Collisions in Space: Perspectives on the Law Applicable to Damage Arising from Space Objects

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Abstract

The number of cases that have resulted in damage from space objects has fortunately been limited. When damage has occurred, however, it has been not inconsiderable.
The increase in commercial space activities need not imply an increase in the number of collisions or accidents between space objects: such presumptions would be conjecture. Concerted efforts are, however, underway to ensure compliance with the relevant inter-agency and international debris mitigation guidelines, as a means of limiting the impact of potential debris-related collisions in space activities. Through this, safety, lifetime and technology requirements for spacecraft are rising.
Where damage from space objects does occur, however, the issue most likely to arouse attention is that of the law applicable to such accidents.
In practice, resort to dispute settlement under the 1972 Convention on the Liability for Damage caused by Space Objects (Liability Convention), with its procedure for settlement of State claims on behalf of their natural or legal persons, remains an option to be exercised in the hands of the State parties to the dispute. Commercial operators may, independently, choose to call upon the domestic courts competent to hear the case in question. Domestic courts are then likely to investigate the relevant conflicts rules available across the various liability regimes that could apply to the damage resulting from the space accident.
This paper takes a closer look at these liability regimes for damage from outer space activities at international and national level, including third party liability, also in relation to GNSS activities. It offers a perspective on the current state of regulation and some reflections on future developments within the law governing liability for space activities.

Introduction

The space community continues to face growing concerns about the risk of collisions in outer space. While the number of collisions has been limited to date, the individual incidents have taken place to accompanying calls for revision of the international system of state liability for outer space

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activities.[1] Such criticisms relate by and large to the need to prove fault on the part of the relevant launching State under Article III, as well as under Article IV.1(b) LIAB when assessing liability for losses and damage in outer space. The provisions of Article II LIAB relating to absolute liability for damage on earth are not focussed on in this paper, given their clear scope of compensation, independent of fault.

Article III LIAB imposes a requirement of fault in establishing liability for damage caused by the space object of one launching State to the space object of another launching State in outer space. The pre-requisite of fault liability is taken up again in Article IV LIAB, which also restricts compensation for damage to third parties in outer space, including those covered by joint and several liability, to damage caused through fault. This has led to direct calls for amendment of Article IV.1(b) to replace the current fault liability rule with a provision for absolute liability. This would put it on a par with liability for damage on earth under Article II LIAB.[2] More specifically, it would cater for potentially unresolved and even uninsured third party liability issues.

I Legal Issues

The combination of the provisions contained in Article III and Article IV LIAB undoubtedly hamper the imposition of liability for outer space activities in practice. Fault is not readily proven in the environment of outer space, particularly where the non-compliance by some States with specific international obligations, such as registration of satellites constitutes a breach of an international obligation, but not fault under Article III LIAB.[3]

Nor have any of the international or inter-agency debris mitigation guidelines been accepted as binding rules of law; as a result, they cannot be used directly at international level as measures or standards of care or fault. The LIAB was not concerned with creating a system of incentives to encourage space activities (unlike OST), but rather to provide compensation via launching States for those injured as a result of their inherently hazardous space activities.[4]

This particular goal may well require further reflection at both national and international level in the near future.[5]

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1 Z. Yun, The 1972 Liability Convention: time for revision? Space Policy (20) 2004, 117-122; H. Hertzfeld, National Space Legislation as an Enhancer of Space Activities, Paper presented at the IISL-ECSL Symposium, UNCOPUOS Legal Subcommittee in 2010, available at <www.unoosa.unvienna.org/pdf/pres/lsc2010/symp02.pdf>.

2 H. Hertzfeld, *id*.

3 This would rather constitute a case of international responsibility under Article VI OST.

4 For further discussion, see L.J. Smith/A. Kerrest, Article VII Outer Space Treaty, in: Hobe/Schmidt- Tedd/Schrogl (eds), *Cologne Commentary on Space Law* (CoCoSL), vol I, 2009.

