Buzko Krasnov

NewSpace Startup Legal Guide

A comprehensive legal guide for entrepreneurs in the NewSpace era. The guide is regularly updated. Access the latest version here.

Version 1 (Nov 2023)

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We are releasing this guide at the end of November 2023, a week after the second integrated flight test of SpaceX Starship. Future historians may well consider this period as the dawn of a new era in space exploration. Starship promises to dramatically reduce the costs of reaching orbit, thereby enabling space ventures that were previously impractical due to prohibitive expenses.

The resulting surge in the space industry requires a novel and strategic examination of the laws governing how public and private entities conduct their space operations. The first satellite was launched into orbit in 1957 and led to education and defense initiatives, but not much in terms of a legal framework. This is particularly true with public international law, where sovereign states struggle to reach a consensus on universal rules beyond the foundational space treaties of the 1960s-1980s.

Similar to how the NewSpace economy is driven by private companies, we believe that the next evolution of space law will be developed with the interests of private actors at the forefront. While there is an abundance of material on public international space law, resources tailored specifically for private space companies remain limited. This legal guide aims to fill that gap and serve as a launchpad for aspiring space startup founders.

This edition of the guide contains nine sections. We begin with the fundamentals, such as incorporation, legal considerations in team building, and intellectual property. If you are an experienced entrepreneur interested solely in space industry-specific insights and regulations, you may wish to jump straight to the space licensing and launch regulations. Subsequently, we discuss the public aspects of space business, covering topics like public-private partnerships and public procurement. In the closing sections, we review letters of intent and memoranda of understanding as well as certain aspects of space risk insurance. Finally, at the end of this guide, you can find an up-to-date glossary of space terms and acronyms.

One last note: the community of space entrepreneurs is diverse and international, and this guide is intended to reflect that diversity in terms of applicable laws and jurisdictions. This 1st edition primarily focuses on the legal landscape in the United States and provides for practical knowledge and in-depth insights. Future editions will broaden the scope to include other relevant jurisdictions. You can find the most up-to-date edition on our website: https://www.buzko.legal/practices-eng/space.

Without further ado, let’s dive in or, perhaps more aptly, ascend into the subject at hand.

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About Buzko Krasnov

Buzko Krasnov is a boutique international law firm with a focus on innovative technologies. We provide legal advice to startup founders and investors under U.S. law, as well as across Europe, via our network of partners.

In response to growing client interest, we have recently established a dedicated space law practice, addressing the unique legal challenges within the burgeoning space industry. For more information on space law, please visit this page: https://www.buzko.legal/practices-eng/space.

Alongside our focus on cutting-edge sectors, we also provide traditional legal services such as intellectual property protection, financing transactions, commercial contracts, and dispute resolution. Our firm takes pride in our deep understanding of both the digital and physical worlds – the realm of bits and atoms.

Contents

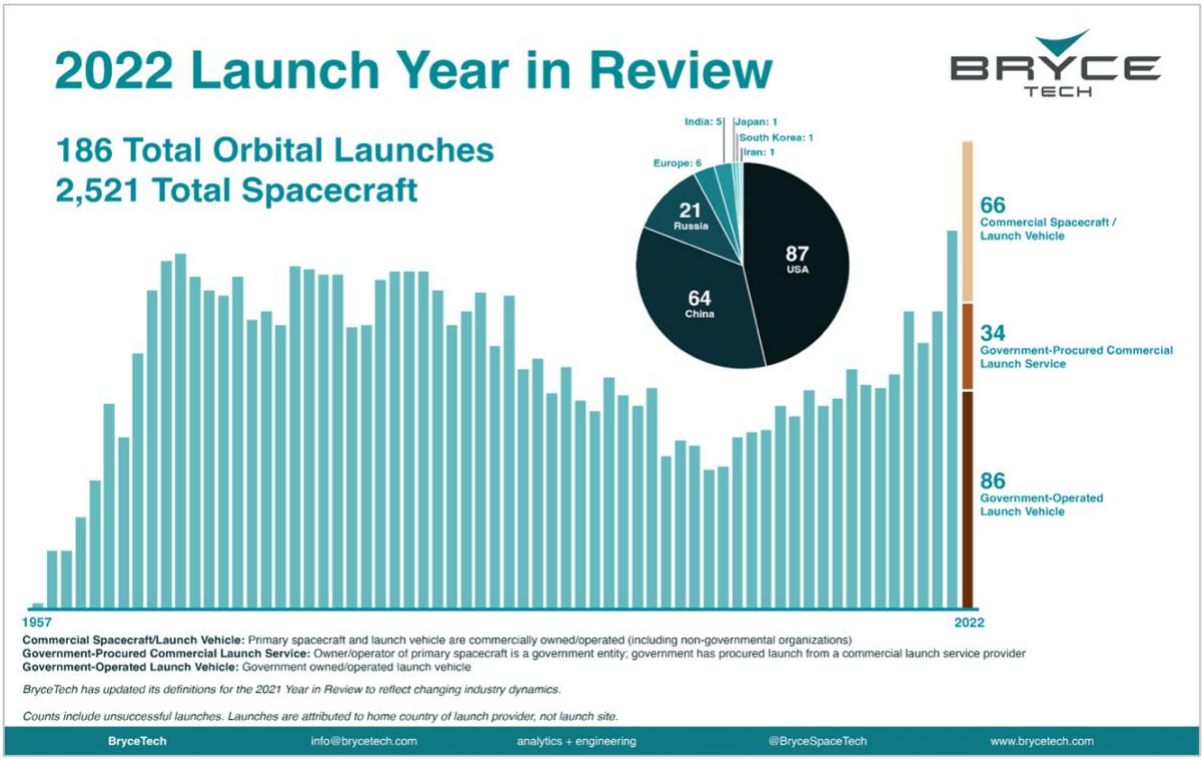
1. Incorporation

The concept of limited liability for company shareholders emerged in the 17th century as a response to the significant risks of sea exploration. Around that time, the Dutch East India Company was formed to lead maritime ventures and carry out trade activities in Asia.[1] Whether venturing across the sea or into outer space, exploration involves risk. Limiting liability for high-risk endeavors is a given for modern-day space missions. Yet, while 17th-century merchants had few options to limit their liability, modern business leaders have a wide array of jurisdictions and entity types to consider.

Despite global opportunities, the U.S. continues to be the preferred jurisdiction for startups, including those in the space sector. This is largely attributed to the progress of the space industry in the U.S. and the ease of access to capital.

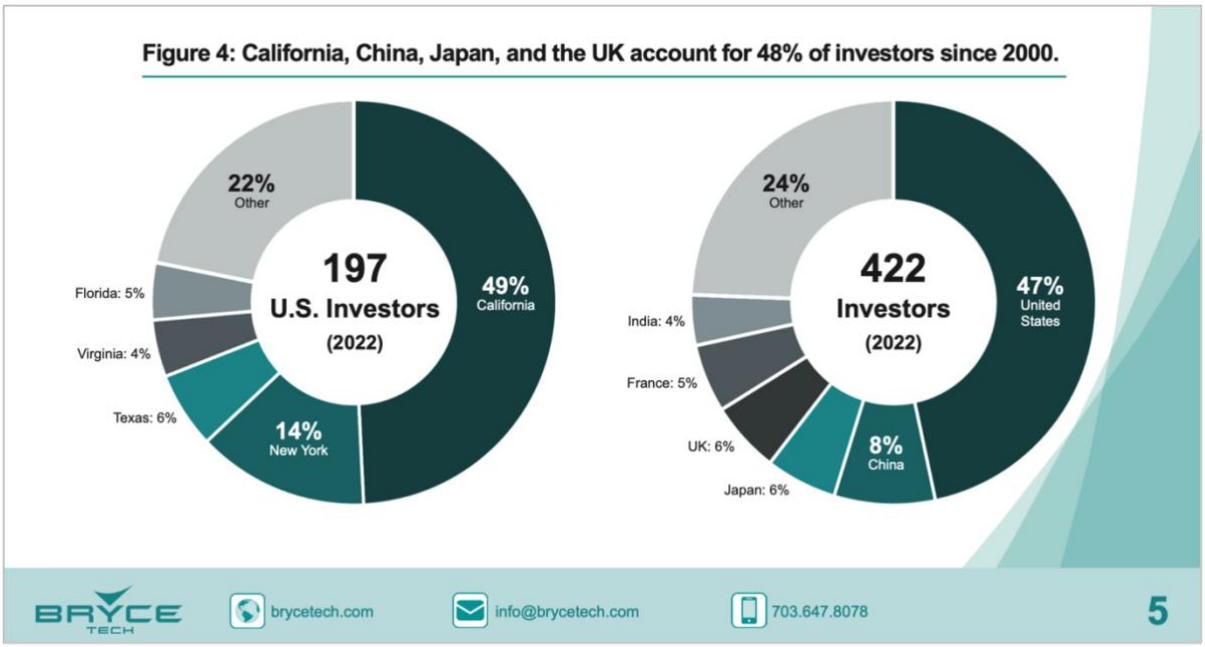
For instance, in 2022, 87 out of 186 orbital launches (approx. 47%) occurred on U.S. soil.[2] Additionally, around half of the 422 active space investors in 2022 were based in the U.S.[3]

Chart 1. BryceTech Report Data



[1] Dari-Mattiacci, G., Gelderblom, O., Jonker, J. and Perotti, E. C. (May 2017). *The Emergence of the Corporate Form*. Journal of Law, Economics and Organization, Vol. 33, No. 2, Pp. 199-213. https://doi.org/10.1093/jleo/ewx002.
[2] BryceTech (Feb. 3, 2023). *2022 Orbital Launches Year in Review*. https://brycetech.com/reports/report-documents/Orbital_Launches_Year_in_Review_2022.pdf.
[3] BryceTech (Oct. 13, 2023). *Start-Up Space Report 2023*. P. 5, Fig. 4. https://brycetech.com/reports/report-documents/Bryce_Start_Up_Space_2023.pdf.

Chart 2. BryceTech Report Data



Below, we discuss the nuances of setting up and operating a legal entity in the U.S. followed by a review of other relevant jurisdictions.

United States

When incorporating in the U.S., two pertinent questions arise: which form of legal entity to select and in which state to establish it? Although many space startups opt for a C corporation in Delaware, it's worth exploring the implications of this decision.

There are two main types of legal entities in the U.S. used for commercial purposes: limited liability companies (LLCs) and C corporations (simply known as C-corps). Let's look at some of the differences between the two.

Table 1. Major Differences Between LLCs and C-corps[4]

	LLC	C-corp
Limited Liability	Yes	Yes
Taxation	Pass-through taxation: an LLC is not taxed at the federal level; LLC members pay taxes on LLC income based on their ownership share and personal tax rates	Double taxation: C-corp's income is taxed at the federal corporate income tax rate, and dividends paid to stockholders are taxed using their personal tax rates
Shareholders' Meeting	Not required	Annual meeting required
Corporate Management	LLC members or managers appointed by LLC members	Board of directors elected by stockholders; board of directors elects officers – CEO, CFO, etc.
Goal Alignment	Companies with revenue and no plans to fundraise in the U.S., operational subsidiaries	Companies looking to scale up using funds from U.S. investors

An LLC is a better option for companies that generate revenue or have no plans for fundraising, like an engineering contractor. If you don't need investments, or you're simply setting up an operating subsidiary, an LLC will do just fine. For instance, Blue Origin, which has no outside shareholders apart from its founder, is an LLC.

