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INSURERS: SPACE MARKET LEADERS AND REGULATORS

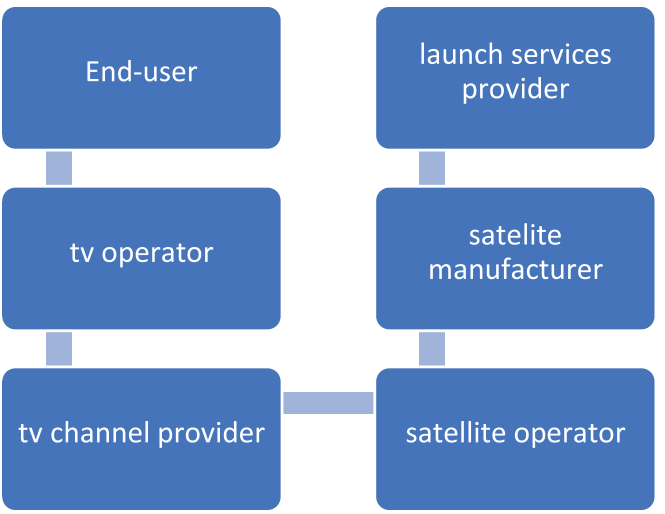
Abstract: For the general public, including the general insurance market, space insurance appears as a unicorn whose existence is sometimes doubted. Questions as fundamental as the insurability of these risks and, on the other hand, their relevance to the space sector are asked. A closer look at the issue, however, allows one to pose the thesis that insurance, and thus insurers, are indispensable participants in the space ecosystem and not only stimulate the development of this industry but are also one of its fundamental players. Not only do they cover space risks, but above all, they set quality and safety standards, influencing the way risks are managed holistically. Insurance has accompanied the space industry since its inception. There is no doubt that the insurance industry has an important role to play in risk management processes, as it is the one that initially developed risk management concepts and tools that have subsequently been applied to all industries. We are now seeing an increasing diversification of space activities, which naturally brings an increasing variety of risks and, consequently, the need for more sophisticated coverage. This poses new challenges not only for entrepreneurs but also for insurers. This applies, for example, to the assessment of risk in new types of ventures, including the growing population of small satellites - launched in the form of mega-constellations[1] - as well as the emerging concepts of orbital servicing and space mining. Even if some of these ventures are embryonic, they require a comprehensive approach to risk management from the outset. Insurance can help answer questions about risk measurement and management.

Keywords: role of insurers, insurance and the sustainability of the space sector, space insurance market

[1] Mega constellations (a network of thousands of satellites), such as SpaceX's Starling constellation of over 1,600 satellites or OneWeb's constellation of more than 250 satellites, continue to grow, with well over 3,000 satellites from SpaceX and OneWeb alone set to be launched in the next year. https://www.insuranceinsider.com/article/29jp3tx39uko1vxsocv0g/space-insurance-rates-set-to-stabilise-in-2022-as-losses-fall-gallagher; (28.10.2022).

1. THE ROLE OF INSURERS IN THE SPACE ECOSYSTEM

At the outset, it is essential to show the context of space insurance. This can be illustrated by such a basic application of satellite technology as communications, including satellite television. In doing so, the value chain of the space sector, including insurance, can be illustrated. From the point of view of the end user (consumer), there is one collective contract for the provision of satellite television services. The provider of such television (e.g. Polsat) contracts with various television stations (BBC, RTL, etc.), which in turn lease capacity on a satellite from a satellite operator such as SES or Eutelsat (or have their satellite, e.g. the operator Iridium). The satellite operator purchases the satellites from a satellite manufacturer such as Airbus or Boeing, and when the satellite needs to be launched, procures the launch service from a service provider such as Ariane or SpaceX.



The value chain analysis above shows us the potential insurance interest in various actors, most notably the satellite operator. Depending on the contractual relationship between the parties, the possibility of loss may also arise for other actors involved in the space ecosystem. Thus, for example, satellite manufacturing contracts may be based on an incentive scheme, meaning that the satellite manufacturer will only earn the remuneration under the contract if the satellite is launched correctly and operates as intended. In such cases, the satellite manufacturer is interested in insuring a possible loss of benefits (remuneration) in case of anomalies in the operation of such a satellite. Similarly, launch providers sometimes offer re-launch to the operator under the same contract in the event of a failed launch operation, implying an insurance interest in the

potential costs of such re-launch. In such cases, the launch provider may have an interest in a Launch Replacement Guarantee (LRG) contract, which will cover the cost of a re-launch in the event of a launcher failure. The practice of space insurers shows the greatest need for insurance coverage for satellite assets in the event of physical loss or damage. Satellite operators rarely seek coverage for loss of revenue.

