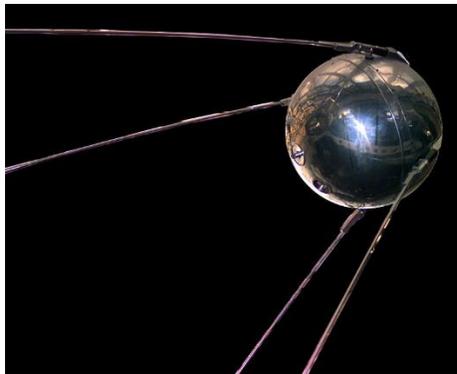


# Balancing Public and Private Interests in the Use of Outer Space



## Background and History

On October 4<sup>th</sup>, 1957, the Union of Soviet Socialist Republics (USSR) launched the first artificial satellite into space.<sup>1</sup> Known simply as Sputnik (Russian for “satellite”), this marked the start of the Space Race, an extension of the Cold War that saw the United States and the USSR both attempting to be the dominant power in outer space. The US soon launched their own satellite, Explorer, on January 31, 1958.<sup>2</sup> This was followed by the creation of the modern American space agency: the National Aeronautics and Space Administration, or

NASA. It wasn’t until 1969 that humans stepped foot on the moon through NASA’s Apollo 11 mission. By this time, interest in space exploration had exploded, with Neil Armstrong’s small step for man being watched live by nearly  $\frac{3}{4}$  of a billion people around the globe.<sup>3</sup>

As the space industry expanded, so did the benefits reaped from its efforts. Some of the clearest examples of the secondary benefits of space exploration are the technological developments it has sparked—such as LASIK eye surgery, a now incredibly common procedure, developed out of NASA’s work on laser radars.<sup>4</sup> Additionally, the Global Positioning System, more commonly known as GPS, is a system of satellites developed by the US military that is now used to timestamp countless financial transactions, study the movement of tectonic plates, optimize the application of pesticides, and, of course, navigate the growing sprawl of urban streets.<sup>5</sup> The late 20<sup>th</sup> century also saw more militaristic uses of space. During the Gulf War, the Allied Coalition were granted a decisive advantage over their enemies through their satellites. These satellites provided information on enemy troop movements, gave early warnings on missile attacks, and allowed for incredibly precise navigation in barren desert terrain.<sup>6</sup>

## International Collaboration

The end of the Cold War saw increased collaboration between government space agencies. The clearest example of this is the existence of the International Space Station, or ISS. With the first segment launched in 1998, the ISS was one of the first truly international collaborations in the space domain.<sup>7</sup> Crossing the divide entrenched by the decades of conflict between the US and the Soviet Union, the ISS was a collaboration between the US, the newly created Russian Federation, the European Union (EU), Japan, and Canada.<sup>8</sup> The ISS is still in operation today, and it has managed to

<sup>1</sup> “The History of Space Exploration.” *National Geographic*. <https://education.nationalgeographic.org/resource/history-space-exploration>.

<sup>2</sup> *Ibid*.

<sup>3</sup> “Space Race Timeline.” *Royal Museums Greenwich*. <https://www.rmg.co.uk/stories/topics/space-race-timeline>.

<sup>4</sup> “The Right Track for Vision Correction.” *NASA Spinoff*. [https://spinoff.nasa.gov/spinoff2003/hm\\_1.html](https://spinoff.nasa.gov/spinoff2003/hm_1.html).

<sup>5</sup> “A Brief History of GPS.” *AEROSPACE*. <https://aerospace.org/article/brief-history-gps>.

<sup>6</sup> “A Brief History of Space Exploration.” *AEROSPACE*. <https://aerospace.org/article/brief-history-space-exploration>.

<sup>7</sup> “History and Timeline of the ISS.” *ISS National Laboratory*. <https://www.issnationallab.org/about/iss-timeline/>.

