

Derisking the Space Economy: Space Debris Mitigation

WORKSHOP SUMMARY

RIYADH, 25 NOVEMBER 2024

Background

The Centre for Space Futures (CSF) is a global centre established by the Saudi Space Agency (SSA) and the World Economic Forum in 2024. As part of the Forum's [Centre for the Fourth Industrial Revolution \(C4IR\) Network](#), CSF is dedicated to advancing the global space economy through policy development, technological innovation, and strategic partnerships.

The CSF serves as a think tank conducting research, hosting events, and facilitating dialogues to foster growth in the space sector. The primary focus areas include:

- **Policy and Regulation:** Formulating recommendations for a supportive regulatory environment for space-based industries.
- **Space Technology:** Identifying and promoting space technologies with significant commercial potential.
- **Cross-Sector Collaboration:** Exploring synergies between the space and terrestrial sectors to drive mutual growth.

Workshop Summary

In line with the CSF and Forum's official launch of the Centre, the CSF and the Forum co-hosted a workshop in Riyadh. This event brought together leading experts in the domain of space sustainability in a private setting to discuss key challenges and opportunities in making progress on the topic of increased collision risk, space traffic management, and debris mitigation and remediation. The decision to focus on space debris in the first workshop stems from its critical impact on the sustainability of space activities and the urgent need to address the risks it poses to both current and future space missions.

The workshop underscored the importance of **regulation**, **financial incentives**, and **international cooperation** as key pillars to address the growing space debris challenge. A balanced approach integrating policy enforcement, economic models, and global governance frameworks will be essential for sustainable space operations.

Space Debris Management – Key Components

Participants highlighted the need for a structured, multi-step approach to space debris management that includes clear financial incentives and metrics, innovative systems for legal enforcement, and bottom-up approaches for collaboration that build on norms and industry best practices.

Requirements for effective space debris management:

- **Active debris removal** and in-orbit servicing are essential technologies for debris mitigation.
- Strict **regulations and licensing** are needed to enforce responsible behaviour, including deorbiting satellites before loss of control.
- **Financial incentives** such as taxation, insurance benefits, and subsidies can promote compliance.
- Focus on **high-risk objects** and debris "hot spots" for prioritization.
- Enhanced **Space Situational Awareness (SSA)** through global data sharing and transparency is critical.

International Collaboration

Participants widely agreed that the indiscriminate nature of debris requires a global response, with extensive international cooperation. This collaboration can adopt several forms including harmonized regulations, data sharing and standardization, and joint research and development on technology solutions.

Possible areas for enhancing international collaboration:

- Establish coalitions of like-minded and global consensus on standards.
- Implement a **polluter pays principle**, where high SDAI countries fund remediation.
- Improve **SSA data sharing** and develop globally validated tools for tracking compliance.
- Frameworks like the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS),

bilateral agreements, and public foundations can strengthen collaboration.

- Saudi Arabia is uniquely positioned to mediate international cooperation between leading space actors.

Financial Incentives

Along with potential regulatory considerations, financial incentives were highlighted as important tools for debris mitigation compliance. A range of financial solutions were explored in the workshop, but participants primarily focused on **insurance incentives**, **tax mechanisms**, and **government-backed funding**.

Potential financial mechanisms:

- Introduce **insurance incentives**, tax credits, and subsidies for responsible operators.
- Use carbon-emission-inspired models like **launch taxes and quotas** for countries.
- Create **innovation funds** to support startups and SMEs that prioritize sustainability.
- Flexible **licensing costs** and government-backed funding can encourage active remediation efforts.
- Penalties and stricter compliance monitoring are required for non-compliant actors.

Space Debris Attribution Index

One proposed idea was a Space Debris Attribution Index (SDAI) that would clarify which actors were responsible for the highest levels of debris. The exact implementation and utilization of such an index was explored in greater detail during the workshop.

Possible SDAI objectives:

- Establish **global standards** for measuring, tracking, and attributing debris.
- A neutral or emerging space-faring nation could lead to avoid political complexities.
- Accountability systems must be transparent, archiving ownership and contributions.
- Integrate Environmental, Social, and Governance (**ESG**) **frameworks** and Sustainable Development Goals (SDGs)-based financial models to align sustainability efforts.
- Develop quantitative **models to assess contributions** to collision risks.

Next Steps

- **Disseminate Workshop Findings:** Publish a comprehensive report summarizing key findings, recommendations, and preliminary action plan.
- **Virtual Follow-on Workshop:** Host a virtual workshop to expand participation and refine recommendations, focusing on concrete action plans.
- **Establish a Working Group:** Create a diverse steering group of stakeholders to provide ongoing guidance and support to this initiative.
- **Space Debris Research Paper:** Conduct research and publish a comprehensive paper on space debris, including workshop effort, technical data, projections, and economic impact.
- **Paper Publication:** Submit the research paper to a peer-reviewed journal or publish it as a CSF working paper, ensuring broad dissemination.

Participating Organisations

- 1- Access Partnership
- 2- Avanti Communications
- 3- Boston Consulting Group (BCG)
- 4- BryceTech
- 5- China Volant Industry Co., Ltd.
- 6- ClearSpace
- 7- Global Satellite Operator's Association (GSOA)
- 8- International Telecommunication Union (ITU)
- 9- LeoLabs
- 10- National Telecommunications and Information Administration (NTIA)
- 11- Neo Space Group
- 12- NorthStar Earth & Space
- 13- Office of Space Commerce
- 14- Prince Sultan University
- 15- Saudi Space Agency
- 16- Slingshot Aerospace
- 17- The Commonwealth
- 18- The Exploration Company
- 19- UNOOSA
- 20- US Department of Commerce
- 21- Viasat

Host and Contact

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