

Dossier de synthèse inversée – Gp 6 : Oscar / Julien / Hadrien / Armand

En vous appuyant uniquement sur les documents du dossier thématique qui vous est proposé, vous rédigerez une synthèse répondant à la question suivante

What is at stake with the new space race?

Votre synthèse comportera entre 450 et 500 mots et sera précédée d'un titre. Le nombre de mots rédigés (titre inclus) devra être indiqué à la fin de votre copie.

Document 1 - Building in zero gravity: the race to create factories in space, *theguardian.com*, 25 sep 2023

So far, the public faces of the new space race have been billionaires like Jeff Bezos and Richard Branson joyriding around in rockets, having maybe the most expensive midlife crises ever. But behind the scenes, big tech is thinking more seriously about the first non-Earth production lines.

For some startups, the most pressing questions in manufacturing right now are: how do you build computer parts, harvest stem cells or produce pharmaceuticals while in space?

A group of founders say it's already happening, at least at the research level. Nasa has given a \$2m grant to scientists who want to see if zero-gravity conditions can help produce new stem cell and gene therapies. The defense company Northrop Grumman partnered with a startup that aims to produce semiconductors in space. By the end of this decade, one expert says, we'll be using items that contain some element that was built off of Earth.

Why go through the trouble of "off-planet manufacturing"? Jeff Bezos told CBS's Gayle King that heavy manufacturing and air-polluting industries could operate away from Earth. "This sounds fantastical ... but it will happen," Bezos said.

Advocates say that certain conditions in space, including the lack of gravity, low temperatures and near-perfect vacuum, mean that certain ingredients, such as crystals, can be made at a better quality than on land. [...]

Pharmaceutical companies are betting that new drugs can be made in space. Merck works with the International Space Station (ISS) to produce proteins in zero-gravity. Astronauts conducting experiments for the pharmaceutical giant have found that crystals grown for the production of its oncology drug Keytruda are smaller and more uniform than the ones grown on earth.

Researchers at Bristol Myers Squibb have said they're testing how to use resources built off-planet to make drugs easier to store. Robert Garmise, associate director of material science and engineering at BMS, told the trade publication Pharma Voice that the company was "involved in a number of different therapeutic areas" such as immunology, fibrosis, cardiovascular disease and neuroscience.

Kevin Engelbert, manager of Nasa's In Space Production Applications portfolio, told the Guardian that the agency had collaborated with commercial partners to enable off-Earth manufacturing since about 2016. The goal is to develop a "low-earth orbit" (Leo) economy that will strengthen the US's leadership in the tech world. But the next phase of space capitalism will not be seamless. [...]

This, though, is just the beginning. In 2031, the ISS will be decommissioned and plunged to a watery grave at the bottom of the Pacific. After that, Nasa will rent space on commercial space vehicles instead. It's a move the agency says will save \$1.3bn in 2031 alone. [...]

Document 2 - The Brave New World of Space, *geospatialworld.net*, oct 3 2023

[...] The major difference between the '*Space Race*' and the '*New Space*' era is the unparalleled liberalization and unshackled access. What was hitherto a monopoly of national space agencies, with core technology limited to only a handful of nations' has achieved the semblance of a 'level playing field' where entry barriers, as well as cost of launches, are drastically being reduced.

From just one satellite in orbit in 1957, to 50 put in orbit just by the USA by the mid-1960s, today over 10,000 satellites are hovering above the Earth. Most of these are by private companies, not government entities. [...]

"Today, the highest number of satellites in space are by Space X and OneWeb respectively, which are both private companies. New Space actors are looking at ways to utilize capability, creating a billion-dollar economy", [Clayton Mowry, President, International Astronautical Federation] adds.

This seamless transition from space being a restricted-access turf of national space agencies to a level-playing field of entrepreneurship and innovation is certainly one of the defining shifts in the past decades.

Be it mapping and navigation that powers the billion-dollar location economy, or the utility of satellite imagery and analytics for agriculture, infra monitoring, planning & designing, mining & metallurgy, space has been a game-changer, adding immense economic value.

“The contours of our current space-age include more diverse actors, both in terms of countries and private sector actors. All of them are aided by a lower cost of space access. As more and more countries have their space agencies, space is no longer just about large countries and their interests”, believes Alexander MacDonald, Chief Economist, NASA. [...]

However, commercial interests and for-profit pursuits haven't reduced the impact of geopolitical tussles in space. Instead, they have become more prominent over the years, as China emerged as a spacing power with a series of its firsts – the first reusable launch vehicle, the first methane rocket, the first SAR rocket etc.

Apart from the ISS, which is set to be decommissioned in 2030, China is the only country in the world that has its space station, Tiangong One.

Though efforts are underway to build space stations, including by private companies such as Axios Space, Boeing, Lockheed Martin, and Northrup Grumman before 2027.

Russia, which launched the world's first space station, Salyut-1 in 1971, and which operated the Mir space station till 2001, also plans to launch its new space station.