<sup>8</sup> “A Shared Frontier? Collaboration and Competition in the Space Domain.” *Harvard International Review*. <https://hir.harvard.edu/a-shared-frontier-collaboration-and-competition-in-the-space-domain/>.

continue operation despite friction between some of the nations involved in its operation. Another example of international collaboration is between the EU and China. In the early 2000s, the two parties agreed to launch a set of complimentary satellites to study Earth's magnetic field. This collaboration extends beyond just the initial launch of the satellites, as China and the EU have established cooperative research groups to analyze the data collected from the satellite clusters, along with hosting an annual research symposium to present the groups' findings.<sup>9</sup>

Unfortunately, these collaborations haven't been entirely free from conflict. In response to the Russian invasion of Ukraine in February of 2022, the US imposed additional sanctions on the Russian Federation. Following these sanctions, the director of Roscosmos (the Russian Space Agency) warned that the US's actions would degrade the relationship between the two nations and lead the ISS to come crashing back down to Earth.<sup>10</sup> While the future of this relationship is unknown, it is not the only example of conflict on Earth impacting space-collaboration. This can be seen in US-China relations, as the two nations refuse to collaborate, and China has not been allowed to join the ISS. This was codified in 2011 when the US passed policy that barred US agencies involved in space from using federal funds "to develop, design, plan, promulgate, implement or execute a bilateral policy, program, order, or contract of any kind to participate, collaborate, or coordinate bilaterally in any way with China or any Chinese-owned company."<sup>11</sup> While NASA has still found some ways to collaborate with their Chinese counterparts, this tension and legislation has prevented any serious progress in scientific collaborations between the two nations.

### **Involvement of the United Nations**

Even before the launch of Sputnik, the UN had begun efforts to maintain the peaceful use of outer space, with the organization first considering prohibition of the use of space for military purposes and the placement of weapons of mass destruction in space during the late 1950s.<sup>12</sup> The UN created the Office for Outer Space Affairs, or UNOOSA, in 1958 with the purpose of supporting global activities across the space community.<sup>13</sup> The agency actively collaborated with governments and the greater space community as a whole to best address the fact that space is becoming more congested while the possible benefits of space exploration are rapidly growing.

The UN's efforts to keep space peaceful came to fruition in 1967 with the passage of the "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies," more commonly known as the "Outer Space Treaty," which established the basic framework for international space law. The treaty bars the placement of any weapon of mass destruction in outer space or on celestial bodies. Additionally, the treaty sets forth the basic principles related to the peaceful use of outer space, establishing that space exploration shall be carried out for the benefit of all and that no celestial body may be subject to national appropriation or claims of national sovereignty.<sup>14</sup>

### **The Rise of Private Entities in Space**

In the past few decades, many governments have given less funding and attention to their national space agencies. For example, NASA's budget made up 0.7% of the US's GDP in the mid-1960s

<sup>9</sup> Ibid.

<sup>10</sup> "Russian space program chief says US sanctions could 'destroy' International Space Station partnership." *Space.com*. <https://www.space.com/roscosmos-rogozin-russia-iss-space-sanctions>.

<sup>11</sup> "Congress Bans Scientific Collaboration with China, Cites High Espionage Risks." *Forbes*. <https://bit.ly/3dpexNg>.

<sup>12</sup> "Outer Space." *Office for Disarmament Affairs*. <https://www.un.org/disarmament/topics/outerspace/>.

<sup>13</sup> "Space Technology and the Implementation of the 2030 Agenda." *UN Chronicle*. <https://bit.ly/3qJdlzJ>.

<sup>14</sup> "Outer Space." *Office for Disarmament Affairs*. <https://www.un.org/disarmament/topics/outerspace/>.

compared to around 0.1% now. This drop in federal funding for federal space agencies was



accompanied by a boom in the private sector, with the industry now bringing in \$300 billion in annual revenue, an increase of \$100 billion from only 15 years ago.<sup>15</sup> While different companies have varying interests in investing time and resources into outer space, the driving force has been trying to achieve a self-sufficient space economy. Jeffery Bezos, founder of Blue Origin and Amazon has said that Blue Origin's main mission is to have "millions of people living and working in space" while Elon Musk, founder of Tesla and SpaceX, has expressed his goals of large-scale cities on Mars within the next century.<sup>16</sup> These efforts are no longer merely seen as fantasy, either, as many large investment firms have begun to see private space enterprises are profitable long-term ventures, providing significant legitimacy to their work.

