Encouraging global cooperation to ensure peaceful exploration and use of outer space

GA4

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Introduction

The exploration of space has always been an issue that has fascinated civilization. Since the beginning of mankind, people have sought to explore space and its mysteries, and use it to our advantage. The Cold War saw the start of actually sending satellites into space and has brought us closer to the era in which we currently are. Today, space is an issue tackled by many cooperations between countries and individuals or nations on their own. The use of space is not simply scientific anymore, space can now also be used for espionage, mapping systems, communication and much more, and this has led to many more unique problems leading to our use of this limitless resource. Not only has the use of space turned into a producer of tension between many countries, our current usage of space has also led to safety debates.

Definition of Key Terms

Satellite

In this report a satellite is defined as an artificial body who is placed in orbit around a planet or moon, but in science a satellite (or a 'natural' satellite) does not have to be defined as an artificial body; the moon is a satellite to our planet earth.

Geostationary Satellites

Geostationary satellites are satellites which remain at a fixed position when seen from earth. This allows antenna to stay pointing in a fixed position without needing to track the satellite. Examples of such satellites are telecommunication satellites such as the ones which allow for cable tv; they remained fixed above a certain country or region.

Geostationary Orbit (GEO)

GEO is the name of the orbit on which the geostationary satellites are located in order to be at a fixed location. Satellites on GEO therefore do a full rotation around the earth in 24 hours and move at the same speed as the earth.

Low Earth Orbit (LEO)

A LEO is an orbit which is under 1000km away from earth's surface and can be up to 160km away from earth. At this orbit, satellites are not geostationary and will orbit around the earth roughly 16 times per day. Since LEO satellites are not geostationary, they often function as part of a bigger 'constellation' of satellites. The International Space Station (ISS) functions on LEO.

Launcher

'Launcher' is the term used to refer to rockets which put satellites or space probes into space.

Space Debris

Space debris are human made objects in space which no longer have a useful function.

General Overview

The Space Race

In order to take a look at the current use and exploration of space, it is necessary to take a step back all the way to the 1950s, where the era of space industrialization, conflict and cooperation first started.

The Space Race started in the 1950s, it was yet another area of conflict for the cold war raging between the United States of America (USA) and the Soviet Union (USSR). Space was being seen as the new frontier to be conquered, and both nations fully threw themselves into this race for the glory of being the first nation to achieve different checkpoints regarding space exploration.
On the 4th of October 1957 the USSR became the first nation to send a satellite into space, Sputnik (which means traveler in Russian). This satellite was launched by an R-7 Soviet intercontinental ballistic missile. This show of strength greatly annoyed the USA, who not only considered space as a "logical extension of the great American tradition of exploration" (History.com editors) but were also very concerned about this show of power of the R-7 missile. A month later, the USSR then launched Sputnik II and became the first nation to send a living organism into space through the dog named Laika.

The USA then followed up by launching its own satellite, Explorer I in 1958 and by creating the National Aeronautics and Space Administration (NASA). The next two checkpoints in the realm of space exploration were then once again won by the USSR, who were the first to hit the moon with Luna 2 in 1959, and the first to send a human into space in April 1961 through sending Cosmonaut Youri Gagarin into orbit in Vostok I. In the end, the space race was won by the USA who were the first to have a man step foot on the moon on July 16th of 1969. This mission was the Apollo 11 Space mission which saw Neil Armstrong become the first man to ever step foot on the moon.

The International Space Station (ISS)

Figure 1 The International Space Station

The ISS marks a point in the exploration of space when collaboration between different countries took a different meaning. The ISS is a space laboratory in LEO, serving as a stepping point for further exploration of outer space, and is a symbol of international collaboration in space as it is constructed and funded by many different nations. The nations which together man the space station are: the USA, Japan, Russia, Canada, and many European nations through the European Space Agency (ESA).

The first piece of the ISS was launched into LEO on November 20, 1998. Due to its position in outer space, it could not be constructed in one go and is instead the result of various space shuttles being sent into space and latching on to each other in the correct order. Astronauts are sent to the ISS in shifts of 6 months, with astronauts being sent by the different nations that man the space station.

