LITERARY
NIT DURGAPUR

COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE (COPUOS)

"Independent fair use of space by non government entities for private enterprise and territorialization of outer space for evolution of mankind"

STUDY GUIDE

Introduction to The Literary Circle:

Literary Circle is the club in NIT Durgapur, which gives the college an extra dimension of creative expression in the midst of technical unilateralism and gives the students of the college an opportunity to transcend the ordinary and mundane.

This club conducts Verve, Literary cum Youth Festival of the college and the biggest of its kind in eastern India. The Literary Circle has successfully pulled off 13 editions of Verve. Flagship events in the fest have become the matter of college folklore.
The club also prints its annual literary magazine Déjà Vu every year, with over 4000 copies distributed inside the college as well as all over metropolitan cities.
The club is known to be highly selective in its admission of new members, with only about 10 students inducted out of the entire batch of 900 each year. Great believers of the phrase 'quality over quantity', the members selected every year are the best of the best in the field of expression and creativity.

Come, step into the Circle!

Introduction to NITMUN:

NITMUN is a forum convened by the members of the Literary Circle for discussion and analysis of global issues. It seeks to bring out motivated delegates from all over the country for brainstorming over significant international issues.

Organised by the Literary Circle, NITMUN promises a challenging yet entertaining time to all delegates. It requires the entire workforce of the club to come up with a topic or a committee that really instigates each and every delegate to ponder. And then, the best executive boards from all over the country are brought together to make sure that every delegate grows and becomes better at the end of the conference. Our greatest goal is to make sure that each delegate learns how to tackle world issues better at the end of the conference as the world is in dire need of young leaders now.

Currently in its 6th edition, NITMUN has been extremely successful in providing the perfect experience to each delegate. Over the years, we have entertained more than 750 delegates in total. Delegates arrive from all corners of India for an experience they never forget.

COUNCIL: United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)

About the committee:
The United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) was established in 1959 (shortly after the launch of Sputnik) as an *ad hoc* committee. In 1959, it was formally established by United Nations resolution 1472. The Committee on the Peaceful Uses of Outer Space (COPUOS) was set up to govern the exploration and use of space for the benefit of all humanity: for peace, security and development. The Committee was tasked with reviewing international cooperation in peaceful uses of outer space, studying space-related activities that could be undertaken by the United Nations, encouraging space research programmes, and studying legal problems arising from the exploration of outer space. It has a current membership of 84 States, as of 2017.

Owing to rapid advances in space technology, the space agenda is constantly evolving. The Committee therefore provides a unique platform at the global level to monitor and discuss these developments. The Committee has two subsidiary bodies: the Scientific and Technical Subcommittee, and Legal Subcommittee, both established in 1961. The Committee reports to the Fourth Committee of the General Assembly, which adopts an annual resolution on international cooperation in the peaceful uses of outer space.

AGENDA:
'Independent fair use of space by non government entities for private enterprise and territorialization of outer space for evolution of mankind.'

Introduction
It is said, "The only constant is change", and humanity has relentlessly done just that. Since the inception of the UN it has facilitated this change and this change is what has led us to the newest frontier, the frontier of outer space. The UN attempts to keep itself well ahead of the times to solve not only the problems of today but also any adversity which we may encounter in the future, during the course of our ceaseless endeavour to expand our horizons, even beyond the borders of our planet, the need to regulate outer space activities was recognised as far back as 1968 when the Outer Space Treaty was first introduced.

However, the original Treaty, which has been signed by all space faring nations, along with the other treaties and conventions that followed failed to address a major issue. These treaties tended to either omit or mention only briefly the role of the Private Sector in outer space and thus failed to deal with the proverbial other side of the coin: the businesses enterprises. Repeatedly has it been proven, most notably in the Air Transport industry and television broadcasting industry, that if the private sector is an active stakeholder then the development of new technologies can occur faster and that the technology thus developed is superior. The private sector possesses expertise and capital simply unavailable to most governments and thus the advantages of working with the private sector is crucial when dealing with Outer Space.

Another matter to be considered is that the Private Sector enterprises have vast sums of money, which they can invest into outer space research, involving them as active shareholders is thus crucial. Hence, laws should exist which provide adequate incentives to invest in such projects, particularly in those that provide opportunity for sustainable development. Multiple UN resolutions have reiterated the crucial rule of space technologies as early warning systems for natural disasters and in transmission of information-both crucial for sustainable development. If private companies invest in the same it is hoped that it will provide job

opportunities for future generations. Thus any regulation must work in a manner that it is not to rigid and thus does not act as an impediment to any private firm investing in outer space, regulations must support investment not impede it. Development has been particularly rapid in recent years. Musk owned SpaceX successfully landed a rocket on a landing platform in the sea, a crucial step in its ultimate endeavour to make space tourism a reality. Excitement has also been centered on the so called “space hotels”. Space hotels were once something out of a science fiction novel, an elusive dream of visionaries, but now with billion dollar investments supporting such projects they have morphed into a pragmatic reality . Again the Outer Space Treaty may be a possible hindrance as it expressed that "outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." It described the same as the "common heritage of all man kind" (couldn't belong to individuals or governments). This clause was written at a time where space hotels may have seemed inconceivable. Today, it is an issue because the company3 will invest substantial sums building the hotel it will have no claim of ownership of the region of space the hotel occupies. In effect, this means that any country has the right to destroy said hotel if it so choses because the country building the hotel is “trespassing”, so to speak. This is a source of possible conflict and thus we must strive to stem its development into a major issue by having appropriate regulation in place.

Definition of Key Terms

- **Space Colonization**

Space Colonization (space settlement, space humanization, space habitation) is autonomous(self-sufficient) human habitation outside of Earth. It is a long-term goal of national spaceprograms.
[www.wordiq.com/definition/Space_colonization]

- **Territorialisation**

The act of organizing as a territory with in another nation or location of choice.