5 Manfred Lachs, (eds. Masson-Zwaan, Hobe), *The Law of Outer Space, An Experience in Contemporary Law Making,* re-issue, Leiden 2010, 130, Nijhoff.

Taken together, the experience gained from satellite collisions does not contribute to a consistent development of the law of liability for space activities.[6] The cases themselves, by virtue of their individual 'specifics', do not offer a basis for authoritative interpretation of the LIAB.[7]

This situation may have a particular impact on the approach of the commercial sector, when assessing the risks it faces in outer space. With no certainty as to the interpretation of the specific international rules in practice, the commercial sector may find reason rather to resort to alternative domestic jurisdictions, leaving the question of the law applicable in outer space accidents to the forum called upon to adjudicate over the dispute.

This could lead to a weakening of the international liability system, which remains an important backdrop to all outer space activities. It also shifts the focus more towards insurance-based solutions for risks involved.

II Applicable Law and Choice of Forum

The question of which law applies to claims for damages or compensation resulting from such space-induced damage was the subject of much debate during negotiations.[8] The Liability Convention, unlike other international systems of compensation, did not set out to provide an exclusive forum for damage claims arising from international space activities;

Article XI para.1 LIAB does not require exhaustion of local remedies before an international claim is made under the Liability Convention. Article XI para.2 LIAB specifically provides for claims to be brought in front of (domestic) courts of law. The domestic court will be required to determine which law is to be applied in the concrete case.

In addition, a launching State cannot readily block a victim's claim; Article XII allows States other than the State of nationality to bring claims on its behalf.

II.1 Negotiations on Liability Convention

Discussions about the applicable law originally took place during the negotiations within UNCOPUOS on the 1972 Convention on International Liability

6 The financial settlement of the Soviet-Canadian dispute relating to the Cosmos 954 crash on Canadian territory took place on a 'without prejudice' and '*forfaitaire*' basis, with no recognition of liability on the part of the launching State. Details of the settlement are available in ILM 1978; on the Cosmos 954 claim, *see further* P.G. Dembling, Cosmos 954 and the Space Treaties, *Journal of Space Law*, 1978, 129ff; Smith/Kerrest, *id*, Convention on the International Liability for Damage from Space Objects, in: *CoCoSL*, vol II, 2012, *forthcoming*; P. Larson and F. Lyall report that the Convention has been activated twice, *see* P. Leeson, F. Lyall, *Space Law, a Treatise*, Surrey, 2009, 117.

7 Marta Meija-Kaiser, Collision Course 2009: Iridium-Cosmos, in: IISL/IAF, *Proceedings of the 52nd Colloquium on the Law of Outer Space*, 274, American Institute of Aeronautics and Astronautics, 2010.

8 The working drafts and reports of the debates on the Liability Convention are available in N. Jasentuliyana/R.S.K. Lee, Manual of Space Law vol. III, Oceana Publications, 1981.

for Damage from Space Objects.[9] At that stage, various views were expressed as to which law applies in the case of damage in outer space.
The *travaux* make reference to the applicable law as being either the law of the place where damage occurred (*lex loci delicti commissi; or lex damni*), or to the rules of international law (*lex patriae; equity, justice etc*), with no further specification as to whether these were exclusive or mutually dependent considerations. It was clear from the discussions that differing jurisdictions could be called upon.
The choice of law would be left to the particular jurisdiction invoked, whether within the diplomatic negotiations on behalf of the parties, the Claims Commission, or a court of law before which the case was heard.

