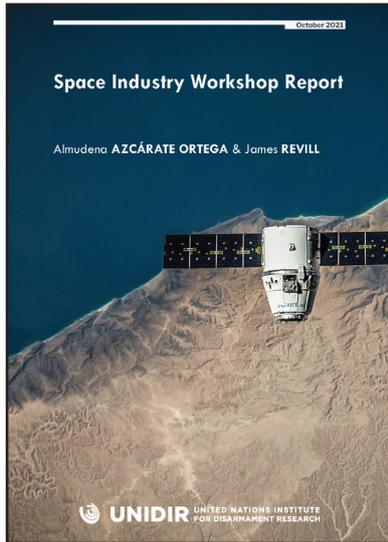
- Michael Spies, Acting Head of the Science, Technology and International Security Unit, UNODA

Concluding remarks

- Robin Geiss, Director, UNIDIR
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RECENT UNIDIR PUBLICATIONS RELATED TO SPACE SECURITY





2021 OUTER SPACE SECURITY CONFERENCE

CONFERENCE REPORT

The 2021 UNIDIR Outer Space Security Conference (OS21) was held on 27 and 28 September 2021 both virtually and in person at the Palais des Nations in Geneva, Switzerland.

The discussion over the course of OS21 is summarised in this document, which also identifies key takeaway points.

This two-day flagship event provided a unique forum for the diplomatic community—as well as experts with military, industry and academic backgrounds—to jointly consider challenges related to security in outer space and to exchange ideas regarding solutions.



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