

NewSpace **How to manage** **a new frontier of risk**



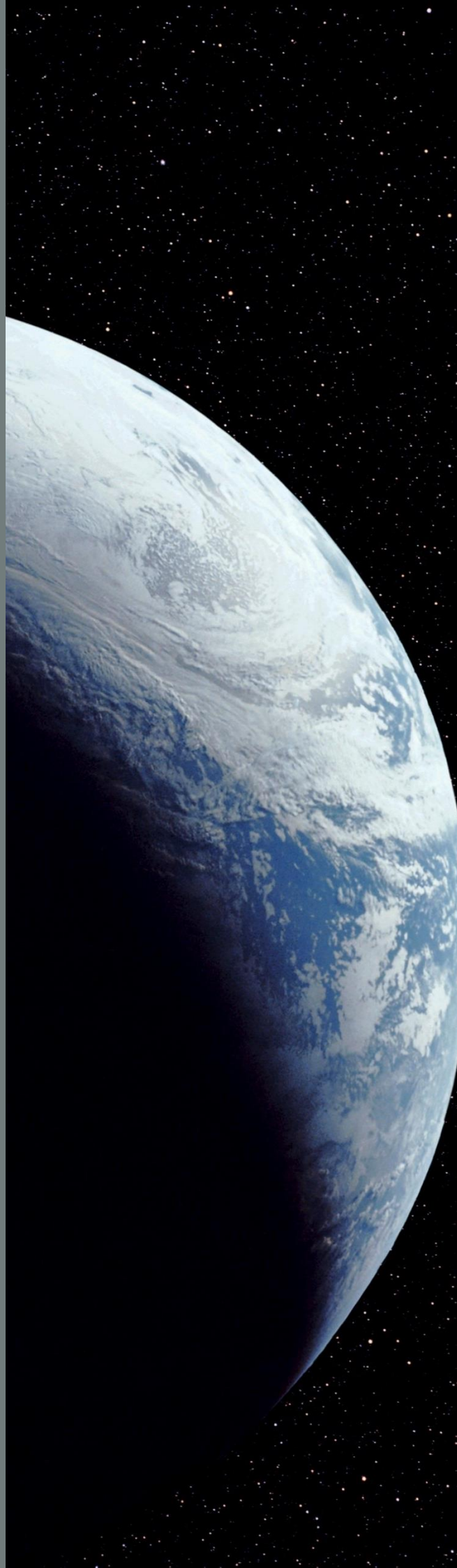
Space is changing

Changes in upstream space activities mean that space technology is going to play an increasing role in people's lives.

'NewSpace' brings with it new challenges and opportunities, both for those familiar with the traditional space sector and those in new sectors that are entering the market.

While the concept of smaller spacecraft in lower orbits is not new, the size and scale of new developments presents opportunities for risk managers and insurers in a variety of sectors. Changes are being driven by four trends:

- The democratisation of space: new technologies are lowering barriers to entry into what has long been the domain of governments
- The increasing use of satellite 'constellations', supported by numerous and varied launch options
- The development of space as a resource: this includes space tourism and in-space manufacturing
- Innovative mission concepts, such as in-orbit servicing



Lloyd's: your trusted space partner



Space insurance at Lloyd's

As companies and governments develop increasingly ambitious plans for space, understanding the risks involved has never been more important.

This is particularly important for space insurance, which can experience high losses and volatility, and requires highly technical underwriting.

Insurers, including the Lloyd's market, can play an important role helping their customers understand and manage their risks and exposures and risks.

This is very useful in capital-intensive sectors such as space, as banks and other financial institutions often insist companies have insurance in place before they lend them money.

Depending on what stage your project is at, it may be too early to buy insurance, but knowing it is available when the time comes will give your investors confidence.

Lloyd's offers tailor-made space insurance solutions that deliver a wide range of benefits including:

- Decades-long insurance cover
- Tailored solutions and coverage for complex and innovative projects
- Cover that includes claims pay-outs after an event, on-the-ground support and services to help businesses deal with operational, financial and reputational impacts

Lloyd's customers include:

- Launch solutions aggregators and operators
- Launch vehicle providers and manufactures
- Satellite transponder users
- Spacecraft and space systems manufacturers
- Earth-observation satellites for both commercial and military organisations
- Telecommunication and broadcasting companies
- Space agencies
- New space entrepreneurs and investors
- Satellite manufacturers, operators and owners
- Universities and not-for profit organisations

Every business must understand the risks and exposures they face, and decide which can be managed.