While much of the public's attention is focused on private companies looking towards manned space travel, it is important to note that most of the revenue associated with outer space comes from satellite-related commercial projects. The prevalence of telecommunication in the age of information has been the driving force, along with satellites' uses in scientific and exploratory ventures.<sup>17</sup> Another important field in space travel is the increasingly prevalent realm of "space as a luxury." 2021 alone saw Blue Origin, Virgin Galactic, and SpaceX launch privately crewed missions to space, with Axiom Space sending the first fully commercially operated mission to the ISS.<sup>18</sup>

The rise of private companies has not meant the complete abandonment of government funded space exploration, but rather government support changing forms. Many governments have pushed their space agencies to build more partnerships with the private sector and have started programs that allow their space agencies to fund private ventures. A perfect example of this is NASA's Commercial Orbital Transportation Services, or COTS, initiative.<sup>19</sup> This initiative saw the private sector take the lead on reducing the costs associated with transporting cargos (and eventually crew) into and out of outer space, with NASA acting as a partner to the private sector. Initiatives of this nature has become common, as much of the public has supported partnerships between the public and private space sectors. Unfortunately, programs like COTS have also made cutting the budgets of space agencies more common, as they can be justified by the lower costs associated with private sector space exploration.

## Committee Mechanics

This committee will function as a forum between representatives from both government space agencies and private companies involved in space exploration. Each delegate in the committee will hold the same voting power, regardless of which organization they represent. Within the committee, debate will flow using standard Model UN protocols and MeDMUN procedures. As stated earlier, every delegate holds the same voting power, and no representative holds any form of veto power.

Where this committee differs from a traditional committee is in the products delegates will be able to produce. Members of the committee can produce two different documents: recommendations

<sup>15</sup> "Space, the Final Economic Frontier." *Harvard Business School*. <https://bit.ly/3BPcAv8>.

<sup>16</sup> Ibid.

<sup>17</sup> Ibid.

<sup>18</sup> "Ax-1 crew returns safely to Earth, successfully completing first all-private astronaut mission to ISS." *Axiom Space*. <https://www.axiomspace.com/news/ax1-crew-returns-safely>

<sup>19</sup> "Space, the Final Economic Frontier." *Harvard Business School*. <https://bit.ly/3BPcAv8>.

and multilateral agreements. Recommendations are non-binding resolutions published on behalf of the forum as a whole and require a majority vote by the committee to be adopted. These recommendations can be made to any outside organization, including the United Nations and to different governments or private companies. Multilateral Agreements, on the other hand, are binding agreements that a group of two or more delegates can enter. These documents will not be voted on by the committee and will represent a written partnership between the organizations involved in the agreements. Agreements can be made between governments, between private companies, or between a combination of both. Multilateral agreements will be structured in the same fashion as a traditional resolution but will only bind and affect the policies of the organizations who are signed on.

## Current Situation

### Resource Extraction in Space and The Artemis Accords

With technological advances and the growing involvement of private corporations in space, previous space activities that were considered science-fiction are now thought to be possible within decades. Increasingly, governments and corporations are jockeying for the technology and legal right to exploit resources in space, such as on the Moon or on asteroids. The United States passed a law in 2015 allowing American companies to use resources from the Moon and asteroids; Luxembourg, a member of the European Space Agency, has a similar policy, and in 2021 Japan's parliament passed a similar law.<sup>20</sup>

To make these policies into a reality, NASA through its Artemis Program hopes to return humans to the Moon in the 2020s and establish a lunar base by 2030—with an eye towards facilitating resource extraction on the Moon. In order to participate in the Artemis Program, a country must sign the Artemis Accords. But the Artemis Accords do not just allow a country to collaborate on the Artemis Program, they are also an effort to establish a more advanced legal framework for activities in space, including on the Moon, asteroids, and other planets. For example, the Accords call for signatories to work towards interoperability between different countries' space infrastructure; directs countries to register objects in space under the Registration Convention; and commits signatories to answering distress calls in space.<sup>21</sup>

