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2024 Orbital Debris Remediation Summit

Event Summary Report



About Secure World Foundation

The Secure World Foundation strives to be a trusted and objective source of leadership and information on space security, sustainability, and the use of space for the benefit of Earth. We use a global and pragmatic lens to study and evaluate proposed solutions to improve the governance of outer space. While recognizing the complexities of the international political environment, SWF works to encourage and build relationships with all willing stakeholders in space activities, including government, commercial, military, civil society, and academic actors. Central to this approach is increasing knowledge about the space environment and the need to maintain its stability, promoting international cooperation and dialogue, and helping all space actors realize the benefits that space technologies and capabilities can provide.

About LeoLabs

LeoLabs is a pivotal player in global space safety initiatives, specializing in space situational awareness and tracking. Their state-of-the-art radar systems and data analytics are essential for monitoring satellites and debris in low Earth orbit, significantly mitigating collision risks. By ensuring the safety and sustainability of space operations, LeoLabs supports the stability of the space environment, crucial for the continued growth and security of the global space economy.

Cover Imagery

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About the Summit

Secure World Foundation, in partnership with LeoLabs, co-organized the first Orbital Debris Remediation Summit on February 20, 2024, in Queenstown, New Zealand. This invite-only event brought together representatives from space agencies, academia, and industry to discuss how the community can make progress on orbital debris remediation, especially for large debris objects. The event was organized around four sessions that each addressed a different set of challenges for remediation: economic, programmatic, economic, and diplomatic. Below is a summary of the main findings and recommendations from the event.

High-level Summit Summary

- Risk from massive derelicts potentially contributing to a rapidly growing space collision risk is not clear enough to motivate action/funding. The ADR community needs to immediately focus on better communicating the risk.
- There was consensus concern that possibly only a major debris-generating collision would stimulate true international resolve and commitment for debris remediation missions, but we should still work on developing solutions whether the worst-case happens.
- There is still a perception that the technology is not ready, thus there is an immediate need for an ADR demonstration mission to remove multiple space objects to prove that is not the case.
- The biggest diplomatic challenge is convincing the three major spacefaring countries (the United States, Russia, and China) who are responsible for 90% of the risk to begin remediating their own large debris objects, particularly SL-16 rocket bodies in the 800 to 1000 km altitude range. One solution may be to develop protocols for other actors to get their consent to remove these objects and global funding strategies to share the cost burden.
- Without funding for ADR, or other debris remediation missions, the likelihood for long-term space sustainability will be curtailed.

Summary by Session

DIPLOMATIC

"Think globally; act locally."

- High level, multilateral bodies such as UNCOPUOS are great forums for informal discussion and consultations but unlikely to drive action.
- Commercial can lead by example, as they have done before, and may help ease the diplomatic challenges if they can find ways to work with several countries.
- "Go glocal" (i.e., think globally and act locally) by having nation states focus on using commercial services to remove their own debris or through bi-lateral agreements and then scale/expand.
- Non-major players can still play a role, but industry needs ways to interact with US, China, and Russia, as well as other launching states.
- Primary barriers to success are budget, liability, and geopolitics.
- General diplomatic discussions create confrontation but not action. Concrete discussion based on the facts drives progress.
- Some form of international collaboration, including with China and Russia, is needed to ensure that any ADR action isn't seen as escalatory with nations that could be considered adversarial.

LEGAL

"Original space law never anticipated issues related to abandoned massive derelicts."

- Nothing in the existing international space law prohibits ADR, but there are uncertainties that create friction to doing so, especially if countries do not want to act.
- Legal "due regard" in space operations is often ignored and liability is based only on collision; not risk reduction maneuver (RRM) nuisance/burden.
- The existing obligation of due regard is the hopeful pathway for space responsibility and ADR; the legal community is currently working to define what this means for the space domain.
- A key question posed was "can national regulations and policies harmonize to provide foundation for international cooperation and best practices?".
- Start with consenting parties first to show positive return from legal flexibility. Eventually, must embrace the top offending countries through other means if they do not follow suit.
- One possible strategy to clarify the legal uncertainties/issues is to start building cases that can be brought before the International Court of Justice.

PROGRAMMATIC

"We're past demonstrating the technology, we are at the point of demonstrating the business case. However, owners of on-orbit massive derelicts abandoned decades ago are the least likely to procure ADR services."

- Governments and companies need to work together, but often have opposite priorities on cost, risk, and time. Overcoming these cultural differences is a huge challenge.
- A few countries (NZ, UK, and Japan) have made good progress on creating the licensing/ oversight pathways to enable ADR, but much more work still needs to be done, especially in the US/Russia/China.
- Need more work on developing new contract mechanisms to deal with issues that are uniquely challenging for ADR, such as defining success, payment structures, liability, and dealing with the potential long list of involved entities
- Initial sponsorship by governments to adopt a service program mentality as an anchor customer will help to not only stimulate the technology, but also the industry and make it favorable to investors. They can also create a demand signal through recurring contracts and policy.
- Companies need to have a runway to get beyond the initial government demo mission to something more sustainable, such as longer-term service contracts for ADR mission execution.
- The most significant barriers for success are differing priorities of cost, schedule, risk, and budget for ADR missions.
- The most expensive way to deal with space debris is to not do it, the second most expensive way is removing one object at a time. Need to find a way to give the ADR provider a way to cut costs, such as grabbing multiple objects with the same spacecraft.
- The existing requirements for controlled re-entry of large debris objects may be counterproductive to ADR and need revising. An object poses the same re-entry risk whether it naturally decays from a higher or lower orbit but may pose much less collision risk while in orbit.

ECONOMIC

“Pay me now or pay me more later.” That is to say, the longer we wait to execute ADR missions, the more it may cost due to major debris-generating events occurring resulting in missions having to transit more cluttered orbits and potentially having to respond more quickly/urgently.”

- Need to separate the economics of historical debris versus future debris. Future debris is easier to solve, including by not generating it to begin with. Historical debris is much harder to deal with and pretty much can only be removed.
- You can't demonstrate the cost of doing nothing, you can only cost what might happen.
- ADR is the side effect of an industry that did not have servicing for the first 50 years of its existence.
- There are many different economic business models for ADR proposed. Most involve cost sharing from those who benefit from the technology (whether across the space industry or broader), rather than fining the offenders. Need to flesh out these specific examples beyond simplistic pitches for this specific use case and implementation to strengthen case.
- Need innovations in business models, potentially along the lines of what Google/Facebook did in separating out who uses the service (users) from who pays for it (advertisers).
- There is not a good alignment of incentives: no economic incentive to remove debris, no economic incentive to really avoid debris, and no connection between benefits of removing debris and paying for it.
- The biggest economic challenge is the need for a more sophisticated discussion of potential funding mechanisms that draws lessons from other domains.



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