- **Regulation**

Broadly defined as a "rule or directive made or maintained by authority". More specifically it is "an authoritative rule dealing with details or procedure (of an activity)"

- **Commercialisation**

Commercialisation basically means utilising something as a means of making money. In the context of space this subsumed various activities such as: space tourism, the mining of resources from asteroids, the use of satellite technology for broadcasting, navigation and security, and "providing goods or services which have monetary value by utilising equipment sent into outer space."

- **Outer Space**

Outer Space can be described as the "void that exists between celestial bodies". As of now there exists no official UN recognised and endorsed definition of what is Outer Space. However when referring to Outer Space the commonly used definition in most space treaties is that it is "the region beyond/above the Kármán Line” (ie. 100 kilometers above the surface of the Earth)." Central to the regulation of the activities of the private sector in outer space is indeed deciding what will constitute outer space.

Space Law:

Space law can be described as the body of law governing space-related activities. Space law, much like general international law, comprises a variety of international agreements, treaties, conventions, and United Nations General Assembly resolutions as well as rules and regulations of international organizations.

Space law, in a broad sense, can be described as an interdisciplinary bucket of various different types of established law that may govern or apply to man's interaction or activities dealing with the "outer space" domain. The need for a set of laws governing mankind's interactions with outer space began with the launch of the world's first artificial satellite, the USSR's Sputnik, in 1957. In reaction to this world-changing event, the United Nations General Assembly issued the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space in 1962. This content of this resolution containing many of the ideas that would be essential to the creation of the five UN Treaties and Agreements on Space Law that would be ratified between 1967 and 1984 .

Space law addresses a variety of matters, such as, for example, the preservation of the space and Earth environment, liability for damages caused by space objects, the settlement of disputes, the rescue of astronauts, the sharing of information about potential dangers in outer space, the use of space-related technologies, and international cooperation. A number of fundamental principles guide the conduct of space activities, including the notion of space as the province of all humankind, the freedom of exploration and use of outer space by all states without discrimination, and the principle of non-appropriation of outer space.

The five declarations and legal principles of Space Law:

- **The Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space (1963):** All space exploration will be done with good intentions and is equally open to all States that comply with international law. No one nation may claim ownership of outer space or any celestial body. Activities carried out in space must abide by the international law and the nations undergoing these said activities must accept responsibility for the governmental or non-governmental agency involved. Objects launched into space are subject to their nation of belonging, including people. Objects, parts, and components discovered outside the jurisdiction of a nation will be returned upon identification. If a nation launches an object into space, they are responsible for any damages that occur internationally.

- **The Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting (1982):** Activities of this nature must be transpired in accordance with the sovereign rights of States. Said activities should "promote the free dissemination and mutual exchange of information and knowledge in cultural and scientific fields, assist in educational, social and economic development, particularly in the developing countries, enhance the qualities of life of all peoples and provide recreation with due respect to the political and cultural integrity of States." All States have equal rights to pursue these activities and must maintain responsibility for anything carried out under their boundaries of authority. States planning activities need to contact the Secretary-General of the United Nations with details of the undergoing activities.

- **The Principles Relating to Remote Sensing of the Earth from Outer Space (1986):**

Fifteen principles are stated under this category. The basic understanding comes from these descriptions given by the United Nations Office for Outer Space Affairs:

(a) The term "remote sensing" means the sensing of the Earth's surface from space by making use of the properties of electromagnetic waves emitted, reflected or :diffracted by the sensed objects, for the purpose of improving natural resources management, land use and the protection of the environment;

(b) The term "primary data" means those raw data that are acquired by remote sensors borne by a space object and that are transmitted or delivered to the ground :from space by telemetry in the form of electromagnetic signals, by photographic film, magnetic tape or any other means;

(c) The term "processed data" means the products resulting from the processing of the primary data, needed to make such data usable;

(d) The term "analysed information" means the information resulting from the interpretation of processed data, inputs of data and knowledge from other sources;

(e) The term "remote sensing activities" means the operation of remote sensing space systems, primary data collection and storage stations, and activities in :processing, interpreting and disseminating the processed data.[13]

- **The Principles Relevant to the Use of Nuclear Power Sources in Outer Space (1992):**

"States launching space objects with nuclear power sources on board shall endeavour to protect individuals, populations and the biosphere against radiological hazards. The design and use of space objects with nuclear power sources on board shall ensure, with a high degree of confidence, that the hazards, in foreseeable operational or accidental circumstances, are kept below acceptable levels."

- **The Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (1996):** "States are free to determine all aspects of their participation in international cooperation in the exploration and use of outer space on an equitable and mutually acceptable basis. All States, particularly those with relevant space capabilities and with programmes for the exploration and use of outer space, should contribute to promoting and fostering international cooperation on an equitable and mutually acceptable basis. In this context, particular attention should be given to the benefit for and the interests of developing countries and countries with incipient space programmes stemming from such international cooperation conducted with countries with more advanced space capabilities. International cooperation should be conducted in the modes that are considered most effective and appropriate by the countries concerned, including, inter alia, governmental and non-governmental; commercial and non-commercial; global, multilateral, regional or bilateral; and international cooperation among countries in all levels of development."

UN involvement, Relevant Resolutions, Treaties and Events:

Since 1966, the UN has facilitated the establishment of treaties dedicated to outer space,

as well as their underlying legal principles. These treaties and principles cover a broad range of topics,ranging from freedom of exploration to regulation of scientific research and the exploitation of extra-terrestrial resources. Every one of these treaties emphasises the basic premise that everything beyond our atmosphere belongs to all mankind.

The 1966 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'):

Provides that space exploration shall be carried out for the benfit of all countries, irrespectiveof their degree of development. It also seeks to maintain outer space as the province of all mankind, free for exploration and use by all States and not subject to national appropriation. Entered into force10 October 1967, 95 ratications and 27 signatures. The Outer Space Treaty provides the basic framework on international space law, including the following principles:

- the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind;
- outer space shall be free for exploration and use by all States;
- outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means;
- States shall not place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space in any other manner;
- the Moon and other celestial bodies shall be used exclusively for peaceful purposes;
- astronauts shall be regarded as the envoys of mankind;
- States shall be responsible for national space activities whether carried out by governmental or non-governmental entities;
- States shall be liable for damage caused by their space objects; and
- States shall avoid harmful contamination of space and celestial bodies.