III Justification for Patterns of Liability

Leaving considerations of applicable law aside, the discussions in the *travaux* on the basis of liability are silent as to why the original proposal for LIAB providing for absolute liability for damage on earth and in orbit, was subsequently altered to accommodate fault liability.
This is unfortunate; the distinction is seen to pose a barrier to effective remedies for damage in outer space. Proof of fault in outer space is impracticable, if not impossible. Moreover, the requirement of fault liability under both Article III LIAB, and Article IV in relation to third party liability, makes the provisions on third party liability equally burdensome.
The following examples serve as a (non-and several liability, where no fault can be established on the part of the first two launching States. This causes problems in practice with causally linked cases of impact that are not fault-related; and finally,

1. the launching state in question is not a signatory to the LIAB (and may not be signatory to the OST);
2. there is a collision between two satellites having the launching state in common; and/or
3. there is no clear interpretation of consequential loss or indirect damage, resulting notably from a collision in orbit, from the perspective of causation and remoteness (causation);
4. Third party liability is not constituted under Article IV, despite its reference to joint and several liability, where no fault can be established on the part of the first two launching States. This causes problems in practice with causally linked cases of impact that are not fault-related; and finally,
5. There is no definition of fault for damage caused in outer space.

Accordingly, there is some apprehension about the Convention's application in practice. This is particularly relevant to the commercial sector. This group's approach to liability solutions for risk is largely determined by its national space law, in so far as this exists.

9 N. Jasentuliyana/R.S.K. Lee, Manual of Space Law vol. III, id., A/AC.105/21 Annex IV, 284, at 292 ff.

III.1 Purpose of Convention

It is important to recall that the LIAB was designed to introduce a victim-orientated compensation scheme designed to provide a valuable system of sufficient compensation that puts victims back into their original position prior to the damaging event. It is for the legal community to ensure that the LIAB provisions are not frustrated in their application.

Given the lack of clear reasoning behind the choice of fault liability, the principle of *restitutio in integrum* for damage in outer space should not be frustrated through uncertainty as to the law itself.

As Judge Manfred Lachs noted in his work, the Law of Outer Space: 'Looking at the body of law now existing, it could not be claimed that the rules adopted attained all their objectives. As indicated in the foregoing analysis, some of them demand further elaboration'.[10]

IV Types of Damage in Outer Space

The type of damage resulting from an in-orbit collision or space accident involving at least one functional satellite is likely to be threefold: firstly, there will be direct damage to property, with accompanying consequential loss that is primarily economic in nature; secondly, there may be damage to third parties, and finally, there will be damage to the environment of outer space. The latter category is important, given its sensitive atmosphere and characteristics as a natural resource.

However, there remains a lack definable legal interest represented in this particular *res communis* and with this, difficulties in establishing claims brought directly under the heading of liability for damage under the LIAB that relate to deterioration of the outer space environment. This appears to hold, despite established rulings in international law about the legal duty of States not to undertake hazardous activities towards others.[11]

Claims under international environmental law could possibly arise where additional provisions provide clear norms or standards on which to base these claims.[12]

IV.1 Consequential Loss

The remaining categories of damage - property damage and consequential loss - present practical problems. Direct damage will result from the impact of the collision on the satellite 'hardware' and its components; it may also go as far as interruption in telecommunication, broadcasting or data relay services by earth observation satellites. Loss of GNSS signal for navigation may also result. Consequently, damage to a functional satellite is likely to lead to significant loss of

10 Manfred Lachs, The Law of Outer Space, 2010, n. 5.

11 Manfred Lachs, (eds. Masson-Zwaan, Hobe), *The Law of Outer Space, An Experience in Contemporary Law Making,* re-issue, Leiden 2010, Nijhoff, 46.

12 The UN Resolution 47/67 of 14 December 1992, Principles on the Use of Nuclear Power Sources, bestows legality on the use of nuclear power in peaceful outer space activities, so that no claims can be brought under the heading of nuclear contamination. The principles are available at <www.unoosa.org/pdf/gares/ARES_47_68E.pdf>.

investment and revenue. However, economic loss is generally regarded as being consequential or indirect damage.

Not unsurprisingly, the LIAB makes no specific reference to indirect – as opposed to direct – damage in the context of a (fault-related) collision in outer space. Clarification would be helpful as to whether economic damage 'on earth' resulting indirectly from a collision in orbit might not be positively interpreted in such a way as to allow it to be interpreted as falling within Article II (absolute liability for damage on earth), rather than Article III of the Liability Convention (indirect result of collision based on fault liability).