On the other hand, due to certain corporate and tax aspects, C-corps are more appropriate for ventures that intend to raise external funding. And since many space startups do in fact rely on outside funding, C-corps are the most commonly used corporate form for them.

After determining the most suitable corporate form for your needs, the next step is to choose the state for registration. As mentioned, Delaware remains the jurisdiction of choice for companies headquarters due to its benign taxes, flexible corporate law, and highly competent courts. However, other states, including Texas, Colorado, and Florida, have become increasingly popular among space entrepreneurs, especially if they already reside in one of these states.

Having your corporation registered in a particular state doesn't restrict the team from doing business in other states. At the same time, if the company has a physical presence (e.g., office, staff) or conducts significant commercial operations (e.g., sales) in another state, it will most likely need to qualify to do business in that other state and maintain a registered agent and an office there.

[4] Belyaeva, A. and Krasnov, E. (Oct. 7, 2022). *Legal Guide for Startup Founders in the USA 2023*. Buzko Krasnov. https://www.buzko.legal/content-eng/legal-guide-for-startup-founders-in-the-usa.

To summarize, the Delaware C-corp is the most common choice of entity and, in fact, the only choice if you plan on raising funds from U.S. investors. If your team is predominantly based in a specific state other than Delaware, you can consider registering an entity in this state.

Canada

In North America, Canada is another country where the NewSpace projects are often launched. In 2022, several Canadian space companies, including Calian, CGI, GHGSat, Maritime Launch, NorthStar Earth & Space, and others, came together to establish Space Canada, a national association representing Canada's space innovators and allied industries. Space Canada's 45 members contribute $2.5 billion to Canada's GDP.[5]

Europe

In Europe, space startups are mainly founded in France, the United Kingdom, Germany, and the Netherlands. In recent years, Luxembourg has also been actively developing its space market which currently brings together more than 70 government and private players, employing more than 1,400 personnel.[6]

Oceania

In Oceania, the space industry is rapidly growing in Australia and New Zealand. For example, Rocket Lab, founded by New Zealander, Peter Beck, has already conducted 16 successful rocket launches from its Launch Complex 1, the world's only private orbital launch site located in Mahia, New Zealand, and looks forward to 13 more launches in Q4 of 2023 through 2025.[7]

Asia

The majority of space activity in Asia occurs in China, with slightly more than 34% of the world's orbital launches in 2022, according to BryceTech.[8] Although space activities in this country are predominantly government-operated, there are also several private space enterprises, such as Space Pioneer, OneSpace, and LandSpace.

Another trending choice for space startups in Asia is India. In November 2022, Skyroot Aerospace became the first Indian private company to reach outer space with its Vikram S suborbital rocket.[9] This was followed by the resounding success of the Indian Space Research Organization ("**ISRO**") landing the Chandrayaan-3 Lander

[5] Space Canada's website: https://space-canada.ca/team.
[6] Luxembourg Space Agency's *Stratégie Spatiale 2023-2027* (in French): https://space-agency.public.lu/dam-assets/publications/2023/strategie2023-2027.pdf.
[7] Launch schedule for New Zealand at RocketLaunch. Live website: https://www.rocketlaunch.live/?includePast=1&filter=new-zealand.
[8] BryceTech (Feb. 3, 2023). *2022 Orbital Launches Year in Review*. https://brycetech.com/reports/report-documents/Orbital_Launches_Year_in_Review_2022.pdf.
[9] Bhattacharjee, N. (Nov. 18, 2022). *India successfully launches first privately made rocket*. Reuters. https://www.reuters.com/lifestyle/science/india-launches-first-privately-made-rocket-into-space-2022-11-18/.

Module in the Moon's south pole region on August 23, 2023.[10] In 2022 alone, around 100 space startups have registered with ISRO to work across various space domains.[11] Furthermore, in January 2023, ISRO signed an MOU with Microsoft to provide Indian SpaceTech startups with free access to the Microsoft for Startups Founders Hub.[12]

Japan, with its long-standing space traditions, is one of the five contributors to the International Space Station ("**ISS**") project and a participant in NASA's Artemis Moon program. In January 2023, the Japanese and U.S. governments signed an agreement to conduct joint space activities such as exploration of the Moon and other celestial bodies as well as collaborative projects in aeronautics, space science, and technology development.[13] Notably, Japan's space sector is currently valued at approx. $8.6 billion and involves more than 50 private startups.[14] These include, for example, Astroscale, a Tokyo-based debris removal company, and Axelspace, a commercial MicroSat developer and satellite imagery provider. On top of that, Japan is also actively working on its new partially reusable H3 rocket,[15] as well as attempting to become the fifth country to land a spacecraft on the Moon.[16]

Africa

African countries are also entering the space race. In 2021, the African space industry was worth nearly $20 billion, and currently, the continent is home to more than 270 NewSpace companies.[17] According to 'Space in Africa', which focuses on the African space and satellite industry, most of these companies are based in South Africa, followed by Mauritius, Nigeria, Egypt, and others.[18] The traditional way of fundraising remains equity investment while bootstrapping and government funding are also advancing Africa's space industry.[19]

In 2022, African countries launched 8 satellites.[20] South Africa has been the most active in satellite missions, followed by Egypt, Nigeria, and Algeria.[21] Since the continent has no spaceports, satellites are launched mainly from Kazakhstan, French Guinea, or the U.S.[22] However, on January 9, 2023, the Djibouti government signed an MOU with Hong Kong Aerospace Technology and Touchroad International to

[10] Pandey, G. (Aug. 23, 2023). *Chandrayaan-3: India makes historic landing near Moon's south pole*. BBC News. https://www.bbc.com/news/world-asia-india-66594520.
[11] IANS (Nov. 17, 2022). *100 startups registered with ISRO to work in space tech domains: Chairman*. Business Insider India. https://www.businessinsider.in/science/space/news/100-startups-registered-with-isro-to-work-in-space-tech-domains-chairman/articleshow/95578146.cms.
[12] *ISRO and Microsoft collaborate to support space-tech startups in India* (Jan. 5, 2023). Microsoft India. https://news.microsoft.com/en-in/isro-and-microsoft-collaborate-to-support-space-tech-startups-in-india/.
[13] Framework Agreement Between the Government of Japan and the Government of the United States of America for Cooperation in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, for Peaceful Purposes. Done at Washington, Jan. 13, 2023. https://japan.kantei.go.jp/content/000121774.pdf.
[14] Kutty, N. and Tochibayashi, N. (Jun. 5, 2023). *How Japan's space industry is seriously gaining momentum*. World Economic Forum. https://www.weforum.org/agenda/2023/06/see-how-japan-s-space-industry-is-gaining-momentum/.
[15] Jones, A. (Oct. 3, 2023). *Japan conducting studies for reusable next-gen rocket*. SpaceNews. https://spacenews.com/japan-conducting-studies-for-reusable-next-gen-rocket/.
[16] Jacob, Ch. (Oct. 5, 2023). *After two failed attempts in the past year, Japan could be next in line to land on the moon*. CNBC. https://www.cnbc.com/2023/10/06/space-exploration-japan-could-be-next-in-line-to-land-on-moon.html.
[17] See the NewSpace Africa Conference 2023 website: https://events.spaceinafrica.com.
[18] Space in Africa (Oct. 2019). *NewSpace Africa Industry Report*. Pp. 2-3. https://spaceinafrica.com/product/2019-edition-newspace-africa-industry-report/.
[19] *Ibid*. P. 4.
[20] See Africa's Launched Satellites on the Space in Africa website: https://africanews.space/african-satellites/.
[21] *Ibid*.
[22] Cascais, A. (Apr. 20, 2023). *Space industry: Africa is ready for liftoff*. Deutsche Welle. https://www.dw.com/en/space-industry-africa-launches-new-space-agency/a-65373644.

build the first international commercial spaceport for about $1 billion in the northern Obock Region of Djibouti.[23]

As shown, there is a wide variety of jurisdictions around the world to incorporate a space startup. Yet the U.S., and Delaware specifically, are still leading the way due to access to government space-related facilities, the high number of investors, and a strong community of space entrepreneurs.

As more countries actively develop their national space programs and create conducive environments for the space industry's growth, you may consider incorporating your space startup in an alternative jurisdiction. This approach is especially sensible if your project can seamlessly integrate into the local space business ecosystem, for instance, if you have secured investors, established connections with a local space agency, or find it more feasible to assemble a team in the selected country.

[23] Moyo, R. (Jan. 10, 2023). *Djiboutian Government signs MoU with HKATG to Build a USD 1 billion Spaceport in Djibouti*. Space in Africa. https://africanews.space/djiboutian-government-signs-mou-with-hkatg-to-build-a-usd-1-billion-spaceport-in-djibouti/. *See also* Hong Kong Aerospace Technology's announcement on the matter: http://iis.aastocks.com/20230110/10571981-0.PDF.

2. Team

Once you have established a legal entity for your space startup, the next step is to recruit a talented team. Legally, assembling a team for a space startup is not drastically different from the process in a typical startup. You should establish an option pool, formulate internal policies, ensure that intellectual property is assigned to the company by executing appropriate agreements with employees, and manage other standard human resources tasks. To learn more, refer to Section IV in our Legal Guide for Startup Founders in the USA 2023.[24]

While space startups, like any other companies, are basically free to choose between employees, this freedom may have certain limits. For example, under contracts with its contractors, NASA may impose certain requirements on the contractors' employees, such as a specific level of security clearance, education and qualifications, work experience relevant to the NASA project on which the contractor's employee will be working, certain technical skills, and compliance with safety standards.

On top of that, U.S. space companies must also comply with statutory rules on hiring. For instance, in August 2023, SpaceX was sued by the U.S. Department of Justice ("**DOJ**") for discriminating against asylees and refugees in hiring.[25] According to the DOJ, its investigation found that from at least September 2018 to May 2022, asylees and refugees had virtually no chance of being fairly considered for or hired for a job at SpaceX, in violation of the U.S. Immigration and Nationality Act (8 U.S.C. 1324b).

In online posts and statements, SpaceX officials claimed that SpaceX could only hire U.S. citizens and lawful permanent residents, i.e., green card holders. However, U.S. federal regulations impose no such hiring restrictions. Moreover, once hired, asylees and refugees living in the U.S. can even access export-controlled information and materials without additional government approval, just like U.S. citizens and lawful permanent residents.

The DOJ is seeking fair consideration and back pay for those asylees and refugees who were deterred or denied employment at SpaceX due to the alleged discrimination as well as civil penalties in an amount to be determined by the court. The DOJ also requests that SpaceX change its hiring policy to ensure the company complies with 8 U.S.C. 1324b's non-discrimination mandate going forward. Should the complaint be accepted, it will be considered in administrative hearings by the DOJ Office of the Chief Administrative Hearing Officer.

While the merits of the lawsuit have been questioned by many in the industry, it is worth keeping in mind when it comes to hiring decisions.