Roscosmos, the country's space agency, has invited BRICS countries to be a part of their space station program. As a consequence of the sanctions against Russia post the Ukraine invasion, space cooperation between Moscow and Beijing is deepening. Russia also plans to develop methane-fuelled rockets by 2027.

The launch of Luna-25, Russia's first moon mission since 1976, was replete with '*Back to the USSR*' symbolism. [...]Meanwhile, Russia has become a shadow of its former self in space capability, despite maintaining an edge in powerful rockets, launchers, and an enviable space defense ecosystem.[...]

Document 3 - Space tourism is growing, but only for the rich, *calcalistech.com*, nov 1 2023

An American, a Brit, and a South African board a spacecraft. No, this isn't the opening of a joke, but the third tourist space flight launched by Virgin Galactic last month. This flight follows a successful mission in August and a research mission in June in collaboration with the Italian Air Force. The space launches conducted by Virgin,

involving regular yet often very wealthy citizens, are the result of nearly 20 years of hard work. [...]

Virgin Galactic is not the only company with such ambitions. Other prominent companies include Blue Origin and SpaceX, which together have ushered in this era's space race. However, this time, the competitors are not the United States and the Soviet Union, but billionaires like Jeff Bezos and Elon Musk. According to UBS estimates, the space tourism market is expected to reach a market value of \$3 billion by 2030. [...]

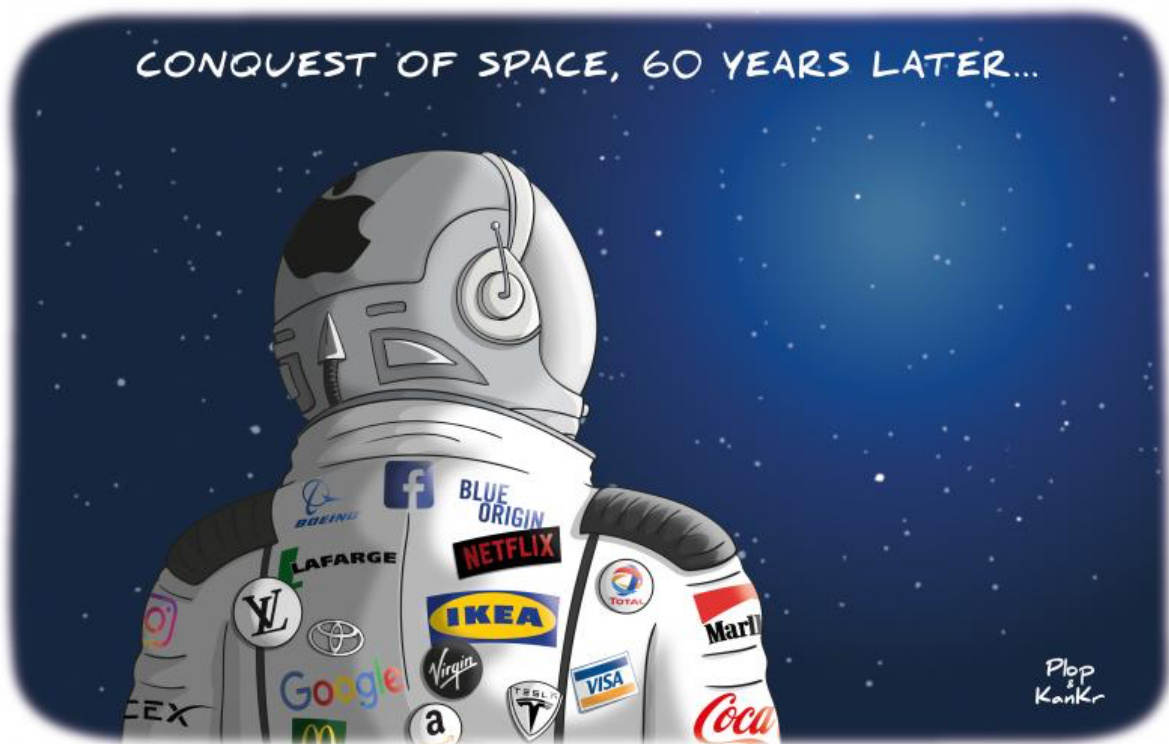
Mayers, an 18-year-old student at the University of Aberdeen in Scotland, is the youngest person to have been sent to space so far [...]. Despite the high cost of space flights, Mayers won her ticket in a lottery organized by the Make-A-Wish Foundation, which aims to make space tourism more democratic.

In contrast to Mayers, the third passenger on that same flight, former Olympic swimmer John Goodwin, aged 80, who suffers from Parkinson's disease, paid \$250,000 for his ticket. He purchased his ticket in 2005, a year after the company's founder, British billionaire Richard Branson, announced his intention to start a space tourism company. His early decision saved him a significant amount of money since, according to the company's website, tickets now cost \$450,000, and there is already an 800-person waitlist. [...]

SpaceX and Virgin Galactic have found ways to engage their enthusiastic fans who are eagerly awaiting their turn. SpaceX, in conjunction with NASA, offers training at the Johnson Space Center in Houston. Similarly, Virgin Galactic offers a preparation program at its spaceport in New Mexico. They are also collaborating with NASA to develop training programs for private astronauts. However, the training required for these space tourists is much less rigorous than that of NASA astronauts. For example, in Virgin Galactic, the training is included in the ticket cost and lasts only a few days, including "fittings for the brand's space suit and boots."