In the aspect of territorialization as a result of the space tourism activities, and enforcing nations to be responsible for the space activities of their citizens is in accordance with the Article VI of the Outer Space Treaty that states “States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty”.

The outer of Space Treaty recommendations impose responsibilities on countries or governments involved in space activities for damages and space environment pollution. The private companies must be in accordance with their country laws.

[http://www.oosa.unvienna.org/oosa/SpaceLaw/outerspt.html]

The 1967 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space ('The Rescue Agreement'):

Provides for aiding the crews of spacecraft in the event of accident or emergency landing. It alsoestablishes a procedure for returning to a launching authority a space object found beyond the territoriallimits of that authority. Entered into force 3 December 1968, 85

ratifications and 26 signatures.
[http://www.oosa.unvienna.org/oosa/SpaceLaw/rescue.html]

Convention on International Liability for Damage Caused by Space Objects("The Liability Convention"):

The Liability Convention was considered and negotiated by the Legal subcommittee from 1963 to 1972. Agreement was reached in the General Assembly in 1971 (resolution 2777 (XXVI)), and the Convention entered into force in September 1972. Elaborating on Article 7 of the Outer Space Treaty, the Liabiity Convention provides that a launching State shall be absolutely liable to pay compensation for damage caused by its space objects on the surface of the Earth or to aircraft, and liable for damage due to its faults in space. The Convention also provides for procedures for the settlement of claims for damages.

Convention on Registration of Objects Launched into Outer Space

The Registration Convention was considered and negotiated by the Legal Subcommittee from 1962. It was adopted by the General Assembly in 1975 (General Assembly resolution 3235) and entered into force on 15 September 1976**.**
Building upon the desire expressed by States in the Outer Space Treaty, the Rescue Agreement and the Liability Convention to make provision for a mechanism that provided States with a means to assist in the identification of space objects, the Registration Convention expanded the scope of the United Nations Register of Objects Launched into Outer Space that had been established by resolution 1721B (XVI) of December 1961 and addressed issues relating to States Parties responsibilities concerning their space objects. The Secretary-General was, once again, requested to maintain the Register and ensure full and open access to the information provided by States and interntional intergovernmental organizations.
States and international intergovernmental organisations that agree to abide by the Convention are required to establish their own national registries and provide information on their space objects to the Secretary-General for inclusion in the United Nations Register. Responsibility for maintenance of the Register was delegated by the Secretary-General to the United Nations Office for Outer Space Affairs**.**

The 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies ('The Moon Agreement')

Elaborates, in more specific terms, the principles relating to the Moon and
other celestialbodies set out in the 1966 Treaty. It also sets up the basis for the future regulation of the explorationand exploitation of natural resources found on such bodies.
Entered into force 18 December 1979,9 ratifications and 5 signatures (as of 1 February 1999).
The Moon Agreement was a UN Resolution in 1979 that was meant to be a progression from the Outer Space Treaty and aimed to turn jurisdiction of all celestial bodies (including the orbits around such bodies) over to the international community.
Thus, all activities would necessarily have to conform to international law, including the United Nations Charter. The Moon Agreement has effectively failed, as it has not been ratified by any country that engages in self-launched manned space exploration or has plans to do so. Any new proposed treaty will need to allow enterprise whilst setting controls. This will need to be put in place soon, as the two biggest players in private space programmes have already set out their ambitions. [http://www.oosa.unvienna.org/oosa/SpaceLaw/moon.html]

Proposed Prevention of Arms Race in Space (PAROS) Treaty:

Although the aforementioned treaties ban the placement of weapons of mass destruction in space, they do not prevent states from placing other types of weapons in space. Hence, in 1985 the Conference on Disarmament established an ad hoc committee to identify and examine issues relevant to prevention of arms race in space such as the legal protection of satellites, nuclear power systems in space, and various confidence-building measures.

A PAROS treaty built on the efforts of the 1967 Outer Space Treaty to preserve space for peaceful uses by committing States Parties to refrain from placing objects carrying any type of weapon into orbit, installing weapons on celestial bodies, and threatening to use force against objects in outer space.

The Principles Relevant to the Use of Nuclear Power Sources in Outer Space adopted in1992:

Recognizes that nuclear power sources are essential for some missions, but that such systems should be designed so as to minimize public exposure to radiation in the case of an accident. [http://www.oosa.unvienna.org/oosa/en/SpaceLaw/gares/html/gares 47 0068.html]

Limitations of Space Laws

As previously discussed, in the current international law regime governing outer space development, there are five main treaties that are active. Unfortunately, the space industry and actors have changed drastically in the last 40 years, leaving existing legislation in dire need of updates that incorporate concerns such as property rights and the activities of commercial corporations. The space industry is quickly entering an uncharted age in which commercial entities have space exploration capabilities that can at least equal those of advanced countries. Examples of these advances include the development of SpaceShipTwo by Virgin Galactic and the efforts by Bigelow Aerospace to develop a commercial orbital space complex out of modular units similar to those used by the International Space Station. These rapid advances in commercial space technology and the possibilities for exploitation of outer space resources that come with them are occurring at a much more rapid pace than current international space legislation can account for however.

