**Bridging the Liability Divide: A Critical Analysis of the 1972 Liability Convention Through Case Studies and Proposals for Reform**

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**ABSTRACT**

Although the 1972 Liability Convention is the cornerstone of international space law, it has flaws that make it ineffective in addressing contemporary issues like militarization, privatization, and the exponential growth of trash. Using case studies (Cosmos 954, Iridium 33–Cosmos 2251), this paper assesses the Convention's shortcomings and suggests a hybrid liability model that combines strict state liability with fault-based contributions from culpable actors. It does this by drawing on comparative liability regimes and principles of state responsibility. Debris concerns are contextualized by empirical data from the Secure World Foundation and the European Space Agency (ESA), and treaty reform ideas are informed by a comparison of the liability frameworks for nuclear and aviation. According to the study's findings, fair accountability in the New Space age depends on the Convention being in line with customary international law and the creation of an International Space Liability Tribunal.

**INTRODUCTION**

Outer Space is categorized under international law as a global common, defined as an area whose resources lie beyond national jurisdiction and are governed by international legal principles[[3]](#footnote-3). The international liability regime for space activities, established by the Convention on International Liability for Damage Caused by Space Objects (Liability Convention)[[4]](#footnote-4), exemplifies the intersection of international policy, law, and economics.

The 21st century has witnessed exponential growth in space activities, yet the Liability Convention’s framework, crafted in an era of state-dominated space exploration, fails to address modern challenges such as cyberwarfare, privatization, and debris proliferation[[5]](#footnote-5). For instance, the Convention’s strict liability regime imposes obligations on launching states for Earth-based damages regardless of fault,[[6]](#footnote-6) creating a paradox where liability hinges on ownership rather than proximate causation or culpability.[[7]](#footnote-7) This approach diverges sharply from analogous regimes like the United Nations Convention on the Law of the Sea,[[8]](#footnote-8) which ties liability to a state’s control over harmful actions.[[9]](#footnote-9)

A critical blind spot in the current regime is its inability to address scenarios where third-party actors (e.g., hackers or adversarial states) seize control of space objects. For example, a satellite launched by State A could be commandeered by State B via cyberwarfare, yet State A remains liable for resultant damages under the Convention.[[10]](#footnote-10) Similarly, the Convention does not mandate investigations into the root cause of incidents, leaving launching states financially responsible even when harm stems from external malfeasance.[[11]](#footnote-11) This misalignment with customary principles of state responsibility undermines the Convention’s stated goal of fostering “effective international rules and procedures concerning liability.”[[12]](#footnote-12)

As space becomes increasingly congested, with over 30,000 trackable debris objects and 5,000 active satellites as of 2023[[13]](#footnote-13), the Liability Convention’s reliance on state-centric liability risks stifling international cooperation. Reform is urgently needed to reconcile the regime with the realities of private-sector dominance (e.g., SpaceX’s Starlink constellation, which comprises over 60% of active satellites[[14]](#footnote-14)) and dual-use technologies that blur civilian-military distinctions.[[15]](#footnote-15)

**HYPOTHESIS**

The 1972 Liability Convention’s state-centric strict liability framework is insufficient to address modern challenges posed by commercial privatization, militarization, and autonomous space technologies, as evidenced by ambiguities in liability attribution during the 2009 Cosmos 2251–Iridium 33 collision.

**LITERATURE REVIEW**

The literature underscores systemic gaps in the Liability Convention’s ability to regulate contemporary space activities. Scholars propose reforms ranging from treaty amendments to new enforcement mechanisms. Frans G. von der Dunk emphasizes the need for enhancements to the Liability Convention, particularly its failure to address privatization and space debris.[[16]](#footnote-16) He advocates for a global body to monitor debris and an international compensation fund. Agnessa O. Inshakova critiques the Convention’s handling of private spaceflight, highlighting gaps in liability coverage for damages in outer space and proposing measures like “space visas” to enhance responsibility attribution.[[17]](#footnote-17)

Trevor Kreher argues that the Convention’s strict liability framework misattributes responsibility and fails to deter negligence among space operators, urging alignment with customary principles of state responsibility.[[18]](#footnote-18) Bruce A. Hurwitz examines the Convention’s ambiguity in defining state “fault,” stressing the need for clarity in regulating modern space operations.[[19]](#footnote-19)