To date, there is no authority relating to causation and the degree of proximity required to substantiate losses from space collisions. Although analogies are often made to the general tort of law, there has been no authoritative discussion on the scope of foreseeability and remoteness in the context of LIAB at tribunal level.

IV.2 Insurance

The impact of two separate rules of law, one imposing absolute liability for damage on earth and the other for fault related damage caused in orbit, have led to a shift in focus, with commercial parties largely looking to the space insurance market to cover their own risks. This is also partly dictated by national law. As with aviation insurance, the risks are high and the losses can be substantial. In addition, the insurance market is subject to cyclical trends and volatility, meaning that market prices and availability are subject to fluctuation.[13] Fault or negligence in an outer space collision may not be readily proven; should it be possible, indemnity is likely to be claimed by the insurers.

IV.3 Law Applicable to Measure of Damages

If fault is to be the measure, not only of the material loss of property in space, but also of the economic loss on earth (revenue, income etc), then discussion should be encouraged on the method of determining fault and the extent to which there is liability for damage caused. These very questions depend on the law applicable to the damaging event. Clear pronouncements on the application of the law are currently needed.

V Risk Analysis and National Law

In the words of one specialist aerospace insurer, '*The space debris situation has become irreversible. Risks are actually increasing as objects collide and produce fragments*', Not all cases of damage in orbit lead to considerations of fault-related liability,[14] natural factors such as radiation and solar flares belong to the hazards to which space activities are exposed.

13 Piotr Manikowski, M. Weiss, Cyclicality or volatility, Space Policy, August 2012, available online at <www.sciencedirect.com/science/article/pii/S0265964612000689>.

14 The provisions on absolute liability are not a main focus within this paper.

Currently, the risk of a collision in space, or in the language of risk analysis, the probability of damage to the spacecraft, is relatively low for the GEO, the greater part of the identifiable risk attaching to operations in the LEO orbit.[15] This has knock-on effects on mission costs, and not least, licensing requirements under national space law.[16] It also impacts on the form of cross-waivers of liability that are common on space activities and were developed in response to this issue.[17]

V.1 Developments in Market for Cubesats

The increase in deployment and corresponding space density of CubeSats involved in earth observation missions may exacerbate the spacecraft's exposure to risk in LEO.[18]

Nevertheless, the use of microsatellites is an ongoing trend in space missions. This has required issues of lifespan, debris control and measures such as de-orbiting to be considered within the licensing process.

V.2 UK Licensing and Cubesats

The UK government has just completed a public consultation on whether the risk ratio faced by the government and its commercial sector under Article III LIAB may justify an amendment to the current requirement of compulsory on-orbit insurance coverage required under the UK licensing rules, specifically for the CubeSat community.[19]

The UK government's 2011 Impact Assessment (IA) emphasises that the probability of in-orbit collision resulting from outer space activities in LEO remains

15 *See* UK Government Department for Business Innovation and Skills, Impact Assessment of the 'Review of the 'Outer Space Act 1986', 18 January 2011, available at: <www.bis.gov.uk/assets/ukspaceagency/docs/osa/im pact-assessment-reform-of-the-outer-space-act.pdf>.

16 Allianz Global Corporate &Specialty (AGCS), Space Risks: A new generation of challenges, 2012, hereinafter 'White Paper' available at: <www.agcs.allianz.com/insights/white-papers-and-case-studies/space-debris-white-paper>.

17 L.J. Smith, The Principles of Public International law and their Relevance to Space Industry Contracts, in: Smith/Baumann (eds), *Contracting for Space – Contract Practice in the European Space Sector*, Surrey, 2011, 45, Ashgate.

18 L.J.Smith, Legal and regulatory content for small satellites, in: Sandau/Röser/Valenzuela (eds), *Small Satellites for Earth Observation*, 133-138, International Academy of Astronautics, (IAA), 8th International Symposium of the IAA, Small Satellites, 2011, Berlin.

