SPACE ECONOMY

Does space really belong to no one?

How billionaires, governments and companies are creating facts and opening up new markets in space.

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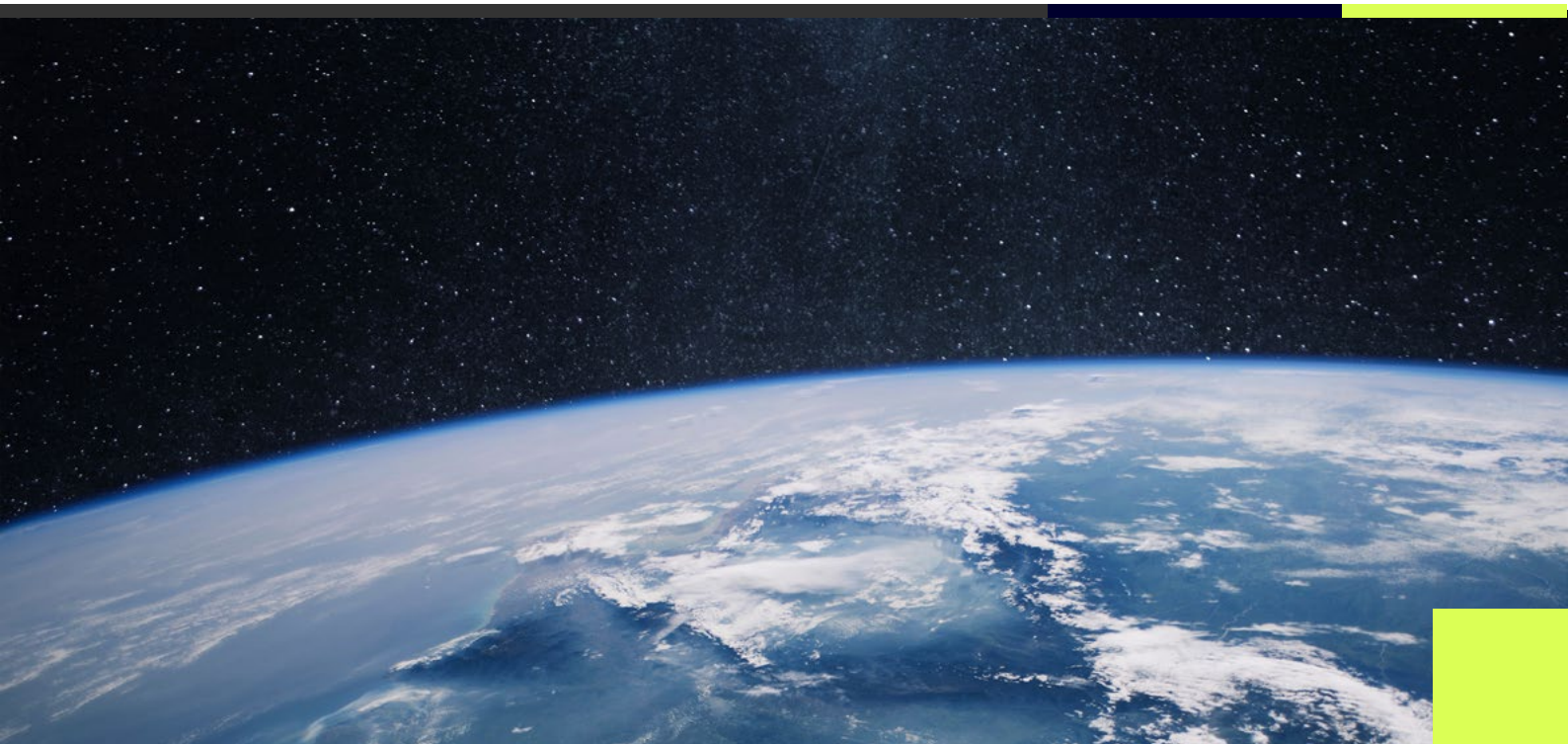
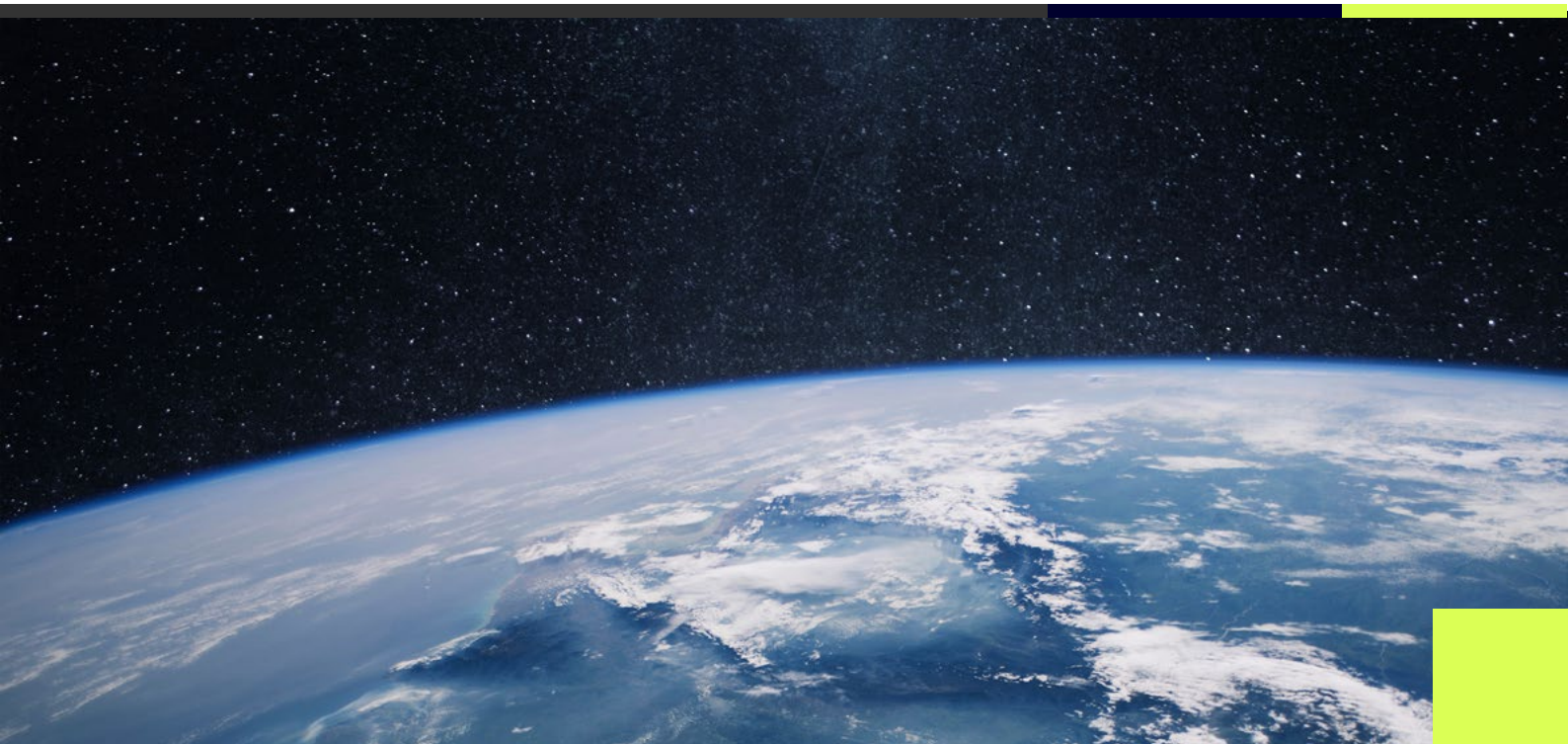


