LEGAL ASPECTS OF INTELLECTUAL PROPERTY RIGHTS IN RESPECT OF OUTER SPACE ACTIVITIES

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MASTER OF PHILOSOPHY

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This is to certify that the dissertation entitled **LEGAL ASPECTS OF INTELLECTUAL PROPERTY RIGHTS IN RESPECT OF OUTER SPACE ACTIVITIES** submitted by **SREEJITH S. G.,** is in partial fulfillment of the requirement for the degree of **MASTER OF PHILOSOPHY (M.PHIL.)** of this university. It is his original work and may be placed before the examiners for evaluation. This dissertation has not been submitted for the award of any other degree of this university or of any other university.

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TO MY PARENTS

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Acknowledgement

Coping with an exceedingly convoluted issue is an insuperable task and ensnaring it is even more insurmountable. It puts the solver in a quandary if the issues bubble up in an unconstrained way. I was experiencing it as I jotted down page after page, chapter after chapter, punctuating with dots and dashes, commas and colons, until the sentences ended with a full stop. But luckily, I have many, to behold me through out this endeavor.

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Chapter I

Introduction

The universe, where we live has always been a theme of nosiness for mankind. Their cosmonautic inquisitiveness has translated early dreams and utopias of the past into astounding achievements of today. These achievements took place through extraordinary human efforts based on creative thinking and directed towards innovation. All research, which has gone after, and the rich experiences of scientists and astronauts have yielded a harvest of technological findings. But towards the end of 20th century, a new trend to channelize these human capabilities started mushrooming. With the commercialization of space activities, as huge investments started flowing towards space related endeavors, there emerged a need for stronger intellectual property protection. In this scenario, it became the insurmountable task for space law and intellectual property laws to ensure and achieve the protection of intellectual property rights with regard to outer space activities.

I.1. Concept of Space Law and Intellectual Property Laws

Space law and intellectual property laws are two distinct branches of law, each with its own unique features and philosophy. The peripheral as well as the intricately inlaid features of these disciplines are dealt with in the ensuing paragraphs.

I.1.1. Space Law

Space Law[1] is defined as a sum total of rules of international law governing relations between states and international organizations in connection with their space activities and establishing a regime of international law for outer space and celestial bodies[2]. It is a special branch of public international law[3], which has been inscribed in

[1] As regards denomination of the legal materials dealing with the questions of space exploration, the writings present a similar variety. The denominations found in the scientific and the official language are cosmic law, interplanetary law, law of astronautics, space law etc. Besides these, there are some atypical names or variants like extra-atmospheric law (Poulantzas), or world space law (Rauchhaupt). But the most broadly used term is the version 'Space Law' or 'Law of Outer Space'. Its use is overwhelming not only in English, but also in German, French, Italian, and Spanish languages. For a useful summary of terminological questions, see L. Babinski, "Doutes et controversies autour du choix dela juste denomination pour le droit a elaborer au sein la", *Proceedings of the Seventh Colloquium on the Law of Outer Space*, 1964, pp.292-300.

[2] A.S. Piradov, *International Space Law* (Moscow: Progress Publishers, 1976), p.43, as quoted from G.P. Zhukov, *Komicheskoye pravo*, p.13.

the international legal system through custom, treaty, and the general principles of freedom, peace, and co-operation[4]. Its sources also include the domestic internal rules of law, which contain special provisions in connection with space activities[5]. The principal subjects in international space law are states, which are vested with international rights and obligations[6].

I.1.2. Intellectual Property Law

Intellectual Property Law[7] is that area of law, which concerns legal rights associated with creative effort or commercial reputation and goodwill[8]. It attempts to strike a balance between providing adequate incentives to develop new technologies, products and artistic creations, and ensuring effective distribution of those inventions

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[3] Opinions differ on the question whether space law can be regarded as a new branch of law. Some jurists opined that traditional international law applied to outer space, whereas some others argued that it would be impossible to simply extend the scope of international law over phenomena lying beyond the scope of earthly empirical laws. An argument that legal regime of outer space has specific features, which required special principles and rules, also came up. But Soviet jurisprudence took the stand that it is a new and separate branch of international law, within the framework of the general system of international law, due to specific features of its principles and rules, which cannot be identified with other branches of international law.

[4] From the fact that space law is regarded as part of international law, it follows that its sources are the same, like those of other parts of international law.

[5] Space law in its wider sense, regarded as part of the national laws, has the same sources as the law of the respective state. For example, United States National Aeronautics and Space Act, 1958.

[6] Though Article VI of the Outer Space Treaty, 1967 gives an implied consent for international organizations to participate in space activities, it emphasizes the prominence of states by placing international responsibility and confers states the power to authorize international organizations to carry out space activities. As regards the Liability Convention, 1972 its provisions do not provide a proper equilibrium between states and international organizations. But even in that Convention, in case of conflicting interest between states and international organizations, full responsibility and ultimate decision lie with the states. Also Article III of the Registration Convention, 1975 Article XI (3) and XIV (1) of the Moon Treaty, 1979 emphasize the principal role of states in space activities. But in the last ten years, the relaxation of tight government control in commercial space activities has led national and multinational companies to join certain commercially operated activities in outer space. In this respect, the subject of international space law is no longer limited to states and international organizations, but private enterprises established in different legal forms have also become entities with rights and obligations under international law.

[7] There are several different forms of rights or areas of law giving rise to rights, which together make up intellectual property. They are: (1) Patents, (2) Copyrights, (3) Trade marks, (4) Geographical Indications, (5) Lay Out Designs of Integrated Circuit, (6) Trade Secrets, and (7) Designs. Though the nature and purpose of these rights are distinctive, they share certain fundamental characteristics that bring them under the category of 'intellectual property'. But this has now acquired a degree of international acceptance, as the title of the United Nations' organ World Intellectual Property Organization indicates. Also see Keith E. Maskus, *Intellectual Property Rights in the Global Economy* (Washington D.C.: Institute for International Economics, 2002), p.28.

[8] David I. Bainbridge, *Intellectual Property* (London: Pitman Publishing, 1996), p.3.

into the economy. It is a branch of law, which protects some of the finer manifestations of human achievements[9]. Intellectual property law is mainly a creature of statute, but has also developed through common law and equity[10]. It is a negative right which is individual centric.

I.2. Social and Political Factors that Groomed Both Branches of Law

Numerous remote and succession of factors played key roles in the grooming of both space law and intellectual property laws. These factors bore a superior impact in the molding of these branches of laws, which in the course of chiseling out legislations left an entrenched impact upon its very existence. Certain core principles of space law and intellectual property laws even owe its existence to these factors.

I.2.1. Space Law

Though there is umpteenth number of factors that shaped space law, those could be mainly compartmentalized into six major ones. They are:

I.2.1.i. Super Power Ascendancy

The long-drawn-out task of prescribing a code for the new frontier ended up in General Assembly Resolutions 1721(XVI) and 1962(XVIII). These resolutions represent a major breakthrough in the development of international space law, and are referred to as the 'first chapters in the book of space law'. This is because all the principles proclaimed in these resolutions were subsequently incorporated into the Outer Space Treaty, 1967[11], from which emanated the whole gamut of space law.

These resolutions reflect a certain international understanding of the principles, which ought to govern the exploration and use of outer space and celestial bodies. These are referred to as the epitome of instant customary law[12]. Moreover,

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[9] W.R. Cornish, *Intellectual Property: Patents, Copyright, Trademarks and Allied Rights* (London: Sweet & Maxwell, 1989), p.3.

[10] Intellectual property rights like designs, rights in performance, plant varieties, etc. owe its origin to statutes whereas breach of confidence, passing off, trade libel etc., have their origin from common law. See Tina Hart and Linda Fazzni, *Intellectual Property Law* (London: Palgrave, 2000), p.4.

[11] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, 1967.

[12] Bin Cheng, *Studies in International Space Law* (Oxford: Clarendon Press, 1997), pp.136-41.

both the history of the resolutions and its contents suggest that the intention of the drafters is to provide ground rules for the future exploration and use of outer space.

Though initially there were some differences in opinion between the two super powers USA and USSR[13] regarding the form in which these principles were to be set out, certain early negotiations between them led to the tabling of a similar proposal. Perhaps it is this consensus between the super powers together with a feeling that what is good for the super powers is also good for the international society, motivated the members to adopt the resolutions unanimously.

I.2.1.ii. Concerns of Developing Countries

During the initial days of space exploration, outer space was looked at by the developing countries as something beyond the hold of all but two or three powerful and technologically advanced countries. So, when the space legal regime was on the rise they intensely participated in it. This involvement was mainly to ensure that their interests would not be adversely affected. And in that process, they vehemently stood for their rights. They were particularly concerned about the arms race being exported into outer space, and like most other countries, they wanted the new environment to be used for peaceful purposes only[14]. It is this concern of the developing countries that culminated in the inclusion of provisions like common heritage of mankind, peaceful uses of outer space, non-discrimination, demilitarization, absolute liability etc., into the gamut of space law[15]. Later, emergence of new technologies like remote sensing and telecommunications added a new fillip to their participation in 'space

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[13] Since the establishment of United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS), USSR demanded for a treaty, on the other hand US was adamant that they wanted a General Assembly Resolution. See J. Simsarian, "Outer Space Co-operation in the United Nations", *American Journal of International Law*, vol.57, 1963, pp.860-61; Cheng, n.12, pp.125-49.

[14] N. Jasentuliana, "The Development of Space Law from a Third World Perspective", in V. S. Mani and others, ed., *Recent Trends in International Space Law and Policy* (New Delhi: Lancers Books, 1997), pp.83-110 at p.84.

[15] See in particular Articles I, III, IV, VII, IX, and X of the Outer Space Treaty, 1967; Articles II, III, IV, V, VIII and XXI of the Liability Convention, 1972; Articles II, III, IV and XI of the Moon Agreement, 1979.

law' making, which resulted in the Legal Principles on Remote Sensing and Direct Broadcasting Satellites[16].

