

# The Future of the Space Industry

The privatisation of space travel is cutting the cost of rocket launches and powering innovation.



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At the SpaceX Launch and Landing Control Center, Spaceport Way, Cape Canaveral, FL, USA. Via Unsplash.

The widely discussed private space missions financed by billionaires like Elon Musk and Jeff Bezos are only part of a far larger development in the space industry, where the focus is shifting from government agencies to private companies. In April 2024, the World Economic Forum [published a study](#) forecasting that, “Lower costs and in



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access to space-enabled technologies such as communications; positioning, navigation and timing; and Earth observation services could take the global space economy to US\$1.8 trillion by 2035, up from US\$630 billion in 2023.”

In 2022, the global space economy was worth US\$546 billion, of which the commercial sector accounted for around 78 percent or US\$427.6 billion. Private companies like SpaceX, Blue Origin, Rocket Lab, and (soon) Stoke Space are playing an increasingly important role.

Hundreds of companies are now active in the space sector, and the competition between rocket manufacturers to find the cheapest solutions for launching satellites has led to dramatic cost reductions. “Thanks to private space travel, the cost of a rocket launch is now only a fifth of what it was 15 years ago,” says space-travel expert Robert Zubrin.

The growing dominance of private companies in the space industry is remarkable because it contrasts so strikingly with more general global political and economic trends. Over the past 15 years, there has been a noticeable global shift towards state intervention and decreasing reliance on market forces. This trend is particularly evident when you compare the policies of the 1980s and 1990s to current developments. Margaret Thatcher was elected prime minister of the UK in 1979 and Ronald Reagan became president of the US in 1981, and both championed the principles of a free market economy. In the 1980s, Deng Xiaoping began his market-economy reforms in China and introduced private property; in 1986, Vietnam launched its “Đổi Mới” market-economy reforms; and in Poland, Leszek Balcerowicz implemented a highly successful policy of capitalist “shock therapy” from 1990. The socialist planned economies in the Soviet Union and Eastern Europe collapsed. Liberalisation, privatisation, and tax cuts characterised this era of economic development.



Today, the trend is quite different: The *Index of Economic Freedom*, an annual report compiled by the Heritage Foundation, [reached a 23-year low](#) in 2024. In the former paragons of free-market reform, the US and UK, economic freedom has declined to its lowest levels since the survey began in 1995. In China, the shift towards a market economy initiated by Deng Xiaoping is now reversing toward more government control. Across Latin America, socialist governments dominate, and numerous countries, including Venezuela, Colombia, Brazil, and even Chile—once a beacon of capitalism—are now governed by socialist leaders. (Argentina has bucked this trend with the rise of Javier Milei.) In Europe, there has also been a noticeable increase in state interventionism, particularly in the name of the fight against climate change.

In the space industry, however, we are seeing the opposite development. During the 1960s, the US's Apollo program marked a significant milestone in space exploration, culminating in the historic moment when two Americans set foot on the moon on 21 July 1969. This achievement was followed by five additional moon landings by the end of 1972, during which a total of 12 Americans walked on the lunar surface. The success of the Apollo program not only showcased the technological prowess of the United States but also underscored the ideological competition between the capitalist United States and the socialist Soviet Union. Of course, the costs were immense: the Apollo moon program cost US\$25.4 billion, the equivalent of more than US\$200 billion today.

NASA made significant strides in scientific exploration through research flights using unmanned space probes. However, no progress was made in the fields of space transportation and manned space travel. "NASA continued to be successful in the field of scientific exploration," Zubrin says. "Projects such as the Hubble Space Telescope marked milestones in science. But it failed in the area of



manned space flight and lost focus after the moon landing. And it was incredibly slow: it took NASA 35 years to develop the Space Launch System SLS, a heavy-lift rocket, whereas Musk managed it in just a few years.”

### Why We Should Settle Mars

Space exploration will bring us inventions that benefit humanity. And it will help us avoid war.

 Quillette • Robert Zubrin



According to the German space travel expert Eugen Reichl, NASA’s shuttle program was an “economic disaster”: “Every single mission cost a billion dollars,” he tells me. “Operating the shuttle was so expensive that all attempts to find a more viable successor aircraft failed to materialise for more than three decades.” There were no further manned missions to the moon, let alone to Mars. And the cost of a space launch remained static from 1970 to 2010, until Elon Musk’s SpaceX succeeded in reducing the cost of a rocket launch by 80 percent from US\$10,000/kilogram to US\$2,000/kilogram with a mostly reusable launch vehicle.

On 22 December 2015, the successful launch of the Falcon 9 from Musk’s SpaceX marked the first time that the first stage of a rocket landed back on Earth after take-off. It was a historic day for space travel and the new technology revolutionised its cost efficiency. Just imagine the expense if every aircraft became unusable after a single flight and had to be replaced. But this was far from the only innovation that made rockets like SpaceX’s so much cheaper than ever before.