1. Management Summary

When it comes to space, most people still think of Sci-Fi series and spectacular images of galaxies and solar systems. But beyond these seemingly fantastic worlds, space has already established itself as a solid and promising economic sector.

The renewed race into space is in full swing and the battle for a share of the rapidly growing space economy is intensifying daily. The forecast growth of this economic sector is significantly higher than the expected growth of the global economy. Another special feature of the space economy is that there are currently no binding rules on how to operate in space. The individual private and state players are currently using their economic and political power, both individually and in various cooperative ventures, to simply create facts.

Although this virtually unregulated market environment harbors considerable risks, it also offers companies the advantage of shaping the path of an entire economic sector through ambitious action and the use of innovative products and strategically well-balanced business models.



2. Introduction

„Space, the final frontier. These are the voyages of the starship Enterprise. Its five-year mission, to explore strange new worlds, to seek out new life and new civilizations, to boldly go where no man has gone before"

This intro was first heard by all those who tuned into the NBC channel on September 8, 1966. It is the intro to the television series Star Trek - Starship Enterprise. This series was created at a time when the USA and the USSR were in a race to space and the moon, at a time when nothing seemed impossible, and the superiority of social and political systems was to be proven through scientific progress.

Fast forward to the year 2025, January 20th to be precise, and the 47th President of the USA, Donald J. Trump, uses the following words in his inaugural speech: „The United States will once again consider itself a growing nation, one that increases our wealth, expands our territory, builds our cities, raises our expectations and carries our flag into new and beautiful horizons and we will pursue our manifest destiny into the stars launching American astronauts to plant the stars and stripes on the planet Mars."

