

Financial Space Debris Mechanisms Workshop

Future of Space Technology, Centre for the Fourth Industrial Revolution

SUMMARY NOTES

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Overview

Space technology plays a crucial role in our daily lives and addresses key global challenges, making it essential that we preserve space. Current levels of debris in space, as well as future debris, requires an urgent solution. Whilst there has been rapid progress in debris removal technologies – as well as broader new regulations and guidelines – the considerable cost of removing objects from space may hinder early uptake. With 2030 seen as potentially a key milestone for the space sector, new ways of covering the high cost of these activities requires specific attention. The workshop on June 6th, co-organized by the World Economic Forum's Future of Space Technologies Initiative and the Lord Mayor of London, brought together 30 actors from the space as well as insurance sectors to discuss how insurance solutions could be applied. As space sustainability is one of the key issues of the Lord Mayor's theme in office, a proposal for making Space Debris Removal Insurance Bonds (SPADRIBs), a type of surety bond, a requirement for putting any material into orbit, was presented and discussed as one example of an insurance solution. A use case from decommissioning energy assets on Earth was also presented as another case study.

Key Takeaways

Debris Risk and Removal

- Significant capital entering the space sector led to an increase in the number of satellites as well as overall debris. Combined with a lack of remediation strategies, this led to a rise in the probability of collisions, especially in Low Earth Orbit (LEO) and Geostationary Orbit (GEO).
- Space sustainability and collision risk is a two part-problem: 1) managing safe operation of existing constellations and 2) removing existing debris (prioritization based on risk).
- Efforts to address safe operations, such as Traffic Coordination System for Space

(TraCSS) in the United States will be important.

- Key stakeholders, especially G7 and G20 countries, must be engaged to create regulations, with international cooperation being essential to create a level playing field, avoid "forum shopping" and support new market entrants.
- At the international level, space sustainability is often overlooked however (e.g. there is no UN's Sustainable Development Goal focused on space) but should be integrated more with Earth sustainability to help inform and educate decision-makers.
- In the future, new guidelines reducing the time retired satellites can stay in orbit from 25 to 5 years will increase pressure for timely removal, but international alignment and better operator behaviour are required to ensure all assets are removed at end of life.
- Adopting a proactive approach is essential, as waiting for regulators to act may lead to unfavourable outcomes for the industry.
- Liability transfer mechanisms maybe needed as some launching states prefer operators to bear this responsibility as well as seek ways to share overall economic risks.
- ADR services will need to be increasingly implemented in the future where satellites are not able to be removed as part of the normal Post Mission Disposal procedure. Companies in ADR sector should focus on cost reduction as technology is currently expensive; exploring downstream funding opportunities is an additional option to spreading the financial burden.

Funding and Insurance¹

Insurance can facilitate information sharing and provide a management system for public actors.

- Specifically, insurance operates on the principle that the premiums of many policyholders cover the losses of a few, focusing on fortuitous losses.

¹ Noting relevant work done by the Federal Communications Commission on Debris Bonds.

- Underwriters assess the risk presented by prospective insureds, determine the probability of loss, and set premiums, accordingly, aiming to collect enough premiums to cover claims and generate a profit over a typical 12-month policy period.
- Currently, insurance plays a minor role for satellite operators, due to the lack of financial incentives for debris removal. Additionally, the insurance market for space operation is particularly challenging during the launch and first year of operation, as pay-outs have significantly surpassed premiums, rendering some missions uninsurable.
- Insurance can be a great tool to distribute the financial burden and raise funds for ADR.
- While insurance companies can follow international regulations, clear frameworks are needed.
- One proposed idea is to establish a fund, similar to climate ones, to support ADR services and address existing space debris. This fund could be financed by governments or via a debris contribution index, adhering to the “polluter pays” principle.

Case Studies

Space Debris Insurance Bonds

The proposal for Space Debris Insurance Bonds (SPADRIBs) aims to address the escalating issue of space debris by providing financial incentives for satellite operators to deorbit their defunct satellites.

The process involves brokers obtaining price quotes from insurers for debris removal and relaying these costs to satellite operators. SPADRIBs are designed to shift the financial motivation for operators, encouraging them to responsibly retire their spacecraft. If operators fail to deorbit their satellites, insurers will step in to cover the costs, which are estimated to be around 1% of the total decommissioning price, based on a 99% or higher successful Post Mission Disposal rate. The proposal emphasizes the necessity for international cooperation and regulatory buy-in, as SPADRIBs alone cannot solve the issue of existing debris.

The 695th Lord Mayor’s Space Protection Initiative supports this by advocating for mandatory financial guarantees, which would ensure that sufficient funds are available for deorbiting operations, even if a satellite operator goes out of business, with underwriters evaluating the financial strength of space operators and charging lower premiums to more solvent operators. The global insurance market has shown support for SPADRIBs by putting forward an ‘Invitation to Treat’ for up to US\$500 million per operator, provided that operators can demonstrate their capability to manage third-party space debris and that regulatory bodies in

respect of space launch make financial guarantees/SPADRIBs mandatory. Similar products exist in other industries, such as decommissioning bonds for oil rigs, and land reclamation bonds for the mining industry.

Decommissioning Security Agreement (Oil & Gas Sector)

The Decommissioning Security Agreement (DSA), led by the UK Government, serves as a standard agreement in the oil and gas industry, aimed at managing decommissioning responsibilities for companies involved in North Sea licenses. Participation in the DSA is commonly adopted by joint venture partners to delineate decommissioning liabilities and ownership, ensuring that future costs are adequately provisioned. The DSA include the incorporation of two trusts: one for holding monies placed in trust and another for alternative provisions such as letters of credit. Payments made into the trust are capital in nature and not tax-deductible, as the company retains a beneficial interest in the fund. On the other hand, relief for decommissioning costs is provided when expenses are covered by monies held in trust. The DSA also implements security arrangements designed to minimize duplication and offer protection against default for all parties, including the Department for Energy Security and Net Zero (DESNZ), oil and gas companies typically utilize a combination of insurance schemes such as demand bonds and comprehensive indemnities to mitigate the risks.

Next Steps:

- A further deep dive is being explored to discuss various financial and insurance approaches, include cost and impacts on the market. Results would be released as part of a broader paper on space debris risk.

Participating Organizations:

Allianz Trade, Alwen Hough Johnston Ltd., Astroscale, Atrium Space Insurance Consortium, Avanti Communications Ltd, AXA XL, Beazley Group plc, BryceTech, Centre for Space Futures, Chubb Limited, D-Orbit, Dassault Systèmes SE, Delano Wheatley Consulting, Earth Space Sustainability Initiative (ESSI), European Space Agency (ESA), GHGSat Inc., Linklaters LLP, Lord Mayor of London, Office of Space Commerce, QBE Europe, Saudi Space Agency, The Commonwealth, Sustainable Markets Initiative, Tokio Marine Holdings, UK Space Association, United Nations Office for Outer Space Affairs, Viasat, Zurich Surety

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