[24] Belyaeva, A. and Krasnov, E. (Oct. 7, 2022). *Legal Guide for Startup Founders in the USA 2023*. Buzko Krasnov. https://www.buzko.legal/content-eng/legal-guide-for-startup-founders-in-the-usa.
[25] *United States of America v. Space Exploration Technologies Corp.*, 68 Fed. Cl. 1 (Fed. Cl., 2005). See the DOJ complaint: https://www.justice.gov/media/1311656/dl?inline.

3. Intellectual Property

Intellectual property ("**IP**") and data are the most valuable assets of any contemporary company, which is even more pronounced in the space industry, where knowledge and technological innovation are so vital.

There are four primary types of IP:

(i) Copyrights;

(ii) Trade secrets;

(iii) Patents; and

(iv) Trademarks.

Let's look very briefly at each of the above as they pertain to the space industry. If you want to learn more, refer to Section V of the Legal Guide for Startup Founders in the USA 2023.[26]

Copyrights

Copyrights protect works recorded on tangible media and arise immediately at the time of their creation by their authors. For technology and space startups, the most relevant copyright-protected item is the source code written by their employees. The registration of copyrights isn't mandatory in the U.S., but it does confer rights similar to those granted by trademark registration.

To secure copyrights, a company should execute appropriate agreements with the authors. In the context of startups, such an agreement is typically known as a Proprietary Information and Inventions Assignment Agreement ("**PIIAA**").[27]

While copyrights are a well-established area of law on Earth, numerous intriguing questions emerge when copyrights and associated data are generated in or transmitted through space. We will delve into this intriguing subject in subsequent editions of this guide.

Trade Secrets

Trade secrets are governed by national legal systems, but the definitions of a trade secret are similar in different jurisdictions. In the U.S., a trade secret is defined as information that derives actual or potential economic value from not being generally known to or readily ascertainable by the public or other businesses that could profit from its disclosure or use. Additionally, reasonable efforts must be made to maintain the information's secrecy. This definition is broadly encapsulated in the Uniform Trade Secrets Act ("**UTSA**"), which almost all states have adopted, and the federal Defend Trade Secrets Act ("**DTSA**") of 2016. Trade secrets can include a wide range

[26] Belyaeva, A. and Krasnov, E. (Oct. 7, 2022). *Legal Guide for Startup Founders in the USA 2023*. Buzko Krasnov. https://www.buzko.legal/content-eng/legal-guide-for-startup-founders-in-the-usa.
[27] Visit Degoverned.com to access and generate PIIAAs and other documents relevant for startups.

of information, including formulas, practices, processes, designs, instruments, patterns, or compilations of information.

Trade secrets may be technical information (e.g., production techniques, chemical formulas, scientific research results, software algorithms), commercial information (e.g., customer databases, marketing strategies), or a combination of their respective elements. Some famous examples of trade secrets include Coca-Cola's recipe, Google's search algorithm, and KFC's "11 herbs and spices" breading recipe.

Since trade secrets rely on secrecy for their protection, here are some steps one may take to safeguard them:

- Implement a strong confidentiality policy in the company;
- Require employees and contractors to sign non-disclosure agreements ("**NDAs**") that legally bind them to maintain confidentiality;
- Impose strict controls regarding access to confidential information and documents on a "need-to-know" basis and by securing physical access (by use of security systems, access cards, etc.);
- Ensure cybersecurity measures in the enterprise, for example, encryption, firewalls, up-to-date software, secure servers, strong passwords, and multi-factor authentication;
- Maintain logs of who accessed trade secrets, when, and why;
- Label confidential documents and other items with special designations, such as "confidential," "secret," or "authorized personnel only;"
- Organize offboarding procedures for employees, for example, immediately revoke access to trade secrets when an employee leaves or changes roles and set up a process for the return of any materials or information related to trade secrets.

Trade secrets are perhaps the most vital IP for space startups. In fact, it is the only way to protect the company's valuable technology and techniques without making them publicly available (like patents). Notably, U.S. counterintelligence agencies recently warned the U.S. space industry to guard against efforts by foreign intelligence agencies to steal research and technologies as they try to boost their own countries' space programs.[28] This incentivizes U.S. space enterprises to use trade secrets instead of publicly available patents.

Elon Musk's stance over a decade ago reflects this approach, as he noted that SpaceX has "essentially no patents." If the company were to publish patents, it would be competitively impractical since other countries involved in the space race could use them as "a recipe book."[29]

The only problem with trade secrets is that they do not protect the technology from independent discovery or reverse engineering. This is what patents are designed for.

[28] Martina, M. (Aug. 18, 2023). *US warns space companies about foreign spying*. Reuters. https://www.reuters.com/world/us/us-warns-space-companies-about-foreign-spying-2023-08-18/.
[29] Anderson, Ch. (Oct. 21, 2012). *Elon Musk's Mission to Mars*. Wired. https://www.wired.com/2012/10/ff-elon-musk-qa/.

In the space sector, trade secret infringement can lead to high-profile trials. For example, on June 7, 2023, Wilson Aerospace ("**Wilson**"), a family-run aerospace tools company based in Colorado, sued Boeing for stealing its trade secrets related to the Space Launch System ("**SLS**"), the primary launch vehicle of the Artemis Moon landing program.

In its lawsuit,[30] Wilson alleges that initially Boeing was unable to find a way to safely attach the engines to the SLS with the exact amount of torque and therefore the SLS project faced repeated and ongoing delays and substantial cost overruns. To overcome the problem, Boeing approached Wilson, who invented the Fluid Fitting Torque Device ("**FFTD**") and other tools during 2014-2016 to install the engines into the rocket.

However, after Boeing gained access to Wilson's trade secrets related to the FFTD and downloaded its proprietary information, Boeing canceled Wilson's involvement in the SLS project without explanation and deleted all records regarding previous collaboration between the companies. Following this, Wilson sued Boeing, claiming that the latter, as it had done to Alabama Aircraft Industries, "has brazenly stolen Wilson's intellectual property." Moreover, having accessed Wilson's trade secrets, Boeing has failed to obtain instructions for them, putting the lives of astronauts, pilots, crews, and passengers aboard its vehicles at critical risk.

On November 17, 2023, the District Court for the Western District of Washington dismissed Wilson's lawsuit due to failure to state a claim.[31]

Patents

While patents are publicly available and thus susceptible to infringement, space companies still rely on them to protect their IP portfolio.

Patents are government-issued grants that give inventors exclusive rights to their inventions, allowing them to prevent others from making, using, selling, or importing the invention without consent. The three primary types of patents issued in the U.S. are utility patents, design patents, and plant patents, each protecting a different aspect of invention and innovation.

Plant patents are granted for inventing or discovering and asexually reproducing any distinct and new variety of plant, such as unique crop strains. This type of patent is less relevant to the space industry, at least until we decode and replicate the legendary potato cultivation method invented by Matt Damon's character in "The Martian" movie.[32]

[30] *Wilson Aerospace LLC v. The Boeing Co.*, Plaintiff's Complaint, Jun. 6, 2023, W. D. Wash., 2:23-cv-00847, https://storage.courtlistener.com/recap/gov.uscourts.wawd.322925/gov.uscourts.wawd.322925.1.0.pdf.
[31] *Ibid.* See all case files here: https://www.courtlistener.com/docket/67481466/wilson-aerospace-llc-v-the-boeing-company-inc/.
[32] Even if we were to replicate this cultivation method, obtaining a patent would be challenging, since the movie was produced almost eight years ago, and this invention would probably no longer qualify as novel.

Similarly, design patents are not invoked very often in the space industry, since they are granted for inventing a new, original, and ornamental design for an article of manufacture.

The most common type of patent in the space industry is utility patents. In the U.S., they are granted for inventing or discovering "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof" (35 U.S.C. 101). For example, if someone invents lunar hub technology for human habitation (like Gateway) or figures out how to launch a rocket heavier than Starship, a utility patent registration may be sought. This patent type has a term for up to 20 years from the filing date. During this period, the inventor has a monopoly (i.e., exclusive rights) over the use of the patented technology and must pay periodic fees to keep the patent in force. In exchange for this monopoly, the inventor has to publicly disclose the details of the invention in the patent application.

Who can apply for a patent if something is invented in outer space?

Imagine that one of the astronauts or cosmonauts invented something while aboard the International Space Station ("ISS"). ISS is a joint project of several partners, namely Canada, Japan, U.S., Russia, and ESA Member States. Which law applies to such inventions?

The problem is that, according to Article II of the OST, "outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." At the same time, patents are enforceable only within the territory of the granting states. As such, a patent monopoly can only be claimed within state borders, but not in extraterritorial domain. Meanwhile, under Article VIII of the OST, states "on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object."

The solution to this legal problem may be to make patent law enforceable for those space objects that come under the jurisdiction of the respective state. Such a measure was taken by the U.S. in 1990. According to 35 U.S.C. 105(a), "any invention made, used or sold in outer space on a space object or component thereof under the jurisdiction or control of the U.S. shall be considered to be made, used or sold within the U.S." Other states, however, have not yet incorporated into their national legislation any provision for the applicability of their national patent law to inventions on board space vehicles.

In fact, there are already examples of U.S. companies filing for patent applications based on the research experiments conducted aboard the ISS. For example, in 2018, Procter & Gamble and Made in Space (which was acquired by Redwire in 2020) independently filed patent applications for the manufacture of specific materials and supplies in space.[33]

[33] Gebhardt, Ch. (Aug. 29, 2018). *First patents filed from commercial research on Space Station, crew readies for busy period*. NASASpaceflight.com. https://www.nasaspaceflight.com/2018/08/first-patents-filed-commercial-research-iss-crew-busy-period/.

Trademarks

A trademark is a word, phrase, symbol, logo, design, or combination thereof to identify the source of goods or services and distinguish those from others. Trademark is a generic term for marks identifying goods (trademarks in the narrow sense), services (service marks), or both. Depending on whether a trademark is used solely by its owner or jointly by the members of a certain organization (e.g., an association), it can be either individual or collective.

Space companies actively protect their trademarks and usually register several of them for different goods and services. For example, SpaceX has registered its famous mark “SPACEX” in the U.S. for “launch and placement in space of satellites [and spacecraft] of others,” “launching the payloads of others into space” (class 39), as well as various communication and transmission satellite equipment (class 9) and services related thereto (class 38). In February 2022, the corporation also filed an application with the USPTO to register the same mark for various toys (class 28). These toys are going to be sold under a multi-year agreement with Mattel.[34]

Similarly, the “ELECTRONE” mark owned by Rocket Lab is registered in the U.S. not only for “aerospace vehicles” (class 12), but also for various apparel and footwear (class 25), which the company sells in its online store. The same is true for the “ASTRA” and “ASTRA SPACE” marks, for which Astra filed its applications in early February 2022.

NASA’s iconic “Worm” and “Meatball” logos have become a common sight in fashion, adorning apparel from numerous brands. While these logos are not protected as trademarks and thus do not generate licensing revenue for NASA,[35] there are restrictions under 51 U.S.C. 20141 against using them in a way that implies endorsement or affiliation with NASA when such a relationship does not exist. NASA evaluates requests for logo use and approves them on a case-by-case basis, communicated via email. However, it does not allow its logos on certain products like NFTs, alcohol, or tobacco, among others, and it has specific guidelines for the logos’ usage to maintain brand integrity.