Standing just a few meters away from Donald Trump at this moment is not only Elon Musk, the owner of SpaceX, but also Jeff Bezos, the owner of Blue Origin. These two companies are probably the best-known private space companies in the world, but they are only the prominent tip of a multitude of private space companies that are driving forward the commercialization of space at an unprecedented speed.

For observers around the world, it seems that exactly 55.5 years after the first moon landing on July 20, 1969, an unprecedented pact was made between politics and business to once again demonstrate their own superiority through technological progress. This pact can be understood as nothing less than a starting signal for new and daring pioneers to conquer space once again.

3. Who owns outer space? (The ownership structure)

If space is now understood as a place of new opportunities and thus as a new economic area, the question immediately arises as to what rules apply in this market, or are there any rules at all and who has what claims?

To answer this question, let's jump back to 1967, October 10 to be precise, when the so-called "Outer Space Treaty - Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies" came into force. At the time, this treaty was intended to ensure that neither the USA nor the USSR would pursue military or territorial activities in outer space:

Article II states: "Outer space, including the moon and other celestial bodies, shall not be subject to national appropriation by claim of sovereignty, by use or occupation, or by any other title."

The treaty should also ensure that all activities in space are of a purely peaceful nature and are intended to benefit humanity as a whole.

Article I states: "The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their level of economic or scientific development, and shall be a matter for all mankind."

If we now take the Outer Space Treaty as a basis, the question of who owns outer space and what rules apply there seems quite simple - namely that outer space does not belong to anyone and the basic rule is that it should stay that way, as its exploration should benefit humanity as a whole and not individual players!

But is this really the case and are all sides actually adhering to this agreement?

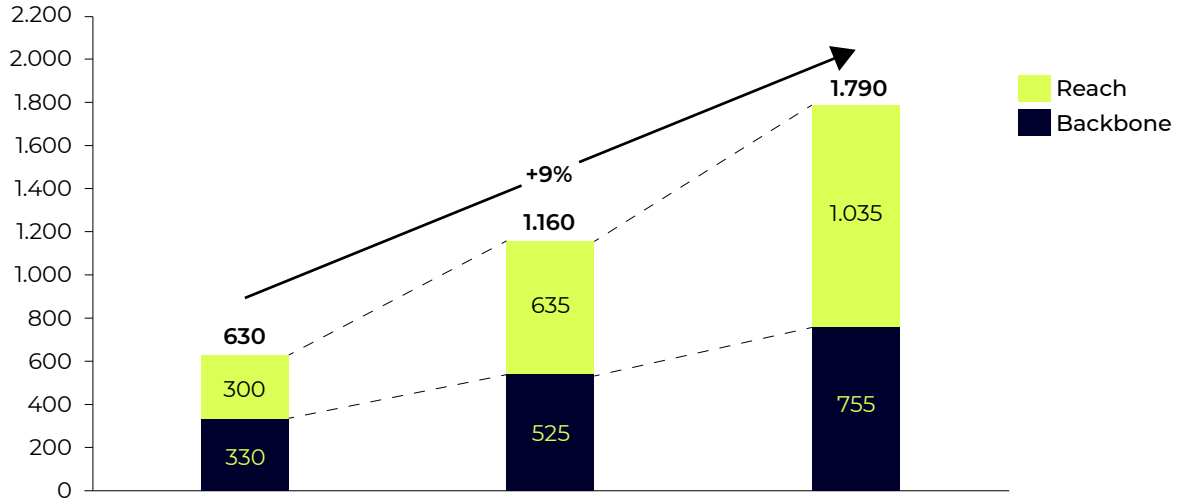
4. The man who sold the Moon

We jump to 1980 San Francisco, where Dennis Hope founds the company Luna Embassy and starts selling land on the moon. But how did Dennis Hope come to this? After all, the Outer Space Treaty stipulates that space, and explicitly the moon, belongs to no one, right? The idea of claiming the moon as his property is said to have come to him around 1972. His creative business idea was based on a combination of what he saw as a logical loophole in the space treaty and an old law in San Francisco that he was aware of. According to the wording of the Outer Space Treaty, only states are prohibited from claiming ownership in outer space, not private individuals. In addition, an old law in San Francisco stipulates that you become the owner of a piece of land if you file a so-called “claim” and this claim remains unopposed for a period of time after publication. Since the necessary objection was never raised, Hope began selling numerous plots of land on the moon and became a rich man as a result. With his idea of selling the moon, Hope could therefore be seen as a pioneer in the commercialization of space.