While the Artemis Accords work off of the 1967 Outer Space Treaty, it has one controversial departure. The Artemis Accords state that, "*The Signatories emphasize that the extraction and utilization of space resources, including any recovery from the surface or subsurface of the Moon, Mars, comets, or asteroids, should be executed in a manner that complies with the Outer Space Treaty and in support of safe and sustainable space activities. **The Signatories affirm that the extraction of space resources does not inherently constitute national appropriation under Article II of the Outer Space Treaty, and that contracts and other legal instruments relating to space resources should be consistent with that Treaty.***"<sup>22</sup> (Bold added for emphasis). A key provision of 1967's Outer Space Treaty is that it forbids any country from claiming the surface of the Moon. Under the Artemis Accords, countries would not claim territory on the Moon, but would be able to establish "safety zones" for resource extraction that other countries should avoid.<sup>23</sup> Already, Australia, Brazil, Canada, France, Israel, Japan, Poland, Saudi Arabia, South Korea, the United Kingdom, and Mexico have

<sup>20</sup> "Trump signs executive order to support moon mining, tap asteroid resources." *Space.com*. <https://www.space.com/trump-moon-mining-space-resources-executive-order.html>; "Everyone's Going to the Moon." *The Economist*.

<sup>21</sup> "The Artemis Accords." *NASA*. <https://go.nasa.gov/3qOpDXA>.

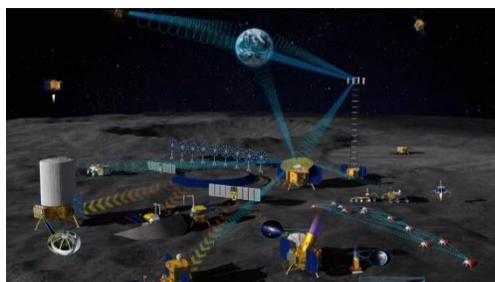
<sup>22</sup> *Ibid.*

<sup>23</sup> "China, US Are Racing to Make Billions From Mining the Moon's Minerals." *Bloomberg*. <https://bloom.bg/3Scjyjf>.

signed onto the Artemis Accords. Notable space powers, such as China, India, and the Russian Federation, have not joined the Accords. China, in particular, has been vocal in its criticism of the Accords believing that it is a landgrab that was unethically negotiated outside of the United Nations and would, in effective, violate the Outer Space Treaty.<sup>24</sup>

### **Intergovernmental Partnerships**

Outside of the Artemis Accords, cooperation between different space agencies continues. NASA typically works closely with the European Space Agency (ESA), Canadian Space Agency (CSA), and Japan Aerospace Exploration Agency (JAXA). On the other hand, Roscosmos and China increasingly



collaborate on space issues, including establishing the International Lunar Research Station—an effort to oppose the Artemis Program. The Iranian Space Agency (ISA) most closely collaborates with either China or Roscosmos, but other space agencies who have not signed onto the Artemis Accords or the International Lunar Research Station have two different potential collaborations on which they could join, if they want to. But collaborations exist beyond these

two different axes, with JAXA and the United Arab Emirates collaborating to launch a landing craft on a SpaceX rocket; and the CSA and ESA collaborating on other scientific initiatives.<sup>25</sup>

### **The Role of Private Enterprise in Space**

Private corporations have increasingly become involved in the space economy over the last decade. But private enterprise approaches space through a different lens than most governments. Traditionally governments invested in space primarily for its military implications and secondarily for its scientific advances—with telecommunication satellites serving as the only major node of the ‘space economy’. Yet the objective of private companies is to generate a profit, scientific discovery for the sake of scientific discovery does not inherently generate a profit. In a world where countries are increasingly permitting private companies to exploit resources in space—on the Moon, an asteroid, or even, in the distant future, another planet—can private companies be expected to respect celestial bodies? Or will they prevent the potential advancement of science through their exploitation?

#### **Benefit of Private Sector: Cost Reductions?**

At the same time, the involvement of private industry in space activities can reduce costs and make other initiatives in space possible. Many companies entering the space economy, such as SpaceX, Blue Origin, and Rocket Lab, entered the sector with the explicit goal of making it more affordable to put assets into space. While traditionally launches into space were single-use, meaning they could be used one-time, private companies have sought to develop reusable rockets and vehicles for getting into space. Rocket Lab charges roughly \$10,000 per pound to get satellites into a low-Earth orbit; while SpaceX’s launches work out to roughly \$1,500 per pound to get material into a low-Earth orbit.<sup>26</sup> While this may seem high, it compares to the \$30,000 per pound that it cost to use NASA’s Space Shuttle, which has a reusable launch vehicle.<sup>27</sup> In theory, reducing the cost to put material into orbit could spur greater advances and developments in the space economy.