Before SpaceX, the cumbersome companies that supplied rockets to NASA operated under a different model. They were not incentivised to



build rockets as cost-effectively as possible. NASA would order rockets on the basis of so-called “cost-plus” contracts. The contractors had to document their costs and were then allowed to add a moderate profit of around eight to ten percent to the price. In a market economy, companies always strive to keep costs as low as possible and Musk is famous for his relentless pursuit of innovative cost-cutting measures. He is also awarded government contracts, but at a fixed price, so he is motivated to continuously find ways to cut costs.

According to the logic of cost-plus contracts, the more costs a company generates, the more profitable the contract ends up being to the company. Robert Zubrin remembers: “As a result, it is the norm for such contractors to have overhead rates exceeding 300 percent. Indeed, at the Martin Marietta company (later Lockheed Martin), where I was employed from the late 1980s through the mid-1990s (and which was, along with Boeing, one of the two most successful of the eight major aerospace companies of that era), we at one point had more than 13,000 people at our primary facility, with fewer than 1,000 working in the factory—leading one wit to scoff: ‘At Martin Marietta, overhead is our most important product.’” Reichl confirms that these cost-plus contracts were also standard practice in Europe for decades. The higher the costs, the higher the profit. So, nobody in the industry was interested in lower prices.

Elon Musk is by no means the only major player in the private space industry today, but he is the most important and he is certainly its pioneer. In 2001, after selling PayPal, Musk was sitting with some of the company’s alumni in Las Vegas and one of them asked him what he was planning to do next. “I’m going to colonise Mars,” he declared. “My mission in life is to make mankind a multi-planetary civilisation.” His colleague’s reaction? “Dude, you’re bananas.”



But where to start? During his Google research, Musk came across an announcement for a dinner being hosted by an organisation called the Mars Society in the spring of 2001. Admission was US\$500, but Musk ended up sending a check for US\$5,000, which caught the attention of Robert Zubrin, the society's founder and president. Zubrin met Musk and invited him to spend a day at his company near Denver. Musk then donated a further US\$100,000 dollars to the Mars Society to finance the Mars Desert Research Station project. For a time, Musk was also on the Mars Society's board of directors.

I met Robert Zubrin in May 2024 in Frankfurt and asked him what he thought were the factors that enabled Musk and his company SpaceX to achieve such extraordinary results: "Musk is driven. But it's not money that drives him, he has enough of that. He wants to go down in history. The most important factor was Musk's refusal to adhere to absurd cost-plus programs. And he was good at implementing existing ideas that had previously been rejected. For instance, the idea of designing only the lower stage of a rocket for reusability was initially proposed by Boeing but dismissed by NASA. Musk built the Falcon Heavy rocket in just six years. It has half the payload capacity of the Saturn 5, but is largely reusable, unlike the Saturn and other predecessors, which could only be used once. Musk's Starship, a fully reusable, completely revolutionary vehicle, has been in development for eight years."

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Perhaps the most prominent champions of private space travel are Jeff Bezos, the founder of Amazon and Blue Origin, and Richard Branson, the British billionaire behind Virgin Galactic. And although the media often focuses on the concept of space tourism, which involves offering the wealthy trips to space, Bezos and Musk have both set their sights on loftier goals. But their motives are different. Bezos, in particular,





envision a future in which a significant proportion of industrial production takes place in space as a means of addressing environmental challenges on Earth. Back in 2016, the [Amazon founder said](#): “Over the next few hundred years all of our heavy industry will be moved off-planet and Earth will be zoned residential and light industrial. And that just makes a lot of sense! You shouldn’t be doing heavy industry on Earth. Resources are more plentiful in space. ... We can build gigantic chip factories in space, and then just send the little bits down. We don’t actually need to build them here.”



Musk, on the other hand, wants to settle millions of people on Mars, in part because he is convinced that humanity has no other chance of survival in the long run. Asteroids from space keep hitting planet Earth—one such collision led to the extinction of the dinosaurs and almost all life here. Of course, this could also happen on Mars, but if it happens on Earth and people are living on Mars by then, then the survival of humanity would be assured.



For decades, America has been keen to send humans to Mars, yet government-funded space programs have made little progress towards achieving this goal. While there have been plenty of successful unmanned missions to Mars that have greatly expanded our understanding of the planet, the objective of a manned landing on Mars has not been actively pursued, even after US President George H.W. Bush [announced](#) his “Space Exploration Initiative” on 20 July 1989:

In 1961 it took a crisis—the space race—to speed things up. Today we don’t have a crisis; we have an opportunity. To seize this opportunity, I’m not proposing a 10-year plan like Apollo; I’m proposing a long-range, continuing commitment. First, for the coming decade, for the 1990s: Space Station Freedom, our critical next step in all our space endeavors. And next, for the new century: Back to the Moon; back to the future. And this time, back to stay. And then a journey into tomorrow, a journey to another planet: a manned mission to Mars.