In the space sector it is complementary to mission assurance, and can provide peace of mind in case something goes wrong.

If you haven't considered the following questions, a conversation with Lloyd's could provide the answers and help you design the right insurance solutions for your needs.

- What would be the impact of a total loss on your current assets and revenue? Could this impact the viability of your business in the future? What would this scenario look like and how would you respond?
- Do you know the rating factor and predicted failure rate of the launch vehicle you are using?
- When does responsibility pass from the manufacturer to you? If you're using a launch service, who is responsible for what and when?
- What are the critical points of failure that could bring your business to a halt? Who are your key suppliers, and what is your backup plan if they fail to deliver?
- What are the risks that could threaten health and safety? Are you in your own building or renting space? Who is responsible if something goes wrong? Who do you need to talk to improve health and safety?
- If a member of staff or visitor uploads a picture to social media during critical testing, how could this affect your brand, and damage your reputation and people's trust in you? How are investors likely to respond and do you have a plan to manage the fallout?

Lloyd's products and services



What sets Lloyd's apart?

Lloyd's is the global centre for space insurance. Lloyd's pioneered satellite policies, and our expert underwriters continue to push the frontiers in this evolving sector, ensuring we are always at the cutting edge of risk mitigation.

Unmatched choice

40+ syndicates offer space insurance*

Financial strength

A+ (Strong)
Standard & Poor's

AA- (Very Strong)
Fitch Rating

A (Excellent)
A.M. Best

Designed for you

Every space mission is different, yet our unique market structure means we can meet your specific risk needs. With extensive specialist NewSpace experience, the Lloyd's market can deliver the precise, tailored cover needed to protect your business.

*Estimated 2019 figures

What does the Lloyd's market insure?

Lloyd's insurers offer a range of products and services for all aspects of space projects. These include:

Pre-launch

This provides coverage from the manufacturer, during the transit to the launch site, through testing, fuelling and integration with the rocket launcher.

Launch

Launch insurance can cover: the launch, orbit raising, in-orbit testing, commissioning into service and a +1 option to cover in-orbit operations for the remainder of the year.

The launch is often the riskiest part of any space activity, and while the risk only exists for a relatively short period of time, the damage is often catastrophic. Occasionally, it can have other impacts such as a satellite being placed into an orbit that reduces its operational life or compromises its performance in some other way.

Third-party liability

Third-party liability insurance covers the legal liabilities of the insured to third parties for bodily injury or property damage, when the space object is on the ground, during launch or in orbit. The risk location is the territory in which the insured's business establishment is located. Third-party liability covers the launch and time spent in-orbit.

While space is large, and the relative size of satellites is very small in comparison, collisions can have severe consequences. While there has not yet been an event in space to trigger this type of claim, the implications for the satellite operator at fault could be financially catastrophic. Despite the lack of historical incidents of this nature, risk managers should consider third-party liability as a serious threat to their businesses.

In the UK, for example, the UK Outer Space Act of 1986 requires that a party carrying out certain space activity indemnify the Government against claims arising from that activity. Licencees typically must obtain third-party liability insurance of €60m (UK Space Agency, 2014). Other nations also require indemnity and insurance (United Nations Office for Outer Space Affairs, 2019).

Failure to meet contractual obligations

Consequential financial loss insurance covers the service interruption, loss of profits, revenue or additional expenses that might be incurred if a space object cannot be used following material damage. The risk location is the territory in which the insured's business establishment is located.

Asset physical damage

Material damage insurance covers physical damage to, or loss of, a space object during one of the four stages of its life cycle. Contracts may cover the object during its manufacture, pre-launch, launch and orbit. The insured may be a satellite manufacturer, satellite operator or a provider of launch services.

Most territories treat space objects as 'moveable property' and the risk location is usually determined by the physical location of the object. However, where the moveable property's location is uncertain or variable, the risk location is the territory in which the insured's residence or business is located. Therefore, for regulatory and tax purposes, European Economic Area member states usually consider the risk location for launch and in orbit risks to be the territory in which the insured's business is located. The location of risk for space objects in transit or temporary storage follow the rules respectively for goods in transit or normal storage risks.