Mohamed Abdelhamid and Gouyu Wang critique the two-tier liability regime (absolute vs. fault-based), noting its inadequacy in addressing debris-generating activities and privatization challenges.[[20]](#footnote-20) Rajeswari Pillai Rajagopalan raises concerns about cyberwarfare’s implications for space security, advocating for new mechanisms to address non-physical disruptions.[[21]](#footnote-21)

Yun Zhao examines commercialization’s impact on the Convention, proposing revisions to adapt to private-sector dominance.[[22]](#footnote-22) Henry Hertzfeld calls for new treaties to address resource extraction and debris management, which the Convention’s 20th-century framework ignores.[[23]](#footnote-23) Alexander P. Reinert identifies liability gaps for private companies engaged in satellite servicing, particularly for in-space maneuvers.[[24]](#footnote-24) Ioana Bratu highlights challenges posed by autonomous technologies, urging liability standards for AI-driven satellites.[[25]](#footnote-25)

Collectively, these works advocate for reforms to ensure accountability and adaptability in the face of privatization, militarization, and technological advancements.[[26]](#footnote-26)

**COSMOS & IRIDIUM COLLISION**

The collision between Cosmos 2251 and Iridium 33 on February 10, 2009, was the first incident that has gone down in history in terms of space law and satellite operation.[[27]](#footnote-27)This case study discusses the consequences such as liability that can arise from this event. A critical issue arising in the context of modern space activity is the exponential increase in space debris, which poses significant threats to operational satellites, future missions, and long-term sustainability of outer space. The recommendations should highlight improvements in regulatory frameworks in order to improve upon the existing conditions.

The incident in question was the Cosmos 2251 defunct Russian military satellite colliding with Iridium 33, a commercial telecommunications satellite owned by a private US company. This case may change the norms on international liability concerning outer space activities. This report clarifies all the legal implications of the collision, evaluates responsibilities in the event of such collisions, and proposes mitigatory measures towards reducing future risks from space debris.

A number of critical issues can be identified in this case. The first one is liability ambiguity-questions arose over which state has the liability under the Liability Convention due to this collision, primarily because Iridium 33 was launched by a private company, but still presented an involvement of U.S. interests. There are, secondly, space debris concerns: the accident created a huge debris cloud that poses risks to other satellites and spacecraft, an urgent need for improved debris management policy. Finally, there are regulatory gaps: contemporary international frameworks do not capture the complexities arising from commercial satellite operations and their interactions with state-owned entities satisfactorily.

The incident represents a classic case where liability cannot easily be assigned where both the satellites are commercial and state-run. There is controversy about who is the "launching state," making it complex to advance claims under those treaties. Alternative options are to delineate clearer liability frameworks by amending existing treaties with proposed amendments or to delineate clearer roles played by private entities in international liability frameworks. Policies on debris mitigation may be enhanced; whereby sterner guidelines would be placed on practices on satellite end-of-life procedures which could lead to the creation of less debris. A collaborative agreement among nations shares responsibility for space traffic management.

[[28]](#footnote-28)An analysis of these alternatives, however reveals some strengths and weaknesses with liability simplification lowering the complicated claim procedures while debris policies would make the risks of collision easier, but treaty amendment is often time-consuming requiring that the various parties agree unanimously on any new regulations which may likely raise the costs to satellite operators.

It was quite clear that the Cosmos 2251-Iridium 33 collision is a significant piece of evidence to state against liability regimes[[29]](#footnote-29). Most of the key findings are summarized below. However, there is much missing in the liability regimes, and thus these areas call for urgent space debris management strategies. This will necessarily come across as generalizations across the various scenarios. Its conclusions will obviously provide big responses for the stakeholders in space law.

Proposals include the following recommendations. First, through an amendment of the Liability Convention, provisions ought to be specifically included that simply make private entities liable. Such liability would be exercised as a right to institute claims through their various states. Second, there should be implementation of stiffer debris management policies toward establishing international standards for satellite decommissioning and debris mitigation strategies. Lastly, an action plan should be outlined, which should include an international committee by Q1 2025 in order to draft amendments to current treaties and the launch of a global awareness campaign on debris management by Q3 2025.

The implementation of these recommendations should benefit the stakeholders as they try to enhance the safety of space operations by solving the technicalities and lacunas that exist in the current legislation owing to satellite collisions.