[34] *Mattel Announces Multi-Year Agreement with SpaceX to Produce Toys and Collectibles* (Jul. 20, 2022). Mattel. https://corporate.mattel.com/news/mattel-announces-multi-year-agreement-with-spacex-to-produce-toys-and-collectibles.
[35] Wattles, J. (Jul. 23, 2022). *Why everyone’s wearing NASA-branded clothes*. CNN Business. https://edition.cnn.com/2022/07/23/tech/nasa-apparel-popularity-space/index.html.

4. Licensing of Space Activities

Space activities typically require licenses or permits granted by state authorities. The legal framework for this comes from Article VI of the OST,[36] which addresses the international responsibility of states for their national governmental and non-governmental activities in outer space. Article VI stipulates that "the activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty." Every major space-faring nation, including the U.S., China, Russia, Australia, New Zealand, Canada, France, Luxembourg, Germany, and others, has ratified or accessioned to the OST.

National laws further define space activities subject to authorizations, the types of such authorizations, and specific requirements to obtain them. In the following sections, we delve into the details of space licensing in the U.S., given its prominence as the primary hub for commercial space endeavors. In future versions of this guide, we will cover licensing regimes in other popular jurisdictions.

Commercial space launch activities conducted by U.S. citizens or in U.S. territory are governed by 51 U.S.C. 509. Under 49 C.F.R. 1.83(b), the authority to issue authorizations for space activities, as well as other functions, is delegated by the U.S. Secretary of Transportation to the Federal Aviation Administration ("**FAA**"), an agency within the Department of Transportation.

The FAA may license or permit space activities only in cases when they are not detrimental to public health and safety, the safety of property, or U.S. national security or foreign policy interest. Otherwise, such licensed or permitted activities may be prohibited, suspended, or ended immediately (51 U.S.C. 50909(a)). Similarly, the license itself may be suspended or revoked by the FAA if it is necessary to protect the above interests (51 U.S.C. 50908(c)(2)).

A case in point involves the FAA's suspension[37] of SpaceX's Starship program. The agency took this action pending the outcome of a "mishap investigation" after the first Starship rocket damaged the launch pad and nearby infrastructure in Boca Chica, Texas. Subsequently, the FAA itself faced legal challenges[38] from a consortium of U.S. environmental advocacy groups and a Native American cultural heritage organization. They criticized the agency for neglecting to assess the environmental hazards associated with the Starship launch in Boca Chica and for failing to introduce sufficient measures to address those concerns.

Generally, the FAA has the authority to issue the following types of licenses and permits depending on the intended space activity:

[36] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. Done at London, Moscow and Washington, Jan. 27, 1967. https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html.
[37] Kolodny, L. (Apr. 24, 2023). *SpaceX Starship Explosion Spread Particulate Matter for Miles*. CNBC. https://www.cnbc.com/2023/04/24/spacex-starship-explosion-spread-particulate-matter-for-miles.html.
[38] *Center for Biological Diversity et al v. Federal Aviation Administration et al*, 2023, D. C. 1:2023cv01204. https://dockets.justia.com/docket/district-of-columbia/dcdce/1:2023cv01204/254763.

Table 2. Space Licenses and Experimental Permits in the U.S.

Launch License	
Launch-Specific License	Authorizes a licensee to conduct one or more launches, having the same launch parameters, of one type of launch vehicle from one launch site (14 C.F.R. 415.3(a)).
Launch Operator License	Authorizes a licensee to conduct launches from one launch site, within a range of launch parameters, of launch vehicles from the same family of vehicles transporting specified classes of payloads (14 C.F.R. 315.3(b)).
License to Operate a Launch Site	
Authorizes a licensee to: • operate a launch site (14 C.F.R. 420.41(a)); and • offer its launch site to a launch operator for each launch point for the type and any weight class of launch vehicle identified in the license application and upon which the licensing determination is based (14 C.F.R. 420.41(b)).	
License to Operate a Reentry Site	
Authorizes a licensee to operate a reentry site by offering use of the site to support reentry of a reentry vehicle (14 C.F.R. 433.3(b), 433.5).	
License to Launch and Reentry a Reusable Launch Vehicle ("RLV")	
Mission-Specific License	Authorizes a licensee to launch and reenter, or otherwise land, one model or type of RLV from a launch site approved for the mission to a reentry site or other location approved for the mission (14 C.F.R. 431.3(a)).
Operator License	Authorizes a licensee to launch and reenter, or otherwise land, any of a designated family of RLVs within authorized parameters, including launch sites and trajectories, transporting specified classes of payloads to any reentry site or other location designated in the license (14 C.F.R. 431.3(b)).
License to Reentry a Reentry Vehicle Other Than an RLV	
Reentry-Specific License	Authorizes a licensee to reenter one model or type of reentry vehicle, other than an RLV, to a reentry site or other location approved for the reentry (14 C.F.R. 435.3(a)).
Reentry-Operator License	Authorizes a licensee to reenter any of a designated family of reentry vehicles, other than an RLV, within authorized parameters, including trajectories, transporting specified classes of payloads to any reentry site designated in the license (14 C.F.R. 435.3(b)).
Experimental Permit	
Authorizes a person to launch or reenter a reusable suborbital rocket only for: • research and development to test new design concepts, new equipment, or new operating techniques; • a showing of compliance with requirements for obtaining any of the licenses listed above; or • crew training before obtaining a license for a launch or reentry using the design of the rocket for which the permit would be issued (14 C.F.R. 437.5).	

Each of the above licenses and permits has specific application requirements and validity periods as detailed in 14 C.F.R. Chapter III Subchapter C. License requirements for launch, reentry, or both launch and reentry are provided in detail in 14 C.F.R. Part 450. Before submitting an application to the FAA, the applicant has to consult with the FAA to discuss the application process and possible issues relevant to the FAA's licensing or permitting decision (14 C.F.R. 413.5). The application itself has to be submitted in writing and in English either by paper, by use of physical electronic storage, or by email (14 C.F.R. 413.7(a)). It must be signed, dated, and certified as true, complete, and accurate by the company's officer or other individual authorized to act for the entity in licensing or permitting matters (14 C.F.R. 413.7(c)).

If the FAA finds the application complete, a license or permit will be issued no later than 180 days after acceptance of the completed application (51 U.S.C. 50905(a)(1)). For human spaceflight activities, if there is any pending issue with respect to an application, the FAA informs the applicant of that issue as well as the action required to resolve it not later than 120 days after accepting an application. The exact time frame for reviewing an application and making a decision within the above 180-day maximum cap is set on a case-by-case basis during pre-application consultation (14 C.F.R. 413.15(a)).

All active licenses issued by the FAA are available on the agency's website. Any interested person can check out what the licenses for SpaceX, Rocket Lab, Virgin Galactic, Blue Origin, Northrop Grumman, and others look like.

For example, under License Number LLO 18-105A (Rev 6), SpaceX launches its Falcon 9 from the Kennedy Space Center in Florida.[39] Under License No. LLO 19-117, Rocket Lab is authorized to conduct launches of its Electron from Launch Complex 1 in Mahia, New Zealand.[40]

Apart from the above licenses and permits, the FAA also issues safety element approvals. A safety element approval is a document containing the FAA determination that one or more of the safety elements, when used or employed within a defined envelope, parameter, or situation, will not jeopardize public health and safety or the safety of property. In turn, "safety elements" is a broad term and comprises the following two groups:

(i) Launch vehicle, reentry vehicle, safety system, process, service, or any identified component thereof; and

(ii) Qualified and trained personnel, performing a process or function related to licensed activities or vehicles (14 C.F.R. 414.3).

To apply for safety element approval, the applicant does not need U.S. citizenship (14 C.F.R. 414.7(a)). However, the applicant must have sufficient knowledge and expertise to show that the design and operation of the safety element for which the approval is sought qualify for such approval (14 C.F.R. 414.7(c)) as well as belong to one of the following categories:

[39] Commercial Space Transportation License No. LLO 18-105A (Rev 6) dated Jun. 29, 2023, authorizing Space Exploration Technologies to conduct Falcon 9 launches with payloads on board and associated pre-flight ground operations: https://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/media/LLO_18_105_SpaceX_Euclid.pdf.
[40] Commercial Space Transportation License No. LLO 19-117, dated Oct. 9, 2019, authorizing Rocket Lab Global Services to conduct Electron launches from Launch Complex 1 to transport payloads to LEO: https://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/media/LLO_19-117_License_and_Orders_2023-05-01.pdf.

(i) Designer, manufacturer, or operator of a launch or reentry vehicle or component thereof;

(ii) Designer or developer of a safety system or process; or

(iii) Personnel who perform safety-critical functions in conducting a licensed launch or reentry (14 C.F.R. 414.7(b)).

In its Safety Approval Guide for Applicants, the FAA further indicates that safety element approval can also be obtained by "a company providing a service in support of a launch operation."[41] Similar to foreign citizens, non-U.S. companies can also apply for safety element approval from the FAA.[42]

A safety element approval does not confer any authority to conduct activities for which a license or permit is required, and an application for a safety element approval may be submitted with a vehicle operator license application or separately (14 C.F.R. 414.11). Apart from that, the safety element approval application procedure is quite similar to obtaining a license and is described in detail in 14 C.F.R. Part 414 Subpart B. A safety element approval is valid for five years and may be renewed (14 C.F.R. 414.25(d)).

Active safety element approvals are also published on the FAA's website. For example, under Safety Approval No. SA-14-006, Black Sky Training is authorized to provide training services for crew and spaceflight participants.[43]

For a basic understanding of licensing in the U.S., refer to the FAA Getting Started with Licensing tool.[44] With its help, one can check whether a contemplated project needs authorization from the FAA to conduct certain space operations and, if so, its type. It also briefly covers the application steps, including initial discussions, pre-application consultation, application evaluation, and license issuance or denial.

For the pre-application stage, the FAA also provides simple application checklists, organized depending on the type of desired authorization. Further, the FAA issues Advisory Circulars that are of vital practical importance.[45] These documents provide guidance and information to the aerospace community and typically outline acceptable methods and techniques to comply with regulations or other FAA requirements. While not mandatory, they are often used by industry professionals as a means of ensuring compliance with FAA regulations. Finally, you can fill in and submit a Pre-Application Initial Contact Information form to request consultation on your matter from the FAA.[46]

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[41] Federal Aviation Administration's Safety Approval Guide for Applicants. Version 1.1 (Jul. 20, 2012). P. 4, § 3.1. https://www.faa.gov/sites/faa.gov/files/2022-03/Safety_Approval_Guide_1_1.pdf.

[42] Nield, G. C., Sloan, J., Council, Sh. and Dunlap, M. (Oct. 2015). *FAA Safety Approvals in Commercial Space Transportation*. 66th International Astronautical Congress. P. 6. https://www.faa.gov/sites/faa.gov/files/space/additional_information/international_affairs/safety_approvals_FAA_ast_iac_jerusalem_nield_oct_2015_508.pdf.

[43] Commercial Space Transportation Safety Approval No. SA-14-006A (Rev 1) dated Jan. 18, 2019, authorizing Black Sky Training to provide space flight training service for crew and space flight participants: https://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/media/BST%20SA%2014-006%20renewal_01_18_2019.pdf.

[44] See Getting Started with Licensing on the FAA website: https://www.faa.gov/space/licenses/licensing_process/.

