

Consulting & Analytics Club

Commercializing Space Travel

Introduction



Space travel means a **voyage outside the Earth's atmosphere**. So, even if you are going a little mile above the Earth's atmosphere, it is **considered space travel**.

Commercializing space travel is transitioning from government-led space activities to those driven by private companies seeking profit. This involves:

- **Private investment:** Companies invest in rockets, spacecraft, and infrastructure.
- **Market-driven focus:** Activities prioritize services and products with market demand, like space tourism, satellite launches, and resource extraction.
- **Cost efficiency and innovation:** Companies strive for cheaper, more reliable space travel to gain an edge.
- **Collaboration:** companies, governments, and research institutions work together for advancement and responsible space use.

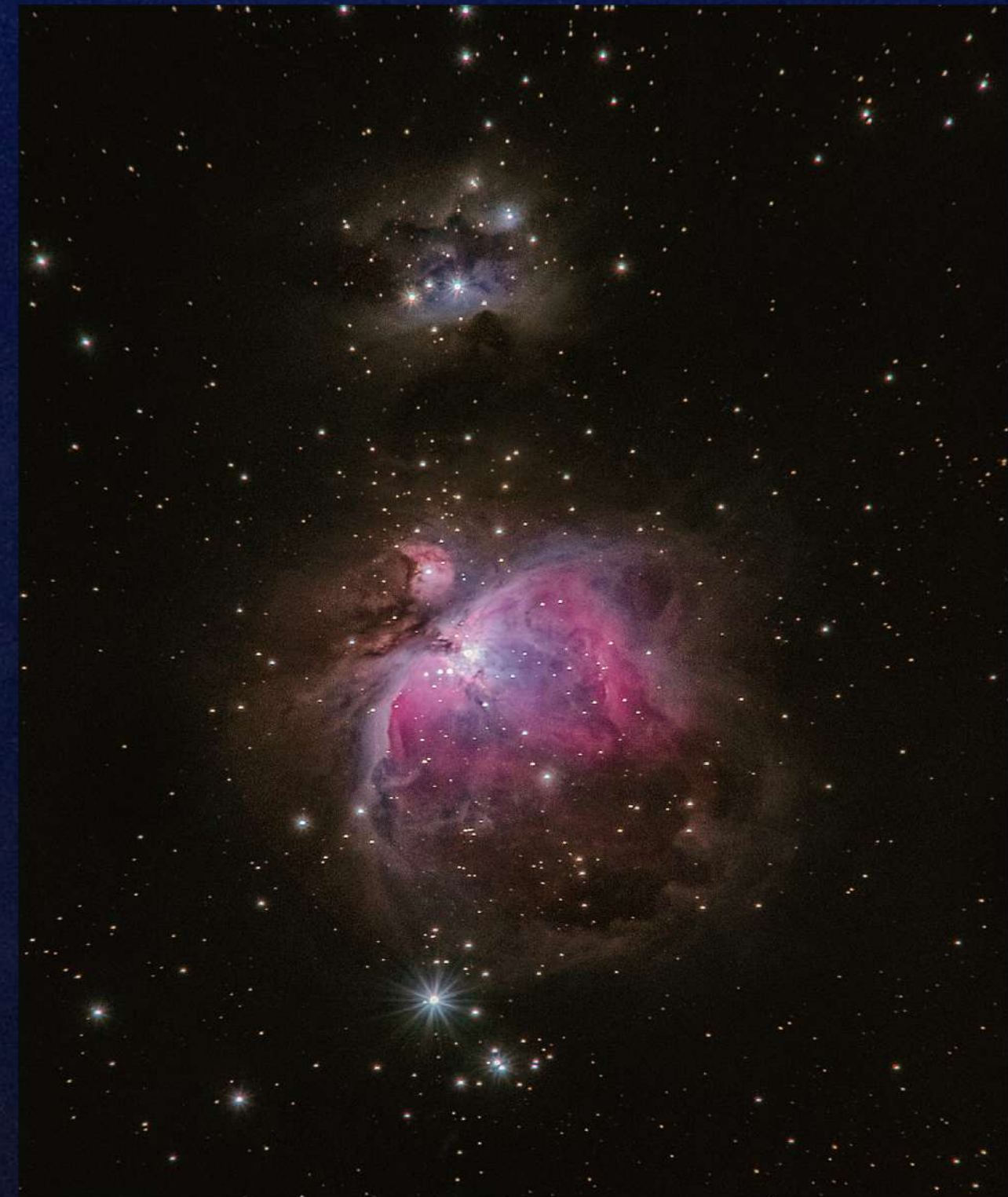
This shift aims to increase accessibility, expand what we do in space, and ultimately make space travel more affordable and widespread.