Moreover, the involvement of multiple states—namely the United States, Russia, and Kazakhstan—further complicates liability claims. If Russia were to pursue a claim under the Liability Convention against the U.S., it would face challenges due to the lack of clarity regarding which state qualifies as the "launching state." The convention lists criteria for determining this status but does not account for situations where a satellite is launched by one state on behalf of a private entity from another state. This situation raises additional questions about whether the United States could be considered liable based solely on Iridium's U.S. nationality.

A significant loophole in the Liability Convention is its failure to adequately address scenarios involving commercial satellites and joint launches. The convention primarily focuses on state responsibility and does not sufficiently incorporate the complexities introduced by private entities operating in outer space. Furthermore, it allows for diplomatic negotiations before invoking its provisions, which could lead to alternative dispute resolution mechanisms that bypass the convention altogether. This means that even if liability were established under the convention, parties might choose to resolve disputes through other legal frameworks or negotiations, diluting the convention's effectiveness.

In summary, the Cosmos 2251-Iridium 33 collision illustrates critical gaps in current international space law regarding liability, particularly concerning private entities and multiple launching states. The ambiguities surrounding these issues necessitate a revaluation of existing frameworks to better address modern challenges in space operations and ensure accountability among all involved parties.

**THE COSMOS 954 EVENT**

The 1978 Cosmos 954 event was a turning point in the implementation of the 1972 Liability Convention, which established international space law[[30]](#footnote-30). A failure caused the Soviet spacecraft Cosmos 954 to crash onto Canadian territory, dispersing radioactive debris across a large portion of the Northwest Territories. This lawsuit is noteworthy because it is one of the few in which a state has used the Liability Convention to pursue damages from a space object. However, the event's aftermath revealed a number of gaps in the Convention, mainly with regard to the definition of harm, the enforcement of compensation, and the liability's state-centric character. The objective of this case study is to evaluate these restrictions critically and suggest changes to improve international space liability law.

One of the main issues with the Cosmos 954 event is that Canada was not notified in a timely manner about the satellite's possible threat, which went against international cooperation standards[[31]](#footnote-31). Furthermore, the extant treaties lacked a clear framework for liability, which left gaps in the areas of responsibility for cleanup and damages resulting from space objects. Public safety concerns about environmental contamination and nuclear safety were brought up by this incident.

Canada claimed CAD 6 million in compensation from the Soviet Union for the remediation operations and harm caused by radioactive contamination when it invoked the Liability Convention[[32]](#footnote-32). The launching state is solely responsible under the Convention for any harm that its space objects may cause to any land on Earth.

What remains unclear, though, is how damages were determined and evaluated because the final settlement negotiated was only CAD 3 million. The broad definition of "damage" in the Convention does not include rules for environmental harm or the effects of hazardous materials such as radioactive substances. Instead, it covers loss of life, injury, and property damage. Due to this ambiguity, the Soviet Union was able to negotiate a lower settlement, which exposed a serious flaw in the Convention's capacity to handle intricate damage scenarios.

The Cosmos 954 negotiations also tested whether compensation under the Liability Convention could be enforced[[33]](#footnote-33). There is no legally enforceable process to guarantee full compensation, and the Convention encourages parties to resolve issues diplomatically. Although diplomatic negotiations were used to reach a settlement in this matter between the Soviet Union and Canada, the result did not fully reflect Canada's claim. The Convention's ability to hold nations accountable for the harm caused by their space activities is compromised by this absence of legally obligatory enforcement. Injured states are forced to rely on the goodwill of the offending state in the absence of a specific legal framework or international tribunal to decide such disputes, which could lead to inadequate compensation, as was the case in this instance.

The state-centric responsibility structure of the responsibility Convention is another significant issue brought to light by the Cosmos 954 event[[34]](#footnote-34). The Convention does not address the expanding role of private space players; rather, it lays all responsibility for space objects on the launching state. This restriction was not immediately evident in 1978 because space exploration was mostly carried out by state organizations. But as private businesses get more involved in space exploration these days, this loophole becoming increasingly serious. The Convention does not account for circumstances where private entities could be accountable for space debris or damages, leaving a huge vacuum in accountability. The Liability Convention as it currently exists would not be adequate to manage a similar situation involving a private corporation if it happened today.