I.2.1.iii. Cold War

Cold War to a larger extent acted as a catalyst in the initial shaping of space law. During this period of unfriendly relations between the United States and the USSR, both countries poured huge amounts of money into their space programmes. This is because many of the political and public opinion battles were being fought over superiority in space. This super power clash gave a new impetus to the human conquest of space. In 1957, Soviets launched Sputnik-I, which gave the indication that they would also be capable of hurling a nuclear warhead across the artic to hit the United States[17]. But during the first years of cold war, the nuclear balance of terror favored United States[18]. Despite this, a fear of losing the space race made them more vigilant. This apprehension geared by cold war geo-politics forced the super powers to settle for the demilitarization and non-appropriation of outer space[19].

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[16] During the chore of drafting a code for remote sensing, the UNCOPUOS witnessed a conflict between the developing countries that advocated the principle of sovereignty, especially Permanent Sovereignty over Natural Resources (PSNR) Principle and those who stood for the freedom of outer space and freedom to disseminate information. As regarding Direct Broadcasting Satellites (DBS) Principles, the objections raised by some developing countries thwarted the adoption of these principles in UNCOPUOS by a consensus, which was later adopted by the General Assembly. See Cheng, n.12, pp.589-97; Jasentuliana, n.14, pp.89-90. For support see, among COPUOS members in discussions in the legal Sub-Committee at its 16th (1977) Session, Chile, A/AC.105/C.2/SR.269 (17.3.77), para. 4, Iran, ibid./SR.270 (18.2.77), para.13; India, ibid./SR.270 (18.3.77), para.32; Mexico, ibid./SR.271 (21.3.77), para.14; Indonesia, ibid./SR.272 (22.3.77), para.16; German Democratic Republic, ibid./SR.272 (22.3.77), para. 27; Egypt, ibid./Sr.272 (23.3.77), para.7.

[17] Robert M. Lawrence, Strategic Defense Initiative: Bibliography and Research Guide (Colorado: Westview Press, 1987), p.6.

[18] Ibid., p.3.

[19] It was this apprehension of losing the space race that resulted in the inclusion of non-appropriation and demilitarization clauses in the Outer Space Treaty, 1967. See particularly Articles II and IV. During the early cold war days, United States and USSR could be seen as two scorpions in a bottle, both immobilized by virtue of their own, and their antagonist's fatal power. When Soviets started gaining nuclear power, US gave shape to several defense initiatives, like 'Mutual Assured Destruction' (MAD). As far as Soviets are concerned, they neither accepted nor rejected MAD. But several misgivings about the safety of the MAD made US look for alternatives. One alternative that gained popularity was mutual arms control. Article IV of the Outer Space Treaty, which bans the stationing of nuclear weapons in space, is a reflection of this trend. See Lawrence, n.17, pp.3-6. Also see Cheng, n.12, pp.215-64.

However, first lunar landings made the United States somewhat leaders and in its aftermath cold war suspicions over-shadowed space exploration programmes. This has had its impact in the subsequent Moon Treaty[20].

Even at the time of its demise, cold war left its impact upon space law. Its death, which is mainly due to the collapse of Soviet Union, resulted in the reorganization of Soviet aerospace agencies with a large dose of privatization, having collaboration with European and American firms. In such an atmosphere of increasing private participation and mergers[21], space law slowly had a shift from a 'law of co-operation' to a 'law of competition'.

I.2.1.iv. Role of Organizations

Various international, national, inter-governmental, and non-governmental organizations have played a remarkable role in codifying space law. Such organizations range from the United Nations (UN) to national space agencies. Among these, the most noteworthy is that of UN's Committee on Peaceful Uses of Outer Space (UNCOPUOS), which in its early years [22] has contributed a lion's share to the gamut of space law[23]. The role played by the specialized agencies of United Nations

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[20] See Articles IV, and XI (I), (2), (3) of the Moon Treaty, 1979. Also see Cheng, n.12, pp.357-74.

[21] The demise of cold war and emerging competition in space sector touched off a wave of mergers in the American aerospace industry. Martin-Marietta acquired the aerospace division from General Electric Company in 1992, and then merged with the aerospace giant Lockheed two years later. In 1997, Boeing acquired longtime rival McDonnell Douglas Corporation's space and communications division. Several European firms announced their intention to combine forces to challenge the newly formed American giants. In 1999, the French, German, and Spanish partners in the Airbus consortium merged to form the European Aeronautic Defense and Space Company.

[22] The UNCOPUOS is criticized for its newly emerged group dynamics and expansion. Too many members have little knowledge of either the technical or the legal elements involved and too many appear only for one year, making political speeches for an audience other than that in front of them, and then depart for other more prestigious or lucrative appointments. As this has run in step with the greater difficulties of the areas under the Committee's consideration, it has had an adverse effect on the work. Until recently, UNCOPUOS worked, based on consensus, and the Committee's personal problems resulted in UNCOPUOS making little progress on many matters in the 1980's. For more details, see E. Galloway, "Consensus as a Basis for International Space Co-operation", *Proceedings of the Twentieth Colloquium on the Law of Outer Space*, 1978; Francis Lyall, *Law and Space Telecommunications* (Vermont: Gower Publishing Company, 1989), pp.21-23.

[23] The UNCOPUOS has so far elaborated the texts of five treaties on the law of outer space and, in addition, passed four resolutions of direct relevance to the substantive law which include, Resolution 1721(XVI) of 20 December 1761; Resolution 1884(XVIII) of 17 October 1963; Resolution 1962(XVI (III) of 13 December 1963; Resolution 37/92 of 10 December 1982; Treaty on Principles Governing the Activities of State in the Exploration and Use of Outer Space, including The Moon and Other Celestial Bodies, 27 January 1967; Agreement on the Rescue of Astronauts, the Return of Astronauts,

and certain telecommunication organizations, mainly in codifying telecommunications law, which is now a specialized branch of international space law, is really of note[24]. Non-governmental organizations like International Astronautical Federation (IAF), International Institute of Space Law (IISL), American Institute of Aeronautics and Astronautics (AIAA), and Institute of International Law with their action plan of achieving a sound astronautical programme, mainly through dissemination of knowledge, has also contributed substantially to the growth of space law[25]. Finally, yet importantly, a series of bilateral agreements between space agencies of various states acted as a catalyst in the grooming of space law.

I.2.1.v. Globalization

Globalization[26] came as a prime contender to the concrete paradigm that states are the major players in international relations[27]. Globalization is the sum of multiple local activities, which involves the interpenetration of these activities with worldwide range, consequence, and significance. It has had its impact on almost all walks of life ranging from culture to laws. A very significant feature of globalization is,

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and the Return of Objects Launched into Outer Space, 22 April 1968; Convention on International Liability for Damage Caused by Space Objects, 29 March 1972; Convention on Registration of Objects Launched into Outer Space, 14 January 1975; Agreement Governing the Activities of States on the Moon and Celestial Bodies, 18 December 1979. Also see Carl Q. Christol, *The Modern International Law of Outer Space* (New York: Pergamon Press, 1982); Nicolas M. Matte, *Aerospace Law* (Toronto: Carswell Company, 1969).

[24] The International Telecommunications Law, which is a specialized branch of international space law, is mainly created by the specialized agencies of United Nations. International Telecommunications Union and World Meteorological Organization deserve special mention here. Apart from these specialized agencies, certain regional organizations like, INTELSAT, INTERSPUTNIK, INMARSAT, EUTELSAT, and ARABSAT could claim a good share in grooming telecommunications law. The ITU has particular roles in the matters of radio frequency, allocation, use and registration, orbital positions and rate setting. As far as other organizations are concerned, the law, which relates to the working of these organizations, is partly a matter of agreement expressed in the constituent documents of these bodies. The decisions of their governing bodies and decision-making processes are law within that organization for the purposes of that organization. They are also, however governed by general principles of international law relating to the interpretation of, and compliance with, the terms of international agreements. See Lyall, n.22, pp.17-26.

[25] See Andrew G. Haley, *Space Law and Government* (New York: Appleton-Century-Crofts, 1963), pp.343-93.

[26] The term 'Globalization' in essence is seen as an economic, political, social, and ideological phenomenon. Here it is defined in an economic context, as a concrete manifestation of market forces now liberalized, increasingly unfettered by state regulation and control. For details see Claire Turenne Sjolander, "The Rhetoric of Globalization", *International Journal*, Autum, 1996, p.604.

[27] Philip G. Cerny, "Globalization and Other Stories: the Search for a New Paradigm for International Relations", *International Journal*, 1996, p.617.

marginalization of the functions of states as well as an increased participation of certain important actors in the international society i.e., non-state actors such as Non-Governmental Organisations, Transnational Corporations, and individuals.

In space sector globalization ushered in waves of commercialization and the growing participation of non-state players. These activities increasingly engaged rules of international economic and trade laws to the realm of space law and involved international organizations with law-making and dispute settlement functions in this area[28].

In the post globalization period in order to facilitate commercial activities, the International Space Station (ISS) was launched. Its utilization necessitated a legal framework. The foundation document for the ISS is the Inter-Governmental Agreement, 1998 (IGA)[29]. Based upon IGA several Memorandums of Understanding were entered into between various space agencies[30].

Though forces of globalization have substantially groomed space law, there remains quite a sizeable amount of issues, which is being negotiated, like intellectual property rights, dispute settlement, contractual liability etc.

I.2.1.vi. Juristic Writings

No other discipline owes that much in it's molding from the writings of jurists as space law has. Relying on general ideas, jurists prepared the background for the development of space law in the United Nations and outside. They used their ingenuity, power of reasoning, commitment to the common interest of mankind, and

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[28] International Space Law received a new dimension when an international trade regime was established in 1997 within the framework of General Agreement on Trade in Services (GATS) and the WTO Agreement on Basic Telecommunications Services, annexed to the GATS.

[29] Inter-Governmental Agreement is officially known as the Agreement among the Government of Canada, the Governments of Member States of the European Space Agency, the Government of Japan, the Government of Russian Federation, and the Government of United States Concerning Co-operation on the Civil International Space Station, January 29, 1998.