19 UK Department of Business Innovation and Skills, Consultation, 'Reform of the UK Outer Space Act 1986', available at: <www.bis.gov.uk/assets/ukspaceagency/docs/osa/co nsultation-reform-of-the-outer-space-act>. The results of the UK consultation are expected within the next few months. The review may lead to removal of the compulsory in-orbit insurance requirement (third party) for CubeSats.

a serious consideration. The Impact Assessment classifies the collision risk in LEO as conservative at a figure of 7.7*10 -6 per year.[20]
In plain words, this means a rare, but potential occurrence.
Should there be an amendment to the UK legislation following on the consultation, the compulsory insurance requirement for the CubeSat community alone would be lifted. This would relieve the community of smaller satellites from compulsory insurance coverage. However, this may also lead to a lifting of the compulsory third party liability insurance otherwise required, leaving stakeholders to bear their own risk.

V.3 Debris and Fault

The statistics and risk analyses undertaken by NASA and other debris monitoring centres all highlight a significant volume of debris in outer space.[21] Space debris belongs to the category of risks that seriously affect the sustainability of continued space activities.[22] However, the impact of space debris compliance on the determination of fault in terms of the law of liability for space collisions in orbit remains an open issue. No such interpretation has emerged to date.[23] This too has hampered clear rules of the road for imposing the liability mechanism. This aspect is discussed further below in the context of technical and legal rules regarding space activities.

VI Debris Mitigation Guidelines

Discussions about space debris and risk mitigation relate to whether the various international debris mitigation guidelines are now seen to rank among the binding rules of international space law.[24] If answered in the affirmative, their role as binding rules of law could add further legitimacy to the guidelines as measures of standards of care in the law.

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20 UK Impact Assessment, 2011, 12, n. 15, above.

21 NASA *Orbital Debris Quarterly News,* vol.16, Houston, National Aeronautic and Space Administration, 2012, available at <http://orbitaldebris.jsc.nasa.gov/newsletter/pdfs/ODQNv1 6i2.pdf>; *further* European Space Agency, Space Situational Awareness, (SSA), June 2012, <www.esa.int/esaMI/SSA/SEMYTICKP6G_0.html>.

22 *See* various authors' contributions on the subject within I. Marboe, *Soft Law in Outer Space*, 2012; *further,* Report of the Legal Subcommittee on its 50th session, 2011, A/AC/105/990, Nos. 168.169; Annex III, 8; NASA, Orbital Debris Quarterly, n. 10, above; AGCS White Paper, Space Debris 2012, n. 11 above.

23 Report of the Legal Subcommittee on its 50th session, 2011, A/AC/105/990, id.

24 The sources of international law are contained in Art 38 Statute International Court of Justice, a full text of which is available at <www.icj-cij.org/documents/index.php?p1=4&p2=2&p3=0#CHAP TER_II>; G. Lafferanderie, Basic principles Governing the use of Outer Space in a Future Perspective, in: Benkö/ Schrogl, *Space Law, Current Problems and perspectives for Future Regulation*, 2005, 5 at 8-9; Report of the Legal Subcommittee on its 50th session, 2011, A/AC/105/990, n. 17, above.

The view that customary rules of international space law require less time for their development than is otherwise known in international law has been advanced for some time by renounced experts in the field of outer space law.[25] The nature of space activities is such that State practice may develop over a short period of time; further, that the particularities of technical development, especially in outer space, should enable important practices to be recognised as State practice in law.[26]

VI.1 State Practice and Soft Law

Were agreement to be reached on the status of debris-avoidance and mitigation rules as sources of binding legal rules[27], the measure of fault involved in the particular incident could be assessed on a basis not dissimilar to that relied on in product or manufacturer's liability through tools such as compliance with the state of the art. This would help produce a reference level for a definition of fault liability for damage in outer space, providing a sound basis for reference to these codes of conduct.

The Legal Subcommittee has noted that the existing guidelines play a predominant role at the level of licensing space activities,[28] but it has not yet recommended their adoption as rules of law. The topic remains on its agenda.