<sup>24</sup> “Artemis Accords: why many countries are refusing to sign Moon exploration agreement.” *The Conversation*. <https://bit.ly/3LoaIwL>.

<sup>25</sup> “Everyone’s Going to the Moon.” *The Economist*.

<sup>26</sup> “To cheaply go: How falling launch costs fueled a thriving economy in orbit.” *NBC News*. <https://nbcnews.to/3qJRwQo>.

<sup>27</sup> *Ibid*.

Additionally, as governmental budgets are increasingly stretched thin, private industry can continue to innovate and make developments in space more open to other countries. In 2003, Brazil's space program suffered a launch-pad catastrophe that killed 21 people and destroyed a satellite.<sup>28</sup> Since the disaster, Brazil's space program has floundered and been severely curtailed owing to budget issues. Private industry in space can more consistently invest and innovate to reduce costs associated with the space economy. Though private industry is not immune from disasters, with an uncrewed launch from Blue Origin suffering a rocket failure in September 2022, the incentives in private industry to become more efficient means that private industry has a greater interest in innovation.<sup>29</sup>

### **Participation in the Space Economy: Equitably Spread or a Closed Market?**

Many private space companies are American and work closely with NASA, this means that the benefits of the space economy are not well distributed among many countries. Many American space companies are prevented or restricted from doing business with countries with which the United States is not aligned or have nuclear ambitions. The rockets that are used to put a satellite into a low-Earth orbit can also help deliver a nuclear weapon. This means rockets are a dual-use technology, "items have a primary commercial/civil application but have also have the potential for military or weapons applications."<sup>30</sup> Russia, Pakistan, and Iran are largely prevented from working with most American space companies, such as Northrop Grumman, Lockheed Martin, and Boeing. Across the board, collaboration on space activities between NASA and China; and American corporations who work with NASA and China are restricted as the United States seeks to prevent the Chinese government from stealing technology and advancing their own military and commercial space industries.<sup>31</sup> In this sense, while private companies might make it cheaper to get to space, restrictions by the American government could prevent more countries from partaking in the space economy—cutting into the potential profits of a corporation involved in the space economy. These restrictions, and their reasons for them, raise the question of how governments and corporations ensure that private sector technology that has a dual use is only used for peaceful space activities?

Other countries have begun to promote private space industries within their countries. Many national space agencies, such as Australia's, Saudi Arabia's, South Africa's, Turkey's space agencies were only founded in the past 15-years. Each of these, namely Australia's and Turkey's were explicitly founded to encourage the development of a private, domestic space industry. Countries increasingly recognize the importance of the space economy as a source of jobs, scientific advancement, and national prestige. Luxembourg, a member of the ESA, has invested heavily in private asteroid mining companies in an effort to place the country on the cutting edge of asteroid mining.<sup>32</sup> Both JAXA and CSA have also funded similar efforts within their countries. Some countries have adopted more protectionist stances to the space economy, with the ESA heavily favoring Airbus, a European aerospace company, in its collaboration with private industry.

### **Space: The Tragedy of the Commons—Turbocharged by the entrance of the Private Sector**

Private sector involvement in the space economy can provide high paying jobs and lead to reduced costs and greater innovations. But private industry involvement, given its profit motivations, is not a

<sup>28</sup> "Brazilian Rocket Explodes, 21 Dead." *CBS News*. <https://www.cbsnews.com/news/brazilian-rocket-explodes-21-dead/>.

<sup>29</sup> "Congress asks for more transparency into New Shepard failure investigation." *SpaceNews*. <https://bit.ly/3QRUY6d>.

<sup>30</sup> "Examples of Dual Use Items." *The University of Oklahoma*. <https://bit.ly/3qSpLFb>.

<sup>31</sup> "Here's why NASA won't work with China to explore space." *Business Insider*. <https://www.businessinsider.com/nasa-china-collaboration-illegal-2015-10>.

<sup>32</sup> "Luxembourg leads the trillion-dollar race to become the Silicon Valley of asteroid mining." *CNBC*. <https://www.cnbc.com/2018/04/16/luxembourg-vies-to-become-the-silicon-valley-of-asteroid-mining.html>.

panacea for all space issues. Private industry might be able to reduce costs and build more efficient rockets, but the question remains whether private industry is the right sector to lead exploration and scientific efforts or whether it is ‘right’ for the private sector to exploit the resources of the Moon or an asteroid.