[45] Find all Advisory Circulars on the FAA website: https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.list/?&appliedFacets={%22officenumber%22%3A%22AST-1%22}.

[46] See the FAA Pre-Application Initial Contact Information form: https://www.faa.gov/space/licenses/licensing_process/media/Pre-Application_Initial_Contact_Information_final.pdf.

Globally, space licensing is regulated on a country-by-country basis through their national laws. This is also relevant even for ESA Member States. For example, to conduct space operations in French Guinea, one will need authorization from the French *Centre national d'études spatiales* ("**CNES**"). The applicant will need to comply with the provisions of *LOI n° 2008-518 du 3 juin 2008 relative aux opérations spatiales* (French Space Operations Act),[47] as well as with the regulations of CNES and the policies of *Centre spatial guyanais* (Guiana Space Centre).

Other countries with active space programs such as China, India, Russia, the U.K., Australia, and New Zealand also have their own national laws and regulations on space licensing. To understand the fundamentals of licensing procedures in different countries, refer to the handy articles of ANGELS, a joint initiative by Adelaide Law School at the University of Adelaide, and the International Aerospace Law and Policy Group.[48]

[47] *LOI n° 2008-518 du 3 juin 2008 relative aux opérations spatiales* (in French): https://www.legifrance.gouv.fr/loda/id/JORFTEXT000018931380/. *See also* unofficial English translation: https://download.esa.int/docs/ECSL/France.pdf.
[48] See ANGELS' articles on space licensing on its website: https://spacelaws.com/about-angels/.

5. Launching Your Payload

You have developed your NewSpace product – let's say it is space debris tracking hardware and software – and you are considering launching it into orbit. Before you proceed, you will need approval for your payload from the appropriate regulatory authority. In the U.S., this would be the FAA.

A favorable payload determination can be secured by either the entity applying for the launch or reentry license or by the payload's owner or operator. The FAA will issue such a determination if two conditions are met:

(i) The applicant has secured all necessary licenses, authorizations, and permits; and

(ii) The launch or reentry of the payload will not jeopardize public health and safety or property, U.S. national security or foreign policy interests, or violate international obligations of the U.S.

To initiate this process, you will need to submit detailed information about your payload to the FAA. This should include its classification (such as communications, remote sensing, or navigation), dimensions, function, ownership, associated risks, and any other pertinent data. For a comprehensive understanding of the payload review and determination process, refer to 14 C.F.R. 450.43.

Next, you will need to engage with a launch service provider to actually get your payload into space. Established aerospace companies like SpaceX, Astra, and Orbex offer such services. Alternatively, you can opt for companies that function much like ride-sharing platforms, such as Uber, but for space. These companies take bookings on behalf of various spacecraft manufacturers and operators.

A notable player in this sector is Exolaunch, a German-based company specializing in launch services and mission management for SmallSats. A company like Exolaunch can help you plan your launch, test your payload, transport it to the launch site, integrate it into the launch vehicle, and execute the launch using rockets like Falcon 9, Falcon Heavy, Electron, Ariane 6, PSLV, or Vega. The company has already launched over 320 satellites into orbit and even offers its own hardware. Its recent achievements include the placement of a first-of-its-kind 16U SubeSat into GEO on behalf of Gravity Space,[49] the successful deployment of 32 satellites on SpaceX's Transporter-8 mission,[50] and a Multi-Launch Agreement with Muon Space, a climate constellation company, for at least three satellites to be launched on SpaceX Transporter missions through 2024.[51]

Other options for launch service providers include Nanoracks, a Texas-based builder of space hardware and in-space repurposing tools; Precious Payload, a Delaware-based company offering an online launch reservation platform for small satellites; and Exotrail, a space mobility operator headquartered in Paris, France.

[49] Cowing, K. (May 8, 2023). *Exolaunch Deploys First-Ever 16U Smallsat Into GEO Using Spacex Falcon Heavy*. SpaceRef. https://spaceref.com/space-commerce/exolaunch-deploys-first-ever-16u-smallsat-into-geo-using-spacex-falcon-heavy/.
[50] *Exolaunch successfully deploys satellites on Transporter-8.* SpaceWatch.Global. https://spacewatch.global/2023/06/exolaunch-successfully-deploys-satellites-on-transporter-8/.
[51] See Exolaunch's website: https://www.exolaunch.com/news_92.

Once the payload determination is secured, you will need a Launch Services Agreement ("**LSA**"). LSA is a contract between a launch services provider and a customer, i.e., a payload owner or a satellite operator, to transport a payload from the Earth's surface into a dedicated orbit. This contract outlines the terms and conditions of the expected launch, such as:

- Launch services to be provided;
- Reservation fee in case of multiple launches;
- Launch schedule and its potential adjustments;
- Launch site;
- Rebooking options and costs;
- Price and payments;
- Parties' warranties and representations on obtaining the necessary government authorizations and compliance with mandatory rules and regulations as well as professional standards;
- Provision of post-launch payload data by the launch services provider; and
- Consequences of a failed launch or satellite loss.

This contract may also comprise certain general or optional provisions, such as the parties' cross-waiver or limitation of liability, insurance and launch risk guarantee, force majeure, assignment, priority of government launches over the agreed one, confidentiality and publicity, notices, survivability, governing law, and dispute resolution.

Further, there exist three main types of LSAs that correspond to the launch options, namely dedicated, ridesharing, and piggyback. A dedicated LSA governs a single-payload mission and may be effectively negotiated by the customer. Dedicated LSAs usually cover the launch of huge satellites or satellite constellations. A ridesharing LSA, in turn, accommodates multiple payloads from various customers and typically is modeled based on a standard form provided by the launch service provider, leaving less room for negotiation. Finally, piggyback LSAs are normally contracted for small space research and scientific missions with certain discounted and favorable terms and conditions for the customer.

The main specifics of these three launch options are as follows:

Table 3. Types of Launch Services Agreements

	Dedicated	**Rideshare**	**Piggyback**
Overview	A single-mission launch with the rocket's entire capacity being allocated to one customer who takes control of all launch factors: date, specific orbit, trajectory, etc.	A multi-mission launch with the rocket's capacity being shared by several customers. Satellites are released either in the same orbit or in a different orbit, but not far apart	A multi-mission launch with the primary mission occupying most of the rocket's capacity, while secondary missions depend on its date, specific orbit, trajectory, etc.

Customers	Commercial companies operating huge satellites (e.g., Jupiter 3) or satellite constellations (Starlink, OneWeb), major space research missions (Hubble, Chandra, James Webb)	Commercial companies intending to deploy their SmallSats	Universities, schools, and other non-profit research and scientific organizations as secondary mission customers
Costs	• Falcon 9: $67M • Falcon Heavy: $97M • Electron: ~ $7,5M • Vega: ~ $40M	• Falcon 9 / Falcon Heavy: $5,500/kg • Electron / Vega / Ariane 6: subject to negotiations	Subject to negotiations and particular offer from the launch services provider

Finally, LSAs may be negotiated for a single launch or multiple launches. In the latter case, the LSA may be referred to as a Multiple-Launch Agreement ("**MLA**"). For example, such MLA was signed in March 2022 by SpaceX and AST & Science, a subsidiary of AST SpaceMobile, a Texas-based satellite designer and manufacturer, to launch the BlueWalker 3 and BlueBird 1 satellites with a reservation for launching the BlueBird 2 as part of a satellite mobile communications constellation.[52]

[52] Multi-Launch Agreement Between Space Exploration Technologies Corp. and AST & Science, LLC dated Mar. 3, 2022. https://www.sec.gov/Archives/edgar/data/1780312/000149315222006357/ex10-1.htm.

6. Public-Private Partnership in Space

In contrast to the 20th century, when space exploration was solely the domain of states, today's landscape is characterized by robust partnerships between public and private entities. Such collaborations are mutually beneficial. Private space companies gain access to government facilities and funding, providing them in turn with a competitive edge in the market. Meanwhile, states benefit from advancing their national interests in space and acquiring technologies they might not have the capacity to develop on their own.

A startup with an innovative SpaceTech project can proactively reach out to national space agencies to explore potential collaborations. If the project has already gained recognition, these agencies might even approach the team directly. ESA and NASA are among the most engaged in forming public-private partnerships. For startups aiming to collaborate and enhance their space ventures, these agencies could serve as valuable starting points.

For example, in 1993, ESA initiated the Advanced Research in Telecommunications Systems ("**ARTES**") program.[53] This extensive, long-term initiative supports the R&D of advanced satellite communication products and services. One of its primary objectives is to foster collaborative frameworks that can boost the European and Canadian satellite telecommunications industries.

A key component of ARTES is its Partnership Projects branch, which focuses on fostering partnerships between ESA and satellite operators and manufacturers, as well as on co-funding to share the risk that comes with investing in SpaceTech projects. Under the umbrella of ESA Partnership Projects, over 50 satellite systems are currently at various stages of development. These range from smaller CubeSats to larger geostationary satellites. Notable projects include SAT-AIS in partnership with LuxSpace, ELECTRA with SES and OHB System, SmallGEO with Hispasat and OHB System, Eagle-1 with Sitael, Tesat-Spacecom and SES, and HummingSat with SWISSto12, among others. According to ESA, many of these initiatives would not have come to fruition without such partnerships, as the technical or commercial risks would have been too high to undertake alone.

NASA provides an even broader array of partnership opportunities. The agency collaborates with a wide range of entities, including domestic space companies, other federal agencies, research institutions, public outreach organizations like museums, state and local governments, academic institutions, foreign entities, as well as professional associations and non-profit organizations.

NASA primarily engages in three types of cooperative agreements:

(i) Partnership Agreements;

(ii) Procurement Contracts; and

(iii) Space Act Agreements.

[53] See more on the ARTES program on ESA's website: https://www.esa.int/Applications/Connectivity_and_Secure_Communications/ARTES/About_ARTES.

NASA employs Partnership Agreements either to support the needs of an external partner who reimburses government expenses (reimbursable partnership) or to achieve a mutual goal when working collaboratively on a no-exchange-of-funds basis (nonreimbursable partnership). Procurement Contracts are utilized when the primary aim of the collaboration is to acquire property or services that directly benefit or are used by the U.S. government.

In addition to Partnership Agreements and Procurement Contracts, NASA is authorized to enter into "other transactions as may be necessary in the conduct of its work and on such terms as it may deem appropriate" (51 U.S.C. 20113(e)). Such "other agreements" are called Space Act Agreements ("**SAAs**") and constitute the most common legal instrument to form partnerships at NASA.

SAAs come in four distinct types:

(i) *Nonreimbursable SAAs*: These are collaborative agreements where both NASA and the partner contribute resources, such as personnel, facilities, expertise, or equipment. No funds are exchanged between the parties, and each side funds its own participation for mutual benefit.

(ii) *Reimbursable SAAs*: These involve a partner paying NASA to utilize its unique resources like personnel, facilities, or technology. Payment must be made in advance for each phase of the project, and NASA cannot provide services that the U.S. private sector can reasonably offer.

(iii) *Funded SAAs*: In these agreements, NASA provides funds to a domestic partner to meet a specific objective without any direct benefit to NASA.

(iv) *Unfunded SAAs*: Under these agreements, NASA provides resources such as goods, services, or facilities to a domestic partner without any exchange of funds. Again, there's no direct benefit to NASA.

