

E7.7 Remediation of Space Debris: A Fundamental Challenge*Date: 25/10/2019**Co-Chairs: Dr Lesley Jane Smith, Dr Philip De Man**Rapporteur: Mr Omar Saal*

E7.7 was the final session organised by the International Institute of Space Law (IISL) as part of their “Colloquium on the Law of Outer Space”. The session was introduced by Co-chair, Dr Smith, who remarked that the subject matter of space debris remediation is one of the most challenging topics to address, not only from a technical perspective, but from a legal perspective as well. A total of six papers were presented, with Dr Catherine Doldirina, the invited speaker being the first presenter to initiate the session. Dr Doldirina’s presentation was based on her paper titled “How to Introduce Decommissioning Devices as a Requirement for Satellites Launched into Space at the European level”. Dr Doldirina began by emphasising that there is scholarly agreement that the majority of launched satellites are not attempted to be decommissioned and removed from their orbit, posing a risk to active space objects. Nevertheless, she described different technical solutions (each with specific advantages and disadvantages) that are available for compliance with decommissioning requirements. Dr Doldirina then focused her presentation’s scope on how to make technical approaches to satellite de-orbiting a common practice. Specifically, as a means of controlling and mitigating space debris in line with the current strategic needs of the European Union (EU) regarding space safety, security, and sustainability of space activities. Dr Doldirina argued that equipping satellites with decommissioning devices can be a means of space debris remediation in line with EU needs. She stressed that this approach is feasible because it is consistent with existing EU procurement mechanisms and principles, as reflected in Article 189 of Lisbon Treaty, and the ‘Space Strategy for Europe’. Hence Dr Doldirina highlighted that regulatory procurement actions can be adopted by (inter)governmental agencies to reshape the operational procedure and manufacturing designs of satellites from an industry standard. Moreover, to promote responsible monitoring and control of space objects, and to effectively reduce debris once a satellite becomes unusable. One question asked was whether companies who provide de-orbiting services had been considered, instead of requiring additional decommissioning hardware to be integrated into satellites. Dr Doldirina responded that she believed in the long run pre-installed devices will be cheaper, and a more responsible way of preventing space debris generation. Nevertheless, she conveyed that when devices do not work as intended, de-orbiting services could be a valuable supplementary option.

Following Dr Doldirina, Mr Wart Munters presented his paper on “Space Debris: Between Unity and Fragmentation - Risk as a Static Principle with Dynamic Outcomes”. Mr Munter’s research centred on what he believes to be an emerging principle of risk that concerns orbital space. Mr Munters explained that two space objects cannot occupy the same orbital position simultaneously without incurring outcomes that are counter to sustainable practices like hazardous debris. Consequently, the sustainability of space activities in earth orbital space primarily depends on the ability of international law to effectively and legitimately regulate the growing actors who are using orbital resources. Therefore, Mr Munters put forward that such regulation requires space lawyers to properly account for the physical and factual behaviour of space objects in legal terms. To accomplish this task, he proposed a common static normative risk principle, to be adopted by the international community. This principle he explained, should be constructed from procedural legal means to produce permissive rights and restrictive obligations attached to space objects and their respective actors, in line with empirical scientific data and risk assessment. To conclude, Mr Munters detailed that the legal rights and obligations attached to space objects should be described on a risk spectrum using scientific and technical terminology, in line with the laws of physics and requirements to sustain space activities,

particularly when considering increasing space debris. A question was asked on whether a legal structure is already in place to deal with space object interactions. Mr Munters, contended that existing frameworks do not fully acknowledge the different bundles of (inter)national rights and responsibilities that States possess, and how this can impact their interpretation of space law. Therefore, he explained that the risk analysis approach is a way of deriving legal understanding from scientific data.

The next presenter was Dr Martha Mejia-Kaiser who discussed her paper “Out into the Dark: Removing Space Debris from the Geostationary Orbit”. Dr Mejia-Kaiser introduced different benefits of launching a satellite into Geostationary orbit (GEO), likening the orbit to a ‘string of diamonds’. However, Dr Mejia-Kaiser described that despite its practical uses, GEO is being polluted by large amounts of space debris. She explained that although the space treaties contain no explicit provision on avoiding space debris generation, there are initiatives like the Inter-Agency Space Debris Coordination Committee (IADC) guidelines that encourage States to protect GEO by allocating fuel to move their satellites to a Graveyard Orbit before inactivity. Nevertheless, she noted that the IADC guidelines are not legally binding, and that States and intergovernmental organisations have little interest in adopting an international treaty prohibiting the generation of space debris due to the liability risks if they do not comply. What is positive, Dr Mejia-Kaiser expressed, is that the IADC guidelines and growing national legislation of States concerning space debris could be a budding sign of *opinio juris*, an element needed for the creation of a norm of customary international law. Nonetheless, Dr Mejia-Kaiser underlined that it is in the interest of States to retain GEO’s usability, considering the large revenue generating space activities that rely on the orbit; she remarked that active debris removal operations, in accordance with Article IX of the Outer Space Treaty, should be pursued by States. With an optimistic tone, Dr Mejia-Kaiser ended her presentation by stating that she hopes the ‘string of diamonds’ will be kept for all nations, for generations to come. One question asked was whether compliance with space debris guidelines is a matter of regulation or mission design? Dr Mejia-Kaiser responded by explaining that as States become more aware of the space debris consequences, it is a mixture of both because regulations can promote compliant mission designs. She gave the example of China who adopted a regulation on this topic, which prompted Chinese missions to reduce their debris generation.