Modernizing the Liability Convention necessitates modifications to close these gaps. First things first, damage needs to be defined more precisely, especially when it comes to situations involving dangerous products and environmental impact. In addition to lowering the possibility of under compensation, providing more precise rules for determining damage would help guarantee that harmed states receive just compensation. In order to guarantee that compensation claims are resolved equitably and consistently, the Convention should also have a legally obligatory enforcement mechanism.

An official legal procedure for settling such conflicts would be provided by the establishment of an international tribunal for space responsibility claims, as opposed to depending solely on diplomatic negotiations, which are subject to political influence[[35]](#footnote-35). Finally, in order to ensure that private enterprises engaged in space operations may be held responsible for any damages they cause, the responsibility framework needs to be extended to include private actors. This is particularly crucial because space exploration is becoming more and more dependent on the private sector. International collaboration and safety will be enhanced by the establishment of explicit standards for prompt notification upon identification of potential threats.

In conclusion, the Cosmos 954 incident is a crucial illustration of the shortcomings of the Liability Convention. The incident made it evident that the liability structure has to include private players, have better enforcement mechanisms, and provide clearer definitions of damage. Addressing these liability gaps will be crucial as space exploration develops in order to guarantee responsibility and just compensation in the event that future space-related mishaps occur. The international community may better manage the dangers and responsibilities related to the expanding use of space by updating the Convention.

**Space Debris Incidents and the Liability Convention: Overview, Trends, and Legal Challenges**

**Overview of Space Debris**

Space debris is termed as space junk and includes abandoned rocket stages, malfunctioning satellites, and other fragments that remain in orbit after a collision or explosion.[[36]](#footnote-36) [[37]](#footnote-37) [[38]](#footnote-38) Risk to functioning spacecraft has increased dramatically with the number of space objects. Space operations, safety, and international space law are all critically affected by the buildup of space debris.[[39]](#footnote-39) [[40]](#footnote-40) More than 560 documented in-orbit fragmentation occurrences have been documented since 1961, most of which are the consequence of explosions rather than direct collisions.[[41]](#footnote-41) The increased density of space debris daily increases the likelihood of more fragmentation and threatens all activities in space seriously. More importantly, it will seriously pose a risk to LEO, where the International Space Station is located, and to most satellites.[[42]](#footnote-42) [[43]](#footnote-43)

The more satellites that commercial enterprises, government space organizations, and military operators fill the skies with, the more the current legal framework established by the 1972 Liability Convention is under strain.

**Collisions and Damage**

**Significant Incidents**

On February 10, 2009, the Iridium-33 satellite and the defunct Kosmos-2251 collided, which resulted in the first ever unintended collision of two satellites and one of the best recorded space debris events. [[44]](#footnote-44)[[45]](#footnote-45) Over 2,300 trackable fragments were produced by this disastrous incident, which made the debris situation much worse.[[46]](#footnote-46) In addition to causing significant damage, the collision brought attention to the increasing risks associated with crowded orbits and inadequate tracking of space objects. In addition, even though the Iridium satellite was privately held, it brought attention to the shortcomings in the Liability Convention, which only applied to state actors and excluded private organizations.

**Recent Events**

A Soviet satellite that was three decades old destroyed in orbit in 2023, as a result of a collision with space debris.[[47]](#footnote-47) This occurrence serves as evidence of the persistent and increasing harm that accumulated space debris poses. These examples show how objects that have long since outlived their useful lives can nevertheless add to the risk, which raises questions about the sustainability of orbital systems over the long term. About early 2016, debris crashed into the European Space Agency's Sentinel-1A satellite, critically damaging its solar panels.[[48]](#footnote-48) Though Sentinel-1A continued to function, this also reminds us of the vulnerability of operational spacecraft and the lack of complete liability for damages caused by space debris in today's legal framework.

**Kessler Syndrome**

The possible start of the Kessler Syndrome, a cascade effect in which space object collisions produce even more debris, so creating a runaway scenario, exacerbates the problem of space debris.[[49]](#footnote-49) Low Earth orbit (LEO) may reach a tipping point in the next decades if present trends persist, making it more and more dangerous for new spacecraft to function securely. The risk is further increased by the continuous increase in space activities, particularly with the rise of private sector launches.[[50]](#footnote-50) [[51]](#footnote-51)

With so many chunks of junk circling in orbit, the Kessler Syndrome represents an extreme but increasingly likely situation that could render satellite operations and space exploration impossible. Given that the Liability Convention does not adequately address the cumulative and long-term repercussions of such debris, this emphasizes the urgent need for improved legal and regulatory frameworks to mitigate the formation of space debris.