Data on the number of active satellites illustrate the size of the space insurance market. However, this data needs to be supplemented by figures showing the size of the global space industry. In 2020, the industry generated revenue of US$371.3 billion. These figures show that this industry includes satellite services ($117.8bn), satellite ground equipment ($135.3bn), satellite manufacturing ($12.2bn), launch services ($5.3bn) and the non-satellite industry (including NASA, ESA and military space funds), which contribute with another $100.7bn. Space insurance accounts for a tiny fraction of this amount at around US$550m in premiums in 2021. Most of the policyholders fall into the satellite services category, including satellite operators that provide satellite television, remote sensing and other satellite services. Space insurers are also trying to follow the market trends and thus are developing bespoke insurance for products in the NewSpace sector. This brings hope as regards insuring not just the launch phase but also in-orbit, something that could change over the next year as the sector grows. With the space sector continuing to expand, there is increased competition between insurers for attractive risk, meaning that the space industry is becoming a buyers' market[2].

In order to understand the satellite market and its insurance needs, it should be noted that approximately half of all active satellites are used for commercial communications services, including the delivery of satellite television, satellite phone calls, and broadband services via satellite and satellite radio, for example. The next most significant section is remote sensing - satellites used to photograph the Earth's surface for civil engineering, land use, pollution monitoring, and agricultural purposes, as well as to obtain images of activities. Other uses of satellites are also shown, although most of the satellites insured are communications or remote sensing satellites.

Although about 3,300 active satellites are in space, only about 10 per cent are insured. These are primarily large individual commercial satellites. This number does not include scientific and military satellites, which, as government projects, are not insured but are self-insured by the state. Others, sending to low earth orbit mega-constellations of communication satellites, which comprise about two-thirds of the total number of satellites in orbit, rely on having spare satellites in orbit in case of a problem rather than insurance as a risk

[2] https://www.insuranceinsider.com/article/29jp3tx39uko1vxsocv0g/space-insurance-rates-set-to-stabilise-in-2022-as-losses-fall-gallagher;

transfer mechanism. Most insured satellites (about 250 out of 300 insured satellites) are communications satellites, most of which are in geostationary orbit, providing satellite television, broadband, data services, etc. Geostationary communications satellites typically operate for 15 years and range in size from approximately 2,000 kg to 6,000 kg in mass. Insurance values range from approximately USD 100 million to USD 550 million. Similar quality of service can be provided by satellites operating in mega constellations, i.e. operating simultaneously in numbers of several hundred or several thousand, e.g. the current number of SpaceX Starlink satellites is over 2,000. Satellites produced and released in series replace insurance mechanisms for operators. Because they can rely on the interchangeable operation of these satellites in the event of an anomaly. However, this kind of risk management leads to a congestion of orbits, contrary to the principles of sustainable development.

Often, insurance is part of the whole project or just a part of it. For example, in the case of deliveries to the International Space Station, some cargo may be insured, as may the risks of loss of pay for the launch services operator. Risks associated with transporting crew to the ISS are also covered by insurance.

2. INSURANCE AND THE SUSTAINABILITY OF THE SPACE SECTOR

As in other industries, the sustainability of the space sector requires a collective effort from the various stakeholders in the space ecosystem. Insurers are heavily involved in initiatives that will improve the space environment while reducing the risk of space exploration. Closely related sustainability initiatives include active space debris removal (ADR) and on-orbit servicing. The intensive progress of work in this area is related to both technology development and is necessitated by the deteriorating state of the space environment.