5. Space as a new market

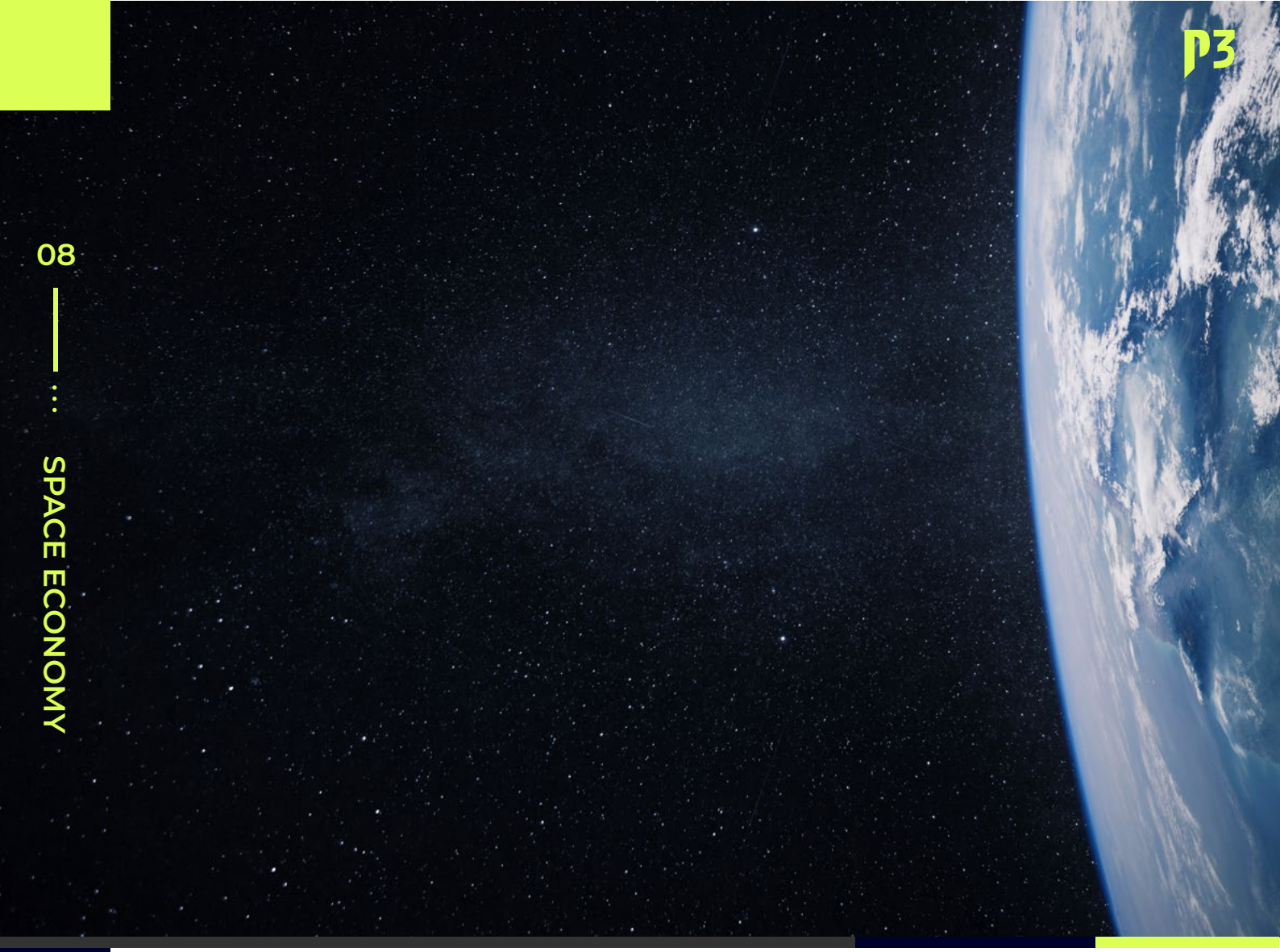
The idea of selling the moon dates back 45 years. In the meantime, the so-called space economy has become a globally growing industry which, like space itself, seems to know no bounds in its growth. While space and all activities in it were originally reserved purely for the institutions of states, such as NASA, space has been commercialized bit by bit and with increasing speed over the last few years. This commercialization has meant that many countries and research institutions are now dependent on private companies to transport their people, goods and scientific instruments into space. In a joint study between McKinsey & Company and the World Economic Forum, published in 2024, the economic potential of the space economy was examined. While revenue for 2023 was still around 630 billion US dollars, the study predicts that revenue will increase to around 1.8 trillion US dollars by 2035.