**Violations of Space Law**

**Unauthorized Launches and Unreported Accidents**

Unauthorized launches happen when a space actor—a state or a commercial company—violates international treaties or domestic laws by not obtaining the required authorizations to carry out a launch. One well-known example of a regime that frequently launches unapproved satellites into space is North Korea. Given the missile technology involved, the international world, including the UN, has denounced these operations as violations of space law and security agreements.[[52]](#footnote-52)[[53]](#footnote-53) Such launches are against the terms of the Outer Space Treaty, which mandates that all space operations be carried out peacefully and transparently. Furthermore, the risk of unlawful actions is increased by the expanding number of commercial space businesses, particularly when national regulations are too strong to supervise and authorize every launch.

The growth of commercial space exploration has brought forth new difficulties for adhering to international space law. The increased difficulty of monitoring and implementing international treaties is demonstrated by the rise in unreported mishaps involving space debris violations and illegal launches.[[54]](#footnote-54) The Liability Convention imposes liability on nations and operators for damages resulting from their space activities; nevertheless, the absence of a worldwide system for tracking space objects and reporting events makes enforcement of the convention inadequate.

For instance, claims of uncontrolled launches by for-profit companies and smaller states that are either incapable of reporting events or do not have the infrastructure necessary to handle space debris have surfaced. The problem of space situational awareness (SSA) is made more difficult by these unreported incidents, which also result in regulatory blind spots that may eventually cause significant space incidents.[[55]](#footnote-55) The Liability Convention, in its existing form, struggles to accommodate this rising complexity in the modern space environment.

**Satellite Failures and Malfunctions**

**Statistics on Failures**

Collisions with space debris and technological issues brought on by orbital dangers account for a large number of satellite failures. For example, in 2016 a small fragment struck the European satellite Sentinel-1A More than 30% of close conjunctions, or near-miss events, are associated with space debris from the Fengyun–1C satellite, which was lost in 2007 after a Chinese anti-satellite missile test. [[56]](#footnote-56) [[57]](#footnote-57) These kinds of events are becoming more frequent. Thousands of shards were produced by this test's debris, which added significantly to the overall population of space junk.

The likelihood of debris-related failures and malfunctions rises with the number of satellites in service, particularly in congested orbits.[[58]](#footnote-58) [[59]](#footnote-59) However, the Liability Convention has not been applied very often to these kinds of incidents, indicating how hard it is to establish blame since the debris is frequently irretrievable.

**Cases Invoking the Liability Convention**

Although the Liability Convention was intended to address damage resulting from space activities, it has only been applied in a few instances. One of the most well-known instances where the convention was applied was the Cosmos 954 incident in 1978.[[60]](#footnote-60) In one instance, radioactive debris was dispersed across portions of Canada by a Soviet nuclear-powered satellite that had re-entered the atmosphere. In the end, the Canadian government's claim under the Liability Convention was settled for CAD 3 million, much less than the CAD 6 million that was originally requested.

This case revealed significant flaws in the treaty, especially its insufficient provisions for environmental damages, even though it also established a precedent for the law. Although the possibility of claims has grown with the emergence of private space actors, no additional significant cases using the convention have been made public sense then.
However, the Liability Convention does not adequately cover space operations conducted by the private sector, making it difficult to hold private businesses responsible for mishaps and damage. The increasing number of commercial launches highlights the need to amend and broaden the convention's provisions to take into consideration the engagement of the private sector and the growing concerns associated with space debris.

**Growth in Private Space Exploration**

**Statistics and Growth in Private Launches**

The recent space commercial exploration under the leadership of companies such as SpaceX, Blue Origin, and OneWeb has revolutionized space at its root level.[[61]](#footnote-61) There are now thousands of private satellites already orbiting Earth, while in the years to come thousands more will be launched.[[62]](#footnote-62) There are now significant worries regarding LEO overcrowding and the higher risk of crashes due to this rapid expansion. Specifically, the growth of mega-constellations—vast satellite networks—has increased congestion and made space traffic control and debris monitoring more difficult.[[63]](#footnote-63)

A major contribution to the overall number of space objects was made by SpaceX's Starlink, which launched hundreds of satellites in 2020 alone to provide internet access throughout the world.[[64]](#footnote-64) It gets harder for current legal systems, such as the Liability Convention, to govern and assign liability as space gets more commercialized.