A very notable example of this can be seen through close examination of the Outer Space Treaty, widely considered the most accepted piece of international space legislation with 91 signatory nations. This issue with this piece of legislation is its largely ambiguous and idealist nature, indicative on the drafters' intention for future generations to clarify emerging space related issues as the years passed. Review of various articles within the Outer Space Treaty leave much room for interpretation especially regarding the idea of commercial entities undertaking space mining operations. A prime example of this openness to interpretation is the issue that the Outer Space Treaty only prohibits the *national* appropriation of outer space and the celestial bodies, which leaves open the possibility of an individual or private association lawfully appropriating any part of outer space. Another example can be seen in Article One of the Outer Space Treaty, which states that outer space is the province of all mankind and that its exploration shall benefit all nations. Language such as this has been interpreted several ways, but it is generally accepted that it confirms the "freedom of use" of space because every state has an equal right to pursue space activities. With this interpretation of Article One combined with the vast increase of space actors since the initial drafting of the Treaty, there exists a potential for conflict as more nations/corporations have

access to the possible wealth outer space exploitation could provide. Moving on to Article Two of the Outer Space Treaty, which prohibits national appropriation of outer space territory, more confusion is injected to the equation. The prohibition on national appropriation establishes that outer space is a *res communis*, not subject to the common heritage doctrine, which means that states are free to use the area so long as their activities do not deprive other states of the same right. The Outer State Treaty fails to incorporate all of the common heritage elements: while it provides for non-appropriation, peaceful usage, and some form of benefits sharing, it does not require the establishment of an international body to manage natural resources, nor does it guarantee their preservation for future generations. In this case, the development of celestial bodies is not off limits to development as long as space actors have equal rights (or opportunity) to the asset. Without international oversight, these individual interpretations of insufficient international space law can cause conflict between space actors attempting to gain economic benefit.

In essence, the limitations of currently drafted international space legislation have created an anarchical system in regards to the exploitation of outer space resources. This is similar to the Realist view of terrestrial international relations in which the international system is considered anarchical and therefore individual nations must take actions to protect their national security. Carrying this Realist theory forward to the space arena, it can be predicted that nation-states would take actions to ensure that their economic aspirations concerning space exploitation were protected from other states or hostile actors the advancement in capabilities of space-directed weaponry by militaries, nations now have an avenue for which to directly address these concerns.

Development of commercial and private sector in space exploration:

In *The Man Who Stole the Moon*, the science-fiction novel written in 1949, the main character is obsessed with being the first man to travel to and own the Moon. The book might have been a work of fiction but fulfiling it's story in real life, ceases to be fiction. Dennis M. Hope spotted a legal loophole in the 1967 treaty, which had no reference to allotting private persons with lands that had no owner. In 1980, he submitted a letter entitled Declaration of Property to the United Nations, but has yet to receive an answer, even after 34 years. With no official refusal, he feels that he is the rightful owner of over 7 trillion acres of extraterrestrial land, whose value reaches over $100 trillion.

By permitting non-governmental activities in space, albeit under government supervision, the Outer Space Treaty allowed for the creation of the commercial telecommunications, remote-sensing, and spacecraft launching industries, which were then in their infancy and today are thriving. However, the treaty "does not contain any principles that would regulate economic activities for the purpose of exploring and exploiting the natural resources of outer space, the Moon and other celestial bodies." At the time the treaty was negotiated, the issues of economic development in space seemed remote, and so diplomats set them aside as potential obstacles to finding agreement on what they saw as more pressing issues.

It is important to direct attention to the fact that space activities are increasingly involving private initiatives with market pressure on the weak body of regulations already in force by the countries that had signed some international space treaties. Space servicing exploration is

motivating private companies to develop space tugs and associated strategies to do business in space. A plethora of private companies have entered the field of space exploration through:

- **Space tourism:** Presently the private side of space exploration is coming about with some initiatives in tourism and orbital services areas. The involvement of private companies in the space activities requires regulation not coded so far. Space tourism is the recent phenomenon of individuals paying for space travel, primarily for personal satisfaction. The idea is not new and what is interesting is the greater impact space tourism has in the public mid. The space tourism is nowadays frequently the subject of printed and broadcast media. The idea of space tourism is not new.

In 1950s we had the rest wave of optimism about rocketry designs for space stations and Moon-bases. The rest private company appeared in the scenario of space exploration, the Aeronutronic Ford and the American Rocket Society. That initial dream gradually evaporated as the cold war took over. In 1967, Barron Hilton and Kraft Ehricke published a paper about space tourism dealing with Space Hotels and other ventures hinting the emergence of territorialization as a result of these activities.

Extraterrestrial real estate is land on other planets or natural satellites or parts of space that is sold either through organizations or by individuals. Ownership of extraterrestrial real estate is not recognized by any authority. Nevertheless, some private individuals and organizations have claimed ownership of celestial bodies, such as the Moon, and are actively involved in "selling" parts of them through certificates of ownership termed "Lunar deeds","Martian deeds" or similar. Although, these deeds have no legal standing, the Outer Space Treaty is under constant scrutiny by lawyer's inorder to find some loopholes.

- **Space mining:** Space law currently encourages exploitation of minerals, but this may change with the economic and environmental landscape. This is due to the advent of privately funded space programmes, along with potential concerns over the amount of matter being brought into the Earth's atmosphere and its unknown consequences. The Google Lunar X Prize has been set up to encourage growth of privately funded space programmes and is currently being competed for by 16 teams from around the world.

Space law will need to adapt to this changing landscape and will play a significant role in metal trading in the near future, with asteroid mining due to begin in 2020. The key questions which will need to be answered surround property rights. When the technology has developed to make space mining financially viable, the principles of the 1967 UN Outer Space Treaty, which currently forms the foundation of space law, will need to be updated. Supplies of metals may be limitless, but the history of international law concerning space and property rights within it is tempestuous. The basis of space law is found in the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies ('Outer Space Treaty'). 140 countries are party to the Outer Space Treaty, and a further 24 who have signed it but are yet to ratify it. This treaty fundamentally established the principle that no nation can own the Moon. Article II of the Treaty states that Outer Space, including the moon and other celestial bodies, is not subject

to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means. The common consensus is that this principle is extended to individuals and private companies, such as Deep Space Industries and the Google backed Planetary Resources, which want to harvest resources to fund their permanent space development.

- **Space debris:** The Liabilities convention of 1972 holds States responsible (liable) for any damage caused by their equipment in outer space. If a private entity causes damage, however, the country which has sustained the damage has to appeal to the Nation in which the private sector entity that caused the damage is based and than get this application approved by the Secretary General before compensation can be claimed. The cumbersome nature of this process coupled with the lack of major accidents has meant that states have sporadically requested this compensation. This de-facto private sector impunity allows them to potentially function with lower safety standards; hence, crucial part of regulating activities of the private sector in outer space is holding them directly responsible for any damage they cause. The Liabilities Convention in effect does not have any bearing on the private sector. Space Debris have been defined earlier and they pose obvious problem, for they collide with expensive equipment causing millions of dollars worth of damage, threaten the lives of astronauts, and make navigation more difficult. In order to reduce the rate at which space debris are created the guidelines came into force. Space debris will also be created by the activities of the private sector and they too must be regulated and prevented.