Should the question of fault in relation to debris mitigation come to be adjudicated, the various international debris guidelines can be taken into account by the experts in determining whether there was any element of fault involved.[29]

VII Conflicts and Applicable Law

It was indicated at the beginning of this paper that, should the private commercial sector bring claims for damages before domestic tribunal rather than opt for the international procedure under LIAB, there may be more than one possible forum.

Each legal system has its own rules ascribing its international and national jurisdiction, alongside its own law (*lex fori*) and the law applicable to the case if it took place beyond the national jurisdiction (*lex loci delicti commissi*). This is the law of the place where the damage took place.

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25 Manfred Lachs, (eds. Masson-Zwaan, Hobe), *The Law of Outer Space, An Experience in Contemporary Law Making,* re-issue, Leiden 2010, Nijhoff *further*, P. Leeson, F. Lyall, *Space Law, a Treatise,* n. 4 above.

26 P. Larson and F. Lyall, in *Sace Law,* id., provide full references on the development of 'instant customary law', n. above, 70-80. Customary international law is a source of law under Article 38(1)(b) Statute of the International Court of Justice, *see* n. 14, above.

27 P. Larson, F. Lyall, *Space Law,* id.; J.-F. Mayence in: I. Marboe, *Soft Law in Outer Space*, 2012, n. 14, above.

28 UNCOPUOS Legal Subcommittee, 50th session 2011, A/AC/105/990, n. 17, above.

29 L.J. Smith, A. Kerrest, Art. III, Convention on International Liability for Damage from Space Objects, 1972, (LIAB) in: *Cologne Commentary on Space Law*, CoCoSL, vol II, 2012, Cologne, *forthcoming*.

The court has a choice as to which law is to be applied to the substantive merits of the claim. Private international law recognises two potentially different schools of thought relating to the breach – here – of an obligation in tort.
Traditionally, the applicable law in tort cases has been that of the place where the damage took place (*lex loci delicti commissi*). There is an alternative, well-known in transnational cross-border claims in the form of the place where the damage originally occurred, *lex loci damni*.
The final decision belongs to the court seised; it will rely on its own rules as to whether one or other law is to be applied. The result is that a foreign court can apply the substantive rules of another State through *renvoi*, the technique of referring back to the law of the State where the damage took place.
Some thought will be required on this matter before further cases of debris-related or satellite collisions take place. The concept of law applicable in outer space is moot, at least according to the international law of outer space. Ultimately, it is for the competent national court in question – and any arbitral tribunal called upon - to determine the question of applicable law and the applicability of the international treaties.

VIII. Challenges for Outer Space Law

The foregoing indicates that it the time has come to give some consideration the development of the law in the sense of Judge Manfred Lachs. Issues of liability are compounded by the increase in the volume of commercial spacecraft across all space-faring jurisdictions, large or small; the different levels of treaty ratification and compliance under both the LIAB and Convention on the Registration of Space Objects (REG) add to the complexities of how to address dispute resolution.

IX Easement through National Law

National space law can ease this impasse between fault liability, technical requirements as to debris mitigation, with rules of national space law relating to the commercial space sector. Firstly, the national government can impose compliance with the debris mitigation rules as a legal obligation within the licensing process: this has been achieved for Europe for the very first time under the French Law on Space Operations. Secondly, it can oversee that failure to comply is seen as fault. Finally, governments should include a conflict of law provision enabling national law to be applied in a conflicts case to those covered by the national statute.
This ensures that the national and other stakeholders intended to fall within the scope of the national system regarding insurance, liability and indemnification are covered.
Governments also have the option of imposing stricter rules of liability than those falling within the international provisions, as well as giving legitimacy

to the contractual flow-downs of inter-party liability waivers towards those injured as a consequence of space operations.[30]

IX.1 Third Party Liability

The important question of third party liability (TPL) resulting from space collisions remains unsettled. In the absence of a specific convention or international regime for this, issues of third party liability are otherwise going to be solved in accordance to the law applicable to the incident itself. This may fall under compulsory TPL insurance requirements at national level.