A current list of SAAs, categorized into those with U.S. entities and international companies, can be found on NASA's website.[54] For instance, an unfunded SAA with SpaceX outlines the implementation timeline for its Integrated Low-Earth Orbit (LEO) Architecture, which includes projects like Starship, Super Heavy, Dragon, and Starlink.[55] Similar SAAs with companies like Blue Origin, ThinkOrbital, Northrop Grumman, and Sierra Space offer insights into their future plans.

For those interested in pursuing partnerships with NASA, the process is fairly straightforward. NASA announces opportunities through the SAM.gov procurement system. Additionally, contact information for personnel responsible for partnerships at various NASA Centers and Laboratories is readily available.[56]

[54] List of Current Space Act Agreements on NASA's website: https://www.nasa.gov/partnerships/current-space-act-agreements/.
[55] Unfunded Space Act Agreement Between the National Aeronautics and Space Administration and Space Exploration Technologies Corp. for Collaborations for Commercial Space Capabilities 2 (SAA-UA-23-38918) dated Jun. 13, 2023: https://www.nasa.gov/wp-content/uploads/static/saa/domestic/38918_SpaceX_CCSC2_SAA-UA-23-38918_Baseline_signed.pdf.
[56] See NASA Locations, Capabilities and Points of Contact on its website: https://www.nasa.gov/partnerships/nasa-locations-capabilities-and-points-of-contact/.

7. Public Procurement

Since governments continue to be major players in the space industry, it's vital for private enterprises in this sector to stay informed about public procurement opportunities and government tenders.

Securing a government contract can be a significant milestone for a young space startup. While well-established companies like SpaceX or Blue Origin may have the upper hand in bids for high-profile projects like building rockets or satellites, emerging companies can still be competitive in other areas or jurisdictions. For instance, you might find opportunities in tenders for software development related to asteroid mining.

One key to succeeding in the procurement process is being aware of upcoming tenders in a timely manner. To help you stay informed, we provide some links to the websites of public authorities on a jurisdiction-by-jurisdiction basis:

Table 4. Public Procurement Electronic Platforms

North America	
U.S.	SAM.gov Doing Business with NASA
Canada	Canadian Space Agency CanadaBuys
Europe and U.K.	
ESA	Doing Business with ESA
European Union	Tenders Electronic Daily Funding and Tenders Portal Public Buyers Community Platform
France	Plateforme des Achats de l'État (PLACE)
Germany	DLR Calls for Tender e-Vergabe
Luxembourg	Portail des Marches Publics
U.K.	Contracts Finder (over £12,000) Find a Tender (over £138,760)

Oceania	
New Zealand	Government Electronic Tenders Service (GETS)
Australia	AusTender Business.gov.au
Asia	
India	ISRO e-Procurement Portal
Japan	Japanese Government Procurement

Navigating the public procurement process can be complex, involving various steps such as bonding, oral or written discussions, representations, and certifications. The rules and requirements differ depending on the jurisdiction and the specific space agency involved. For example, ESA has its own set of procurement procedures,[57] while NASA publishes its own guidelines.[58] As such, it's crucial to consult directly with the relevant space agency and seek advice from local legal experts to understand the nuances of the procurement process in the specific jurisdiction.

Beyond standard commercial contracts, some governments offer non-repayable grants for the development of specific space-related technologies. For example, these could come in the form of funded SAAs with NASA. However, receiving such a grant often comes with strings attached. You may be required to report on how the funds are used or to operate your business within the funding state for a specified period. Failure to meet these conditions could result in the state reclaiming the granted amount. Therefore, it's important to scrutinize the terms and conditions of any procurement contract or grant meticulously. Remember, there's no such thing as a "free lunch" when it comes to public funding.

[57] See ESA Procurement Process: https://www.esa.int/About_Us/Business_with_ESA/How_to_do/The_ESA_Procurement_Process.
[58] See NASA Procurement Reports and Guides: https://www.nasa.gov/procurement-reports-and-guides/.

8. Letters of Intent and Memoranda of Understanding

If you are somewhat familiar with the space industry, you know that everybody likes to enter into letters of intent ("**LOIs**") and memoranda of understanding ("**MOUs**"). These are important documents used to outline the intentions and preliminary agreements of the parties involved in joint space ventures. Since these two types of documents are similar, for simplicity, we will refer only to MOUs in our discussions.

Parties sign an MOU at the very beginning of a new collaborative project when they have generally agreed to cooperate and wish to put on paper their mutual vision of the project so that they can further negotiate more precise terms and conditions.

The key characteristics of all MOUs are as follows:

(i) *Preliminary Character*. MOUs are usually signed prior to entering into a formal detailed contract. In MOUs, the parties may express their intention to sign such a contract, set a period for doing so, and stipulate some basic conditions that will later become part of the formal contract.

(ii) *Non-Binding Nature*. MOUs are generally not intended to impose legal obligations on the parties since their purpose is to lay down a general roadmap for the parties' relationship. In practice, however, MOUs often contain certain legally binding provisions that we address below.

(iii) *Basic Terms and Conditions*. MOUs will often contain basic terms and conditions that the parties have already agreed upon. These may include, for example, the procedure and timeframe for signing the main contract, its subject and price, payment milestones, basic technical specifications, etc.

(iv) *Compact Size*. MOUs are typically concise documents, usually less than 10 pages in length, designed to be straightforward and easy to read. This brevity distinguishes them from the main contract, which can encompass several dozen pages filled with complex legal terminology.

(v) *Further Steps*. It is a good practice to agree in the MOU on the subsequent steps and responsible parties. For example, the MOU may indicate or name the party responsible for drafting the initial version of the main contract.

From a legal perspective, while MOUs are usually non-legally binding agreements, they may create some enforceable obligations for the parties involved. First, an MOU may specifically designate certain provisions as legally binding. For example, parties often agree that confidentiality,[59] choice of law,[60] no-shop,[61] breakup fee,[62] or

[59] A confidentiality provision is aimed to protect sensitive or proprietary information shared by the contractual parties from being disclosed to unauthorized third parties.
[60] A choice of law or proper law clause is a contractual provision in which the parties select the specific jurisdiction whose laws govern their agreement and must be applied in interpreting it.
[61] A no-shop clause is designed to prevent one party from actively seeking or entering into negotiations with other potential partners for a particular period of time. Thus, this clause ensures that the parties are focused on their transaction without looking for alternative offers during the negotiation process.
[62] A breakup fee is a stipulated amount of money paid by one party to the other in case the agreement is terminated under certain defined circumstances. This fee is aimed at covering the party's expenses incurred in negotiating and performing the agreement, such as time, effort, loss of chance, etc.

intellectual property[63] provisions can be legally binding, while the rest of the MOU will not.

Second, depending on the applicable law, the MOU may create an obligation for the parties to negotiate in good faith. This obligation implies that the parties must make a genuine effort during negotiations for a formal contract to reach a mutually acceptable agreement. While it does not compel the parties to ultimately sign a formal contract, it does require them to approach the negotiation process with honesty, fairness, and an intent to consider each other's interests and concerns without unreasonably frustrating negotiations.

Space MOUs generally fall within one of the three categories depending on the parties involved: (i) MOUs between private companies; (ii) MOUs between a private company and a space agency; and (iii) MOUs between public agencies, including different national space agencies and other public entities, like universities and research centers.

MOUs between private companies are rarely published and usually only mentioned in press releases of the parties concerned.[64] In contrast, when one of the parties is a public entity, the MOU is often made available to the public.

Similar documents defining the objectives and framework for future collaboration are also often used by NASA and ESA to partner with national governments and space agencies, universities, private space companies, etc. These documents are usually available to the public. For example, back in 1998, NASA and ESA entered into a 51-page MOU for their joint ISS-related activities.[65] In 2018, the agencies also signed a one-page Statement of Intent on Mars Sample Return.[66]

Usually, such public agreements do not contain any detailed legal provisions. Their purpose is to announce or reaffirm the cooperation between two national space agencies or between an agency and a public organization. These agreements are mainly for the purposes of management and planning, outlining the general fields of their joint activities, such as space exploration and operations or space science and technology. Such agreements may also refer to particular space programs that the parties intend to jointly implement. However, they are typically not binding upon the parties and do not involve any exchange of funds.

[63] Intellectual property provisions outline the ownership, protection, and permitted use of any intellectual property created or utilized during the course of a contractual relationship.
[64] For example, in this press release dated Apr. 2018, Rocket Law announces the signing of an MOU with York Space Systems to develop a universal Interface Control Document and supporting Concepts of Operations that will streamline the manifesting process for small satellite launch customers: https://www.rocketlabusa.com/updates/rocket-lab-and-york-space-systems-team-up-to-develop-rapid-response-launch-capability/.
[65] Memorandum of Understanding Between the National Aeronautics and Space Administration of the United States of America and the European Space Agency Concerning Cooperation on the Civil International Space Station. Done at Washington, Jan. 29, 1998. https://download.esa.int/docs/ECSL/ISS_NASA-ESA-MoU.pdf.
[66] Joint Statement of Intent Between the National Aeronautics and Space Administration of the United States of America and the European Space Agency on Mars Sample Return. Done Apr. 26, 2018. https://mepag.jpl.nasa.gov/announcements/2018-04-26%20NASA-ESA%20SOI%20(Signed).pdf.

9. Insurance

Whenever there is risk, there is a need for insurance. Hence, the space economy, with its inherent high level of risk, seems like a perfect candidate for insurance coverage.

The first space insurance policy was issued by Lloyd's of London in 1965.[67] It covered physical damage during the pre-launch phase of Intelsat I, commonly known as the "Early Bird." This was the first commercial communications satellite, enabling direct contact between Europe and North America. Since then, the space industry has grown rapidly, while the space insurance market has evolved at a comparatively slower pace.

Currently, between 20 and 30 underwriters offer space risk insurance services. Some of these include:

- Lloyd's
- AXA XL
- Munich Re
- Marsh
- International Space Brokers (part of Aon PLC)
- Atrium
- Willis Towers Watson
- Arthur J. Gallagher & Co.

Despite the increasing demand for space risk insurance from commercial space operators, the scale of both actual and potential losses in space makes the market particularly challenging for insurers. Recently, major players in the space insurance market like American International Group Inc., Swiss Re, and Allianz had to put their underwriting activities on hold due to a series of significant incidents.[68] On July 11, 2019, a "major anomaly" occurred during the launch of the Arianespace's Vega rocket resulting in the total loss of the 1,200-kg FalconEye 1 Earth observation satellite and a subsequent $373 million insurance claim. Later, in November 2019, China Satcom lost contact with its ChinaSat-18 communications satellite, leading to a $250 million insurance claim.[69]

Thus, in just one year, these incidents pushed total market losses to nearly $800 million, compared to $400-450 million in gross premium value.[70] This has prompted some underwriters to revisit their market assumptions and increase premiums immediately. By one estimate, it took three years for the premiums to fall back to 5-20% of the policy cost in 2022, which was the pre-2019 level.[71]

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[67] Flytkjaer, R., Oswald, N., Sadlier, G. and Stanbrough, L. (Dec. 4, 2019). *NewSpace: Bringing the new frontier closer to home*. Lloyd's and London Economics. P. 8, 10, 39. https://assets.lloyds.com/assets/pdf-newspace-new-space/1/pdf-newspace-New-Space.pdf.