[30] Memorandums of Understanding were entered into between the National Aeronautics and Space Administration (NASA) of the United States of America and the European Space Agency (ESA), between NASA and Russian Space Agency, between NASA and Canadian Space Agency, and between NASA and National Aeronautics and Space Development Agency of Japan, concerning co-operation of civil international space station.

historical wisdom to prepare the blueprint for the law of outer space[31]. Throughout its transition, scholastic attention kept the dynamism alive and chiseled the discipline in line with its changing form[32]. Notwithstanding this, the various colloquia and symposiums organized under the auspices of International Institute of Space Law, International Astronautical Federation and other bodies, which made available forums for the scholars to gather, acted as a think-tank for space law.

I.2.2. Intellectual Property Laws

Intellectual Property has had its genesis in ancient Greece, with patents alone as its subject matter[33]. During the 12th and 13th centuries, there existed the concept of 'monopoly rights', though not for intellectual creations[34]. However, the first monopoly right for an intellectual creation was granted in 1559[35]. Later, with the invention of printing press, the concept of copyrights also became the subject matter of intellectual property. The first enactment in this regard was the Statute of Monopolies of 1624[36]. From this point onwards, intellectual property laws started taking a dramatic expansion to its form. A host of factors, some of them economic,

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[31] S.Bhatt, "Contribution of Scholars and Jurists to the Development of Space Law", in V.S.Mani and others, eds., *Recent Trends in International Space Law and Policy* (New Delhi: Lancers Books, 1997), p.141.

[32] Throughout its transition from the 'law of co-existence' to a 'law of co-operation' and then to a 'law of competition', it is the keen attention conferred by the jurists from time to time that added a new fillip to the development of space law. In the earlier days, it was by scholars like Andrew G. Haley, Myres S. McDougal, Euguine Pepin, and Oscar Schachter. During its second stage, in the good hands of Stephen Gorove, Nicolas Mattesco Matte, G.P. Zukhov, and Manfred Lachs, space law received absolute intellectual nourishment. The challenges posed by space commercialization and the transformation of space jurisprudence into a 'law of competition' was boldly undertaken by modern space jurists like Bin Cheng, N.Jasentuliana, F. Von der dunk, Karl H. Bocksteigel, S. Bhatt, and Chia-jui-Cheng.

[33] According to Greek historian Phylarchos, the city of Sybaris granted a patent for an article of cusine, presumably a recipe. For more details see Gregory A. Stobbs, *Software Patents* (New York: Wiley Law Publications, 1995), pp.2-3.

[34] In 1326 in England, the Crown established a policy to encourage importation of new arts into England. It began granting monopolies to the first individuals or guilds willing to undertake importing new products. See P.J. Federico, "Origin and Early History of Patents", *Journal of Patent Office Society,* vol.18, no.7, 1936, pp.19-20.

[35] The Queen granted letters patent to Giacopo Acontio for inventing a new kind of furnace and wheel machine. For more details, see Federico, n.34.

[36] The Statute of Monopolies of 1624 is the first patent statute ever enacted. Among the exceptions provided in this statute were patents for new inventions granted for not more than 21 years and certain patents on warlike manufacturers and materials. This statute remained on the books as patent statute of Great Britain until nineteenth century.

some ideological, some political, and some peculiar to the sphere of law have converged to thrust the subject into its position of salience.

I.2.2.i. Industrial Revolution

Until late 19th century, there prevailed an anti-patent movement in Europe[37]. This was a consequence of free trade and anti-monopoly movements. However, the scenario was changed with the industrial revolution, which ushered in the concept of a market-oriented society. Such societies emphasized the rights of creators on the ground that individuals should be allowed to profit from their intellectual labor and thus be motivated to greater creativity[38]. Interest groups in such economies created pro-patent lobbying groups.

The market-oriented economy created by the industrial revolution led to the growth of international trade and competition in industrial goods. The nation state adopted various policies for promoting their industries and a need for international co-operation in patent matters grew, especially since nations often discriminated against foreigners[39]. These factors paved way for the enactment of Paris Convention for the Protection of Industrial Property, subsequently followed by many more treaties and agreements.

I.2.2.ii. Ideological Currents

To account fully for the shaping of intellectual property law one must also take into account certain ideological factors. The first one has been the widespread popular commitment to a 'labor desert theory' of property. The notion that a person deserves to own something he or she has created through productive labor has gained

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[37] An anti-patent movement emerged in Europe, first in Germany and somewhat later in Holland, where patent laws were repealed in 1869. Switzerland rejected several patent law proposals. Even England considered adopting significantly weaker patent laws, and France had earlier weakened patent protection at the time of French Revolution. This movement was mainly a consequence of free trade and anti monopoly movements, since patents were associated with mercantalistic policies as well as with monopoly privileges. For a detailed discussion see Ove Grandstrand, *The Economics and Management of Intellectual Property* (Cheltenham: Edward Elgar, 1999), pp.31-36.

[38] Dennis Pirages, "Intellectual Property in a Post-Industrial world", *Science Communication,* vol.17, no.3, 1996, pp.267-73.

[39] Perhaps it is the reflection of this policy, which inducted a 'national treatment' clause in the Paris Convention. See Article 2 of Paris Convention for the Protection of Industrial Property, 1883.

good popularity[40], especially in United States of America. Such attitudes have contributed to the willingness of legislators and judges, first to establish and then to expand intellectual property rights.

Secondly, the notion of classical liberalism has contributed in many more detailed ways to the expansion of intellectual property rights. The most important, probably, has been the strong commitment of both courts and legislators when administering the copyright law to the principle of aesthetic relativism.

The third ideological current that had a powerful impact, particularly on copyright law was the popularization and persistence of a 'romantic conception of authorship'[41]. Copyright law in Europe and United States grew out of and to some extent helped popularize this romantic vision. Combined with the general labor desert theory, it helped support the notion that an artist deserves to his own creations. This led to the concomitant expansion of the rights of copyright owners and the extension of copyright protection to concepts like photography.

I.2.2.iii. Pro-patent Era

Though political and economic forces mainly defeated the anti-patent movement of the late nineteenth century, this did not produce a market reversal into a pro-patent era. Obviously, after industrial revolution intellectual property (IP) legislations carried weight, but IP issues were circled in the backwaters of business, economics, and policymaking and continued to do so for a good century[42].

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[40]. For an application of the argument to intellectual property, see Justin Hughes, "The Philosophy of Intellectual Property", *Georgetown Law Journal,* vol.77, 1988, pp.296-314 at p.287.

[41] See for example, Martha Woodmansee, "The Genius and the Copyright: Economic and Legal Conditions of the Emergence of the Author'', *Eighteenth Century Studies,* vol.17, 1984, p.425; Martha Woodmansee, "On the Author Effect: Recovering Collectivity", *Cardozo Arts and Entertainment Law Journal,* vol.10, 1992, p.227; Peter Jaszi, "On the Author Effect: Contemporary Copyright and Collective Creativity", *Cardozo Arts and Entertainment Law Journal,* vol.10, 1992, p.279; Also see Jane M. Gaines, *Contested Culture: The Image the Voice and the Law* (1991); Mark Rose, *Authors and Owners: The Invention of Copyright, (*1993); Susan Stewart, *Crimes of Writing: Problems in the Containment of Representation* , (1991).

[42] Ove Grandstrand, n.37, p.38.

Several factors like the increasing domestic patent litigations[43], attitudes of US Antitrust Division[44] etc., were responsible for the emergence of a pro-patent era. But the main stream of events emanated from large US corporations. Through a series of initiatives and reports, channeled through various committees, councils, and task forces, US big industry pressed for stronger IP protection and enforcement against infringers and counterfeiters domestically and abroad[45]. They also pressed for a trade-based approach to improve intellectual property protection by including IP matters in the GATT framework of trade negotiations[46]. In general, these initiatives and pressures were part of a larger movement to increase the competitiveness of corporate sector, for which it had become increasingly clear that technology was a key asset that had to be protected.

The pro-patent movement acted as a catalyst in bringing the IP negotiations to the GATT forum. The fact that it was a movement of 'corporeal giants' to strengthen their dominance, highlights the later extensive changes in the IP framework.

I.2.2.iv. Pre-TRIPs Negotiations

Though Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs) is treated as the turning point in the development of intellectual property

[43] Pro-patent era commenced in United States with the establishment of a federal court of appeals, namely the Court of Appeals for the Federal Circuit (CAFC), specifically to hear patent appeals in lieu of other circuit courts of appeal. This type of specialized court has been contemplated for a long time in the patent circles. As the complexities in the patent circles grew, the pressures for a specialized court of appeals mounted and finally resulted in the creation of the CAFC. These pressures were generated largely within pro-patent circles in law and industry. The CAFC started to act in a pro-patent manner, in stark contrast to what United States courts had done previously. The validity of patents was upheld far more often and patent damages were largely increased. This led to a rise in the economic value of patents to patent right holders. See Grandstrand, n.37, p.38. Also see R.E. Hofer, "The Real World of Juries, Damages, and Injunctions in Patent Cases", *Albany Law Review*, vol.50, 1990, pp.593-609.

[44] Traditionally the United States Antitrust Division had been hostile to Intellectual Property (IP) legislations and IP licensing, interpreting patents as monopolies that limited the static efficiency of price competition. Attitudes changed with reference to upgrading the incentive aspects of patents to promote dynamic competition through R&D–based new products and processes and limiting the disincentive to R&D investments created by unauthorized imitation and 'freeriding'. See Grandstrand, n.37, p.39.

[45] See n. 1, p.39.

[46] The international trade aspects of Intellectual Property Rights (IPRs) were proposed to take place primarily within GATT framework, an arena in which United States had a more leeway than in the United Nations framework (with WIPO and UNCTAD) or the framework of other international institutions designed for intellectual property protection, which moreover were perceived by US as too weak. For more details, see M.L. Cordray, "GATT V. WIPO", *Journal of Patent and Trademark Office Society*, vol.76, no.2, 1994, pp.67-144.

rights, the pre-TRIPs negotiations shaped IPRs from an 'acceptable obstacle' to a standard setter[47]. While preparing the backdrop for Uruguay Round, there were mainly two choices before the negotiators. It was either to create a regime, absolutely new, by replacing all the existing forms of protection or one, which preserves all the old values. The negotiators apprehended that a complete change in the system could wreck havoc because some of the world's largest industries like pharmaceuticals, agri-food, computer software, entertainment, and luxury goods depended heavily on intellectual property protection.[48] Based on this perception, they used existing conventions as a logical point of departure. Thus, the entire substantive provisions of Paris and Berne Conventions (with the exception of Article 6 bis) and the IPIC Treaty were incorporated into TRIPs. In addition, the negotiators by incorporating a new set of rules for enforcement and acquisition gave teeth to the existing IPR framework.

