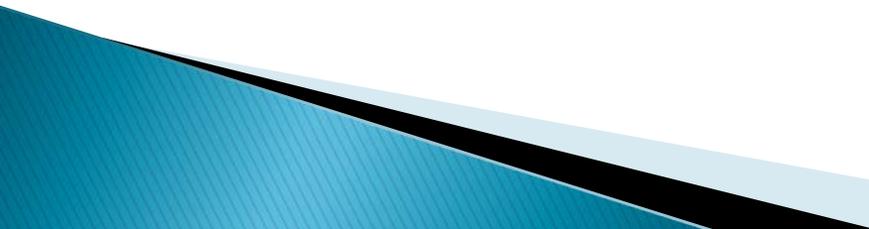


Global Economic Fund For Space Debris Removal

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The Problem

- ▶ Tracked Space Debris Objects have increased from 5600 objects in 1980 to over 16K in 2011.
 - ▶ Space Debris, particularly in LEO and Polar Orbits are a hazard to all future space launch operations
 - ▶ We are possibly near the “tipping point” with regard to Kessler Syndrome whereby the “cascade effect” would make the problem progressively worse and this would not only be a problem for LEO operations but for all space launches.
 - ▶ In short this is a hazard for the “sustainable use of space” and all space applications are at risk.
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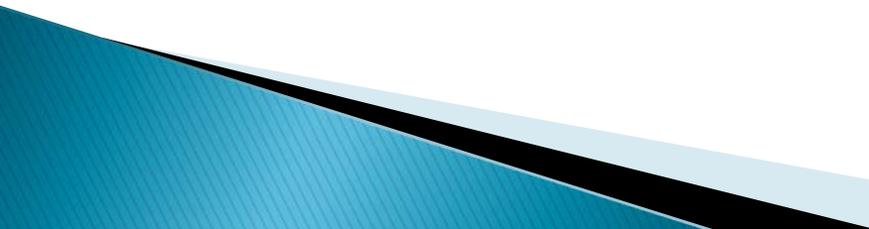
Why the Global Economic Fund for Space Debris Removal is needed

- ▶ The removal of space debris requires considerable expense and new technology still needs to be developed.
- ▶ The creation of a space debris fund, to which, all launch operators and space systems contribute—governmental and private—is the most equitable “future oriented” way to proceed and has many potential benefits. The “looking back” approach that requires nations considered responsible for deploying or creating debris is really not viable.
- ▶ The benefits are that (i) a diversity of “international licensed entities” can develop the needed technology; (ii) these entities would be compensated only after they have successfully developed needed technology and removed debris from orbit; (iii) the creation of a fund rather than a single international agency charged with this task insures flexible & competitive development of technology; (iv) this allows the fund to be shut down when the mission is accomplished as opposed to shutting down an international agency; (v) this would be the most economically effective approach; (vi) this approach would be able to model the payment of launch insurance that is a process well known to the space community.

How Would this Fund Actually Be Created and Function?

- ▶ This would “seem and feel” much like payment for launch insurance except the payments would be collected by governments and paid into an international bank that would hold funds in interest bearing escrow account. Payment would be about 5% to 6% of total mission costs. There could be scheduled refund payments for “clean launches”.
 - ▶ Entities to remove debris would be “internationally licensed” probably by UNOOSA. For the longer term a new international convention is needed.
 - ▶ UNOOSA would create and update an international register of objects to be removed. This process should be confirmed by a new convention.
 - ▶ Compensation for removal would be established on fixed basis of certain amount per kg and paid only after debris actually removed.
 - ▶ Governments could make grants to “licensed entities” to help develop technology for removal.
 - ▶ Technology deemed to be “space weapon” would not be eligible for compensation.
 - ▶ Up to 10% of fund could be used to prevent future creation of space debris. Partial refund after a “clean launch” would create a strong economic incentive against future debris creation.
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Diversity of Technology Key Reason for Creating a “Compensation Fund Rather Than International Entity

- ▶ Electro–Dynamic System (May be most cost effective)
 - ▶ Space Mist
 - ▶ Tether Deployed Nets
 - ▶ Ground Based Lasers
 - ▶ Adhesives
 - ▶ Robotic systems
 - ▶ Ion beam Shepherd
 - ▶ etc.
 - ▶ All are not mature. Some are considered space weapons. In order to be “licensed entity” the technology must be “reasonably mature” and not considered a space weapon.
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Conclusion

- ▶ A fund that creates economic incentives has many advantages. We must have a “looking forward” rather than a “looking back” solution
 - ▶ Governments can provide R&D grants and incentives to develop NOW regarding a specific mechanism and empowering process. The “fund” is but one option, but is worthy of serious study. The satellite communications, remote sensing, space navigation, meteorological agencies need to become more actively involved. The Space Data Association is a good first step, but much more needs to be done.
 - ▶ A Declaration from this Workshop is commendable but governments & commercial entities must seriously take up this issue. The first step would be declare the “will” to create a “mechanism” within 2 years.
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