Space debris is currently one of the most severe problems of space exploration. The number of objects in certain orbits is proliferating (especially in low Earth orbit). There are fears that we may be approaching Kessler syndrome, in which there is such a crowd in orbit that the collision of two objects will cause a cascade of other collisions. Some insurers have publicly stated that they will no longer insure satellites in low Earth orbit. This is not the case for all insurers, but insurers are paying close attention to the low Earth orbit environment. They are talking to regulators to ensure that regulations ensure that satellite operators take care of the space environment. Mass production of space junk, rapid shrinkage of orbital slots, and changes in space business models require an increasingly agile approach. However, all these issues are not just of interest to satellite operators. Equally involved are regulators, policymakers, and stakeholders such as insurers. Thus, active space debris removal projects are taking

place with the support of space insurers. Examples include companies such as Astroscale or Clearspace, which are trying to create a new commercial business based on active debris removal and have partnered with insurers. Their services will help to reduce the risk of on-orbit collisions in the future.

The second concept contributing to sustainable development is the in-orbit service, which has been around the space industry for a long time. Although the first attempts were quite successful, they took place 20 years ago and, commercially, were followed by a long period of stagnation. Nowadays, FGD is becoming one of the tools for achieving the goals of sustainable space development promoted at a global level. This is also the case for on-orbit servicing. The result could be an exciting feedback loop in which FGD services and the insurance market give each other a synergistic surge of new opportunities. IOS is an emerging concept commercially, greeted with much hope and enthusiasm from both the space industry and space-access countries. The potential of this idea is enormous, as it can solve at least some of the many thorny issues, one of the most important of which is space debris. This undoubtedly requires, first and foremost, reliable technology, but the management and legal aspects should also be treated with great care. Recently, we have started to see satellite servicing become a reality with MEV-1 and MEV-2 satellites docking with Intelsat 901 and Intelsat 10–02, respectively, to continue the life of these satellites even though they are running out of fuel.

When discussing the insurance of IOS, it cannot be considered in isolation from the whole risk management process but must form an inherent part of it. Two sides of the same coin would have to be analysed: (1) whether IOS can help insure satellites mitigate the risk, and (2) insuring the IOS missions. There are several issues to be considered in this respect, such as whether IOS has the potential to help avoid or reduce insurance claims, who will benefit from it, who should pay for it, who has the authority to approve a service mission, and finally, whether insurers underwrite differently a satellite that has a reduced redundancy of components, but is cooperative with on-orbit servicing. Even a shallow analysis of them may lead to the conviction that IOS has a potential for "game-changing innovation", as most of the payments made by the insurers during the in-orbit stage are due to component failures, deployment issues or expired resources (fuel, solar array/battery failure).

Although the risk assessment perspective of IOS missions looks pretty complex and certainly in the first period, it may even increase the need for an individual approach to space insurance underwriting, which, as a rule, is tailored risk coverage. However, in the long term, we can expect positive results from the involvement of space insurers in such undertakings, if only by lowering the exposure for property and revenue losses. The interaction between insurers and the IOS industry can be seen in several contexts. Depending on the technological and legal outcomes, a new type of risk may emerge, such as second-party

risks (contractual liability) and changes in the third-party liability paradigm into risk-based liability. The IOS may also affect certain specific features of a space insurance contract, putting the insurer more in control of risk exposure. At a minimum, there would be the possibility of the IOS vehicle inspecting the satellite, which may impact loss adjustment. It will be easier to assess whether the malfunction is permanent or can be remedied. The other insurance consequence is the possibility of introducing new criteria for the type of loss assessment, which lowers the risk of a total loss or TCL in terms of PD and BI - given the emerging possibility of restoring the service of the satellite by IOS spacecraft. No doubt, however, new risks will emerge related to the possibility of the servicing spacecraft damaging the target satellite. This will implicate assessing PD's (underwriting) exposure and liability. In the latter case, this must also be addressed in IOS arrangements (e.g., as a knock-for-knock clause).

To sum up, we could say then that insurers have a vital role to play in the context of the sustainable development of space ventures through the involvement of space insurers in IOS aspects of risk management of space ventures such as (1) damage mitigation, (2) risk assessment for the insurer at the in-orbit stage, (3) cause of damage detection in terms of recourse actions being more possible, (4) changing the insurance paradigm from all-risk insurance to named perils insurance, (5) reducing the number of catastrophic losses or TCL, due both to better loss detection as well as possibility of remedying the damage. We must understand that only one solution fits all, especially where different technical methods are emerging (e.g., with or without docking to the satellite). All these contribute to stabilising the volatile space insurance market (with the growing number of risks covered, the law of large numbers would be easier to apply, which would benefit the whole market).