Space Today

Nowadays the use and exploration of space have progressed a lot. Scientists and nations now turn to exploring Mars, with it being considered the new checkpoint to reach. Scientific satellites are also being more and more developed in order to be able to learn about planets and solar systems that could never even be reached, such as the James Webb Space Telescope (JWST) and its revolutionary pictures of the universe. But scientific exploration is no longer the only use of space.

In reality, many things, a lot more than what could be expected, function thanks to satellites. Today most people in developed countries use google maps or another online variant of this. These maps are based off of satellite constellations in LEO. Most people in developed countries also have access to a television, and many people watch the news on a television channel. This is broadcasted through telecommunication satellites in GEO, who actually have their antenna shaped in a specific way in order to only broadcast to a specific country.

However, satellites are not only used for everyday functions, they also have a military use. Military satellites are usually in GEO. They can be aimed towards a certain point in order to provide effective communications, navigation, as well as reconnaissance information. More and more, having use of military satellites can be decisive in certain conflicts. Although military satellites convey a lot of information to the nation that holds them, they cannot be used as field weapons due to the 'Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies' (The Outer Space Treaty), which forbids this.

Issues related to the Use and Exploration of Space

An issue that is becoming more relevant today than it ever was before regarding satellites and the use of outer space is pollution. In the space industry, pollution is not just the burning of fuels, although this does play a significant role, but also the pollution of outer space an of earth's orbits.

In order to launch a satellite into space, a launcher has to be used, with many different compartments containing fuel. To give an example, the European Ariane 5 launcher uses 237.8 metric tons of propellant per booster, and this is not even counting the main compartment. This defiantly poses an ecological problem, considering the accelerated rate at which satellites are being launched into space currently.

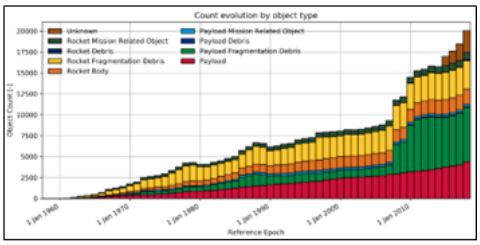

Figure 2 ESA / Space Safety / Space Debris

Furthermore, not only does it pollute to send all of these satellite into space, but these satellites then pollute our orbits. Most of the time, when a satellite is sent into orbit around our planet, it will stay there until it ceases working, and then stay there in orbit, sometimes crashing into other satellites, causing space debris. The amount of space debris in orbit around earth right now has reached a crucial amount, posing a risk to any future launched satellites, or shuttles containing crew. Contrary to popular belief however, satellites do not pose a risk yet of falling back on earth, as the nearest satellites would take 25 years to do so, and satellites on further GEO orbits would take thousands of years to do so. Yet an effective solution must still be found for the space debris up in orbit, and the space debris which will eventually make its way down back onto earth.

Lastly, an issue that is not yet a big concern but will more and more become important in the future is related to individual privacy and satellites. As satellites become more performing, and as the use of military satellites becomes more common, privacy will become a concern. As of now, according to the American University Business Law Review, satellite images are precise enough in order to be able to spot a car, but not to distinguish the model of said car. Seeing the rapid progress of technology, it is expected that satellites will be able to discern many more details than that shortly. The original Outer Space Treaty considered the use of weapons in space, but at the time this was so unimaginable that privacy is not a clause in said treaty.

Timeline of Key Events

Date	Event
4th of October 1957	Sputnik I is launched
3rd of November 1957	Sputnik II containing Laika is launched
31st of January 1958	Explorer I is launched
12th of April 1961	Yuri Gagarin becomes the first man to be sent in orbit in space
27th of January 1967	The Treaty on Principles Governing the Activities of States in the Exploration and Use of

Outer Space, including the Moon and Other Celestial Bodies is signed.	
20th July 1969	Neil Armstrong becomes the first man to have landed on the moon.
20th February 1986	Mir's main module is launched
20th November 1998	The first piece of the ISS is launched

Major Parties Involved

United States of America (USA)

The USA is a major participant in the use and exploration of space. The USA has a national agency regarding space and aerospace, NASA (National Aeronautics and Space Administration). NASA is currently the biggest space agency in the world, with the highest budget in the world. NASA often cooperates with other space agencies, but due to its enormous budget it can use its own launchers, with one of the exceptions to that being the James Webb Space Telescope (JWST) the biggest satellite launched into space, which was launched through the Ariane 5 launcher due to NASA not having big enough launchers at the time.