The French national space law, *Loi sur les Opérations Spatiales,* LOS, ensures generous limitations of liability towards the commercial sector and more specifically, cross waivers of liability amongst the industry, are given statutory legitimacy. This system works well, but only where there is a compulsory coverage for third party damage backed by a state guarantee.

This explains the continuing interest in developing a new third party liability convention to cover liability for victims of GNSS operations. While solutions are available under aviation law, the situation under space law is currently unsuited tenable.

X Options for Dispute Settlement Court of Arbitration (PCA) Optional Rules for Arbitration

There have been recent developments in fields related to dispute resolution over space activities that offer an alternative to the dispute settlement mechanisms provided by the LIAB.

This is to be found in a new set of arbitration rules governing outer space activities.[31] Where an arbitral tribunal is constituted under the PCA rules, the subject of liability for damage resulting from outer space activities can be held to fall within its jurisdiction. Article 23 of the Rules relating to jurisdiction of the arbitral tribunal allows the arbitration panel to rule on its own jurisdiction.

The PCA optional rules enable the development of an expert forum for future disputes from outer space that is appropriately equipped to deal with disputes between the space community stakeholders of States, their space agencies, intergovernmental organisations, and commercial enterprises.

30 See below, p. 11., Article 19, French Law on Space Operations 2008.

31 Permanent Court of Arbitration (PCA), *Optional Rules for Arbitration of Disputes Relating to Outer Space Activities*, effective as of December 6, 2011, *see further* S. Hobe, *Zeitschrift für Luft-und Weltraumrecht*, ZLW, 61 1/ 2012, 4. The Optional rules appear as an Annex to the foregoing article, at pp 6-25.

XI Conclusion

In the current state of space activities, with far reaching technical regulations and standards of compliance on incumbent operators, fault is unlikely to be easily established. In addition, the fault liability rule is unlikely to lead to a workable solution for compensation, leaving predominantly insurance solutions to cover risks.

Currently, on-orbit insurance does not cover specific debris-related issues; 'all risks' over is common, and some specific space-debris cover may be obtained through existing aviation insurance policy extensions. Indemnification of a government for fault-related TPL can only arise on proof of fault, leaving insurance to meet the loss according to the insurance cover.

In the absence of international bilateral agreements between launching states, particularly those undertaking foreign commercial launches on behalf of appropriate States in the sense of Article VI OST, the issue of third party liability resulting from in-orbit collisions is likely to open up a whole spectrum of questions that relate less to TPL than to the individual relationship between governments, their commercial sector, national space law and the organisation of commercial launches from foreign launching states.

Until such time as this complex is clarified, the issue of private international law and the law applicable to the damage in question may produce some useful and even surprising results.

It is therefore worthwhile recalling that the LIAB set out to deliver a foolproof system of compensation for damage arising out of hazardous activities in outer space. These objectives should be upheld and the law enabled to move forward to provide workable and equitable solutions.

As Judge Manfred Lachs described in his work on space law, international negotiation is subject to particular pressures that may lead to improvisation and even errors.[32] Since the space community is aware of the urgency and difficulties of Article III LIAB in practice, it could serve the community well if the debris guidelines were accepted at least within the national space law. Acceptance as state practice would also be preferable, even if this debate has not yet finally matured. Although substituting fault liability by absolute liability is an attractive solution, the follow-on costs for all insurance is likely to become an argument against this.

It is high time to allow a change of paradigm, minor though it appears to be, before fault liability forestalls the operations of the Liability Convention in practice.

This can be achieved more efficiently at domestic level. An authoritative and respected panel forum of qualified adjudicators may also resort to the application of the private international law of tort(s), and thereby level out the current imbalance between Articles II and III LIAB. This would correspond with Judge Manfred Lach's view as to the content of space law *de lege ferenda*.

32 Manfred Lachs, n. 5, above, 130.

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