Space junk, which is defunct satellites and debris floating around Earth is increasingly a danger to other satellites and transit through low-Earth orbit. In 2021, space junk damaged the ISS.<sup>33</sup> With 23,000 space junk objects tracked, it was only a matter of time before it damaged something.<sup>34</sup> While fortunately, nobody was injured, if space junk is not reduced, it is only a matter of time before a more serious accident occurs. While private companies, given their late entry into space, have not caused most of the current space junk (China created the most space junk in a single event with its destruction of its military satellite with a missile in 2007), the increasing involvement of the private sector in space presages more space junk.<sup>35</sup>

But current space junk does not represent the only potential concern that the private sectors entrance into space provokes. Orbit around earth is increasingly congested. SpaceX, through its Starlink satellite internet program could place 12,000 satellites into orbit around Earth, compared to the 2200 put in orbit between Sputnik in 1957 and 2020.<sup>36</sup> More than tripling the satellites in orbit, when combined with existing and future space junk, is a recipe for disaster. In December 2021, one of SpaceX’s satellites had a near miss with China’s space station, forcing it to take evasive actions.<sup>37</sup> Without a government motivated to clean-up the space junk, how can space be kept safe for other countries and other companies? On Earth, if residents were unhappy about a trash situation, they would work with their government to try and address the issue. But nobody, neither a company nor a government, owns zones within orbit, so who’s responsibility is it to destroy or remove space junk? This junk-issue will likely reoccur in one form or another when economic activities begin on the Moon. If countries and companies cannot claim territory on the Moon, then who can be responsible for potential environmental issues caused by activities in those areas? While some companies are exploring ways to remove space junk, these efforts have not yet fully gotten off the ground.

Additionally, with private companies, not just SpaceX, and governments increasingly putting satellites into orbit, ground-based astronomers will struggle to effectively study the universe. Satellites and large space junk can leave streaks on imagery from ground base telescopes. In this case, commercial activity is directly negatively impacting scientific research. Satellites play an important commercial and military role, but too many satellites in low-Earth orbits will hurt the field of astronomy.

## Enduring Challenges

In essence, to succinctly define the issues facing this committee. Representatives from private industry and national space organizations will need to establish rules for resource exploitation on the Moon, asteroids, and, eventually, planets, while balancing the need to continue to scientifically study

<sup>33</sup> “Space junk slams into International Space Station, leaving hole in robotic arm.” *CBS News*. <https://www.cbsnews.com/news/space-junk-damage-international-space-station/>.

<sup>34</sup> Ibid.

<sup>35</sup> “China berates US after ‘close encounters’ with Elon Musk satellites.” *The Guardian*. <https://bit.ly/3RReh0B>.

<sup>36</sup> “Space junk: Astronomers worry as private companies push ahead with satellite launches.” *The Conversation*. <https://bit.ly/3BjIM8u>.

<sup>37</sup> “China berates US after ‘close encounters’ with Elon Musk satellites.” *The Guardian*. <https://bit.ly/3RReh0B>.

these celestial bodies. The committee will also need to outline how to protect intellectual property of private space companies, while preventing dual-use technologies from slipping into the wrong hands, while also ensuring that access to space and the space economy is spread more equitably. On top of these issues, some committee members will want to push for the ability of private companies to collaborate with a wider selection of countries. Finally, all committee members must confront the dangers posed by space junk and the overcrowding of low-Earth orbits to manned space missions and other satellites in orbit. questions:

### Question to Consider

- 1) Who have been the major players in space? Who has historically been excluded?
- 2) How do private interests in space exploration conflict with public interests, and how can this be remedied?
- 3) How can the United Nations and other international bodies keep the use of outer space peaceful and productive?
- 4) To what degree should resources on the Moon or an asteroid be able to be exploited by governments and/or private industry?
  - a. Should the benefits of these resources be shared equitably?
  - b. Can these resources be exploited without, in effect, claiming territory (in violation of the Outer Space Treaty)?
- 5) What challenges does the international community need to face to allow space exploration to blossom to its full potential?
- 6) Is there a role for the private sector in exploration efforts further afield as well as mining efforts on the Moon and asteroids?