After Dr Mejia-Kaiser, Mrs Mihoko Shintani took to the stage to present her “Proposal of Governmental Compensation for Damages in Orbital Activities, especially for Space Debris Removal”. Mrs Shintani, who hails from Japan, used the country as a case-study, and proposed a governmental compensation system that covers on-orbit services such as active debris removal. She introduced a legislative system comprising of ‘compulsory insurance’ and ‘governmental compensation’ that could provide a foundation for space debris removal activities operated by private actors. Mrs Shintani conveyed that, assuming the technological hurdles and price can be overcome, there are two main (liability) risks. One being the destruction of a third party’s satellite, and two, being the destruction of a counterparty’s satellite. Furthermore, she noted that private operators will need national consent to remove debris due to constraints in international space law. Mrs Shintani highlighted to the audience that her legislative proposal could be included as an amendment to the Japanese ‘Space Activities Act’ or as a new national law. Regardless of the variety of risks associated with on-orbital debris services that can address space debris concerns, Mrs Shintani stated it will be interesting to see which countries act first to make industrial legislation to govern such business activities. Particularly, as she stipulates that an international regulatory standard is unlikely to be adopted before private debris removal trials are initiated. On a personal note, Mrs Shintani concluded by sharing that she expects the space industry in Japan to grow further, including its use of new legal instruments. One question that was asked was whether this proposal would be an incentive to debris remediation or a hindrance? Mrs Shintani responded that the present space activity law in Japan only covers third-party liability resulting from

rocket launch failure. Hence, she hopes her proposal could encourage debris remediation businesses through more certainty regarding insurance coverage and compensation.

It was then the turn of Ms Rada Popova to present the paper on “The Path to Establishing an Effective Framework for Space Debris Remediation on the Basis of Mitigation: Legal Proposals Resulting from the Technical Results of the ReDSHIFT Project”. Ms Popova introduced the legal outcomes of the ReDSHIFT project to the audience, which were collected over a three year time span on different methods of reducing space debris. Ms Popova argued that the *corpus juris* for outer space activities, including the IADC’s non-binding guidelines and recommendations are not sufficient enough as a legal framework to alleviate the impact of space debris. Specifically, as the IADC and the Committee on the Peaceful Uses of Outer Space guidelines do not describe post-mission disposal measures, and only apply to Low Earth Orbit (LEO) and GEO. Nevertheless, Ms Popova recommends that Medium Earth Orbit should also be defined as a protected region like LEO and GEO. Moreover, she delineated that a holistic approach comprised of a pragmatic exchange of restrictions and their benefits should be combined with adequate regulation to maintain space’s usability in the long term. Nevertheless, Ms Popova underlined that although compliance with debris mitigation measures are crucial, it will ultimately not be enough to stabilise the debris environment. Therefore, she emphasised to the audience that it is important that lawyers, scientists, and engineers alike work together to forward remediation techniques such as reformulating existing guidelines that will complement debris mitigation methods. A question asked was on what mechanisms could be proposed to promptly update existing soft law guidelines to ensure they promote compliance. Ms Popova conveyed that this was a relevant question to ask because enforcement action is what counts. Moreover, she explained that economic incentives that are introduced through regulatory bodies may be a more effective approach to motivating different actors to take measures to counter the rise of debris in various orbits.

Lastly, was Dr Tennen who graciously stepped in to present Prof. Maria de las Mercedes Esquivel de Cocca’s paper on “The law for More Effective Assistance, Reconstruction and Damage Repair in the Event of Disasters Caused by Space objects or Natural disasters”. Dr Tennen contextualised Prof. de Cocca’s research by engaging the audience through a series of questions on the ‘common heritage of mankind’ principle. By doing so, he explained that Ambassador Aldo A. Cocca, who is largely credited as the Principle’s father, helped inspire this paper, but due to his declining health, Prof. de Cocca opted to help care for him. Her paper, Dr Tennen conveyed, focuses on what happens when debris is not removed and causes a natural disaster. By referring to space objects that have either crashed on Earth, or presented a collision risk, Dr Tennen explained that the threat of a space debris related disaster is growing. As a result, Prof. de Cocca has proposed that governments take necessary steps to prepare populations, as this type of emergency will arise. Dr Tennen put forward that an exclusive fund should be established to mobilise services for rescue efforts, as well as food and health resources. It was acknowledged by Dr Tennen that Prof. de Cocca has specified that governments may be apprehensive to allocate funds for a potential catastrophe that is caused by space debris hazards. Therefore, Dr Tennen explains that Prof. de Cocca has advocated for an international and scientific non-governmental body to help coordinate international efforts. Due to her absence, Dr Tennen asked the audience to direct any questions to Prof. de Cocca’s email.

To conclude the session, Dr Smith used the opportunity to summarise the various research points that were presented. In doing so, Dr Smith posed a question to the audience regarding what they thought is required now to address debris remediation. After some discussion, the Co-Chairs thanked the presenters and those who had attended, acknowledging that after such a fruitful session, they look forward to continuing the tradition in Dubai for the 71st International Astronautical Congress.