Business interruption and loss of revenue

Space incidents can lead to significant loss of revenue and can bring business operations to a halt. This policy provides coverage for lost income resulting from interruption to, or the downtime of, an organisation.

Data breach liabilities from cyber attacks

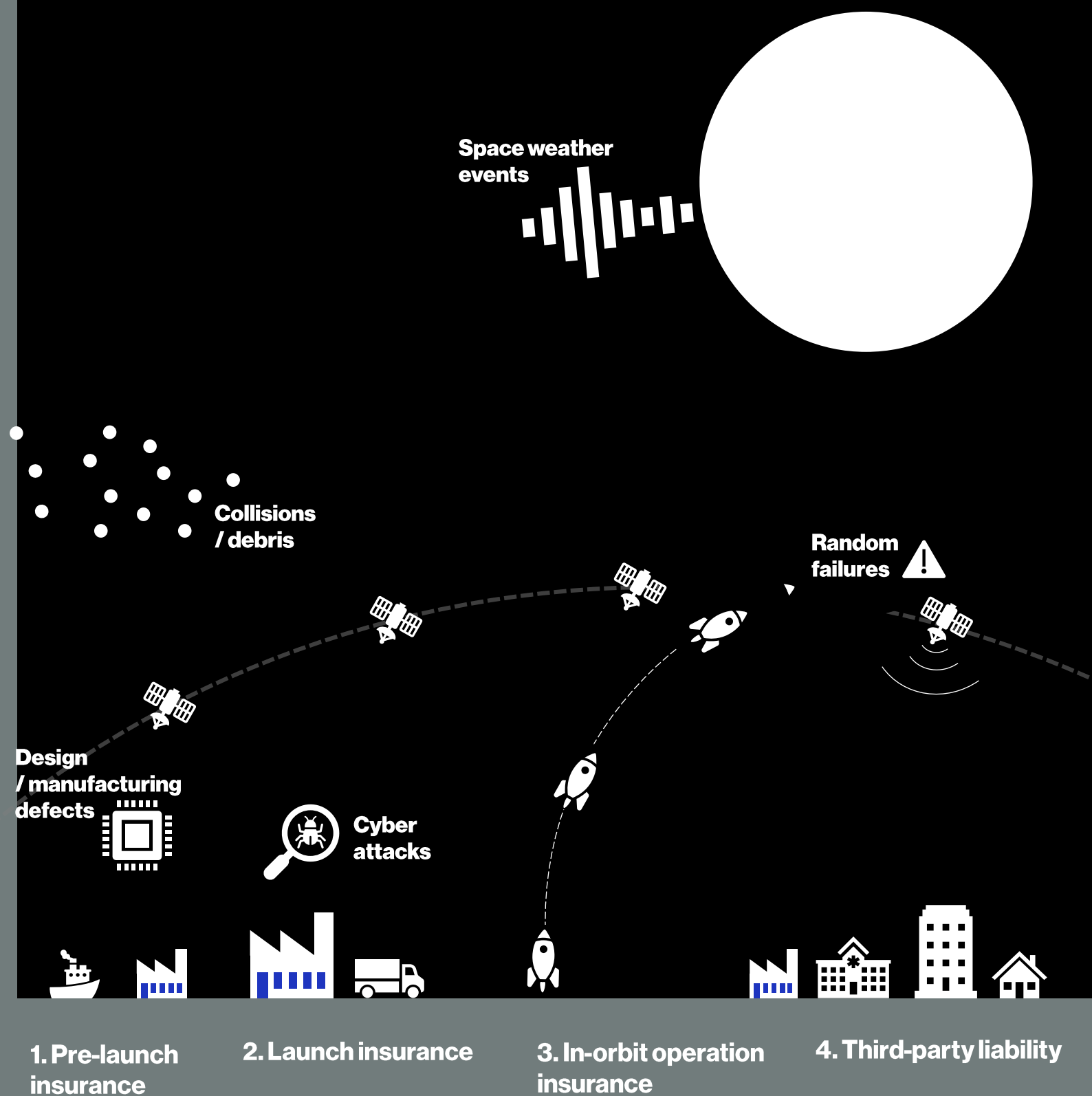
Data breach can have serious implications for an organisation's operations and reputation. A data breach response policy goes beyond a traditional liability insurance policy because it also provides a service that helps business manage the aftermath of a breach including the costs of notifying customers, forensic investigations, legal fees and public relations services.