[68] Grush, L. and Shields, T. (Aug. 28, 2023). *Billion-Dollar Satellite Risks Upending Space Insurance*. Bloomberg. https://www.bloomberg.com/news/articles/2023-08-28/billion-dollar-satellite-risks-upending-space-insurance?embedded-checkout=true.

[69] Jones, A. (Nov. 19, 2019). *China Satcom Files Insurance Claim over ChinaSat-18 Loss*. SpaceNews. https://spacenews.com/china-satcom-files-insurance-claim-over-chinasat-18-loss/.

[70] See chart on space insurance market results in 2010-2021 by Todd D. (Feb. 23, 2022). *Space Insurance Year 2021 Was a Winning One on a Calendar Basis*. Seradata. https://www.seradata.com/space-insurance-year-2021-was-a-winning-one-on-a-calendar-basis-but-worries-remain/.

[71] Zisk, R. (Oct. 31, 2022). *The Space Insurance Landscape*. Payload. https://payloadspace.com/the-space-insurance-landscape/.

Besides premium volatility, the space insurance market naturally favors more experienced players with a proven track record, or "flight heritage." As a result, activities in LEO are less frequently insured,[72] since this segment is younger and often involves startups and venture capital funding.

The specific insurable space risks and types of policies vary depending on the insurer. However, there are two main types of space insurance, namely (i) first-party property (or material damage) insurance and (ii) third-party liability insurance.[73] First-party liability insurance, in turn, can be categorized into three separate types. Together with third-party liability insurance, they are described below:

Table 5. Types of Space Insurance

Insurance Type	Insurance Sub-Type	Coverage
First-Party Property Insurance	*Pre-Launch Insurance*	Covers rockets, satellites, and payloads prior to launch. This generally includes risks associated with transportation to the launch pad, assembly, inspection, and other pre-launch activities.
	Launch Insurance	Provides coverage for risks that may occur between the end of the pre-launch insurance and the completion of initial testing of the satellite's functioning after it separates from the rocket. The entire coverage period may last only 20-30 minutes.
	In-Orbit Insurance	Starts after the launch insurance expires and is usually based on one-year policies. These may be renewed depending on reports from satellite operators.
Third-Party Liability Insurance		Covers liability for damage to third-party property, personal injury, destruction of launch facilities, and loss of revenue during launch or in-orbit operations. As the number of space debris increases and rockets grow in size (for example, the Starship), this type of insurance becomes increasingly important.

In some jurisdictions, insurance may be a legal requirement for certain space activities. For instance, in the U.S., such requirements are placed with regard to third-party liability insurance. Under 51 U.S.C. 50914, a launch or reentry license holder shall obtain liability insurance or demonstrate financial responsibility in amounts to compensate for the maximum probable loss, that is:

(i) no more than $500,000,000 in case of third-party claims for death, bodily injury, or property damage or loss resulting from an activity carried out under the license; *plus*

(ii) no more than $100,000,000 in case claims by the U.S. government for damage or loss to the government's property resulting from an activity carried out under the license.

[72] *Ibid*.
[73] Gaubert, C. *Insurance in the Context of Space Activities*. In Dunk, F.G. von der and Tronchetti, F. (eds.), Handbook of Space Law, Edward Elgar Publishing, 2015. P. 910.

The above amounts are set for claims related to one launch or reentry only. Alternatively, if the amount of "the maximum liability insurance available on the world market at reasonable cost" is less than those indicated in the above (i) or (ii), the licensee must obtain that available insurance.

However, if a successful third-party liability claim for death, bodily injury, or property damage or loss resulting from one licensed launch or reentry exceeds the amount specified in (i), the U.S. government promises to indemnify the defendant (51 U.S.C. 50915(a)(1)). The maximum indemnification amount under statutory law is set at $1.5 million plus additional amounts to reflect inflation occurring after January 1, 1989. Thus, in 2023, this totals approx. $3.9 million. This, however, applies only to national claims, since for international claims, the U.S. remains "absolutely liable" without any limit under Article II of the Liability Convention.[74]

The Secretary of Transportation is also authorized to lower the above maximum amounts of coverage on a case-by-case basis and only after consulting with NASA, the Secretary of the Air Force, and the heads of other appropriate executive agencies. This is important for insuring small satellites and satellite constellations.[75] The time limit for the Secretary of Transportation to determine the maximum amount of coverage is no later than 90 days after a licensee requires a determination and submits all information the Secretary requires.

Finally, at no cost to the U.S. government, an insurance policy must protect the following parties:

- The government itself;
- Government's executive agencies, personnel, contractors, and subcontractors;
- Contractors, subcontractors, and customers of the licensee;
- Contractors and subcontractors of the licensee's customer; and
- Space flight participants.

Similar to the U.S. statutory law, Section 38 of the U.K. Space Industry Act 2018 stipulates that space license holders and others engaged in spaceflight activities may be required to insure against specified risks and liabilities. Specifically, licensees must show that they either hold or are able to benefit from third-party liability insurance for the duration of the licensed activities. According to the U.K. Civil Aviation Authority's Guidance on insurance requirements and liabilities,[76] it is common practice to have just one insurance policy per launch that covers all the licensees (orbital operator, spaceport, range control service providers, etc.) as well as the U.K. government as additional insureds. Typically, the launch operator secures this third-party liability insurance.

Therefore, the space insurance market, especially premiums, is highly sensitive to major adverse events like the total loss of large satellites. The decision to insure a spacecraft and payload is a matter of commercial strategy, dependent on their value and the potential impact of a loss. The best course of action is to consult space underwriters for a thorough risk assessment and management plan in advance.

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[74] Convention on International Liability for Damage Caused by Space Objects. Done at Moscow, London and Washington, Mar. 29, 1972. https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/liability-convention.html. See also Gaubert, C. *Ibid*. P. 916.
[75] Bielicki, D. M. (Jun. 2020). *Legal Aspects of Satellite Constellations*. Air and Space Law. Vol. 45, Issue 3, P. 257.
[76] *Guidance on insurance requirements and liabilities under the Space Industry Act 2018* (Jul. 29, 2021). U.K. Civil Aviation Authority. P. 19, § 4.7.
https://publicapps.caa.co.uk/docs/33/Guidance%20on%20insurance%20requirements%20and%20liabilities%20(CAP2218).pdf.

Glossary of Space Terms*

Ariane A European civilian expendable rocket family operated by Arianespace. Arianespace is the world's first commercial launch service provider, initially established in 1980 jointly by the French space agency (CNES) and ESA and currently owned by several European shareholders, including ArianeGroup, Airbus Defence and Space, Thales Alenia Space, Safran Aero Boosters, and others. The Ariane rocket family consists of 6 models. Ariane 1 was first launched on December 24, 1979, while Ariane 6 is still to be launched. The rockets are primarily designed to launch satellites and other payloads and are launched from the Guiana Space Centre at Kourou in French Guiana.

Artemis A NASA-led space exploration program with the goal of re-establishing human presence on the Moon for the first time since the Apollo 17 mission in 1972. The program aims to establish sustainable lunar exploration with the vision of using the Moon as a stepping stone for future crewed missions to Mars and other destinations in the solar system. Artemis is implemented by several government space agencies and private spaceflight companies under the Artemis Accords signed on October 13, 2020, as well as multiple supporting agreements. Artemis involves the development of new spacecraft, including the Space Launch System (SLS) and the Orion spacecraft, as well as the construction of the Gateway, a lunar outpost that is expected to serve as a staging point for lunar missions.

ARTES The Advanced Research in Telecommunications Systems, the ESA's long-running program to support the development and implementation of innovative satellite telecommunications technologies and services. The program encourages collaboration between industry, research institutions, and governmental organizations to promote the advancement of satellite-based mobile communications, broadcasting, broadband services, and integrated applications.

C.F.R. The Code of Federal Regulations, a codified act comprising rules and regulations promulgated by the executive departments and agencies of the U.S. federal government. The C.F.R. is a dynamic resource, with its editions published in the Federal Register annually, although some sections and parts may be updated more frequently throughout the year. It is also published online on the eCFR website which is updated daily. The C.F.R. is organized into 50 Titles. Title 14 is devoted to Aeronautics and Space and is overseen and enforced by the FAA.

CNES *Centre national d'études spatiale*, the French national space agency. CNES was formed on December 19, 1961, thus being the world's third-oldest space agency after the Russian Roscosmos and NASA. Its headquarters are located in Paris. Along with ESA and the European Union Agency for the Space Program (EUSPA), CNES operates launches from the Guiana Space Centre, ESA's spaceport for launching satellites, located at Kourou in French Guiana.

* Compiled with partial reference to Hertzfeld, H. R. (Dec. 2012). *A Guide to Space Law Terms*. Research by Yung, L. X. and Osborne, D. V. Space Policy Institute, George Washington University and Secure World Foundation. https://swfound.org/media/99172/guide_to_space_law_terms.pdf.

CubeSat A type of miniature satellite, typically in the shape of a small cube with the standard size of 10 cm per side called "one unit" or "1U." The size of a satellite can be extended to 1.5, 2, 3, 6, and even 12U. CubeSats are designed to be lightweight, low-cost, and relatively simple to construct, making them an accessible option for educational institutions, research organizations, and commercial entities interested in conducting space experiments and missions.

Dragon A space capsule designed and operated by SpaceX that is used for transporting humans and cargo to and from Earth's orbit. The spacecraft comes in two respective variants, namely Crew Dragon and Cargo Dragon. Crew Dragon is capable of carrying up to 7 passengers and is the first private spacecraft to take humans to the ISS and back. Dragon is also notable in that it can return up to 3,000 kg of payload mass back to Earth. The capsule is equipped with 16 Draco engines and a parachute system stabilizing it during reentry. SpaceX currently operates Dragon 2 (since 2014), which replaced Dragon 1 after its retirement in 2020.

Electron A two-stage, lightweight, and partially recoverable orbital-class rocket designed by Rocket Lab. Electron was developed for commercial small satellite launches, both rideshare and dedicated, and is capable of launching up to 300 kg of payload into LEO. Electron's first stage is designed as reusable with its re-entry using parachutes and subsequent capture via helicopters. The rocket is powered by an electric-pump-fed Rutherford engine. Electron was first launched on May 25, 2017, and currently flies from Rocket Lab Launch Complex 1 in Mahia, New Zealand, and Launch Complex 2 on Wallops Island, Virginia.

ESA The European Space Agency, an intergovernmental organization dedicated to space exploration. ESA was formed at the end of the Conference of Plenipotentiaries held in Paris on May 30, 1975, under the Convention for the Establishment of the European Space Agency. It is headquartered in Paris and is composed of 22 Member States, 5 Cooperative States, and 4 Associate States. ESA is not part of the European Union's framework. The organization works on projects related to Earth observation, telecommunications, navigation, space science, and human spaceflight.

FAA The Federal Aviation Administration, an agency within the U.S. Department of Transportation regulating all aspects of U.S. civil aviation and commercial space transportation. The FAA exercises its authority under 51 U.S.C. and 14 C.F.R..