3. SPACE INSURANCE MARKET

To understand the role of insurers in the space industry, it is worth outlining some of the characteristics of space insurance. It represents a combination of responses to the nature of the risks present in space exploration and insurance technology. Thus, these insurances are based on the concept of "all-risk", where we are confronted with only a handful of exclusions (war, insurrection, intentional acts of the named insured, etc.) and with the characteristic features of space and with space-specific events related to anti-satellite weapons. In the last few years, the market has also introduced an exclusion for cyber attacks (malicious acts), although harmless cyber incidents are still covered. The insurance covers permanent physical loss or damage to a satellite previously in good standing.

It should be noted that if a satellite is only temporarily disabled due to, for example, a weather event causing it to fail, no cover is available. Despite the

availability of cover for both material loss and loss of revenue, most operators only cover the assets rather than the revenue generated by the satellite. How the sum insured is calculated is also distinctive, based on the cost of a replacement satellite, a replacement launch service and insurance, with the cost often being the third most expensive item in a satellite project.

Another feature of the space insurance market is the low volume of risk (only around 300 satellites are insured) and the high value of space assets and high risk. This makes it extremely difficult to apply standard insurability rules to space insurance. We must remember that to be insurable, the risk must meet specific criteria. These include the risk being pure (as opposed to speculative), due to a chance, being definite and measurable, not catastrophic, accidental and causing relatively large loss exposure. An important feature is also statistical predictability of the damage based on sufficient statistical sample (called a "law of large numbers")[3]. When we juxtapose these characteristics with the nature of space risks, we can see quite clearly a low number of high-value risks compared to other types of insurance. This is caused by the limited number of launches and satellites and the diverse range of launch vehicles and satellites, which further narrow the possibility of acting on the rules of statistical probability. When we thus compare space risks with, for example, motor insurance, we have to realise the vast difference in insurability prerequisites.

Moving forward, underwriters who cannot apply "the law of large numbers" – the typical method of risk measurement and statistics – are forced to work on an individualistic approach to risk assessment. As a result, while the statistical analysis of a historical database is sufficient for classical risks, space insurers must work based on a "technology-based engineering analysis". Another factor that complicates space underwriting is the limited access to data on space projects that must be insured. This, even though it does not directly influence rates in the space insurance market, further limits the database for developing meaningful statistics[4]. For example, there are differences between two satellites, even from the same manufacturer, which may carry different risks of loss. This means that the risk assessment for space risks is more in-depth than in many other insurance groups. Statistical analysis is more limited, so as mentioned, most insurers have an engineer or consultant on their team. Initial presentations and, annual health reports and claims information can be more detailed than in many other insurance cases. As part of their risk assessment activities, underwriters will also often be invited to visit satellite manufacturers, launch sites and major subsystem suppliers[5].

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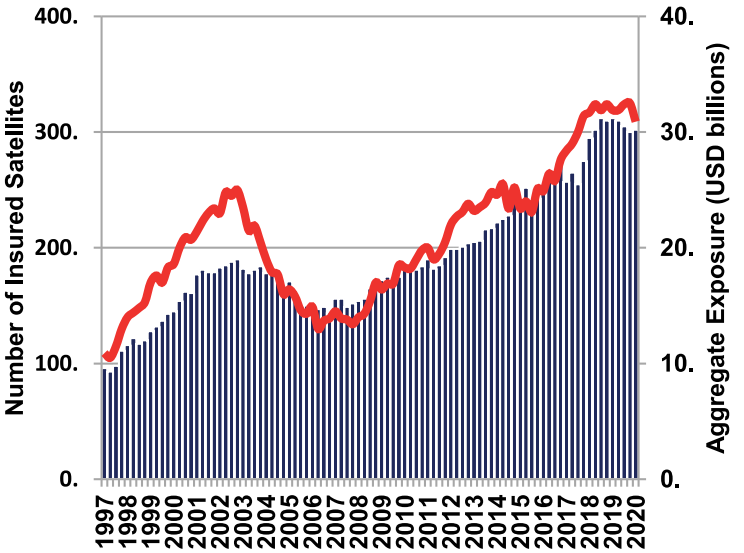
[3] E. J., Vaughan (1997). Fundamentals of Risk and Insurance.