Space travel can encompass various destinations, such as Proxima Centauri, the closest star to ours, which is still 40,208,000,000,000 km away, or exoplanets like Kepler-186f. However, regarding human space travel, our current focus is limited to Earth's orbit, the Moon, and Mars.

Why this Project?

Space fascinates people universally. We foster a shared passion for the wonders beyond our planet.

- We acknowledge the universal interest in space, and the project seeks to understand and tap into the commercial potential, inspiring a shared passion for business opportunities beyond our planet.
- We aim to explore commercial opportunities, creating a future that brings economic growth, job opportunities, and investments in industries related to space exploration.
- We are exploring innovative strategies to revolutionize space travel commercially, making it feasible and economically viable.



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The fundamental factors hindering fast space travel

For human space travel, we are currently limited to orbiting Earth, visiting the Moon, and exploring Mars due to several limitations such as propulsion, survival, navigation challenges, and the need for advanced shielding technology. These primary challenges must be overcome before we can travel to other destinations.



Why Commercial Travel to Mars Not Feasible in Near Future

Commercial travel to Mars is challenging due to high costs, safety concerns, and limited demand. The 6-9 months journey is a major obstacle. Overcoming these challenges requires advancements in propulsion systems and practical issues. Yet, if we succeed, commercial space travel to Mars could become a reality.



What is the currently available technology for fast travel?

NASA uses advanced propulsion systems like Liquid Apogee Motors, VASMR engines, and Solar sails for fast space travel. Successful missions like Deep Space One highlight the potential for faster speeds. However, there are limitations to the speed of current space travel.

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Can Humans Withstand Such Speeds?

Faster space travel raises concerns about human tolerance to high speeds due to lethal effects of inertia, causing vision loss and loss of consciousness. Trained pilots manage up to nine Gs momentarily, while spacecraft shielding is required to protect against micrometeoroids. Shortening travel times is desirable to mitigate risks like radiation exposure and food supply challenges on longer missions.



What are the current technologies that have the potential to make us achieve faster speeds?

Groundbreaking propulsion technologies like fusion drives, nuclear pulse propulsion, photon drives, photonic propulsion, antimatter engines, and nuclear fusion are being explored to revolutionize space travel. While each offers unique advantages, they are still in theoretical or early development stages and require overcoming significant technical, regulatory, and practical challenges. Despite these hurdles, ongoing research promises to transform space exploration and enable faster, more efficient journeys to distant destinations.



Space travel history

We researched the history of space travel and found significant events that shaped our understanding of the universe. Notable achievements include landing on the moon, launching the first satellite, and human spaceflight. Scientific discoveries include new planets, stars, and galaxies. Space exploration has advanced humanity's understanding of the universe.

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Types of Space Tourism

Space tourism offers suborbital, orbital, and lunar flights with different experiences and costs. Virgin Galactic, Blue Origin, and SpaceX offer suborbital and orbital trips with varying lengths of stay and costs. Lunar tourism, such as the dearMoon project, offers trips to the Moon's orbit or surface with longer durations and advanced spacecraft.



Opportunities Unlocked by Faster Space Travel:

Faster space travel enables efficient exploration, interplanetary trade, and secure astronaut missions. Advancements in energy sources and communication further enhance its potential, paving the way for interstellar travel. Overall, it holds immense promise for advancing humanity beyond Earth's boundaries, offering groundbreaking exploration, economic growth, and enhanced safety.



Why is space travel so expensive?

The high costs associated with space tourism stem from the complexity of space travel, the need for advanced technology, and the numerous expenses involved in designing, manufacturing, launching, and operating spacecraft. As technology advances and the industry matures, there may be opportunities for cost reductions and increased affordability in the future.

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Parallel with the airline industry

The parallels between the rise of the airline industry and the commercialization of space travel reveal intriguing similarities in terms of historical progression, technological advancements, and evolving consumer accessibility