Falcon 9 A two-stage, partially reusable rocket designed and manufactured by SpaceX and used for both payload launches and human spaceflights. The rocket can lift up to 22,800 kg of payload to LEO and 8,300 kg to geostationary transfer orbit (GTO). The Falcon 9's first stage is equipped with Merlin engines that use rocket grade kerosene and liquid oxygen as rocket propellants in a gas-generator power cycle. The first Falcon 9 launch was on June 4, 2010. Falcon 9 is now the only U.S. rocket to transport humans to the ISS and has the highest number of launches among the U.S. rockets.

Falcon Heavy A partially reusable super heavy-lift rocket manufactured and operated by SpaceX. The rocket's first stage is composed of a center core and two attached Falcon 9 boosters, thus using 27 Merlin engines in its design. Falcon

	Heavy is capable of generating more than 2,232.1 tf of thrust at liftoff, equal to approx. 18 Boeing 747 aircraft, and is therefore one of the world's most powerful operational rockets. Its first launch was conducted on February 6, 2018.
Gateway	The first planned space station beyond LEO that is expected to orbit the Moon. The project is also known as Lunar Orbital Platform-Gateway (LOP-G). It is the key component of NASA's Artemis program and is implemented jointly with ESA, the Japan Aerospace Exploration Agency (JAXA), and the Canadian Space Agency (CSA). Gateway is intended to serve as a short-term habitation module for crewed missions traveling to and from the Moon, a space research laboratory, as well as a storage facility for robotics and equipment. The station's launch is expected in 2025.
GEO	Geostationary orbit, an orbit over the equator at an altitude of about 35,786 km so that the satellite appears to be stationary from the ground.
ISRO	The Indian Space Research Organisation, a national space agency of India. ISRO was formed on August 15, 1969, and is headquartered in Bengaluru. ISRO's notable achievements include the successful launch of the Chandrayaan and Mangalyaan missions, which aimed to explore the Moon and Mars, respectively. The agency has also developed satellite launch vehicles, namely PSLV and GSLV, to place the satellites into designated orbits.
ISS	The International Space Station, the largest modular spacecraft orbiting the Earth. The ISS is placed in LEO. It is a collaborative endeavor of five space agencies, namely NASA, Roscosmos, JAXA, ESA, and CSA. Assembly of the ISS commenced with the Zarya module launched by Russia on November 20, 1998. Currently, the station is made up of 16 pressurized modules. The ISS legal framework consists of the ISS Intergovernmental Agreement signed on January 29, 1998, four MOUs between NASA and each cooperating space agency, and various bilateral Implementing Arrangements to execute the MOUs. The station can host up to 6-7 inhabitants at a time and serves as a microgravity and space environment research laboratory.
LEO	Low Earth orbit, an orbit with an altitude of 2,000 km or less above the Earth's surface.
Liability Convention	The Convention on International Liability for Damage Caused by Space Objects entered into force on September 1, 1972. Currently, the Liability Convention is ratified by 98 states and is signed but not ratified by 19 others. Also, four international organizations have declared their acceptance of the rights and obligations provided for in this multilateral treaty. The Liability Convention provides for several fundamental provisions on international space law, such as the principles of absolute liability, limit on its amount, exemption of certain types of damage, and resolution of disputes through the parties' consultation and negotiations.
LSA	A Launch Services Agreement, a contractual arrangement between a launch services provider and a customer, used for the purpose of securing the specific launch services for a payload, such as a satellite or a spacecraft. LSAs outline the terms and conditions under which the launch services provider will deliver the agreed-upon services, including the launch vehicle, launch

schedule, price and payments, etc. LSAs typically come in one of three types corresponding to launch options, namely dedicated, rideshare, or piggyback.

MicroSat Short for microsatellite, a MicroSat is a type of small satellite that typically weighs between 10 and 100 kg. However, this weight is not a universal convention, and MicroSat may weigh either more or less than these limits. While larger than NanoSats, MicroSats are still significantly smaller and lighter than traditional satellites and designed to provide cost-effective solutions for various space missions.

MLA A Multi-Launch Agreement, an LSA typically involving multiple launch missions over a specified period. MLA allows the customer to secure a series of launch services for multiple payloads or missions, often at predetermined prices and under specific terms and conditions agreed upon by both parties.

NanoSat A diminutive for nanosatellite, a small satellite with a typical weight of 1 to 10 kg. NanoSats are often built as off-the-shelf Cubesats which helps to minimize their cost and development time. They can serve a variety of purposes, including scientific research, Earth observation, and communication. Similar to the "MicroSat," "NanoSat" alone does not possess any distinguishing specificity except for the satellite's relatively small mass and size.

NASA The National Aeronautics and Space Administration, a U.S. government independent agency responsible for the civil space program and aeronautics and aerospace research. NASA was established on July 29, 1958, under the National Aeronautics and Space Act which has been amended several times and further codified in 51 U.S.C. Chapter 201. Since its formation, NASA has led most U.S. space exploration and research missions.

NewSpace A movement in the contemporary era of the space industry characterized by the increasing involvement of private companies in the development, exploration, and utilization of space. It represents a departure from the traditional model of space exploration dominated by government agencies. NewSpace contributors, such as SpaceX and Blue Origin, aim make space more affordable and accessible to the public.

OST The Outer Space Treaty, formally the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, entered into force on October 10, 1967. OST is a multilateral international treaty and as of October 2023, has 114 states as its parties and 22 as signatories. Forms the basis of international space law, covering fundamental provisions such as the free exploration and use of outer space by all states, lack of national sovereignty in outer space, its peaceful use, states' liability for damage caused by their space objects, etc.

Launch Vehicle A vehicle designed to operate in, or place a payload (satellite, probe, or other spacecraft) or human beings in, outer space, as well as a suborbital rocket. The most common type of launch vehicle is a multi-stage ballistic missile-shaped rocket.

PSLV Polar Satellite Launch Vehicle, a medium-class expendable rocket, designed and operated by the Indian Space Research Organization. PSLV was first launched on September 20, 1993, and comprises five variations, two of which, namely PSLV-CA and PSLV-XL, are currently in operation.

RLV A reusable launch vehicle that is designed to return to Earth mostly intact allowing for multiple launches or the recovery of vehicle stages for future use in a substantially similar launch vehicle (14 C.F.R. 401.5). Examples of partially reusable launch vehicles are, SpaceX's Falcon 9 and Falcon Heavy, as well as Rocket Lab's Electron. SpaceX has promised that its Starship will be fully reusable.

SAA A Space Act Agreement, a type of contractual arrangement used by NASA to collaborate with non-governmental entities, such as private companies, universities, and other organizations. SAAs serve as the key public-partnership instruments in the U.S. space industry. They facilitate collaborations between NASA and external partners to achieve specific research, development, or commercialization goals in the field of space exploration and associated technologies.

SmallSat A diminutive of small satellite, a group name for satellites of small size and mass not exceeding 180 kg. SmallSats are categorized into MiniSats (100-180 kg), MicroSats (10-100 kg), NanoSats (1-10 kg), PicoSats (0.01-1 kg), and FemtoSats (0.001-0.01 kg). The low cost and ease of construction of SmallSats makes them highly utilized for commercial satellite operations, space exploration, and research, as well as for satellite communications.

Space Debris Defunct human-made objects in space, primarily in Earth's orbit or re-entering the atmosphere, that are no longer functional. They are also often referred to as space junk. Space debris can include non-functional spacecraft, abandoned launch vehicle stages, fragments from disintegration, erosion, and collisions, as well as other materials and fragments discarded during space missions.

SpaceTech Short for space technology, this term refers to the technology and systems developed for use in outer space, including both hardware and software components designed for space exploration, satellite communication, satellite imagery, space transportation, and related applications. SpaceTech encompasses a broad range of technological advancements and innovations that enable various space missions, satellite operations, and scientific research activities.

Starlink A satellite constellation operated by SpaceX and deployed in LEO and aims to provide global internet coverage. Starlink network is designed to offer high-speed, low-latency internet access to underserved and remote areas of the world, as well as to serve as a competitive option for internet services in urban and suburban regions. Starlink satellites were first launched in 2019. Currently, nearly 5,000 satellites are operating in orbit, with SpaceX looking to grow the network to 42,000 satellites.

Starship A super heavy-lift transportation launch system manufactured by SpaceX and designed to carry both crew and cargo to Earth orbit, the Moon, Mars, and beyond. The Starship system is expected to be fully reusable. It consists of two stages, namely the Super Heavy booster and the Starship spacecraft itself. Currently, the Starship system is the world's most powerful launch vehicle capable of launching up to 150,000 kg of payload to LEO in its reusable version. SpaceX expects Starship to carry up to 100 passengers on interplanetary flights and be used as point-to-point transport on Earth as well

	as for the development of a Moon base. Its first orbital test flight was conducted on April 20, 2023, from Boca Chica, Texas.
Super Heavy	A first stage of the Starship launch system equipped with 33 Raptor engines. The engines use subcooled liquid methane and liquid oxygen and collectively produce 7,590 tf of thrust. One Raptor engine has twice the thrust of the Falcon 9 Marlin engine. Super Heavy is fully reusable and is expected to be capable of re-entering the Earth's atmosphere to land back at the launch site. Its first launch was as part of the Starship system on April 20, 2023.
Tianlong-2	A three-stage medium-sized liquid propellant rocket developed and operated by Chinese private aerospace company Space Pioneer. Tianlong-2 can lift up to 2,000 kg to LEO and 1,500 kg to 500 km Sun-synchronous orbit (SSO). Its first stage is powered by three YF-102 gas generator engines delivering up to 190 tf. The rocket was first launched on April 2, 2023, with the Jinta CubeSat on board. This mission made Space Pioneer the first Chinese private company to reach orbit.
U.K. Space Industry Act 2018	An Act of the U.K. Parliament introduced by the U.K. Secretary of State for Transport to support and regulate the growth of the country's space industry. It received a Royal assent on March 15, 2018. The Act operates in conjunction with the U.K. Outer Space Act of 1986 as well as other statutory instruments and is the main regulatory framework for all space-related activities carried out in the U.K. It covers such provisions as space licensing, liability and insurance, spaceflight standards and safety, and the U.K. international obligations in the field of space.
U.S.C.	The United States Code, formally the Code of Laws of the United States of America, an official codification of the general and permanent federal statutes. Its first edition was published in 1926. Currently, the U.S.C. consolidates 53 Titles, namely Titles 1 through 54, with Title 53 being reserved for the proposed statutes on small business and five other Titles supplemented by Annexes. The main edition of the U.S.C. is published every 6 years by the Office of the Law Revision Counsel of the House of Representatives, while supplements are published annually. While the C.F.R. represents regulatory law, the U.S.C. constitutes statutory law. The most relevant part for private space companies is 51 U.S.C. Subtitle V, which contains provisions on space programs targeting commercial opportunities.
Vega	An expendable three-stage rocket developed by Arianespace in collaboration with ESA and several European countries with Italy at the forefront. Vega is designed to carry multiple small-to-medium-sized satellites and other lighter-weight payloads. The rocket is capable of lifting up to 1,500 kg from the Earth's surface. Its first stage is equipped with a P80 solid propellant motor delivering up to 307.4 tf of thrust. Vega is primarily used for scientific and small commercial missions. It is launched from the Guiana Space Centre at Kourou in French Guiana. The rocket's first launch was on October 9, 2012.

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NewSpace Startup Legal Guide

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