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TECHNICAL PRESENTATION

"COOPERATIVE REMEDIATION OF MASSIVE DERELICTS — NOW IS THE TIME TO BEGIN"



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Orbital Debris — Our Shared Problem

Humanity's future in space is threatened by man-made debris in outer space

Three sizes

- Small: Hundreds of millions of objects
- Medium: Millions of objects
- Large: 36,000+ objects larger than a grapefruit

Most dangerous: "Massive Derelicts" in Upper-LEO

- 2000+ objects, 1-10 tons per object, un-maneuverable
- Owned mostly by the Russian Federation, the United States of America, and China
- France, Japan, India and the European Space Agency own a few
- Objects are tightly clustered in orbital shells and travel at high speeds
- Forecast collisions (or explosions) are imminent and will be devastating



Hurdles to Remediation





Well known legal, political and economic reasons are inhibiting action

But there are also other less visible impediments

- Acting based on statistical risk assessments is problematic
- For Massive Derelicts, cooperation is more important than leadership
- Fault-based paradigms for debris remediation are harmful
- World-Wide industry is ready

The Case for International Cooperation



Purely national programs, although beneficial and necessary, carry baggage that will inhibit timely, efficient and meaningful risk reduction

- Domestic preferences
- National security constraints
- Ineffective to reduce overall statistical risk

Opportunity versus fault

Share the burden (enables economic efficiency)



Necessary Building Blocks for Cooperation



A path to cooperative remediation of Massive Derelicts must include:









Agreement on a framework for cooperation – Cooperative Structure

Principles of Cooperation

Planning Process and Timeline

Performing the Work – Remediation Mission **Business Model**

Cooperative Structure



Alternative Frameworks

- UN-based arrangement (multilateral)
- Government to government agreements (bilateral)
- Public Intergovernmental organization (IGO)
- Private-Public Nongovernmental organization (NGO)

Private-Public International NGO (INGO): The surest path to timely cooperative remediation

- Non-political (neutral)
- Low cost, streamlined, transparent
- Enables economies of scale (efficient)
- No changes to international law required

Necessary Principles of Cooperation



- Cost, risk and information sharing during planning and remediation missions
- Legal consent
- Object selection methodology
- Procurement plan
- Dispute resolution mechanisms
- Protection of sovereign prerogatives

Necessary Planning Process and Timeline



≥ 1 year

≤ 1 year

≥ 1 year

Several years



Phase 1

Negotiation of structural agreements including Principles of Cooperation (one year or more)

Phase 2

Identifying and selecting initial objects for remediation consideration (one year or less)

Phase 3—6

Development of contracting process, documents seeking proposals for remediation, evaluation of proposals, negotiation and award of mission contracts (one year or more)

Phase 7—8

Performance of initial remediation mission(s) (one year or more), and follow-on missions sufficient to provide meaningful risk reduction (several years)

Performing the Work – Remediation Model

- TCTB's public-private INGO model facilitates cooperation among governments through its single-issue focus
- TCTB's neutral, multi-jurisdictional structure ensures confidentiality, transparency and trust
- TCTB's model enables efficiency
- TCTB's path is streamlined to meet the urgent need
- Examples of similar NGOs include the Red Cross (shared objective of humanitarian aid), and international mediation for cross-border disputes (shared respect for rule of law)



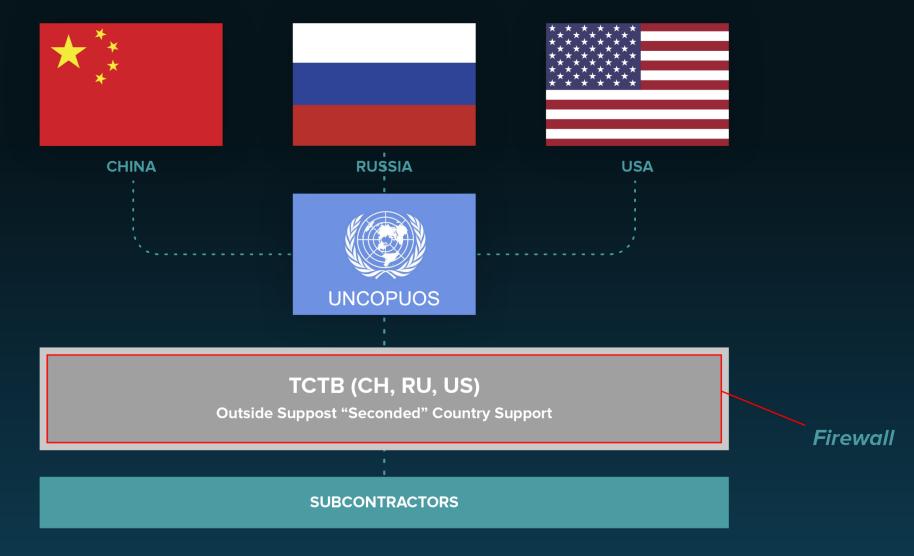
More information about TCTB's novel path to remediation can be found at

threecountrytrustedbroker.com



INGO Model — TCTB











Valentin Uvarov



Guoyu Wang









TCTB Advantages and Limitations





TCTB Is:

- The lowest cost alternative
- Neutral and transparent
- Fully compliant with existing local and international law
- Overcomes all legal, political and economic hurdles
- Ready to begin planning now!



TCTB Is Not:

- An obligation to remediate
- A substitute for diplomacy, or political decision-making
- A solution for all types of debris TCTB's Proposal is limited to Massive Derelicts

Questions?



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