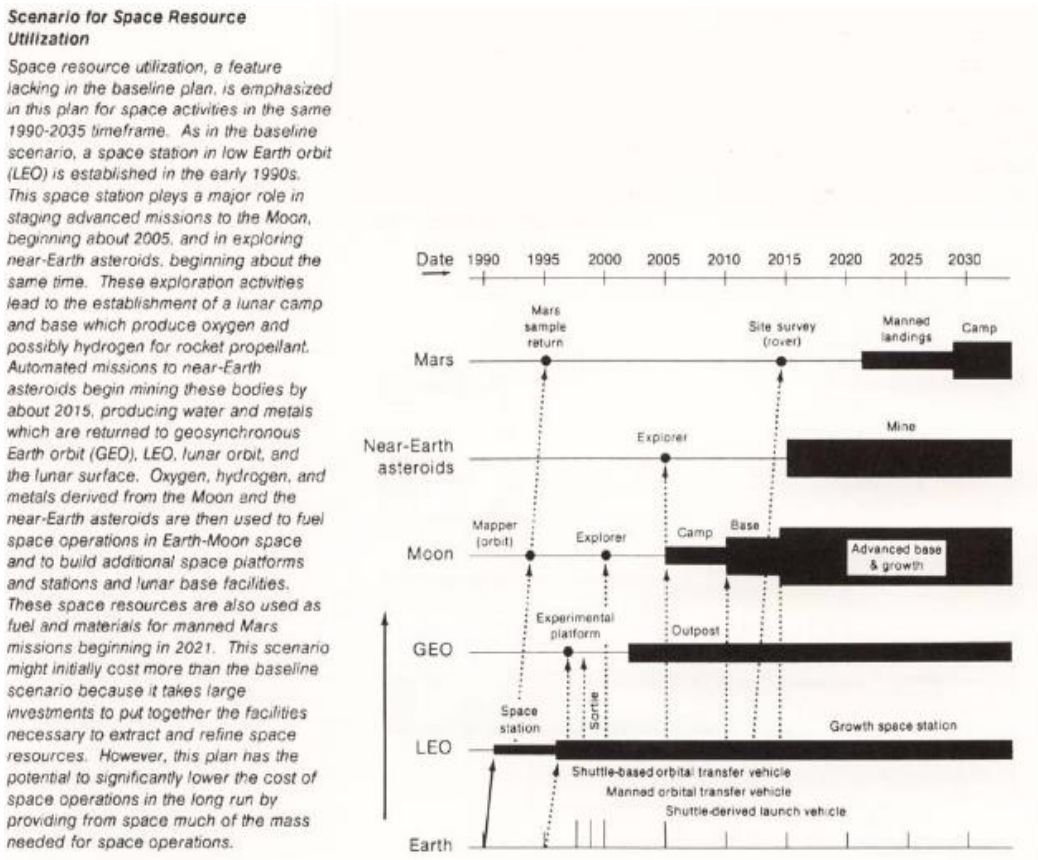
- **Space colonisation(territorialization**): Space colonization (also called space settlement, or extraterrestrial colonization) is permanent human habitation off the planet Earth. Although unspported by the Outer Space Treaty, the idea of space territorialisation stems from imminent threats like the possibility of Earth being struck by an asteroid, or other problems posing mass destruction on Earth. It might play an important role in the evolution of mankind in the near future but currently it it no more than a commercial tool for private enterprise and escaping to a space colony [after a disaster] is the worst-case scenario. Space colonisation remains a mere plan on paper due to a number of factors like threat from space debris, radiations, disruption of gravity, etc.

- **Ownership of Space Resources:** One particularly lucrative opportunity for the private sector in outer space has emerged as mining of resources from celestial bodies such as the moon and asteroids. This is a potentially huge industry wherein space mining may provide resources such as gold, silver and platinum which may satisfy demand for these products on Earth. Aside from this energy demands on Earth may also be satisfied using space resources. Seeing how natural resources are running out, one particular energy source has been identified: Helium-3. Extraction and the subsequent use of helium-3 is expected to generate billions in revenue. The private sector is also interested in extracting water from the moon, water extracted from the moon is will be used not to supply Earth but instead supply the International Space Station (ISS). The ISS requires water not only for consumption but also to provide electricity using hydrogen fuel cells and in the engines of the rocket.

It's obvious that regulations are thus needed to ensure the extraction is efficient and companies are prevented from establishing a monopoly over any particular space resource.

The Moon treaty on one hand called for such infrastructure when it demanded that, "an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the moon" be established. However it is this same Treaty that causes an hindrance to the activities of the private sector in outer space because it declared the Moon

and all other celestial bodies as the, "common heritage of all man-kind" and called for "an equitable sharing by all States Parties in the benefits derived from those resources". This in effect prevents private sector from ever getting involved in space mining because they would have to share all they obtain. However the treaty hasn't been ratified by a single major space faring nation and the U.S. has passed a law that directly contradicts this. So for all purposes the Moon Treaty is not law. Hence it is for the committee to decide what amendments and allowances have to be granted to the private sector bearing in mind the current realities. The following are some facts on space resources and mineral reserves in some of the celestial bodies:



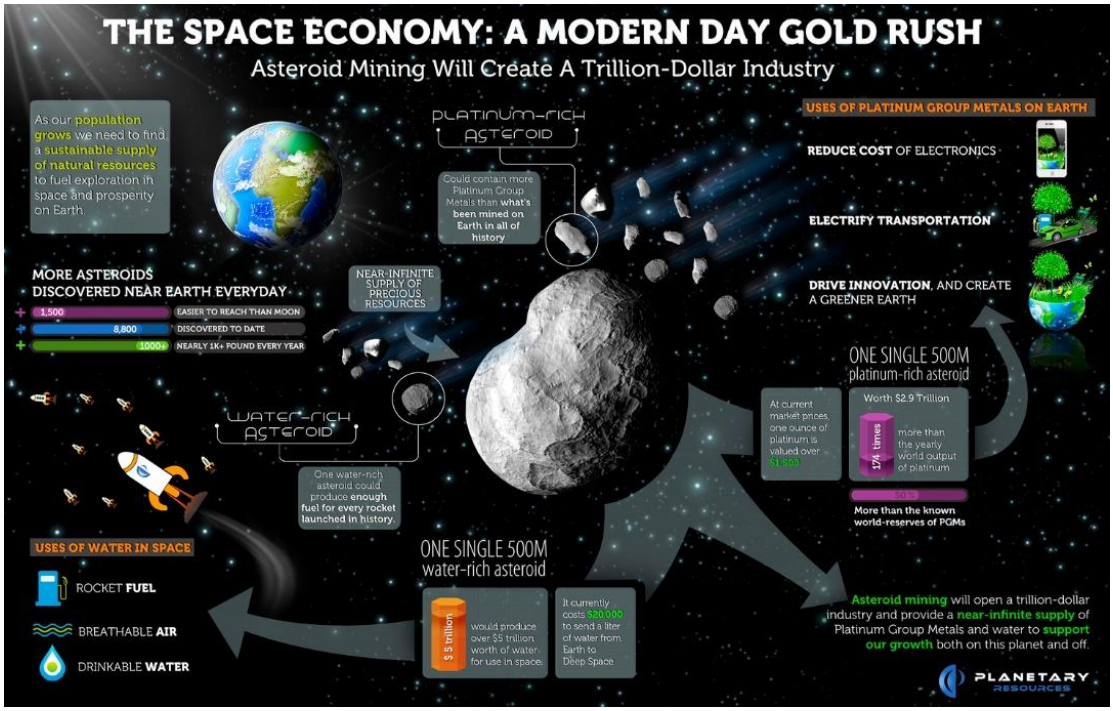
[https://goo.gl/images/oRdivh]

Table 2. Minerals identified on Mars by orbital remote sensing and in-situ rover-based analyses.

Mineral Species	Origin	Detection Method[1]	References
Primary Igneous Minerals			
Olivine Pyroxene (clino- + ortho-) Feldspar (plagioclase, maskelynite) Ilmenite Magnetite	Basaltic rocks; basaltic sands (physically- weathered rocks); soils and dust	MER: Mössbauer, Mini-TES; ME: OMEGA	(Christensen et al. 2004; Bibring et al. 2005; Morris et al. 2006)
Secondary Minerals			
Kieserite Gypsum Polyhydrated sulfates Ca-/Mg-sulphates	Aqueous alteration + deposition	ME: OMEGA; MER: Mini-TES	(Christensen et al. 2004; Gendrin et al. 2005; Langevin et al. 2005; Ming et al. 2006)
Jarosite, Fe^{3+} sulfate	Aqueous/eolian deposition	MER: Mössbauer, Mini-TES, APXS	(Christensen et al. 2004; Klingelhofer et al. 2004; Rieder et al. 2004 Squyres et al. 2004; Morris et al. 2006)
Nanophase ferric oxide	Aqueous alteration + deposition	MER: Mössbauer, Mini-TES	(Ming et al. 2006)
Hematite	Aqueous alteration + deposition	MER: Mössbauer, Mini-TES	(Ming et al. 2006)
Goethite	Aqueous deposition	MER: Mössbauer	(Morris et al. 2006)
Hydrated phyllosilicates (nontronite)	Aqueous alteration	ME: OMEGA	(Bibring et al. 2005)
Aluminosilicates (allophane and amorphous SiO_2)	Aqueous alteration	MGS: TES	(Michalski et al. 2006; Ming et al. 2006)

[1] Abbreviations: ME= Mars Express; MER= Mars Exploration Rovers; MGS= Mars Global Surveyor; Mini-TES= Mini-Thermal Emission Spectrometer; OMEGA= Observatoire pour la Minéralogie, l'Eau, les Glaces, et l'Activité is a visible and near infrared spectrometer; APXS= Alpha Particle X-Ray Spectrometer; TES= Thermal Emission Spectrometer.

[https://goo.gl/images/NlNADZ]



[https://goo.gl/images/8tGFMR]

U.S. Commercial Space Launch Competitiveness Act :

This update to US law explicitly allows US citizens to "engage in the commercial exploration and exploitation of 'space resources' [including ... water and minerals]." The right does not extend to biological life, so anything that is alive may not be exploited commercially. The Act further asserts that "the United States does not [(by this Act)] assert sovereignty, or sovereign or exclusive rights or jurisdiction over, or the ownership of, any celestial body." Some scholars argue that the United States recognizing ownership of space resources is an act of sovereignty, and that the act violates the Outer Space Treaty. It has the following clauses:

TITLE I-SPURRING PRIVATE AEROSPACE COMPETITIVENESS AND ENTREPRENEURSHIP (*Spurring Private Aerospace Competitiveness and Entrepreneurship Act of 2015 or the SPACE Act of 2015):* This bill reaffirms that the Department of Transportation(DOT), in overseeing and coordinating commercial launch and reentry operations, should:

- promote commercial space launches and reentries by the private sector;
- facilitate government, state, and private sector involvement in enhancing U.S. launch sites
- protect public health and safety, safety of property, national security interests, and foreign policy interests of the United States; and
- consult with another executive agency, including DOD or NASA, as necessary to provide consistent application of commercial space launch licensing requirements.

TITLE II-COMMERCIAL REMOTE SENSING: The Department of Commerce shall report annually to Congress on the implementation of its authority to license private sector parties to operate private remote sensing space systems.(Sec. 201)

Each such report may include classified annexes necessary to protect the disclosure of sensitive or classified information.