Satellite contingency

Policies can cover anything from a launch vehicle blowing up during the 'climbing phase', a spacecraft that fails to separate from its launch vehicle, a solar array doesn't deploy, a short-circuit that stops in-orbit operation, or a satellite damaged by space debris.

Underwriters often collaborate with other teams across their business, so if you need additional coverage such as export credit coverage or errors and omissions coverage, ask your Lloyd's broker to look into it for you.

Lloyd's offers insurance cover for satellites over their entire lifespan, from manufacturing and on the launch pad to in-orbit testing and commercial operation.



If you are interested in getting Lloyd's space coverage, this is the type of information underwriters will ask you for:

Satellite projects

When evaluating a satellite project, insurers are particularly interested in the following:

- An overview of your business plan, key personnel, experience, etc
- An overview of your satellite providing a summary of each bus subsystem, levels of redundancy available, a heritage list with details of first flight items and items undergoing qualification or which are on life test and a list of anomalies which might affect any of your flight hardware and what corrective actions are being taken
- Mass, power, propellant and pointing budgets as well as an estimate of payload performance parameters including the margins available
- Details of the intended assembly, integration and environmental test programme
- An overview of production assurance plans and any standards being followed
- The operations of your satellite, both the early operations phase when first reaching orbit and undergoing in-orbit testing, as well as your standard operational procedures once the satellite enters service. Applicable details will include a description of the control facilities, link budgets, the in-orbit testing plan and how you will manage upgrades and anomalies
- The choice of launch vehicle: small, medium heavy or super heavy lift
- The extent of the insurance cover you are seeking and the insurance parameters that are to be measured to and upon which any claims calculations will be based

Loss of revenue

If you are interested in securing insurance for the loss of revenue to your company that would occur if the satellite stopped working, insurers will also be interested in factors such as:

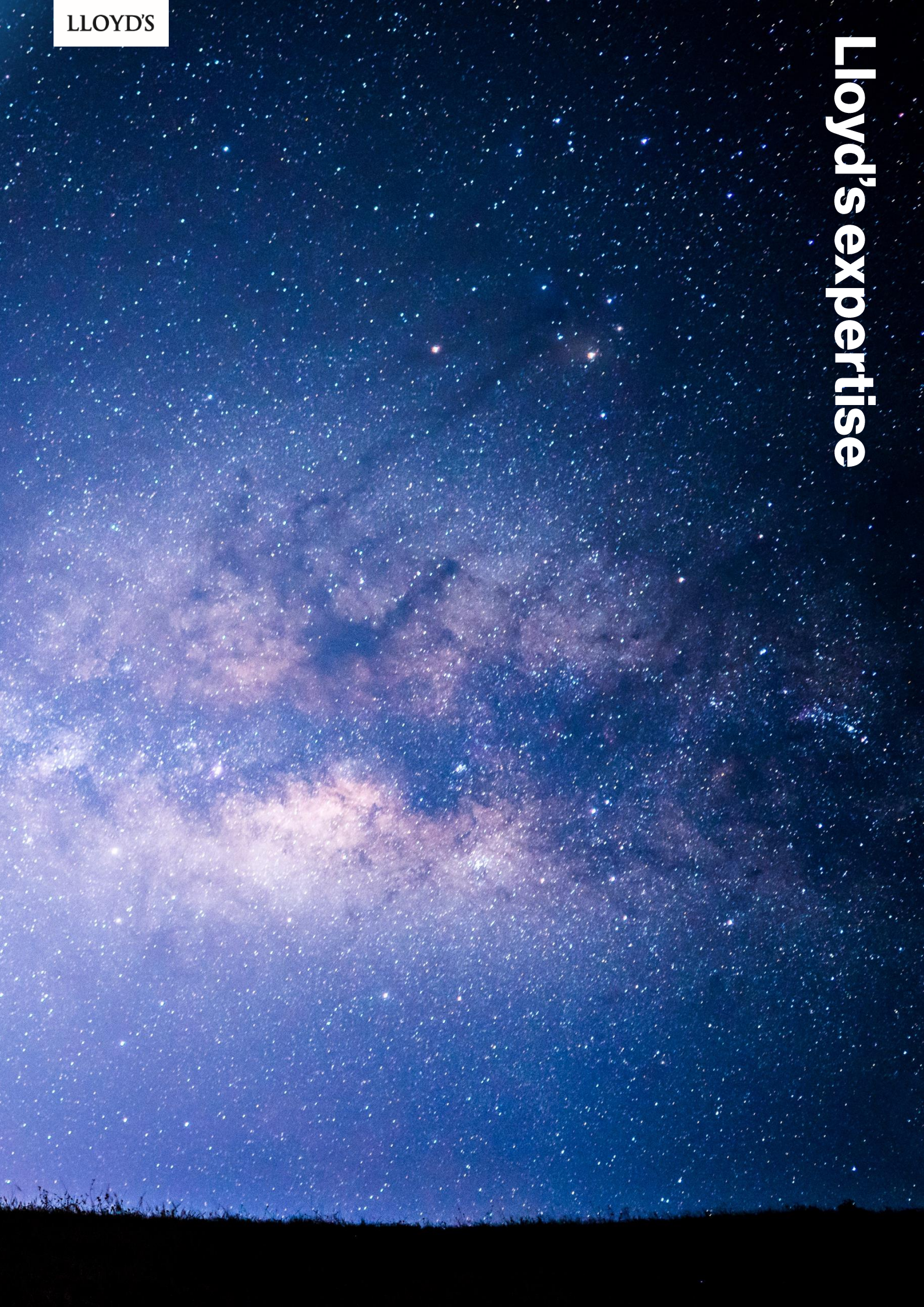
- What is the amount of revenue to be insured and how is the revenue generated (e.g. fixed price contracts, future signed contracts, letters of intent, etc)?
- What are your contractual obligations to your customers?
- Would any extra expenses be incurred - for example, the cost of leasing a ground station under a fixed-term contract, even if the satellite is lost?
- What outgoings can be reduced in the event the satellite is lost (e.g. contractors who may no longer be required)