Financial Forecasting

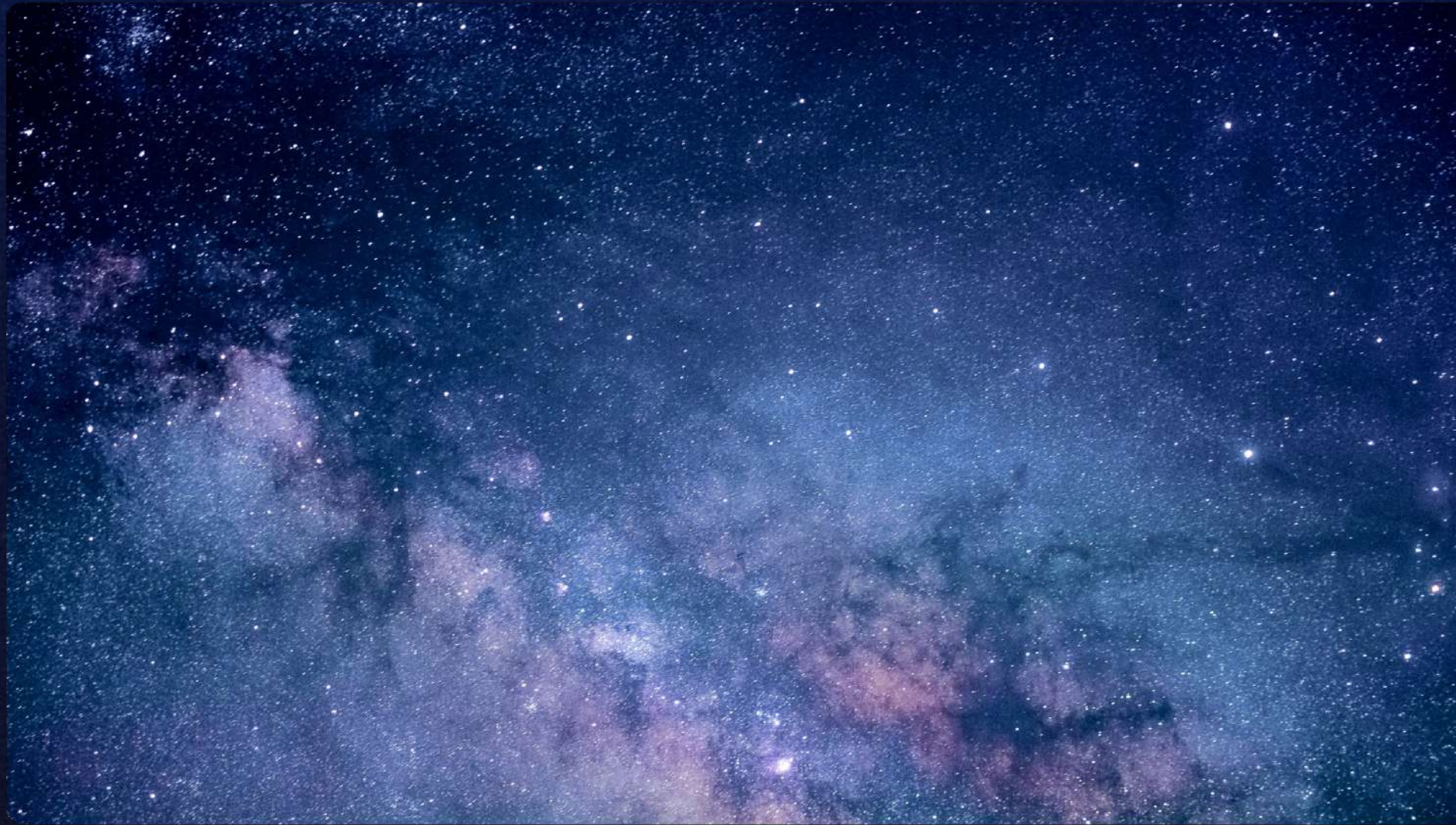
Based on limited data, our financial forecasting suggests that increasing the number of people per flight substantially reduces the cost per passenger, regardless of the orbit. However, overall costs remain high, indicating the need for further reduction. Even with projected cost reductions in the space tourism industry, prices remain prohibitively high for most of the population.



Cost Reduction Strategies for Space Tourism

By using versatile spacecraft design, reusability, streamlined manufacturing, strategic collaborations, and innovative technologies, the cost of space tourism can be reduced. This holistic approach addresses both technical and operational aspects, making space travel more affordable for enthusiasts.

Future Scope



- The project has the potential to pioneer a new industry, opening up opportunities for economic growth, job creation, and technological innovation.
- Breakthroughs in space travel technology will lead to innovations with applications beyond space, impacting fields such as transportation, materials science, and communication.
- Successfully commercializing space travel opens the door to space tourism, allowing individuals to experience space firsthand. This not only fulfills the dreams of space enthusiasts but also creates a new and unique industry.
- the long-term vision of human expansion into space, with the establishment of space habitats, lunar bases, or other structures that support sustained human presence beyond Earth.