I.2.2.v. Globalization

Globalization[49] in the world economy has created a new situation in which trade policy must react. It made many traditional intellectual property notions obsolete. One is the emphasis on private rights.[50] Secondly, in the post globalization period IPRs are recognized only when knowledge and innovation generate profits and not when they meet social needs. This went to the root of the ideology preached by the pro-patent lobby during the industrial revolution. Moreover, the globalized economies impose a sort of commercial code of conduct upon the creators[51].

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[47] Intellectual Property was considered in the GATT context as an 'acceptable obstacle' to free trade, at least until the Tokyo Round.

[48] Daniel Gervais, *The TRIPs Agreement-Drafting History and Analysis* (London: Sweet and Maxwell, 1998), p.16.

[49] See n. 26.

[50] In its Preamble, TRIPs recognizes intellectual property rights as private rights. This emphasizes the individual centric nature of IPRs though there is a view that it stands for a common good.

[51] There is recent trend to encourage researchers to make inventions not on their area of interest but upon those areas, which has high marketability. One Scientist in a letter to *Nature* points out, "If there are no arrangements with industry to bring in patent generated money, or licensing fee, one is looked upon as an outcast, not doing one's share to keep the industry viable." See B.S. Chimni, "The Philosophy of Patents: Strong Regime Unjustified", *Journal of Scientific & Industrial Research*, vol.52, April 1993, pp.234-39. Also see "Science Sells its Soul", *Nature*, vol.347, 1990, p.509.

Globalization, as mentioned earlier, ushers in growing participation of non-state players. This perpetuates a kind of 'intellectual capitalism'[52] where majority of IPs remain with the private corporations[53]. Lastly, the greatest contribution of globalization to the IP legal regime is the integration of the weakly interrelated intellectual property rights into an umbrella regime.

I.3. Philosophy of Space Law and Intellectual Property Laws

Comprehension of the philosophies of these branches of law provides a superior insight into them, which at a later stage, will facilitate in constructing regimes upon these disciplines, if needed. By philosophy, what is designated here is a set of beliefs or attitudes that guide space law and intellectual property laws and it is traced by examining the process of 'concept formation'. In the present context, what is supposed is, to behold those assortments of factors that groomed these branches of learning and to perceive the relationship between theory and practice. The philosophy portrayed here is not ontological, phenomenological, static or rights based, but that emphasizes the dynamic nature of space law and intellectual property laws and also those, which identifies its normative risks.

I.3.1. Philosophy of Space Law

One unique feature of space law is that it is the law about a 'commons'[54] owned by everybody and could be used by anybody. Space Law represents

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[52] Intellectual Capitalism is normally defined as a condition where there is private ownership of intellectual capital. See Grandstrand, n.37, pp.318-56 at p.322.

[53] For example, assume, a scenario where technology doubles after every seventh year and the development unit is 100, which will also be doubled with the technology. Here, if an invention is made in year 2000 it will be privatized through patents for 20 years. So at 2007 private domain will have 100 units and public will have zero units. At 2007, a new technology comes, which is also privatized through patents. Then by 2014, private domain will have 300 units and public again zero. By 2021 private sector will have 600 units and public will get 100 because the patent protection of the first technology will expire. Thus, the public-private IP ownership ratio will be 1:6. This perpetuates intellectual capitalism.

[54] The entire gamut of space law could be highlighted with the help of a metaphor, that of sheeps, shepherds and a village common. Here, sheeps depict satellites, shepherds the states, and village commons the outer space. A number of problems may arise from the use of the commons. 1) Damage caused by the sheeps to the commons, which designates the debris in outer space. 2) Damage by one sheep to another sheep, which designates frequency interference between satellites and 3) Sheep straying into private land adjoining the commons, which indicates satellites falling down into a country and direct broadcasting from a satellite in outer space into a country without that country's permission. Here, everybody owns the commons and all could use it. Any action against the sheep owner could

international community aspirations and stands to promote the highest good of the community[55]. In its earlier stages, it was 'law of co-existence' and in its later stages, it was that of 'co-operation'[56]. From the gamut of space law, emanates the principles of 'common interest' of the community, which must be safeguarded in the exploration and use of outer space and celestial bodies. Here all problems were addressed to the community of mankind, hence all speculative, imaginative, and ultra-legalistic notions gave way to a pragmatic and sociological determination[57].

The spirit of space law lies in ensuring freedom for states in outer space counter balanced by the demands of common interest of mankind as a whole.[58] The thread that runs through the entire body of space law is the inclusive access to and inter-dependant interests of all participants in space activities. In short, during its initial days, the space legal system was based on the perennial spirits of co-operation, sharing, mutual assistance, and freedom. From these emerged a notion of humanism.

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only be with the consent of that sheep owner. So, they made arrangements to spell out what they could each do and what they would agree to be liable. Thus, each sheep owner would own, control, and be liable for each sheep it put on the common. (The manifestation of this metaphor into reality is the Outer Space Treaty, Moon Treaty, Liability Convention, Registration Agreement, and Rescue Agreement). There is no policeman with enforcement power for the village though there is a village headman. (Village headman here is the United Nations). There are three main sources of law for the village commons. One is the agreements between the shepherds, secondly, the directions given by the village headman (Resolutions and Declarations of UN) and lastly certain moral principles like, the commons is a common province of whole villagers, it should be used for peaceful purposes etc., (Customary International Law).

[55] Article 11(2) of the Moon Treaty, while envisaging the internationalization of moon and other celestial bodies, stresses on the principle of common heritage of mankind in para 5. Moreover, the preamble of the Outer Space Treaty, 1967, the Liability Convention, 1972, and the Registration Convention, 1975 recognizes the common interest of all mankind. Article 1 para1 of the Outer Space Treaty highlights that outer space including moon and other celestial bodies as the province of whole mankind. See Rega J. Rao, "Outer Space: A Part of Common Heritage of Mankind", in V.S. Mani and others, eds., *Recent Trends in International Space Law and Policy* (New Delhi: Lancers Books, 1997), pp.191-208; S. Bhat, *Legal Controls of Outer Space: Law, Freedom and Responsibility* (New Delhi: S. Chand and Co, 1973).

[56] See K. H. Bocksteigel, "Commercial Space Activities: Their Growing Influence on Space Law", *Annuals of Air and Space Law*, vol. XII, 1987, pp.175-91.

[57] If one considers the aforementioned metaphor it would not be a surprise to note that in an environment, where the playground is an exotic locale, a common province of mankind, where all players were states, the notion of sharing and co-operation found prominence. If one look at the major space treaties, General Assembly Resolutions and General Principles of Space Law, there emanates a utilitarian approach. The concept of 'common province of mankind' envisaged in Outer Space Treaty and the 'common heritage of mankind' in the Moon Treaty underscore this.

[58] See N. Jasentuliana and Roy S.K. Lee, eds., *Manual of Space Law*, vol.2 (New York: Oceana Publications, 1979), pp.175-91; For more on these aspects see Myres McDougal, Lasswell, and Vlassic, *Law and Public Order in Space* (London: New Haven. Conn, 1963).

Until late 20th century space, law reflected a utilitarian approach and philanthropy. All this time, it remained a state-centric and state controlled system.

During its initial days, space activities were almost exclusively characterized by the focus on exploration and research. But in the recent years, especially in the post-globalization period, due to commercialization and growing participation of private industry, economic applications of space research became its objective instead of by-products[59]. In the wake of these developments, the very philosophy of space law is at stake and its perennial spirits of sharing, co-operation, mutual assistance, and philanthropy are fading away. At this juncture, the state-centric space law has become a corporeal-centric one.

I.3.2. Philosophy of Intellectual Property Laws.

The main playground of Intellectual property rights since the days of its inception is an 'intellectual commons'. One justifiable purpose of intellectual property is to enrich this commons[60]. This was accomplished through an impermanent monopoly right or a temporary restriction before the information entered the commons[61]. So, the claimant is not taking anything from the commons but he is in fact adding to the commons through an individual effort. Incentives here play the

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[59] The gamut of space law mainly comprising of five UN treaties and resolutions were formulated when space activities were undertaken mainly by states. The framework created mainly with exploratory space activities in mind, is now confronted with the growth of commercial space activities conducted both by states and by private enterprises. For details, see Michael Harr and Rajiv Kohl, *Commercialization of Space-An International Comparison of Framework Conditions* (Rich Land: Battle Press, 1996); Frans G. Vonder Dunk, "Public Space Law and Private Enterprises- The Fitness of International Space Law Instrument for Private Space Activities", *Legal Framework for the Commercial Utilization of Outer Space* (Cologne: IASL-University of Cologne, 2001), pp.12-39. Though there is no exhaustive list as to what are the commercial space activities, studies undertaken by various Centres of Space Law reveal that it include activities like launch and associated services, remote sensing, telecommunications etc. Solar energy collection and mining of asteroids may also come in the near future. See Bocksteigel, n.56.

[60] Also, there prevailed another view that the intellectual property rights were means to pursue private rights. Whereas certain other scholars saw it as an attempt to capture more of a finite and limited resource information. For a detailed discussion on it, see Peter Drahos, The *Philosophy of Intellectual Property* (Dartmouth: Applied Legal Philosophy Series, 1996).

[61] Peter Drahos justifies this by pointing out that such a commons contains both existing and potential information and the creator adds to the intellectual commons supported by his own resources. He argues, "in such a scheme what is the importance of 20 years, say, in the greater scheme of things". He further points out that the best way to increase the size of the commons is to increase the incentives to generate new information through allocation of new and broader rights. See Drahos, n.60.

role of a catalyst[62]. This concept owes its strength mainly to the post industrial revolution ideology that individual should be allowed to profit from their intellectual labor and thus be motivated to greater creativity. Based on these, the philosophy of intellectual property rights is to be perceived as a balancing. A balancing of 'creation' and 'stimulation' with 'diffusion[63]. The temporary monopoly right is justified on the ground that there exists an intimate relationship between the creator and the creation (thanks to the romantic conception of authorship). This philosophy highlights the individual-centric nature of IP laws.