Global space economy in $ billion



Source: Future of Space Economy research

This increase would correspond to annual growth of around 9%, which would be higher than the expected growth in global gross domestic product. The **supply chain and transportation; agriculture; defence; retail, consumer goods and**

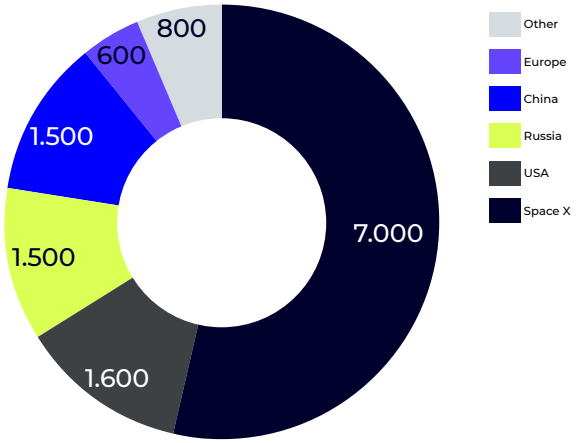


lifestyle as well as digital communication sectors were identified as accounting for an estimated 60% growth. The study also emphasizes how important private sector investment is for the forecast growth. In 2021 and 2022, investments from the private sector already amounted to around 70 billion US dollars. The involvement of private companies is so essential because, unlike state institutions, they are subject to the rules of the free market and competition. These framework conditions lead to innovations and increases in efficiency that are only possible in the free economy through constant competition. An indispensable increase in efficiency can already be observed on the absolute basis of the space economy, namely the rocket launches required for transportation into space and their costs. Over the past 20 years, the cost of a rocket launch has fallen by no less than 90%, which has led to a 50% annual increase in the number of satellites launched between 2019 and 2023.

6. Which (private) players are already operating in space?

Probably the most famous and media-effective player in the space industry is Elon Musk and his company SpaceX. In December 2024, his company was valued at around 350 billion US dollars. SpaceX's commercial success is based on its reusable rocket parts. Before SpaceX succeeded for the first time in 2017 in bringing a rocket safely back to Earth after launching it into space, rockets were de facto disposable products that could only be used once and burned up on re-entry into the Earth's atmosphere after completing their task. The ability to reuse rocket parts immensely reduced the cost of transportation into space. In addition to its reusable rockets, SpaceX has also transformed the satellite sector. With a total of around 7,000 satellites (as of January 2025), out of a current total of around 13,000 satellites, SpaceX is by far the largest satellite operator in the world with its Starlink network.

Global distribution of satellites



Source: Statista

SpaceX currently has approvals for a total of 19,427 satellites. In addition, the company is said to already have plans for a further 22,488 satellites. The aim of Starlink is to offer a seamless global mobile network that is no longer reliant on

traditional radio towers. The power and influence associated with this network became clear during Russia's invasion of Ukraine at the latest. In Ukraine, Starlink ensures that communication networks are maintained in large parts of the country. As there is no comparable system anywhere in the world, the Ukrainian state and its supporters are de facto dependent on the monopoly of a private company.

SpaceX's biggest competitor is probably Blue Origin. Founded by Jeff Bezos on September 8, 2000, the company pursues the goal of enabling space tourism and transporting humanity into space in the long term by developing reusable rockets. The company attracted particular media attention in October 2021 when it transported the then 91-year-old William Shatner, known as Captain James Tiberius Kirk of the Starship Enterprise from the TV series Star Trek - Starship Enterprise, into space as the oldest person to date. The previously unlisted company reported a turnover of around 4 billion US dollars in 2024 and was awarded a 3.4 billion US dollar contract in 2023 to develop the "*Blue Moon*" lunar lander for NASA's Artemis-V-mission.

In addition to the big players, a whole number of so-called NewSpace companies have already set out to secure their share of the constantly growing market in space. Looking at Germany, there are now around 125 such NewSpace companies. Some of the best-known names are **Isar Aerospace** based in Ottobrunn near Munich, **Rocket Factory Augsburg (RFA)**, **OHB SE** in Bremen, **Mynaric** from Gilching near Munich, **HyImpulse Technologies** from Neuenstadt am Kocher and **PTS (Planetary Transportation Systems)** based in Berlin. The fields of activity of these companies range from the development of cost-effective and efficient new rockets (Isar Aerospace & Rocket Factory Augsburg), the construction of satellites and space components (OHB SE), the development of laser communication technologies (Mynaric), the development of new rocket propulsion systems (HyImpulse Technologies) and the development of technologies for lunar missions and planetary exploration (PTS).

On a global scale, there is no reliable information on how many NewSpace companies there are, but the number is likely to be significantly higher and is growing almost daily. The "Space Innovators USD" ETF, which comprises 50 companies active in the space industry and its fund volume of USD 74.6 billion

(as at February 2025), provides some indications of global entrepreneurial activity. Another indication is the fact that over 200 financing rounds with a total volume of around USD 15.4 billion were already carried out in this sector globally in 2021.