NASA isn't the only space agency in the USA, as there are other privately owned space agencies in this nation. An example of this would be Elon Musk's Space Exploration Technologies Corp. (SpaceX). Although this company is privately owned, SpaceX holds a big role in space development and exploration and owns its own launcher.

European Space Agency (ESA)

The European Space Agency is a unique example of cooperation between countries regarding space matters. ESA currently has 27 members/partners, and is rapidly growing. It is interesting to note that not all of these members are part of the European union, with one exception not even being part of the European Continent. ESA is funded by its members, with France as its biggest funder. Although ESA does usually use the French Ariane launchers, due to a retardment in the new Ariane 6 launcher ESA currently uses American launchers. It can be noted that although ESA used to use Russian launchers, it has stopped doing so ever since the Russo-Ukraine war broke out. Another particularity of this space agency is that due to its many participating nations, ESA policy is that it cannot build or participate in building satellites which would be used for military purposes.

Russia

Russia does have its own space agency, ROSCOSMOS. Originally, back when Russia was a part of the USSR, it had launched its own space station, Mir, in 1986. Mir is still considered to be the most elaborate and longest lasting space station to date. It was forcibly re-entered into the earth's atmosphere in 2001, where it disintegrated. In the new era of space cooperation, Russia was working well alongside other nations, such as participating in the ISS. However, recent events of the Russo-Ukraine war have significantly decreased international cooperation in the space industry. ROSCOSMOS is considered to be one of the major space agencies in the world. As of now, Russia will keep participating in the ISS until the year 2028, while it is busy building its own space station.

Japan

Japan also has its own space agency, the Japanese Aerospace Exploration Agency (JAXA). JAXA is considered to be one of the major space agencies in the world, and often cooperates internationally. Japan is part of the nations which hold a claim to the ISS, and can send astronauts into space.

Previous Agreements, Treaties and Conventions on the Issue

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (The Outer Space Treaty)

The Outer Space Treaty was signed in 1967, and is the foundation for current international space law. Through this treaty, the basic principles of space exploration and use were established.

- Space is free to be used by any and all nations, no nation can claim sovereignty over space or any bodies present within it (excluding earth)
- In orbit and in space the use and presence of Weapons of Mass Destruction such as nuclear weapons is forbidden, all celestial bodies are to be used peacefully
- Any astronaut from any nation is considered to be a representative of mankind as a whole, and as such all nations provide aid to these astronauts regardless of their nationality when needed, such as in the case of an emergency landing.
- Nations are responsible for their own agencies, may they be private or not, and are responsible for damage or contamination of space made by space objects coming from their nation.

The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space

This agreement states that all signatories will aid and rescue astronauts in need, and will return them to their country. It also states that all signatories agree to help to return a space object to the nation that made/financed it if it lands on earth on another country than it was launched from

Possible Solutions

As in any debate, there are many different ways in which the use and exploration of space could be tackled. Underneath a few proposals of ideas are suggested, but delegates are encouraged to think creatively and come up with alternative solutions which better tackle their country's concerns.

One way of looking at this could be to finally tackle the issue of space debris. Delegates could propose a solution to better manage and bring back down to earth the space debris currently in space, or how to ensure that future satellites do not add to said space debris. This could potentially be done through international cooperation on plans to design satellites charged with bringing space debris back to earth, but delegates would then have to remember to come up with a solution on where and how this debris would be handled once it is back on earth.

A different path that certain delegates may choose to take would be to look into the rewriting of the Outer Space Treaty, which has been mentioned before in this research report. Delegates could choose to rewrite this treaty in a way that better protects privacy. This could tackle individual privacy, but can also look at the privacy of a nation as a whole, and how military surveillance satellites interfere with the sovereignty of certain nations. Technically, delegates could also rewrite this treaty in the opposing way, allowing for more military use of space. This could certainly be in favor of certain nations' policies. However, this would have to be done reasonably, rewriting the treaty in order to send nuclear weapons into space is not a desirable outcome.

Lastly, delegates could also look into the pollution on earth caused by launchers. This could prove to be relevant in light of the current situation regarding global warming. Different proposals could be made to ensure that launchers do not pollute as much, ranging from an extreme solution of limiting the amount of launched satellites per year, to an international agreement to redesign launchers so that they do not pollute as much.

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