The rush to space has already created new industries, some of which offer slightly more affordable ways to experience space, such as astronaut starter camps and zero-gravity simulation flights. These industries also include special insurance policies for space travel and even plans to build the first space hotels. The New York Times reported that travel insurance company Battleface launched a space insurance policy for civilians at the end of 2021. [...] Looking ahead, the Orbital Assembly Corporation has revealed its plans to build the first space hotel. [...]

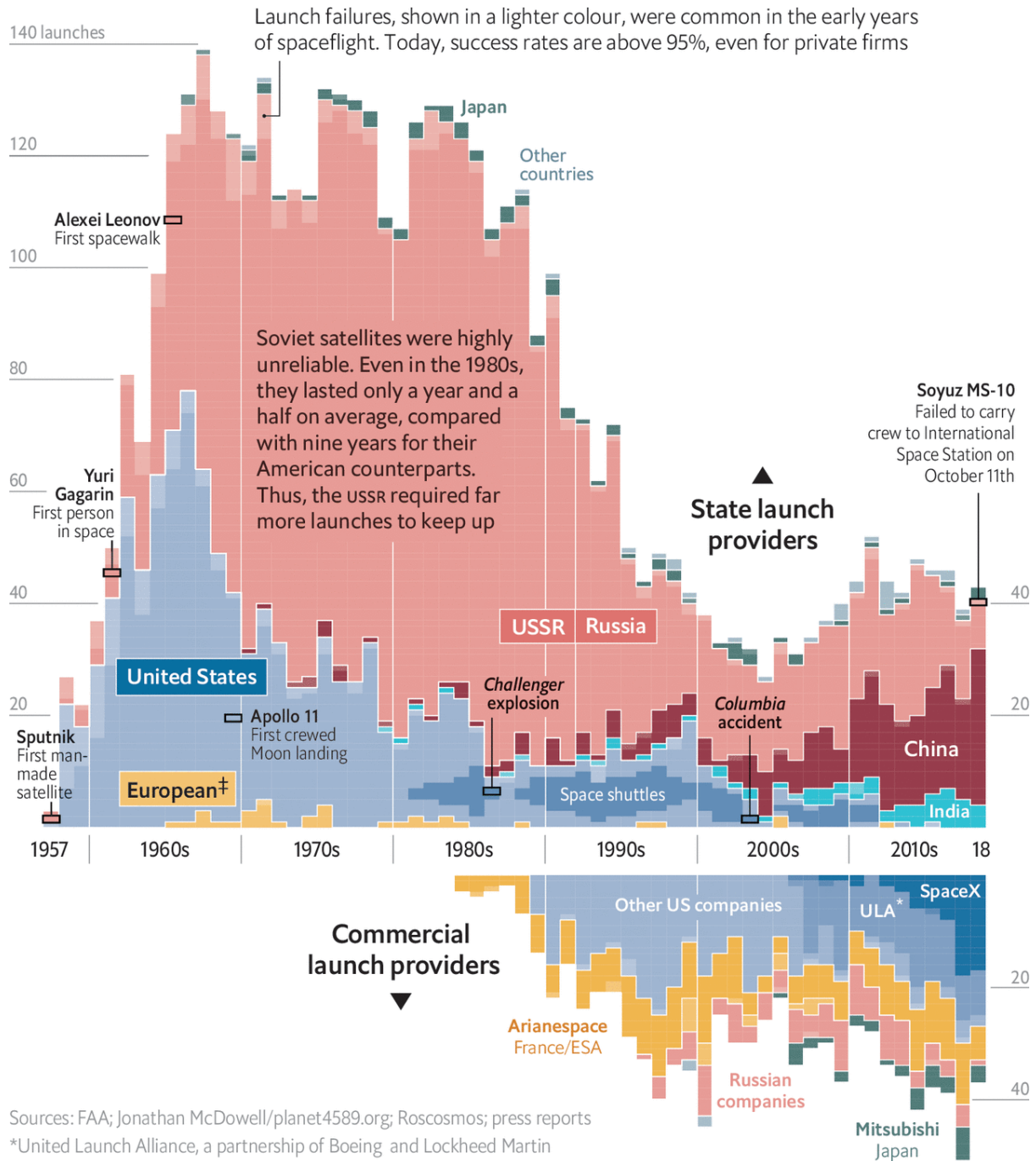
While the industry is developing and growing in demand, it still remains the realm of the wealthy for the most part. It will likely be several more years before it becomes more accessible.



Document 5 -The space race is dominated by new contenders, *economist.com*, 18 oct 2018

Space launches

To Earth orbit or higher, at October 11th 2018



Sources: FAA; Jonathan McDowell/planet4589.org; Roscosmos; press reports

*United Launch Alliance, a partnership of Boeing and Lockheed Martin

†Non-reusable version ‡France, Italy and European Space Agency (ESA)