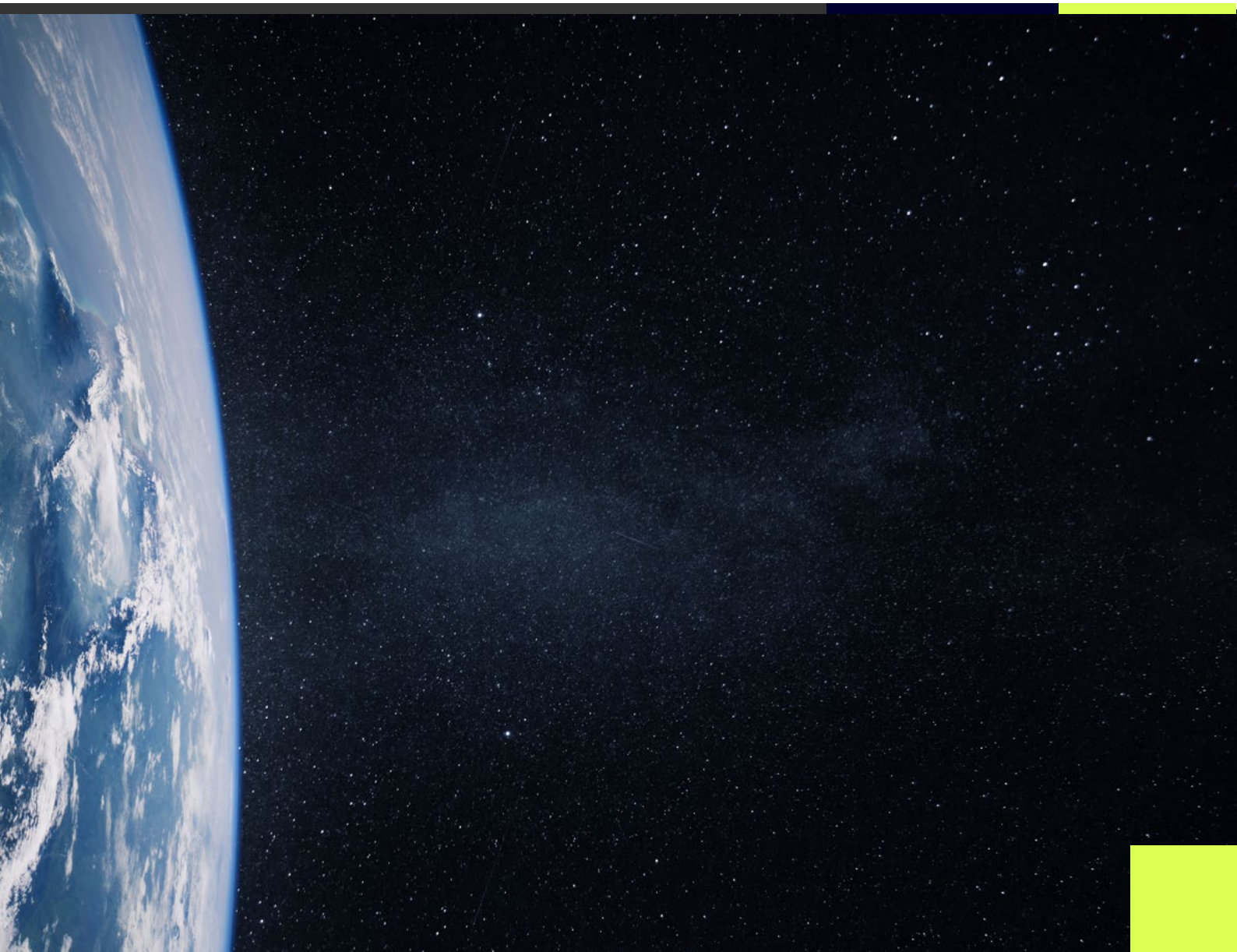
Besides those new players, established aerospace companies such as the European company **Airbus** are also closely connected with the NewSpace scene. Despite its status as an established aerospace company, Airbus is also involved in numerous NewSpace initiatives. Examples of Airbus' involvement in this emerging field include:

- Collaboration on the **OneWeb satellite constellation** with the aim of being able to offer broadband Internet worldwide, similar to SpaceX.
- The **Airborne Innovations** project with its aim to develop new technologies such as platforms for SmallSats (small satellites) in order to serve the market for smaller and more cost-effective space missions.
- Work on orbital service modules known as "**space tugs**", which are used to maintain and dispose of satellites in space. This is an emerging area of activity given the increasing number of satellites in space and thus the potentially increasing amount of space debris.
- Involvement to increase the efficiency of the **Ariane 6 launcher** to compete with other rocket providers such as SpaceX and Blue Origin.

In addition to all these projects, Airbus is also supporting young NewSpace companies through its own innovation arm, **Airbus Ventures**, in order to develop disruptive technologies together with these start-ups.