Commerce shall report to Congress on the statutory updates necessary to license private remote sensing space systems, taking into account the need to protect national security while maintaining U.S. private sector leadership in the field.(Sec 202)

TITLE III-OFFICE OF SPACE COMMERCE: This bill renames the Office of Space Commercialization as the Office of Space Commerce. (Sec. 301)

The Office of Space Commerce shall:

- foster the conditions for the economic growth and technological advancement of the U.S. space commerce industry;
- coordinate space commerce policy issues and actions within Commerce;
- represent Commerce in the development of U.S. policies and in negotiations with foreign countries to promote U.S. space commerce;
- promote the advancement of U.S. geospatial technologies related to space commerce in cooperation with relevant interagency working groups; and
- support federal government organizations working on Space-Based Positioning, Navigation, and Timing policy.(Sec. 302)

TITLE IV-SPACE RESOURCE EXPLORATION AND UTILIZATION(*Space Resource Exploration and Utilization Act of 2015):* The bill directs the President, acting through appropriate federal agencies, to:

- facilitate the commercial exploration for and commercial recovery of space resources by U.S. citizens;
- discourage government barriers to the development of economically viable, safe, and stable industries for the commercial exploration for and commercial recovery of space resources in manners consistent with U.S. international obligations; and
- promote the right of U.S. citizens to engage in commercial exploration for and commercial recovery of space resources free from harmful interference, in accordance with such obligations and subject to authorization and continuing supervision by the federal government. (Sec. 402)

A U.S. citizen engaged in commercial recovery of an asteroid resource or a space resource shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell it according to applicable law, including U.S. international obligations.

It is the sense of Congress that the United States does not, by enactment of this Act, assert sovereignty or sovereign or exclusive rights or jurisdiction over, or ownership of, any celestial body. (Sec. 403)

[https://www.congress.gov/bill/114th-congress/house-bill/2262]

The Development of Space-Directed Weaponry and the risk of arms race

As economic activity is central to many countries' efforts to ensure their national security, it's safe to assume that a country would take every avenue necessary to protect those economic interest, even in the case of development and exploration efforts by commercial entities which base themselves inside the country. These actions could include both diplomatic and military methods to gain an advantage in the outer space domain. Focusing on these possible military methods, the second pillar used as a basis to predict that the forthcoming expansion of human activities by various political actors will occur in a contested and dangerous environment is the ever increasing importance of the development of weaponry with the primary purpose to attack satellites in outer space. In 1991, the first military conflict occurred that showcased the awesome combat enhancing capabilities space platforms could provide to a nation's military. During this conflict, known as the "Gulf War", the United States used capabilities provided by satellites to include reconnaissance, position, timing, communications, and weather information, to greatly improve its capability to execute attacks with an accuracy and timing not seen before in human history this increased capability allowed the United States to end the conflict in relatively short order, this "Gulf War" also happened to be the first conflict with was tracked by the mass media in near real-time. This allowed other countries with relatively equal military power when compared to the United States (China, Russia, etc.) to witness the great importance the U.S placed on space as a domain in which it would fight its wars and the dangers these capabilities could have against their own countries in a possible conflict with the United States . Therefore, these countries began adapting their military doctrine and acquisition strategies to counter the space-based capabilities of the United States.

Focusing on China in particular, there have been demonstrations over the past decade that indicate at least a capability for a terrestrial based weapon to take action against a satellite in space. The most notable of these demonstrations occurred in 2007 when the Chinese launched a ballistic missile armed with a kinetic kill vehicle from a mobile launch platform to destroy a defunct Fengyun-1C weather satellite in low earth orbit. This missile test created a resulting debris field of around 3,000 pieces which continue to threaten human missions and satellites operating in this orbital plane. A more recent test of a possible anti-satellite weapon occurred in May of 2013. During an interview with the news show 60 Minutes, Brian Weeden of the Secure World Foundation, indicated that this missile test may have gone as high as 30,000 kilometers, which could threaten satellites in orbits previously thought to be safe from ground based space weapons. Both of these tests provide indications of the ongoing development and improvement of weapons systems which could be used to impact space operations in the event of conflict.

If having the technological ability to attack space objects is one side of the weaponization of space; the other side would have to be the intent to use the capability. Following the aforementioned use of the SC-19 anti-satellite weapon in 2007, Michael Pillsbury issued a report to the US-China Economic and Security Review Commission which examined three books published by China's National Defense University. Pillsbury summarized the ideas contained in these text and underlined that each author recommended that "that the acquisition of the systems and even their deployment are to be done covertly in a manner that cannot be detected by the United States until the moment of their use by China in a crisis". Finally, Michael Pillsbury outlined several recommendations that the Chinese authors gave their high command to include the development of a space combat capability, a plan to destroy or temporarily incapacitate all enemy space vehicles above Chinese territory, and various different methods to stealthy deny space capabilities through various domains.

It can be safely assumed that ideas such as the ones mentioned above are not limited to only Chinese military planning. Therefore, a conflict between any advanced militaries has the possibility to have damaging impacts to outer space developments or explorations efforts. As this "arms race" with space weaponry continues, there is increasing possibilities that these weapons can come into play and have lasting impacts on any possible commercial or state-sponsored activities in space in the future.

Evaluation of Previous Attempts to Resolve the Issue

Countries most willing to support the idea of opening space to territorialisation and colonisation would be those best placed to take advantage of the situation, and those who have strategic concernsregarding its use. Countries like the United States of America, China and Russia, who have experiencedand highly developed space programs, would likely push very hard for the right to explore and claim territory in space. The economic and strategic significance of extra-terrestrial territory is overwhelming,when as mentioned earlier, terrestrial resources are not only nite but dwindling, while those in space areeffectively limitless. The country that could gain reliable access to vast quantities of raw materials andenergy would have enormous leverage in global trade and politics. [www.informaworld.com/index/783200460.pdf]

Conclusion:

On the whole there has been little attempt to exclusively regulate and control the actions of the private sector in outer space, indeed most treaties in this field deal with States themselves. However many agreements such as the Liabilities Convention and the Rescue Agreement can be extended to apply to the private sector as well. These conventions have widespread support and are regarded, as being fairly successful. Extending their mandate is a fairly easy solution. However questions of property rights in outer space, validity of space tourism and what constitutes the "common heritage of all man-kind" remain unanswered.