[4] K. Malinowska, Risk assessment in insuring space endeavours (2017).

[5] Export restrictions on certain information can also slow the process of obtaining the data that insurers need. Usually, this information is made available, but sometimes it needs to be reviewed/checked before it is released, which can, for example, slow down the claims process.

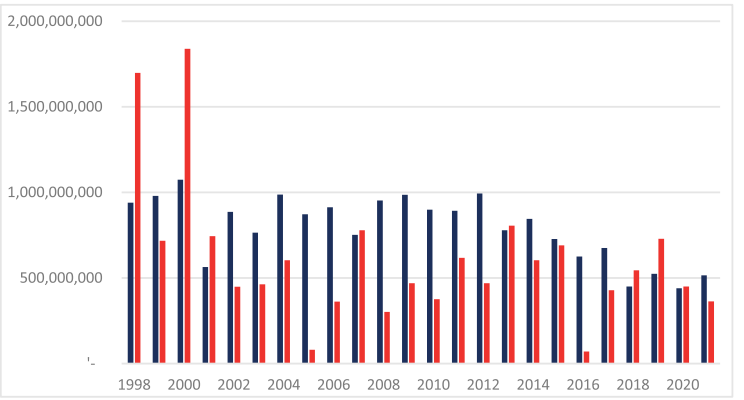
The magnitude of potential claims[6] It impacts other space insurance principles that allow space insurers to sustainably plan for reserves and performance on this line of insurance. One of these is to base insurance on the "short tail" principle, which is that most insurance is written for 12 months. Consequently, too, the book of business has a short tail. Usually, within 12 months of the closing of the financial year, the insurer's financial result on the space insurance line can be ascertained. The loss ratio is also essential. If a carrier vehicle fails, the loss has a double impact on the loss ratio. No claim is made, but the premium will be reduced because the launch vehicle will be grounded for the failure investigation. Sometimes, a vehicle can be grounded for around six months, significantly reducing the premium. The amounts involved in the space market and the high loss potential with a limited number of insured risks also mean that, as a rule, space risks are insured on a syndicated basis. In space insurance, there are many syndicates in which syndicates merge and join a syndicate. Despite the dynamic development of the satellite market in recent years, space insurance needs to develop proportionately, which could affect its price and the insurability of risks and, consequently, the sector's stability. The explosive number of satellites mainly involves mega-constellations, which operate on a self-insurance rather than commercial insurance basis. This means that demand for space insurance is staying the same.



Source: AXA XL

[6] The most significant single loss in the market's history occurred in 2019 (the FalconEye 1 satellite was destroyed due to a Vega launcher failure)—claims of over USD 420 million. The market reacted with a sudden rate surge (100%–200% increase).

Insurance rates in space risks can change significantly even due to one significant loss. Then, a rate increase can be applied immediately for upcoming in-orbit renewals. Usually, however, premium increases are much slower due to the long process of underwriting and risk activation (approx. 18 months). It, therefore, takes several years for premiums to start increasing significantly. Despite higher premiums, we continue to see historically low numbers of satellite launches. It is estimated that the number of insured launches will start to increase sharply in the second half of 2022, so premiums should increase again in 2022[7].



Insurance premiums and claims
Source: AXA XL

When we look at the space insurance market, we can divide the insurance risks into so-called first-party and second-party risks[8]. And finally, the third-party risks. As regards the first party risks, they are typically those risks that are absorbed by the respective parties to the space operation in such a way that each one assumes the risk of the loss of its property and all the consequences resulting therefrom, without the possibility of shifting it to other parties of the space project via the contractual liability clauses or claims in tort, thus limiting substantially the scope of second party risks.

Another subdivision illustrates the phases of development of a space mission, from production, transport, satellite launch operations and then on-orbit operations. Liability insurance is covered separately. According to this criterion, there are four classes of space insurance: Pre-Launch, Launch, In-Orbit and Third Party Liabilities. Liability insurance depends not only on the will of the operator itself but also increasingly on local regulators. An increasing number

[7] See also: https://www.wtwco.com/en-US/Insights/2022/04/insurance-marketplace-realities-2022-spring-update-aerospace; 28.10.2022.