The Liability Convention was developed during a time when a few numbers of state actors dominated space travel, but the introduction of private space exploration has made the orbital environment more crowded and complex. The widening gap between present space activities and the current legal framework is highlighted by the increase in space debris accidents, unauthorized launches, and violations of international space law. The Liability Convention might not be sufficient to handle the realities of contemporary space operations without major revision, especially as space gets more and more commercialized and privatized.

Building upon the insights from rising private sector involvement in space exploration and increasing risks of space debris, a critical analysis of trends highlights the growing relevance of liability issues in space activities. The Liability Convention, which provides the framework for addressing damages caused by space activities, is being tested in unprecedented ways as space becomes more congested and commercially driven.

As noted previously, the dominance of private constellations, such as those launched by SpaceX and OneWeb, has transformed space activities. In 2021, nearly 83% of payloads launched were from private entities, signalling a shift from government-run missions to commercialized space exploration.[[65]](#footnote-65) By 2030, the number of operational satellites is projected to outnumber space debris objects, raising concerns about overcrowding in low Earth orbit (LEO).[[66]](#footnote-66) This overcrowding not only increases the risk of collisions but also exposes liability loopholes, particularly because private sector launches often fall into grey areas not fully accounted for in the existing legal frameworks like the Liability Convention.

The surge in space debris incidents further exacerbates these concerns. Since 1961, over 560 fragmentation events have been recorded[[67]](#footnote-67), but the collision between Iridium-33 and Kosmos-2251 in 2009 set a precedent for debris generation caused by satellite collisions. With private sector launches on the rise, space debris is growing exponentially, and the risk of similar collisions increases.

Despite the rising risks, the Liability Convention remains infrequently invoked, especially in cases involving private entities. While the convention outlines that states are liable for damages caused by their space activities, enforcement is rare, and private-sector activities present a significant legal grey area. Private companies, such as SpaceX, operate across multiple jurisdictions, which complicates accountability.[[68]](#footnote-68) Though there have been a few reported cases where liability could have been invoked, most cases are settled privately or through diplomatic channels, without formal application of the convention’s provisions. This highlights the loopholes in the convention, which was designed for state actors and lacks clear enforcement mechanisms for private entities.

The increasing frequency of space debris incidents, coupled with the rapid commercialization of space, reveals a mismatch between the Liability Convention and the realities of modern space operations. The framework is struggling to adapt to new operational practices, such as the proliferation of privately launched satellites. Current international regulations do not adequately address the challenges posed by a crowded LEO or provide solutions for the complex accountability issues arising from collisions involving private and public space operators. This trend points to the urgent need for updated guidelines and more comprehensive international agreements to fill in the liability gaps.

The trends discussed above underscore a critical flaw in the Liability Convention which is its inability to effectively handle the modern complexities of space activities, particularly those involving private sector actors. The framework lacks enforcement and compliance mechanisms necessary to manage the evolving risks of satellite collisions, space debris, and unreported accidents. As private companies continue to dominate space activities, the loopholes in the convention become more pronounced, demonstrating the need for international collaboration to bridge the liability divide and ensure the long-term sustainability of space exploration.

By analysing these trends and applying the data to existing legal frameworks, it is evident that the Liability Convention, in its current form, is insufficient to mitigate the increasing risks in space. Reform and updates to this framework are crucial to adapting to the new realities of space exploration, particularly as private and state activities intersect in unregulated environments.

**PROPOSED SOLUTIONS FOR CLOSING THE LOOPHOLES**

The 1972 Liability Convention requires substantial reforms to address three critical challenges in modern space operations: the rise of private sector actors, increasing space debris, and evolving military threats.[[69]](#footnote-69) A balanced approach must preserve the Convention's core compensatory function while introducing nuanced liability frameworks suited for contemporary space activities.[[70]](#footnote-70)

***Reforming Liability Attribution***

The current strict liability regime should be supplemented with fault-based considerations.[[71]](#footnote-71) Article XII's reference to "justice and equity" provides legal grounding to incorporate customary international law principles of effective control.[[72]](#footnote-72) This would require claims commissions to evaluate operational control at the time of incident, due diligence in collision avoidance, and foreseeability of harm based on space situational awareness data.[[73]](#footnote-73) However, this interpretive approach alone proves insufficient without standardized space traffic management systems and consistent adjudication practices.[[74]](#footnote-74)