In addition to the obvious areas of activity, however, there are also areas of the space economy that do not immediately spring to mind when you think of the conquest of space. One of these areas that you only see at second glance is the area of **space food**, for example. Due to its pioneering work in the early days of space travel, the USA is (still) the leader in this field. With the development of freeze-drying and special packaging for weightlessness, the USA has created de facto global standards, which have resulted in a monopoly position in this area to this day. In 2024, however, efforts have been made in **Bulgaria and Lithuania** to break this monopoly. In Bulgaria, the entrepreneur **Neli Simeonova**, together with

the writer **Lyudmila Filipova** and the **Institute of Cryobiology**, have come up with a plan to start producing space food in Bulgaria. Looking more closely, however, this is a reactivation of this sector of the economy. In the 80s and 90s of the last century, there was already a renowned production of such specialty foods in Bulgaria, but this came to a standstill during the economic upheavals of the 90s. Another new player on the market is the Lithuanian company **Super Garden**, which received funding from the European Space Agency (ESA) in 2024 to develop freeze-dried snacks for astronauts. In addition to commercial success, the aim of these efforts is to diversify and thus break the quasi-monopoly of the USA in this area.



7. Which (governmental) players are operating in space and what are their ambitions?

In addition to all the private companies, there are also still governmental actors, whereby there is an increasing number of competitors, similar to the private sector. Probably the best-known government player is still **NASA**. NASA is currently working on a manned return to the moon with its Artemis program. Originally, NASA had set the goal of returning humans to the Earth's satellite in 2026, but had to postpone this goal until 2027 due to technical difficulties. Within the Artemis program, which was launched during Donald Trump's first term in office, it would be the first time humans have set foot on the moon since 1972, some 55 years ago. In addition to simply returning to the moon, the Artemis program also includes the construction of a lunar station to enable permanent human stays. In addition, the Artemis program is also considered a blueprint for a manned mission to Mars. Since 2019, the US has also had the so-called "*Space Force*", which was created by then US President Donald J. Trump as a new US armed force. With its establishment, the USA has clearly assigned space a military significance in addition to its economic importance. This shows that the space race has taken on a new, all-encompassing character.

The USA's biggest rival in the reignited space race is probably China. According to current information, China is planning a manned mission to the moon in 2030, which would put it around three years behind the USA. In addition, China is not only planning to establish a permanent lunar station near the lunar south pole, but also to launch a manned mission to Mars by 2033. China is also pursuing ambitious plans in the area of satellites. As part of the "*Qianfen*" project, around 15,000 satellites are to be launched into orbit by 2030 in order to establish its own satellite-based broadband internet network, similar to that of Starlink. The first 18 satellites have already been launched, with the number set to rise to 648 by the end of 2025. The Chinese government's own Tiangong space station, which was completed in 2022, is a project that has received less attention. In contrast to the world-famous

international space station ISS, in which a total of 15 nations are involved, Tiangong is a purely Chinese space station. In addition to all its economic and scientific endeavors, China has also made it clear that space is also military territory. China's view was noted worldwide when, on January 11, 2007, China succeeded in using a ground-based anti-satellite missile to destroy its own Fengyun-1C satellite, which had been in space since 1999, with the utmost precision. With this destruction, China became the only country to date to prove that it is capable of specifically disabling communication systems in space.

In addition to the race to infinity between the USA and China, there are other state actors that are playing an increasingly important role when it comes to advancing the space economy. These include **Russia, India, Japan, Europe, Israel, Iran, South Korea and the United Arab Emirates**, although the focus of the individual countries differs significantly.

Russia's current goal is to reactivate space tourism to the ISS by the end of 2025. Looking at **India**, the Indian Space Research Organization (ISRO) is not only planning its first manned space flight for 2025, but also the construction of its own space station like the Chinese one. **Japan** is working closely with the USA in its Artemis program to put Japanese astronauts on the moon for the first time. The **European Space Agency (ESA)** is currently focusing on the development of the new Ariane 6 launcher in order to achieve European independence when it comes to access to space. In order to achieve this independence, ESA is working closely with private players such as Airbus. **Israel, Iran, South Korea and the United Arab Emirates** have also launched their own space programs with the aim of expanding their individual presence in space and securing a share of the constantly growing space economy market.