Three months after President Bush’s speech, NASA [published a study](#) titled “Report of the 90-Day Study on Human Exploration of the Moon and Mars.” The costs were so high that the authors of the 90-Day report did not even dare to include an estimate. However, a figure eventually leaked to the press: US\$450 billion (equivalent to around US\$1.1 trillion today).

### What We Can Create on Mars

Mars contains all the materials needed to support not only life but technological civilization.

 Quillette • Robert Zubrin





Robert Zubrin immediately realised that the proposed plan was completely unrealistic, far too complicated, and exorbitantly expensive. Zubrin, who worked at Martin Marietta at the time, developed a detailed plan, which included a number of innovations designed to reduce costs, such as eliminating the need for a space station or moon base. People within NASA linked to the Space Station program viewed Zubrin's proposal as a direct threat, especially as he argued that a space station was unnecessary as an intermediate link to fly to Mars. Zubrin revised his original plan. The modified plan came with a price tag of approximately US\$50 billion, about twice as expensive as his original "Mars Direct" proposal, which would have cost about US\$20–30 billion. Despite the higher figure, the amended plan would still cost just one-eighth of NASA's original plan.

In 1996, Zubrin published a widely acclaimed book, *The Case for Mars*, in which he described in detail how a Mars mission and subsequent colonisation of the red planet could be achieved. Of course, there are challenges associated with travelling to and inhabiting Mars, such as radiation and weightlessness, but he proposed innovative solutions to address these obstacles.

The objective, he suggested, should not merely involve replicating the moon landing by making a brief visit to Mars, planting a flag, and spending the next few decades basking in the pride of that achievement. That would be a total waste of time, money, and effort. The true aim, Zubrin argued, should be the colonisation of Mars. He suggested that while the first Mars missions would probably be state-funded, the long-term goal of establishing a colony on the planet could only be achieved with private-sector innovation and investment. The Mars colony, he explained, could exploit numerous unique advantages. It would be much easier and more cost-effective to access the resource-rich asteroids from Mars. He also believes that the challenging living conditions on Mars and the constant need to find



new solutions to problems would lead to an innovative boost, which would ultimately also benefit the economy on Earth.

These are of course visions of the future that might only become reality a few decades from now, much like the economic exploitation of asteroids. Today, the primary source of revenue in space technology comes from satellites, which have been playing a key role in various aspects of our daily lives for years—from GPS navigation to weather observation and telecommunications. The privatisation of space travel is constantly cutting the cost of rocket launches, which has cut the cost of launching satellites into orbit. This has also resulted in the transformation of the aerospace industry, which was once dominated by a few large corporations but is now experiencing a surge in start-ups entering the market, creating a vibrant “new space” start-up scene.

Space travel has been moving towards a more market-oriented approach for years. In January 1984, Ronald Reagan [gave a visionary speech](#) predicting a great future for private space travel:

The third goal of our space strategy will be to encourage American industry to move quickly and decisively into space. Obstacles to private sector space activities will be removed, and we'll take appropriate steps to spur private enterprise in space.

We expect space-related investments to grow quickly in future years, creating many new jobs and greater prosperity for all Americans. Companies interested in putting payloads into space, for example, should have ready access to private sector launch services. ... So, we're going to bring into play America's greatest asset—the vitality of our free enterprise system.

Several months later, President Reagan signed the Commercial Space Launch Act, an ambitious piece of legislation that paved the way for



private companies to commercialise space travel and space technology. Despite this significant milestone, it would take many years before Reagan's vision would come to fruition. Following the historic moon landing, progress in American space exploration began to stagnate. It became clear that the state was too sluggish to tackle the next frontier of space exploration.

However, a few forward-thinking individuals like Peter Marquez, the former Director of Space Policy for the National Security Council, played a crucial role in shaping the future of space policy. He advised both the Bush and Obama administrations: "When I was writing the National Space Policy," [Marquez explained](#), "I kept a copy of Reagan's first space policy on my desk. It emphasised what commercial industry could do. Since then, we had gone away from all these things that were supposedly hard and fast rules of the American ethos: trust industry, trust capitalism, trust technology. In 2010, I didn't think I was doing anything revolutionary. I was just going back in time to the 1980s."

Perhaps that would not be such a bad idea for economic policy as a whole. More market, more economic freedom, and more capitalism yield better results than a policy dominated by the government—a principle that extends beyond just space travel. It is interesting to note that Barack Obama, of all people, promoted private space travel. In 2016, the [Washington Post reported](#): "Obama brought capitalism to outer space." However, according to Zubrin, this was entirely unintentional. "Obama wasn't interested in space travel at all, he wanted to spend the money on social programs. When it was suggested to him that private companies should do what the government used to do, he replied: 'Good idea.'" And that's how Obama ended up promoting private space travel. Sometimes, clearly, the best outcomes are achieved when politicians have absolutely no interest in an issue.