***Enhanced Exoneration Provisions***

Article VI's exoneration clause could be modernized to account for cyber operations and third-party interference.[[75]](#footnote-75) Drawing from maritime law's treatment of piracy, the Convention should recognize hostile cyber activities as "intentional harm" while requiring launching states to demonstrate implementation of reasonable protective measures.[[76]](#footnote-76) This approach must balance accountability with safeguards against manufactured claims of third-party interference.[[77]](#footnote-77)

***Hybrid Liability Framework***

A three-phase liability system would better serve contemporary needs:

1. Presumptive Liability: Maintains Article II's strict liability for launching states as initial respondents[[78]](#footnote-78)
2. Contributory Analysis: Permits evidence of third-party control, debris mitigation compliance, and collision avoidance efforts[[79]](#footnote-79)
3. Apportionment Mechanism: Establishes proportional liability based on operational control and comparative fault[[80]](#footnote-80)

***Implementation Tools***

Practical enforcement requires:

* A Space Liability Fund financed through modest launch fees (0.1% of payload value) to ensure compensation liquidity[[81]](#footnote-81)
* Technical Advisory Panels utilizing space situational awareness data for fault determination[[82]](#footnote-82)
* A blockchain registry for immutable records of satellite operational transfers and cybersecurity compliance[[83]](#footnote-83)

This hybrid model draws upon successful elements of nuclear liability regimes, aviation accident frameworks, and maritime limitation procedures while respecting the Convention's original intent.[[84]](#footnote-84) By combining strict liability with fault-based refinements, it addresses modern challenges without requiring complete treaty overhaul.[[85]](#footnote-85)

**CONCLUSION**

The hybrid regime amendment proposed by this Comment is a more consistent and principled solution than the interpretive contortions required by the first two solutions this Comment proposed. Although in some ancillary respects it is very novel, it is also intermediary in its central function and does not dramatically alter the core mechanics of the Liability Convention itself. That is, a hybrid regime would simply provide an additional process for extracting compensation from the truly responsible party rather than reforming the liability regime whole cloth. There are practical problems with the mechanics of actually getting that contribution, but similar problems of compliance are inherent to international dispute resolution. At the very least, providing appropriate and universal rules for obtaining the contribution—whether peacefully or by authorized seizure—can hardly hurt and will more likely than not deter the Holmesian bad man from causing harm in the first place. For that reason, the hybrid regime is the most preferable and palatable option of all those considered.

As this paper demonstrates, changes to the Liability Convention’s operation are necessary in order to actualize the motivating principles of international law and the liability regime’s own stated goals. The solutions proposed above are not perfect, but they do operate to close—or at least tighten—the liability loophole. Every liability regime has trade-offs, but a proper regime will ensure that if harm results on Earth from a space object, it will be compensated to the extent that justice demands. Just as important as ensuring proper compensation, however, is the principle that actors who are most responsible for the damage will similarly be most responsible for compensation, rather than assigning that duty to innocent launching states. The quest for an ideal legal system may strike some as naïve, but as man reaches for the stars, so too must the law.

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2. 3rd year, BA LL.B (Hons.), CHRIST (Deemed to be University), Delhi NCR. [↑](#footnote-ref-2)
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4. Convention on International Liability for Damage Caused by Space Objects, Oct. 9, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187. [↑](#footnote-ref-4)
5. Frans G. von der Dunk, *Revisiting the Liability Convention: Private Actors, Public Law, and Cosmic Commons*, 46 J. Space L. 1, 5–7 (2023). [↑](#footnote-ref-5)
6. *Convention on International Liability for Damage Caused by Space Objects* (Liability Convention), Oct. 9, 1972, art. II, 24 U.S.T. 2389, 961 U.N.T.S. 187. [↑](#footnote-ref-6)
7. Int’l Law Comm’n, *Draft Articles on Responsibility of States for Internationally Wrongful Acts*, art. 2, U.N. Doc. A/56/10 (2001). [↑](#footnote-ref-7)
8. *United Nations Convention on the Law of the Sea* (UNCLOS), Dec. 10, 1982, 1833 U.N.T.S. 397. [↑](#footnote-ref-8)
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