[8] The second-party risks are eliminated mainly by the contractual clauses [the contractual system of risk allocation consists of inter-party liability waivers, accompanied by hold harmless clauses and flow-down provisions] and do not need insurance.

of national space laws impose mandatory liability insurance (and extend the period of mandatory TPL insurance to the in-orbit phase and the de-orbit phase of the satellite).

manu-facturing	transit	Pre-launch	launch	Post-separation	In-orbit	Re-entry

PHASES OF THE SPACE VALUE CHAIN

Pre-launch insurance is the first that insurers have offered for space missions. The first policy of this type was issued as early as 1965, covering the Early-Bird satellite[9]. This is insurance typically issued by cargo insurers and covers the satellite during transport between production/test facilities and delivery from the production facility to the launch site. Once it arrives at the launch site, the insurance coverage will protect the satellite from any hazards while it is being unpacked, tested, refuelled and attached to the launcher. The launcher, with the satellite on top, will then be transported to the platform and ready for launch. The insurance cover continues until the intended ignition (when the command to ignite the launcher's engines is sent). Typical claims under a pre-launch policy may include mishandling of the satellite, trucks passing under too-low bridges, crane damage, etc.

The most substantial risk is during the launch phase, and this diminishes during the subsequent stages. The time of the cover is not equal, as the launch phase lasts no longer than one hour (depending on the type of the launch vehicle and intended orbit); the early in-orbit phase (depending on the type of the satellite) may last several weeks up to several months (in the case of all-electric satellites). The operational stage may exceed 15 years. The specialised space insurers offer combined coverage for typical space risks, i.e. launch, early in-orbit and in-orbit. The reason for structuring combined space insurance products is the difficulty in distinguishing subsequent phases of the space operation, as it can be even more challenging to discover the moment when the covered risk occurred and the moment when the loss manifests itself, depending on the policy wording. Whatever the criteria within these two types of

[9] The first space insurance contract was concluded in 1965 for COMSAT's Early Bird satellite with coverage of pre-launch insurance and third-party liability insurance written by marine insurers. This satellite enabled direct and nearly instantaneous contact between North America and Europe via television, telephone and fax transmissions. The launch and in-orbit risk coverage began in 1968 by insuring an Intelsat fleet of satellites. Reeth van G., Space and Insurance, International Business Law, vol. 12, 1984, p. 127; Pagnanelli B., Tracking Take-off of Space Insurance, 2007; www.pagnanellirs.com/downloads/id281107.pdf accessed 27. August. 2016; Kuskuvelis I.I., The Space Risk and Commercial; Space Insurance, Space Policy, May 1993 – different (stated that it covered also launch insurance).

cover, it is essential to note that launch coverage begins at the moment of intended ignition and covers the satellite as it ascends into orbit on top of the launcher. It does not include the hazards of the ground operations, as these are included in the pre-launch cover[10]. Some launch policies cover Launch Vehicle Flight Only (LVFO), and coverage ceases when the satellite separates from the launcher. However, most launch policies cover the first year of the satellite's life, ending on the first anniversary of the satellite's launch. This coverage not only covers the ascent into orbit but also covers the satellite. At the same time, it unfurls its antennas and solar arrays, fires its rocket engines to put it into proper orbit, goes through a series of on-orbit tests to ensure it survives the launch intact, and then the remainder of the first year when it enters commercial service. Typical losses in this phase of insurance can result from a launch vehicle failure, failure to deploy a solar cell or antenna, leaving the satellite in too low an orbit and having to spend more fuel to get into the correct orbit, etc. Insurance for the subsequent phases of a satellite's life depends on its condition. Based on a risk assessment, including any anomalies identified, insurers can offer terms for the next year of coverage, usually one year. This process will be repeated annually for the satellite's life, typically 15 years for a geostationary communications satellite. Losses during these life stages can result from component wear and tear, short-circuiting of electrical components, effects of space weather, space debris, etc.