Although space colonisation might be a reality in the near future(as stated by major organisations sych as NASA) as a result of possibility that an asteroid in the right place could leave Earth uninhabitable to humans, it is imperative not only for the UN but also for the nations to not take planet Earth for granted. It is important to remember that space pollution(mainly debris) caused due to attempts at colonisation poses a viable threat to life on Earth. Therefore, it is important to restore peaceful use of outer space by introducing updated international legislation regarding the actions commercial entities can take in the outer space domain and keeping in check, the increasing pace of development in weapons a nation's military may choose to use in the event of conflict which threatens their national security. The next set of steps taken inorder to enforce the aforementioned rules will play a pivotal role in establishing the next stage of human interaction in the outer space domain as a peaceful and cooperative endeavor.

Possible Solutions:

The problems faced are new but that does not mean that existing framework cannot be used to regulate the activities of the private sector in outer space. As discussed earlier the prime example of this should be the Liabilities Convention, which has gained the support of a large number of states when it was passed. Including private entities in its purview and making them bound with the same provisions is a measure that will have widespread support. A similar step can be taken with the Rescue Agreement where the problem is that "astronaut" is a loosely defined term. By using a definition of an astronaut that encompasses space tourists and/or those on mining operations doubts will be cleared and space tourists gain more confidence in space travel, for they will know that they will be rescued in case of an accident. These provisions already have widespread support and altering them to directly regulate the private sector is an obvious solution. Setting up a central UN administered control center for all space flight is yet another viable solution to the issue at hand. As the sheer volume of space flight increases the current procedure of informing the Office of thee Secretary General before each space flight is inefficient. Thus setting up a space flight control center will ensure that there is a single point of correspondence for the private sector and this will encourage more and more of them to get involved in activities in outer space. This is also crucial in preventing accidents as all states will be kept informed and space flights be cleared by this control center. Plane accidents by collision have been virtually eliminated and a dedicated control center will do the same for outer space. Its mandate has to be established but the need for it is obvious. Defining outer space is a step towards eventually solving this issue; simply defining outer space as the region "beyond the Kármán Line" is perhaps sufficient. No UN treaty has officially referred to outer space as this and supporting this definition with appropriate details will ensure that a comprehensive definition can be created, which will not only aid in solving this issue but also providing assistance in other matters of outer space.

There is also the matter of safety. Space travel is dangerous and once it is opened to the general public this issue will be at the forefront; the first such major venture is a mere 4 years away and thus there needs to be an international certification process that decides who shall be allowed to partake in transporting tourists to outer space. Forming a UNCOPUOS subcommittee that reviews applications of companies who wish to undertake activities in outer space is a touted solution. This committee will evaluate companies based on: capital employed (can they afford to provide requisite safety), past history of accidents and involvement in transportation of individuals among other stringent guidelines. Resolutions should outline the exact parameters that companies must meet in order to qualify for space programs. This will again ensure the safety of not only those directly being transported but of those in outer space in general and again will ensure that a lack of legislation on these matters in certain states is not exploited by the private sector.

The most contentious issue and the main reason for the failure of the Moon Treaty was the fundamental disagreement over what constitutes the "common heritage of mankind". National law generally supersedes international law and major nations such as the USA have effectively decided to ignore the provisions of the Moon treaty. They support mining space, they support owning property in outer space, and they support the commercial use of outer space. Here is where a sustainable solution is required. There may come a time when resources on Earth run out and than outer space will have to be used as a source of natural resources, extracting them so that it is in the benefit of "all mankind" is believed by many to be impossible. Thus a solution must make a compromise. One such option is to grant permits to private sector entities to mine celestial bodies such as Mars. These permits will be issued only by a UN administered body, and in order to fulfill the Doctrine of "the common interest of all mankind" these private sector entities will be required to pay a tax on any earnings they make by mining these space resources directly to the UN. It is then the prerogative of the UN to use these funds so that it benefits "all mankind". This is a more viable option than simply prohibiting mining, seeing as how states capable of mining are already attempting to do so, enlisting the help of the private sector as they go along.

Ownership of territory in space poses a similar problem. One cannot claim sovereignty over territories in outer space but that does not necessarily mean that one cannot erect structures on celestial bodies. If a private sector entity intends to build a colony on, say, Mars. They should be permitted to do this however they wouldn't own the territory they would simply, "rent" it from the UN or any other body that nations agree as representative of the interests of "all mankind". The vast financial and human resources of the private sector means that many believe that in order to sustainably explore this new frontier the help of the private sector is essential, this solution enables the same without compromising the common interest principal. Here again the screening process must be stringent and only those business meeting international guidelines will be granted areas to develop on. If in 5 years no construction is done on the property than the permit may be revoked. However, even the companies must be protected and thus the UN body cannot interfere in the construction or running of the colony unless the company is breaking the law. Further bearing in mind the large investment a company will make they should be granted the right to extend their "lease" for as long as they see fit. The space debris mitigation agreement must be followed in the

construction and if required demolishment of the site. Those "space hotels" that are not based on any celestial body but simply orbit around the Earth (similar to the international space station) could also be permitted. Though again the central body should be informed and its orbit decided to prevent accidents and protect space tourists.

Preventing the militarisation of outer space is also crucial. In order to do this all-private spacecraft should be checked to ensure they are not transferring weapons of conventional or non-conventional nature into outer space. Any attempt at the militarisation of outer space is to lead to an immediate revocation of the permit - granting it permission to use outer space - of the company. Again the UN has repeatedly discussed methods to ensure that outer space remains a demilitarised zone, and several provisions of agreements made in the past can be now exclusively applied to the private sector. Additionally, those companies with weather forecasting and early warning systems and satellites should be required to share any data they may have that benefits "all mankind". If a private entity via use of satellites is able to predict, for example, a storm than this information should be shared with any relevant UN entity. In this regard incentivising the private sector to get involved in such beneficial activities could work. These incentives could include a rebate of the aforementioned "tax". It's important to remember that this is a vast issue and solutions outside the scope of this document may be required and are encouraged.