But the nature of intellectual property laws kept on changing with the efflux of time. Though legislations carried weight IP issues got circled in a plexus. During the pro-patent era of 1980's, corporeal giants came forward with a demand for enhanced IP protection. Further negotiations also projected their interests. All these were signs of a new world trade order, which substantially changed the IP scenario reiterating its dynamism.

In the post-globalization period, IPRs are recognized only when they generate profits and not when they meet social needs. It became clear that profit motive could slant the direction of research towards lucrative areas[64]. This has brought about a drastic change in the very philosophy of IP laws where the balancing factor no longer exists. The current philosophy could be perceived as a mixture of 'creation' and

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[62] Critics argue that there is not a shred of evidence that any IP system has provided an incentive, which leads an otherwise uninventive person to perform acts of invention. They argue that there is sufficient evidence that hitherto the inventive individual has been spurred on by the challenge to solve particular problems and the desire to benefit mankind rather than by the objective of taking out IPRs. See in particular Phillips Jeremy, *Introduction to Intellectual Property Law* (London: Buttersworths, 1986) p.90; Chimni, n.51, p.234.

[63] Here 'creation' and 'stimulation' are treated as twin factors that are united by an 'incentive'. Individual inventor creates. Then he is given an incentive which stimulates him to do further inventions. On expiry of the monopoly period, the information is diffused. For support, see Hughes, n.40; Chimni, n.51; If this concept is viewed from an international economics perspective, the rationale behind this arrangement rests on the 'public good' nature of knowledge which, once, created, can be theoretically appropriated by others at zero marginal cost. If free appropriability is allowed *ex post*, there is little incentive *ex ante* to undertake knowledge-creating activities. See Arvind Subramanian, "The International Economics of Intellectual Property Protection: A Welfare Theoretic Trade Policy Analysis", *World Development*, Vol.19, no.8, 1991, pp.945-56; Also see Stanley M. Besen and Leo J. Raskind, "An Introduction to the Law and Economics of Intellectual Property", *Journal of Economic Perspectives*, vol.5, no.1, 1991,pp.3-27.

[64] See Alan H. Goldman, "Ethical Issues in proprietary Restrictions on Research Results", *Science Technology Human values*, vol.12, no.1, 1987, p.29.

'profit'. The profit-oriented, company-sponsored research has made the 'stimulation' factor stooped down to such a level that it is just like "spurring the donkey on by offering a carrot to its rider"[65]. Further profit motive and vested interests expanded the ambit of IP protection even to several newfangled areas where it is not meant to be used[66].

Adding to this, the perpetuating intellectual capitalism where mind is a corporate monopoly has made IP laws a corporeal- centric one[67].

I.4. Objectives of the Present Study

The objectives of the present study are:

1. To identify and put together the space related intellectual property issues.
2. To see whether the existing legal frameworks could effectively lever those issues.
3. To procure the views of various partakers in the space sector regarding the issues.
4. To view the prospect of a new legal regime.

I.5. Methodology

Being an unexplored area the study is embarked on from the scrap. As a pilot study, efforts were made to absorb the concept of space law and intellectual property laws. Since the true character of a discipline is determined by the assortment of factors that groomed it, few thoughts were driven to that direction. Based upon the upshot of that analysis the philosophies of both branches of law were traced out.

Upon the identifying the research problem, the efficacy of on-hand legal framework is tested. Since the current framework turns somewhat ineffectual, the probability of a new one is looked at. Views of various participants in the space sector were sought through questionnaires before undertaking this chore.

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[65] See Chimni, n.51, p.235.

[66] Drahos has warned against the dangers which lie in attempting to use intellectual property laws in ways it is not supposed to be used, for instance to monopolize cultural heritage, or genetic natural resources, rather than in the expansion of individual rights.

[67] See n.53.

For the whole study, there is higher reliance on primary sources. Though scanty, available subject related secondary sources are also included.

I.6. Scope of the Study

The dissertation is divided into five chapters. The present one is the first chapter.

The second chapter portrays the research problem by identifying and putting together the space related intellectual property issues. This is done by giving shove to five hub areas 1) Inventions made in outer space 2) Satellite remote sensing 3) Transmissions 4) Space Vehicular Designs, and 5) Dispute Settlement.

The third chapter is an effort to find out the pertinent law for space related intellectual property issues. A thorough dissection and analysis of the various space and intellectual property laws are made here. This is done in the order stipulated in Article 38(1) of the Statute of International Court of Justice (treaties, custom, general principles of law, and juristic writings). The efficacy of these laws is also put to test within in this progression.

The fourth chapter mainly assembles the responses received from the questionnaires, followed by an appraisal of it. Suggestions received from the questionnaires are also considered in this process. In the concluding chapter, findings permeating from the study and suggestions are integrated.

Chapter II

Space Related Intellectual Property Issues

The inimitable environment of outer space offers extraordinary conditions for research, both in terms of its physical characteristics and of its legal status. In recent years, there is a mounting interest and investment in these operations at a commercial level[1]. This attitude towards commercialization and increased private participation can be perceived in many countries[2]. As long as government entities dominated exploration and research in space activities, only states were given prominence. Since private enterprise is becoming a recognized factor in further space development, and earth oriented space applications are becoming more and more integrated in everyday life on earth, intellectual property rights relating to space activities are gaining considerable importance[3].

II.1. Space Related Intellectual Property Rights

Out of the seven major intellectual property rights, five pertains to space allied activities. They are patents, copyrights, trade secrets, designs, and geographical

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[1]Commercialization means, basically, the conversion of a public duty into private duty. Commercialization does not necessarily involve participation of the private sector. It depends on the political-economic system of a certain country as to what means it will employ to realize its commercial aspirations. Private investment and entrepreneurial activity are the options to achieve this. See H.L.Van Traa-Engelman, *Commercial Utilization of Outer Space* (London: Martinus Nijhoff Publishers, 1993), pp.203-21. According to information provided by the United Nations, in 1996, global commercial utilization of space hardware, including telecommunications facilities, and the development of infrastructure elements, such as the manufacture of launch vehicles, satellites, and ground equipments represented 53 percent of the space industry, which surpassed the governmental expenditure. See Huang Huikang, "Space Law and the Expanding Role of Private Enterprises, with Particular Attention for Launching Activities", *Proceedings of the IISL Space Law Conference, 2001*, Singapore. For more on space commercialization see *Legal Framework for the Commercial Utilization of Outer Space* (cologne: IASL-University of Cologne, 2001); Bin Cheng, *Studies in International Space Law* (Oxford: Clarendon Press, 1997), pp.541-667.

[2] Countries like the USA, the European Countries, Canada, India, Japan and also China must be mentioned in this regard. In Europe and United States, to some extent privatization and commercialization of space activities have emerged as a major trend and have continued to show a strong and fast expansion. Whereas in Asia the commercialization and involvement of private sector in space activities has been limited and expanding slowly. Although there are a few space faring countries, such as China, Japan, and India, most Asian countries have recently begun to build up their domestic space capability. The commercialization of some space activities has to a certain extent emerged in a twin way. First, governmental authorities and their public affiliations have started to partly carry on their space program on a commercial basis, and provide market oriented commercial service to the society, such as launching services and satellite communications. Secondly, space activities involving less governmental responsibility, for instance, telecommunications, receiving and processing remote sensing data and other ground based space applications, have been gradually open to the private sector for commercial utilization. For details see Huikang, n.1.

[3] Traa-Engelman, n.1, p.191.

indications. Patents play a decisive role in protecting the rights related to inventions made in outer space; copyrights and trade secrets could act as instruments for the protection of remote sensing data and transmissions; space vehicular designs may require protection from designs law; and lastly, geographical indications, though may not be obvious, are also assumed to enter the category of space related intellectual property rights[4].

In this chapter various space related intellectual property issues are portrayed with regard to five core areas i.e. 1) Inventions made in outer space, 2) Satellite Remote Sensing, 3) Transmissions, 4) Space Vehicular Designs, and 5) Dispute settlement.

II.1.1. Inventions made in Outer Space

Inventions made in outer space have gathered significance in the near future due to the increase of adequate infrastructure for experimenting in the zero gravity environment[5]. The increase in these activities is likely to result in a more significant demand for the legal protection of products invented in outer space. But the nature of environment in outer space and its location outside the jurisdiction of participating states may pose special problems[6]. One such problem is that of determining 'novelty'.

In space environment, it is probable to accomplish results not obtainable on earth. For example, it is possible to produce a level purity in pharmaceutical products otherwise

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[4] There is a view that earth observation imagery of specific territories corresponds to the identification of what a geographical indication is. The decisive question is, does what appear on a film tape after the transformation of digital information, fall into the category of geographical indication. Otherwise is it an indication, which identifies the earth lines, and forms, which appear on a picture in the territory of a member. See Patrick-Andre Salin, *Satellite Communications Regulations in the Early 21st Century* (The Hague: Martinus Nijhoff, 2000), pp.76-77.

[5] The main features of micro-gravity are the elimination of gravity driven convection, sedimentation, and fluidstatic pressure. Fluid dynamics phenomena can be investigated without the interference of gravity driven convection. Results from such studies are expected to provide important feedback for the testing and development of theories describing three-dimensional laminar, oscillatory and turbulent flow generated by various other driving forces. In life sciences, microgravity provides unique experimental conditions that are unavailable on earth. Space life sciences experiments are concerned with investigations aimed at identifying the part which gravity plays at all levels of life from the organization of a single cell to the nature of gravity resisting and detecting mechanisms in more highly developed organisms including man. For more detailed information on microgravity see "Microgravity Programme-European Space Agency", *Proceedings of the First ECSL/Spanish Centre for Space Law Workshop on Intellectual Property Rights in Outer Space*, Madrid, 1993 (Hereinafter, Microgravity Programme).

