

Catalyzing Space Debris Removal, Salvage, & Use:

via

Maritime Lessons & a Space Salvage Entity

We are on the verge of a dramatic expansion of
infrastructure & humans into outer space.

Even *greatly* enhanced orbital debris “mitigation” is
insufficient.

We must “dredge the harbor” of dangerous orbiting
objects.

We need orbital debris “remediation,”
i.e. cleanup!

But object identification, liability, & funding issues
stand in the way.

Identification Problem

Art. **VIII** of **OST** says a State Party on whose **registry** an object is launched retains **jurisdiction & control**.

But only **16,000** of **34,000** trackable* objects can be tied to a launch **registering** State Party.

* at least 128 million smaller pieces of **untrackable** debris

Liability Problem

Art. VI & VII of OST & Art. V of the Liability Convention make multiple **launching** States **jointly & severally liable** for any harm to persons or property of other States Parties.

But what if it's a **private** entity that procures or carries out a launch or provides a property of facility for a launch?

No liability escape for the State Parties. Per OST Art. VI:
“State Parties ...bear international responsibility (liability)
for national activities in outer space...whether such
activities are carried out by governmental agencies or by
non-governmental entities.

Moreover, “the activities of non-governmental
entities...shall require authorization and continuing
supervision by the appropriate State Party....”

How do we overcome identification/ownership and liability impediments to service, salvage, or otherwise clean up orbital debris -- or even debris from a planetary surface?

Good news!

Individual liability or lack thereof in various circumstances can be determined via liability waiver or apportionment agreements per **Art. V** of the **Liability Convention**.

Example: Mutual liability waiver agreement used by States collaborating on the International Space Station (ISS).

But there remains the issue of **funding** compensation
for harmed party/parties.

**Can we learn anything from maritime
custom and law?**

Maritime tradition for compensating commercial operators who rescue vessels & prevent destruction:

- 1) Phoenicians, Greeks, & Romans rewarded “**salvors**” for rescuing ships & cargo.
- 2) Nowadays, commercial **salvors** are rewarded for rescuing ships, cargo, clearing shipping lanes, & **eliminating or preventing environmental hazards**.*

* See **International Convention on Salvage, 1989**, plus the Special Compensation Protection & Indemnity (P&I) Clause (**SCOPIC**) developed by shipping stakeholders, especially **P&I Clubs**.

A P&I Club is a non-governmental, mutual insurance association, a non-profit cooperative, which provides risk pooling, information, & representation for its ship-industry members.

Funding for liability compensation/3rd Party Indemnity Insurance:

- 1) **P&I Club** “calls”: an annual sum of money to be put in a “pool” to pay liability indemnifications.
- 2) If funds remain in pool by year’s end, the next annual call is reduced.
- 3) But if the **P&I Club** has a major payout before year’s end, Club members have another call to replenish the pool.

By **eliminating** underwriter **profit** margins for third party indemnification insurance, P&I liability insurance is **much less expensive**.

Also, establish **Space Salvage Entity (SSE)** by intergovernmental agreement responsible for:

- 1) assuming **jurisdiction and control**, continuing supervision, ownership, & **liability** for *unclaimed* derelict space objects, while carrying out agreements for transfer of;
- 2) licensing & contracting commercial entities to service, rehabilitate, refurbish, repair, deorbit, or salvage **unclaimed** & *claimed** debris/spacecraft; and
- 3) selling *unclaimed & claimed* salvaged, recycled, or refurbished items & materials at market auctions.

* For *claimed* objects, the SSE receives jurisdiction & control and all connected obligations and rights via agreement with the State Parties claiming the objects.

Incentivizing Transfer of Jurisdiction & Control to SSE:

- 1) SSE creates actuarial (statistical calculation of) risk for every trackable piece of orbital debris to generate probability & severity of collisions;
- 2) SSE will use this data to create a rank-ordered “leaderboard” of object-intervention liability risk to become the basis for insurance costs;
- 3) State Parties & P&I Clubs will pay close attention to leaderboard statistics to calculate contract awards/bounties & annual calls.

Transfer of **jurisdiction & control** of a space object can be carried out via transfer by the State Party of its registration to the SSE in collaboration with P&I Clubs, per **OST Art. VIII** & the **Registration Convention**.

That object will then exist as 1) an **asset** that may be sold at auction or 2) as an ongoing **hazard**, which can become the focus of State Parties & private companies wishing to remove it for mutual benefit.*

In all cases, liability & proportionate P&I insurance coverage would be apportioned among the various parties to a mutual liability apportionment or waiver agreement.

* In this second case, States, commercial companies, P&I Clubs, or NGOs may wish to place special bounties on clearing objects & orbits.

Bottom line: SSE could become a platform enabling multiple actors to collaborate in a market to dispose of or salvage derelict objects, reducing transaction costs for all participants.

(For more info see “Catalyzing space debris removal, salvage, and use: Maritime lessons and a proposal for a space salvage entity and pollution credit system” in *The Space Review*.)

Thank you for your attention!

EXTRA SLIDES

Per **Art. I of Liability Convention**, a “launching State” is:

- 1) A State that **launches** or **procures** the launch of a space object (**2** ways).
- 2) A State from whose **territory** or **facility** a space object is launched (another **2** ways).