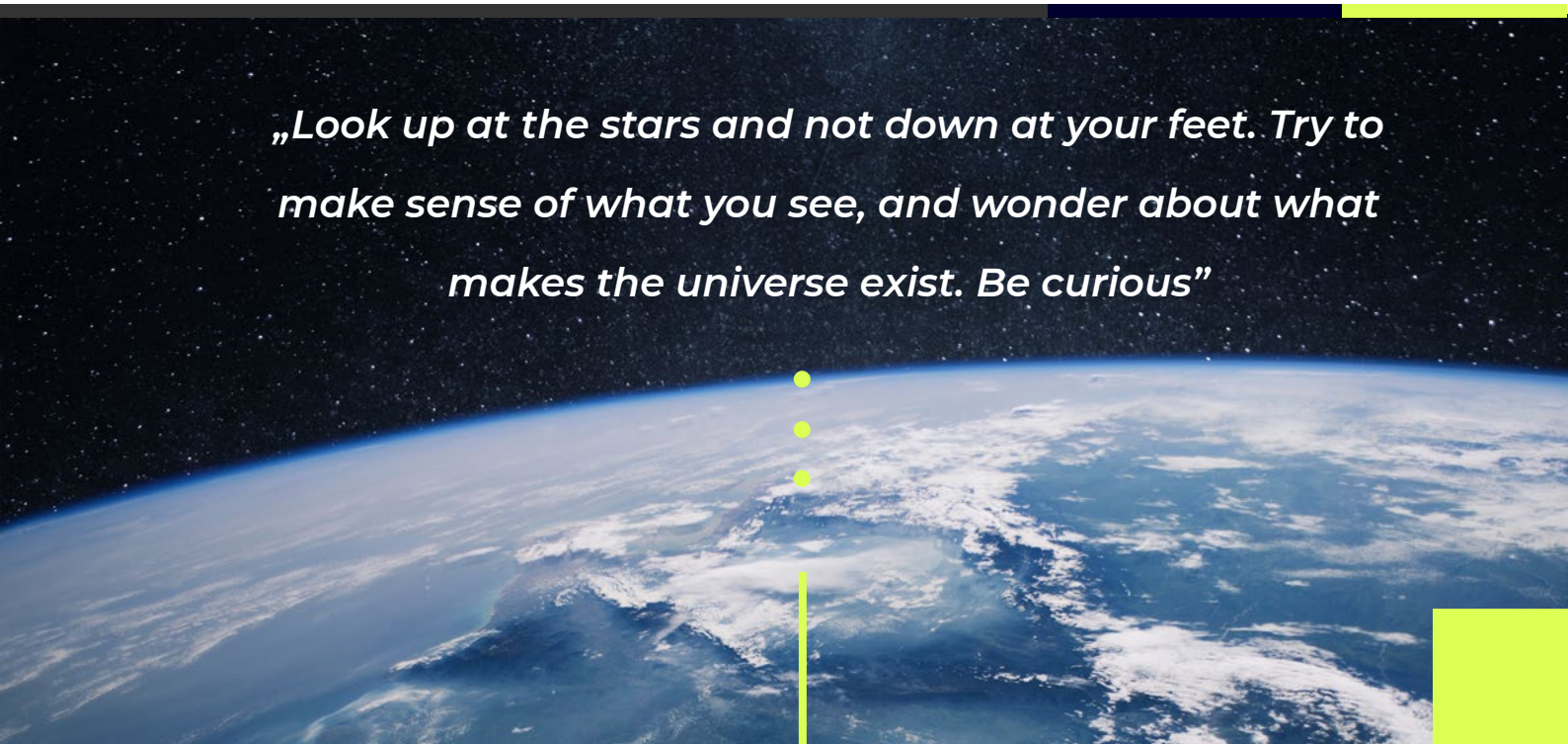
Aside from global politics, there is also a growing awareness of the enormous opportunities offered by the space economy on the somewhat smaller political stage. In Bavaria, for example, the **Bavaria One program** has been launched. In

addition to the establishment of a dedicated faculty for aeronautics, space and geodesy at the Technical University of Munich's Ottobrunn site, the program also focuses on technology leadership in the field of (small) satellites, the development and production of components for space travel and the production of launch vehicle technologies. With this objective, the program offers the opportunity to link the private sector more closely with research in the region and thus make both sides more successful.

8. Where is the journey taking us? (Conclusion)

Looking at the reignited space race, one thing seems clear: in 2025, the 1967 Outer Space Treaty is little more than a historical anecdote. All players, whether private or public, are trying to secure their place in space and thus their share of the promising future of the space economy. The individual players seem to act according to a combination of the motto "*first come first serve*" and the well-known motto of the character Buzz Lightyear from the movie Toy Story (1995) "*to infinity and beyond!*". On the one hand, the players are simply creating facts through their activities and, on the other, there seems to be simultaneous competition to see who has the most ambitious plans. The advantage of this approach for all active and future players is that there are still no binding rules, and the playing field is wide open. There is also the advantage that it is comparatively easy for young and ambitious companies to secure a slice of the ever-growing pie, even though there are already large and established companies such as SpaceX, Blue Origin and Airbus.

The basic prerequisites for the success of all players within the space industry are precise knowledge of current developments, creativity, innovation, security of supply, solid partnerships, a targeted strategic orientation and the desire to venture into uncharted territories. Or as Steven Hawking once said:



Want to find out more about Space Economics and its potential?

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