[6] Assume a scenario where 'A' manufactures product Z through process Y in the gravity driven earthly atmosphere. 'B' repeats the same process in the microgravity environment of outer space. Due to the peculiar nature of cosmic environment, he gets the product Z+1. 'A' accused 'B' for infringing his patented process Y. 'B' contents that for a process, the environment in which it is conducted is vital. Hence performing process Z in the microgravity of outer space makes it a different process. Since it gave rise to a different product there remains no question regarding the infringement of product.

not possible on earth[7]. Also, in the very exceptional conditions of weightlessness fundamental experiments can be carried out with great precision when samples are manipulated without physical contact[8]. If the purity level and precision is such that the new product is distinguishable from the prior art,[9] the product qualifies for patent under the novelty prerequisite[10].

There is also a high prospect of producing a new or modified product in micro-gravity by repeating a process familiar in gravity-ridden environment[11]. Certainly, this could satisfy the novelty requirement regarding the product. But since current Intellectual Property regime envelopes process also, novelty requirements regarding process remains unfulfilled[12].

But when viewed technically, a process includes many factors, one of which is the atmosphere in which the process is performed. If this is applied to the present context, then a process familiar in gravity, if performed in microgravity, becomes a new process and hence easily qualifies for novelty requirement. Such a situation gives a high possibility for infringing patents well protected on earth.

In such ambivalent situations the third criterion for patentability, i.e., obviousness could be employed[13]. So to determine patentability, first it should be decided whether the

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[7] Sa'id Mosteshar, "Intellectual Property Issues in Space Activities", in Sa'id Mosteshar, ed., *Research and Inventions in Outer Space* (London: Kluwer International, 1997), p.192.

[8] Microgravity Programme, n.5.

[9] Prior art denotes that which is known in a particular field. This may be because it is the subject of an existing patent or has otherwise been made generally available or has been previously invented by another.

[10] See *Eli Lilly V. Generics Drug Sales*, 460F2d 1096; 174 USPQ 65 (5th Cir, 1972).

[11] One of the best examples in this regard is the crystallization of proteins. There are clear experimental indications that the crystallization of proteins is enhanced in space. Recent experiments have yielded a variety of protein crystals of a quality superior to that which was obtained on the ground. For more details see Microgravity Programme, n.5. Studying higher organized life forms such as plants, small animals or even man himself can reveal gravity dependent processes, or gravity responses to gravi-sensing mechanisms, all of which can be considered as an extension of ground based research.

[12] By the expression 'current regime' indication is made towards TRIPs, now part of the World Trade Organization which, when fully implemented, will unambiguously strengthen intellectual protection globally. For more on it see Jayashree Watal, *Future Issues on IPRs in the WTO* (New Delhi: ICRIER, 1999).

[13] The expressions 'non-obviousness' and 'inventive step' are quite often used interchangeably. The term 'obvious' means something, which lies in the way, and is used in its normal sense of something, which is plain or open to the eye or mind, something that is perfectly evident to a person thinking on the subject. Obviousness and inventive step are antithesis. What is obvious cannot be inventive and what is inventive cannot be obvious. For a detailed discussion on this see W.R. Cornish, *Intellectual Property* (New Delhi:

invention is non-obvious or not[14]. The test here is whether what is claimed is so obvious that it could at once occur to any one acquainted with the subject. So the general criterion seems to be that "is it such a development, as an ordinary person skilled in that art could if he wished to do so, naturally, make without inventive step. This application could, to a greater extent, solve the aforementioned problems.

But the concept of non-obviousness, if applied to inventions in outer space and if viewed in a broader perspective, will certainly assume a dissimilar dimension. The first question here is, non-obviousness should be as to what? Normally an invention involves three stages[15]: 1) The definition of the problem to be solved, or the difficulty to be overcome, 2) The choice of general principles to be applied in solving the problem over coming the difficulty, and 3) The choice of the particular means to be used. Merit in any one of these stages, or in the whole combination may support the invention. So the obviousness should be attributed to the invention either at any one of these stages or at all stages.

As regards inventions in outer space, the only distinguishing feature in arriving at the product is the performance of procedures in outer space. So, non-obviousness of the invention should be put to test at the third stage. Here non-obviousness exists with regard to process conditions and process reactions in outer space.

This makes the concept an exceedingly convoluted one and finding a way out much more insurmountable.

II.1.2. Satellite Remote Sensing

Satellite remote sensing has a particularly important role in space applications. When remote sensing images were made available from satellites, there emerged a

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Universal Law Publishing Co., 2001), pp.162-75; P. Narayanan, *Intellectual Property Law* (Kolkata: Eastern Law House, 2001), pp.82-89. Also see *Molnlycke V. Procter & Gamble* (no. 5) (1994) R.P.C. 49.

[14] The necessity of the existence of inventiveness or non-obviousness in a patent is recognized as the very foundation of patent law. If the invention is obvious or lacks inventive step, it is not patentable. Almost all the international, regional, and domestic intellectual property instruments stipulate non-obviousness as a criterion for patentability. For example, Article 27 of TRIPs, Article 52(1) of European Patent Convention, 1973, Article 3 of Patents Act, 1977 (UK), Patent Law of Russian Federation, 1992, Patent Act, 1970 (India) etc. Various judicial bodies have also highlighted the concept. For details see W.R. Cornish, ed., *Cases and Materials on Intellectual Property* (London: Sweet & Maxwell, 1996), pp.39-53.

[15] Narayanan, n.13, p.84.

demand for an international co-operation in this area.[16] The use of remote sensing data and the packaging of relevant products require great investments by the industries and they will not be willing to make such investments if the legal protection of the data is not assured.

The most frequent form of protection here from improper appropriation, reproduction, and distribution is copyrights. The Berne Convention and its subsequent modifications allow protection through copyrights[17]. But the Convention mentions a 'collection of works' and not a 'collection of data'[18]. It protects originality, the creation of the work, and the fruit of intervention of a human mind[19].

All the substantive provisions of Berne Convention minus Article *6bis*[20] have been imbibed by the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs) also[21].

One advantage of TRIPs over Berne Convention is that, the protection of 'data' was for the first time, in any multilateral instrument, included in TRIPs under Article 10[22]. But the decisive question is, whether the protection of 'remote sensing data' should

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[16] See V.S. Mani, "The Emerging Legal Regime of Remote Sensing: A General Survey", in V.S. Mani and Others, eds., *Recent Trends in International Space Law and Policy* (New Delhi: Lancers Books, 1997), pp.235-52; V.D. Bordunov, "Legal Problems of International Co-operation in Remote Sensing", *Proceedings of the 22nd Colloquium on the Law of Outer Space*, 1979; B.L. Deekshatulu and others, "Overview of the Legal Aspects of Remote Sensing", in V.S. Mani and others, eds., *Recent Trends in International Space Law and Policy* (New Delhi: Lancers Books, 1997), pp.221-34.

[17] Berne Convention for the Protection of Literary and Artistic works, 1886. The Convention was later revised in 1908 at Berlin, 1928 at Rome, 1948 at Brussels, 1967 at Stockholm, 1971 at Paris. For details see Harry Hillman, "A Note on Berne Convention", *www.culturaleconomics.atfreeweb.com.*

[18] See in particular Articles 2(1) and 2(6) of the Berne Convention.

[19] See Article 2, in particular Article 2(5).

[20] Moral Rights.

[21] During the Uruguay Round negotiations, it was recognized that the Berne Convention already, for the most part, provided adequate basic standards of copyright protection. Thus, it was agreed that the point of departure should be the existing level of protection under the latest Act of the Convention, the Paris Act of 1971. In the area of copyright, therefore the TRIPs Agreement confines itself to clarifying or adding obligations on a number of specific points. See Adrian Otten and Hannu Wager, "Compliance with TRIPs: The Emerging World View", *Vanderbilt Journal of Transnational Law*, vol.29, no.3, 1996, pp.391-413. Also see Articles 2(1) and 9(2) of TRIPs Agreement.

[22] Article 10- Computer Programmes and Compilations of Data

1. Computer Programmes, whether in source or object code, shall be protected as literary works under the Berne Convention

2. Compilations of data or other material, whether in machine readable or other form, which by reason of the selection or arrangement of their contents constitute intellectual creations shall be protected as such. Such protection, which shall not extend to the data or material itself, shall be without prejudice to any copyright subsisting in the data or material itself.

be sought under this clause? Certainly, Article 10(1) speaks of software programs. But Article 10(2) clarifies that a database or other compilation of data or other material shall be protected under copyright even where it includes data or other material that, as such is not protected under copyrights[23]. This provision offers a possibility to extend copyright protection to remote sensing data.

But Article 10(2) has a proviso, which states that the protection laid down here is available only if, by reason of the selection or arrangement of its content, the database or other compilation constitutes an 'intellectual creation'. So to qualify for protection under Article 10(2) there should be an intervention of human mind.

If the nature of remote sensing data is considered, it passes through three stages, which of a primary data, processed data and analyzed information[24]. As far as primary data is concerned, the product of the operation is only a flux of signals. The data emitted by the satellite are only natural waves transformed by an automatic means. They are pre-existent to the satellite intervention and are not a subsequent creation[25]. So, the emitted data is a raw matter of a computer creation i.e., a database and hence will not qualify for copyright protection.

Despite carrying a clause for the protection of database, the stipulation of 'intellectual creation' in TRIPs (Article 10) thwarts the extension of copyright protection to primary data[26]. But in case of processed data, if one considers the technical evolution

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This provision is much broader in scope than Article 2(5) of Berne Convention which applies strictly to literary and artistic works, although the opinion of many commentators and of the WIPO secretariat had been that by combining the general criteria contained in Article 2(1) and Article 2(5), one could draw the conclusion that all original creations were protected under the Berne Convention. See Daniel Gervais, *The TRIPs Agreement: Drafting History and Analysis* (London: Sweet & Maxwell, 1998), pp.79-83.

[23] See Otten, n. 21, p.397.