Pre-launch

When considering the pre-launch phase of a satellite programme, insurers are also interested in factors such as:

- Details of the transport plan, route and the vehicles involved from plant to pad. This should include the quality of vehicle and launch site
- During any storage phases, what are the storage conditions? This should also include transport – i.e. are specific containers being used and what data feeds are available to monitor the condition within the storage? What packaging is being used and is it rated to a standard?
- What are your contractual obligations to your customers and how will programme delays be dealt with, including extra expenses?
- How are risks managed and monitored? (E.g. in the case of fire are dry-pipe sprinklers used?)

Lloyd's expertise



All the reassurance and protection you need in one marketplace

Expertise

The Lloyd's insurance market has well-developed risk scenarios, expert knowledge and decades of experience to help space businesses explore new frontiers.

A number of underwriters in the market are either qualified engineers or use external experts who understand the risks involved. The more complex the risks, the better it is to involve insurers early so they can understand customers' needs and the risks they are facing.

This kind of collaboration, combined with the choice, flexibility and financial security of the Lloyd's market makes it the world's leading insurance platform.

Partnership

Lloyd's builds relationships with its customers to fully understand their businesses and the risks they want to cover. This allows Lloyd's to tailor its products and services as projects evolve, often reducing costs and mitigating risks for both parties. a

Insight

In order to build their knowledge and understanding of risks, insurers often carry out research and technical studies. This information is built into insurance models, actuarial validation and tools such as scenario analysis that help align product design with customer needs.

The increasing digitalisation of industries, including the space sector, means more data is collected and shared – often in real-time – to develop new products such as parametric insurance.

Lloyd's continues to be a pioneer of the insurance industry by responding to the emerging risks that are shaping our future by developing the complex and critical insurance needed to create a braver world.

**The world's first space
satellite insurance was
placed with Lloyd's in 1965,
covering physical damage
to the Intelsat
1 satellite on
pre-launch**

Between 1974 and 1982, Lloyd's underwrote satellites for up to US\$100m each. In 1984, Lloyd's launched a successful salvage mission to reclaim two rogue satellites, sending a shuttle and five astronauts into orbit to retrieve them.

Today, Lloyd's underwriters continue to play a crucial role in supporting satellite launches around the world.

Every year, Lloyd's specialist space underwriters provide satellite owners and users, including national governments, telecommunications firms and research institutes, with protection worth more than US\$7bn.

To find out more and contact a space broker visit
[Lloyds.com/newspace](https://lloyds.com/newspace)