United Nations treaties regulate certain aspects of space activities. In particular, the Convention on International Liability for Damage Caused by Space Objects provides that the launching state is liable for damage caused by space objects for which it has granted a licence. If damage is caused to property on the ground or aircraft in flight, liability is absolute, and fault does not need to be proven. Regarding space-related liability insurance, including, in particular, liability for damage caused by a space object, it should be noted that the obligation to insure does not result from international law, where the treaties are silent about insurance and are limited only to the rules of liability imposed on the launching states. Only the UN resolutions include suggestions on regulating compulsory third-party liability insurance in the national space laws. Thus, the obligation to insure is present in the domestic space laws enacted by spacefaring states, and one of its aims is to secure the international liability of the state for space activity conducted by national entities. In several states, the insurance obligation has yet to be reflected explicitly in the law but constitutes a condition to obtain a licence to conduct space activities. Most launching states require the purchase of TPL policies for the launch phase and certain re-entry events (such as the deorbit of the Mir space station). For on-orbit damage, the fault

[10] Schöffski O., Wegener A.G., Risk Management and Insurance Solutions for Space and Satellites Projects, 24 The Geneva Papers on Risk and Insurance, 1999, p. 205.

must be proven. Most countries that have adopted national space legislation, as mentioned above (e.g. France, USA, UK), require the purchase of a TPL policy for all licensed activities, even when the satellite is in orbit. Other countries do not require the purchase of a TPL policy for licensed on-orbit activities. However, many commercial operators continue to purchase TPL policies as a safeguard against loss of security and to cover legal costs if something happens and a third party tries to make a claim.

The most significant risks noted from the space sector's experience result from various factors. Examples include Space Weather, due to the current cycle of solar activity, when there is the possibility of radiation damage or charging of satellites, which can cause satellite failure. Other risks already identified include Foreign Object Debris (FOD) due to the vulnerability of sensitive satellite equipment should a piece of FOD remain inside the satellite[11]. A large part of the risks, however, is due to technical errors caused during the manufacturing or testing phase of the satellite, including those caused by the inexperience of technicians. This includes not only the incorrect assembly of components but also, for example, the use of prohibited materials, such as tin-plated components. One of these is tin. In the late 1990s, we witnessed many complaints of tin-coated components slipping through the net. In the case of tin, thin fibres ("tin whiskers") can grow when used in space. If these grow in the wrong direction, they can cause short circuits. The industry paid many claims on this issue in the late 1990s/early 2000s. Generic defects, where the same problem affects many satellites, are one of our biggest concerns. A separate problem is defects caused by insufficient testing of a particular solution, which can and has in the past led to generic defects in a whole series of satellites (the famous Boeing -702 satellite damage is an example)[12].

4. CONCLUSIONS

The authors have tried to show how tricky this market is in many places in this paper. The difficulties can be seen in many contexts: technical, where we are dealing with rapidly-evolving technologies, small satellites, new launch vehicles, constellations, custom-built satellites, generic anomalies, space environment, technical insurance (actuarial) resulting from low frequency and high se-

[11] One of the most extensive damages caused by FOD was around $250 million. It was caused by a small piece of Velcro that was trapped in a sensitive part of the satellite's payload, and the substances in it caused plasma formation and damage.

[12] There were anomalies related to a novel solar array arrangement that used mirrors on the edges of the solar arrays to reflect more light onto the solar cells to generate additional power. Although this solution worked well in theory, insufficient testing meant that the additional consequences of using these mirrors were only recognised after the first six satellites were launched. Compensation was eventually paid for all six satellites.

verity a resulting in volatility of the market, and market factors, such as short tail, high cash flow, uncorrelated risks, low cost of entry, soft insurance market[13]. Despite everything, insurance constitutes an inherent part of the whole system developed by the space industry, aimed at handling the risks that cannot be avoided and can barely be mitigated. Insuring the hardly insurable space risks is possible only due to the exceptional knowledge of space insurers forced to use an individual approach to assess space risks without sufficient statistics to act as the law of "large numbers". It is the best example of how in-depth knowledge and obeying the basic principles of insurance may overcome obstacles and make feasible even the most improbable and risky endeavours. Space risks are inherently related to the rules of the space industry, and the impact of such a relation is on the features of space insurance.

Moreover, insurers play a vital role in gradually changing the standards of behaviour in this precarious sector. They participate in setting these standards and stimulate their maintenance. In this way, they take on the role of "soft" regulators. In turn, they increase the chances of their development by taking an active role in financing and insuring new types of space activities, such as ADR and IOS. The conclusion that "space insurance is a critical enabler of innovation and investment" in the space sector could not be more accurate.

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