[24] 'Primary data' is made up of electromagnetic waves refracted by the earth's globe, sensed by satellites, transformed into numeric signals, and returned to the ground. 'Processed data' means the product resulting from processing, through geometric or radiometric corrections. Analyzed information means the information resulting from the interpretation of processed data, imputes of data and knowledge from other sources (cartographic, geological, aerometrical, naval etc.). See Gabriella Catalano Sgrosso, "Remote Sensing Data Protection and Data Distribution Policy", *Proceedings of the third ECSL Colloquium, Perugia, 1999*; Desaussure, "Remote Sensing: the Interaction and International Law", *Proceedings of the 30th Colloquium on the Law of Outer space*, 1987, p. 296.

[25] Sgrosso, n.25, p.453.

[26] Article 10(2)- "Compilations of data ... which by reason of the selection or arrangement of their contents constitute intellectual creations shall be protected as such, ...".

that the works suffer[27], one could think that the kind of protection offered by Article 10(2) could be applied to a certain number of databases with a high documentary added value, where it is possible to find human intervention and originality.

So, if certain domestic and regional efforts[28] are excluded, then presently the protection of primary or raw data remains vulnerable.

II.1.3. Space Vehicular Designs

Spacecraft occupy an extremely imperative position in the use and exploration of outer space. In this era of space commercialization there will be a precipitous increase in its role. With the swelling of commercial space activities, there surfaces the need for a variety of space vehicles to perform the multifaceted functions, which the space sector demands. As the big rocket-manufacturing giants start competing in the market, there will materialize a greater demand for the protection of space vehicular designs.

For the protection of spacecraft designs, obviously designs law should be looked at. Under designs law, for a design to qualify for protection, it must be independently created and novel[29]. So in order to be eligible for protection offered by designs law, it shall be original and shall not be a copy or imitation of any existing design.

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[27] See n. 25.

[28] The law of United States does not invoke copyright for the protection of remote sensing data. But they use the confidential trade secret procedure. The information is a confidential trade secret of EOSAT and its reproduction would cause a misappropriation of the trade secret itself. In France, no law regulates the activities of the SPOT remote sensing satellites. The law of July 3rd 1985 on the "logiciels" protected by copyright is applied analogically also to the collection of remote sensing data. European Space Agency has come out with a solution for the protection of primary data through a Directive of European Parliament and Council Concerning the Legal Protection of a Data Base. This Directive provides for the establishment of a *sui generis* right, that is to say the right of the creator of the database to forbid the extraction and reuse for commercial purposes of the matters resulting from the database for 15 years. The right does not have the aim of protecting the creation and originality of the work but more so the investment made for the collection of raw data. See Sgrosso, n.24; For support see Directive 96/6/CE of European Parliament and Council on the Legal protection of Data Base, 11 March 1996, in O.J., L77/20,27 March 1996; Initial Proposal: COM (92), 24 final, 393, 13 May 1992, in OJ, C 156, 23 June 1992, p.4, modified proposal: COM (93) 464 final Oct.1993 in OJ, C308, 15 Nov. 1993, p.1.

[29] Article 26 of TRIPs Agreement provides that "members shall provide for the protection of independently created industrial designs that are new and or original ...". Also see Designs Act, 1988 (United Kingdom); Section 4 of Designs Act, 2000 (India).

But the law specifically excludes from protection those designs that are dictated mainly by technical and functional considerations[30]. This restriction thwarts the protection of space vehicular designs, which are dictated purely by functional and technical considerations, from the purview of designs law.

Problems regarding spacecraft designs range mainly from, extending the ambit of designs law protection to, the need for drawing a line between intellectual property laws and the natural laws of science[31].

II.1.4. Transmissions

One major category of space activity with anticipated extensive application in the field of intellectual property rights is satellite communication technology. The vastness of geographical coverage facilitated by satellite broadcasting and the intrinsic transnational reach, made unauthorized transmission and redistribution a problem that asked for international co-operation to secure effective protective measures in the interests of the various categories of intellectual property right owners[32]. The topic has been a major concern emphasized during many international gatherings of experts[33]. The result can be

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[30] Ibid. It seems that this restriction has emanated mainly from the stipulation of 'originality' in TRIPs and in various domestic legislations. 'Originality' here indicates choices made by the designers other than technical and functional considerations. Also the rationale behind the designs law is to protect the rights of those designers, who shape an article in order to make it appealing to the eye of a customer and not to those who make the article perform certain functions or a specific function. See P. Narayanan, n.14, pp.124-28. Also see W.R. Cornish, n.16, pp.399-417.

[31] The issue regarding a clash between intellectual property laws and the natural law of science could be highlighted with the help of an illustration- 'A' creates a cone shaped design for a space vehicle. This is purely based on the natural law of science that a cone shaped design could easily penetrate atmospheric velocity than a cylindrical or cube shaped design. Somehow, by interpreting designs law 'A' procures ownership over that design. Later 'B' uses the same design for another space vehicle. 'A' alleges infringement of his right over the design. 'B' contents that he has not violated the intellectual property rights of 'A' but have only complied with the laws of science. Such a dispute arose with regard to the design of the first Indian satellite *"Aryabhatta"* designed by the Indian Space Research Organization (ISRO).

[32] Traa-Engelman, n.1, p.193.

[33] The United Nations Bureaux for Protection of Intellectual Property (BIRPI), followed by its successor the World Intellectual Property Organization (WIPO) as well as UNESCO have been dealing with the issue for a long time. Categorization of owners of rights which might be affected by satellite broadcasting took place during a study of problems at a working group of the BIRPI in 1968 and authors, artists, producers of Programs, broadcasting organizations, news agencies, and organizers of sports events were listed. In order to remedy the anticipated infringement of rights by unauthorized satellite broadcasting, various options were tabled, raging from the application of protectional measures through national legislation, to the elaboration of an international convention, providing an extension of applicability of the existing international conventions in the field of copyright and their neighboring rights, in case of transmission via satellites. For details, see Traa-Engelman, n. 1, p.193.

found in the Convention Relating to the Programme Carrying Signals Transmitted by Satellite (Brussels Satellite Convention), 1974. This is the only international telecommunication convention, which deals somewhat on intellectual property protection.[34]

Though the Convention is largely apprehensive about the protection of the rights of broadcasters[35], there is nothing in it, which is favorable to the space industry. Numerous scholars have expressed their concern over the fact that the Convention does not properly address the rights of authors. But some crucial questions regarding the proprietary rights of a space agency over the data sent by planetary missions and the images of Hubble telescope remain unattended[36].

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[34] The Convention, which deals with satellite piracy, has no direct intellectual property provision. Article 2 of the Convention leaves it to the choice of Contracting States to take adequate measures to prevent the distribution of any Program carrying signals by any distributor for whom the signals are not intended. Here, Article 2 gives Contracting States the option to implement the obligation either under its intellectual property laws or under its civil and penal laws. But there are few factors, because of which the Convention assumes the character of an intellectual property treaty. Firstly, from certain wordings in the preamble like *"Recognizing, in this respect, the importance of the interests of authors, performers, producers of phonograms and broadcasting organizations".*
"Conscious of the need not to impair in ant way international agreements already in force ... in particular in no way to prejudice wider acceptance of the Rome Convention, 1961".
and also Article 6 that reiterates the rights of authors, performers, producers of phonograms, or broadcasting organizations, it seems that the Convention tries to bridge the gaps in the Berne and Rome Conventions as these Conventions did not speak of the protection of signals transmitted by the satellites. Secondly, as far as the catalogue of exceptions are concerned the Convention assumes the character of a copyright treaty. Excerpts of a programme reporting on current events, fragments of theatre performance, sporting events, etc. are permissible to the extend justified for the purpose of information. Thirdly, in order to enable the Contracting Parties to implement the obligation, WIPO has taken the matter into their agenda in late 70s. Such an action on the part of an IP institution like WIPO strengthens the intellectual property nature of the Convention. Fourthly, state practices give sufficient evidence to the aforementioned argument. For example, Kenya before ratifying the Convention amended its copyright laws to incorporate certain protective measures. Lastly, the rationale behind the Convention may be that the originating organization which bears the huge costs to cover the transmission and who pays huge amount of royalties to the original copyright holders like the authors, performers etc., will incur heavy loses if they are not given adequate protection for the signals transmitted to them. No other system of protection could offer such an assurance to those organizations as intellectual property protection. For support, see Convention Relating to the Programme Carrying Signals Transmitted by Satellite, 1974, in particular Article IV (i) and (ii); Heather Dembert, "Securing Authors' Rights in Satellite Transmissions: US Efforts to Extend Copyright Protection Abroad", *Columbia Journal of Transnational Law*, vol.24, 1985, pp.73-78.

[35] See N. Jasentuliana and Roy S.K. Lee, eds., *Manual of Space Law*, vol. II (New York: Oceana Publications, 1979), pp.249-59.

[36] In case of Hubble telescope as Hubble observes celestial targets, its computers turn the information into digital data that travel as radio signals to a communication satellite, which beams the information to Goddard Space Centre. From there, data is sent to the Space Telescope Science Institute, where it is turned back into pictures as captured by Hubble. If this whole process is taken into consideration there are two aspects that will qualify for legal protection: One is the initial digital data and secondly, the data sent to

Hence if viewed from the perspective of space industry, the Convention is practically ineffectual[37] and is unable to inspire a wide spread consensus on legal protection for satellite transmissions.

II.1.5. Dispute Settlement

Until recently, litigations were virtually unheard of in the space law field. But in the wake of the recent budge towards commercialization and the proliferating number of spatial contracts, mostly regarding intellectual property and insurance, the scenario has changed[38]. One of the major problems in this regard concerns the rights and obligations of parties to such a contract. How to safeguard the rights of various actors and how to settle the liability of contracting parties under international space law have been the subject of study by scholars in recent years[39]. Most important of all, the question of how to develop new effective mechanisms for the settlement of disputes arising in relation to space commercialization has attracted much attention from the international community[40]. Despite these efforts, no international framework could be agreed up on till

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Space Telescope Science Institute. For details see "Hubble: An Eye on Universe", *Science Reporter*, March 2003, pp.48-49.

[37] When Brussels *Satellite* Convention was drafted, the issue of satellite piracy was still largely hypothetical. The entire drafting was made keeping in mind 'point to point' and 'distribution satellites'. Many of the flaws of the Convention have been attributed to its timing. The nations represented at the Convention were not in a position to realize the full value of such a treaty. Moreover, all of the major space explorations and odysseys were in the preparatory stages. This is one reason why the Convention lacks an industry-perspective.

[38] After the commercialization of space sector apart from the five space treaties, there are a special inter-governmental agreements; agreements between governments and space industry; non-governmental industrial arrangements, as well as commercial space contracts signed between private entities of appropriate states on the one hand, and between private entities and governmental agencies on the other. See Chia-Jui Cheng, "International Arbitration System as a Mechanism for the Settlement of Disputes Arising in Relation to Space Commercialization", *Proceedings of the IISL Space Law Conference*, Singapore, 2001, p.2.

[39] H.H. Almond, "Disputes Disagreements and Misunderstandings- Alternative Procedures for Settlement-Claims Process in Outer Space", *Proceedings of the Thirty Sixth Colloquium on the Law of Outer Space*, 1993, pp.125-35; K.H. Bocksteigel, "Development of a System of Dispute Settlement Regarding Space Activities", *Proceedings of the Thirty Fifth Colloquium on the Law of Outer Space, 1992, pp.27-35;* K.H. Bocksteigel, "The Settlement of Disputes Regarding Space Activities after 30 Years of Outer Space Treaty", in G. Lafferranderie and Daphne Crowther, eds., *Outlook on Space Law Over the Next 30 Years* (The Hague: Kluwer Law International, 1997), pp.237-49.

[40] Mention should be made of the efforts undertaken by the international Law Association, which took the initiative to study the problem of settlement of Space Law despites already in 1978. Subsequently the Montreal Conference of the International Law Association of 1982 passed a resolution, recommending that space law committee should start the formulation of a Draft Convention on the Settlement of Space Law Disputes. As a result a draft convention on dispute settlement prepared by Professor Bocksteigel was adopted in the Paris Conference. The Buenos Aires ILA Conference in 1994 considered whether it should

date. Presently, litigations are dealt with either by controlling it though contracts[41] or by national courts. But there is an emerging trend to look to courts than executing a liability related commercial contract[42]. This recent trend makes the need for a dispute settlement framework for commercial space activities inevitable.

The crucial question is whether the existing provisions of international space law offer any remedy to manage controversial issues in an effective way.

The Outer Space Treaty highlights the applicability of international law to space activities[43]. This implies that the regulations and procedures for disputes in international law will remain applicable for disputes arising out of space activities.

Under international law, United Nations Charter provides for the pacific settlement of disputes[44]. But its involvement and subsequent action is preconditioned by the likely danger to the 'maintenance of international peace and security'. The International Court of Justice, which represents the principal judicial organ of the United Nations, can be considered as a valuable means for the settlement of space law disputes. But the jurisdiction of the Court signifies the fact that only states may be parties in cases before it.[45] This highlights the fact that though space law disputes between states fall

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amend this text or draft a new international instrument and decided to rather adjust the Paris Convention. Later in 1998, ILA Taipei Conference adopted the "Final Draft of the Revised Convention on the Settlement of Disputes related to Space Activities". The establishment of a new institutional framework for dispute settlement has been recently discussed at the UNISPACE III Technical Forum held in Vienna in July 1999. For a detailed discussion see Traa-Engelman, n.1, pp.251-61. Also see *Proceedings of the Round Table on Settlement of Space Law Disputes*, Cordoba, 1981; ILA Report of the Sixty-Eighth Conference, Taipei, 1998, pp.249-67; *Proceedings of the Workshop on Space Law in the Twenty First Century*, UNISPACE III Technical Forum, July 1999, pp.179-94.

[41] In United States the US government, or NASA typically controlled all liability related issues directly, through its own government contracts, or indirectly, by dictating to its contractors the liability related terms they were obligated to execute with their own sub-contractors. See Larry S. Kaplan, "Recent Developments in Space Law Litigation", Mosteshar, n.7, pp.113-32.

[42] Kaplan, n. 41, p.113.

[43] Article III of the Outer Space Treaty provides that- "States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including moon and other celestial bodies, in accordance with international law, including the Charter of United Nations, in the interest of maintaining international co-operation and understanding".

[44] Chapter VI of the United Nations Charter, particularly Article 33(1) provides that "The parties to any disputes, the continuance of which is likely to endanger the maintenance of international peace and security, shall, first of all, seek a solution by negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means of their own choice".

under the jurisdiction of the Court it rules out any possibility to extend its ambit to private commercial disputes.

None of the space treaties put forward a proper forum for the settlement of commercial space disputes. Outer Space Treaty has a clause that speaks of 'appropriate international consultations'[46]. But rather than dispute settlement it speaks of dispute prevention and is restricted only in case of potential harmful interference. The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Treaty) also offers means of consultations[47]. This is also restricted to harmful interference by other states. Only the Convention on International Liability for Damage Caused by Space Objects (Liability Convention) has a forum for dispute settlement.[48] But even the Convention deals with liability for damages caused by space objects and not contractual liability.

As the very concept of 'space law' itself has a paradigm shift[49], the search for a dispute settlement forum in the good old space treaties would be a futile exercise. The mechanism for the settlement of disputes arising out of its newly wrapped up form should also be compatible with it. What is demanded at this juncture is a pragmatic and need oriented approach[50].

[45] Article 34 of the Statute of International Court of Justice provides that "Only states may be parties in cases before the Court".
[46] Article IX.
[47] Article VIII and XV.
[48] The Convention speaks of a system to settle claims through diplomatic channels failing which a claims commission could be set up. See in particular Articles IX, XIV, XV, XVI, XVII, XVIII, XIX, and XX.
[49] See Chapter I.
[50] For a detailed and analytical discussion see chapter V.

Chapter III

Efficacy of Existing Legal Framework

Space allied intellectual property issues presently pose a big challenge to the space sector. These issues bubble up in an exceedingly intricate manner, which threatens many pre-existing notions of both space law and intellectual property laws. As one delegate during the drafting of Outer Space Treaty[1] stated, "prompt action is essential, not only because the legal aspects of the problem might hamper scientific and technical progress, but also because such progress would depend on the correct solution of the legal problems"[2]. Though he made the statement in certain other context, it is of high relevance to the issue in hand. At this juncture, what is required is an effectual legal framework, which could handle the existing convolutions. A general proposition that has been circumambulating in the space law circles is for the creation of a new and harmonized regime. But before deflecting the entire focus upon those lines, it would be better to peruse the existing framework and an endeavor to seek answers for the entire convolutions in those frameworks.

Presently, no legal framework has an all-inclusive coverage of all space allied intellectual property issues. But an analysis of quite a good number of those frameworks reveals its applicability to the issues in hand. Hence, the blueprint is a search for the pertinent law in the existing legal frameworks. This is done as per the order stipulated in Article 38(1) of the Statute of International Court of Justice[3].

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[1] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 1967.

[2] N. Jasentuliana and Roy S.K. Lee, eds., *Manual of Space Law*, vol. II (New York: Oceana Publications, 1979), p.3.

[3] Article 38(1)- "The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply:

a. international conventions, whether general or particular, establishing rules expressly recognized by the contesting states;
b. international custom, as evidence of a general practice accepted as law;
c. the general principles of law recognized by civilized nations;
d. subject to the provisions of Article 59, judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law."

Though these provisions are expressed in terms of the functions of the International Court of Justice, they are generally regarded as a complete statement of the sources of international law. See Ian Brownlie, *Principles of Public International Law* (Oxford: Oxford University Press, 1990), p.3.

III.1. International Conventions

Relatively a good number of international conventions will bear relevance in the present perspective. This will include space treaties, intellectual property conventions, and certain other legal texts. Among the major space treaties, Outer Space Treaty is subject to a meticulous analysis. As far as intellectual property conventions are concerned the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs), which has engulfed almost all other Intellectual Property conventions like Paris Convention for the Protection of Industrial Property, Berne Convention for the Protection of Literary and Artistic Works, Treaty on Intellectual Property in respect of Integrated Circuits, and Rome Convention for the Protection for Performers, Producers of Phonograms and Broad casting Organizations, is scrupulously examined. Apart from this, the Intergovernmental Agreement (IGA), otherwise known as the International Space Station Agreement regarding inventions made in space station, free trade agreements like North American Free Trade Agreement (NAFTA), regional conventions like European Patent Convention (EPC), and regional directives like European Union Directive on the Legal Protection of Databases, are also dealt with in detail.

III.1.1 Space Treaties

There exists an argument among some jurists that international space law does not provide for the protection of private rights and even less for the protection for intellectual property rights in particular[4]. It seems that they are confounded by the wordings in Article II of the Outer Space Treaty, which prohibits national appropriation of outer space[5]. But it is submitted that the alleged prohibition does not exist. Article II pertains only to real property rights. In other words, it simply means that as among the

[4] H.L.Van Traa-Engelman, *Commercial Utilization of Outer Space* (London: Martinus Nijhoff Publishers, 1993), p.197.

[5] Article II- "Outer space including 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". Also see Wayne N. White, "Interpreting Article II of Outer Space Treaty", Abstract submitted for the 46th Colloquium on the Law of Outer Space, 2003, *www.iafastro.com*, visited on 29/3/2003; Wayne White, "The Legal Regime for Private Activities in Outer Space", *www.spacefutute.com*, visited on 11/6/2001. The French delegate in the discussion leading to the conclusion of the Outer Space Treaty pointed out that, "I am thinking in particular of the risks of ambiguity between the principles of non-sovereignty-which falls under public law-and that of non-appropriation, flowing from private law". For details, see A/AC.105/PV.44 (19.9.66), p.4.

Contracting States, none will be entitled to exercise territorial jurisdiction over any part of outer space[6].

Yet another set of scholars have argued that there is a need for a new commercial space law, since the Outer Space Treaty does not address those issues properly[7]. But when looking for a point of reference between space law and commercial aspects like intellectual property, the Outer Space Treaty does provide a doorway to a much wider realm.

The Preamble of the Outer Space Treaty begins with the wordings, "*inspired by the great prospects opening up before mankind as a result of man's entry into outer space*". This statement accentuates the vision of the drafters who dreamed of a brighter future for mankind in the aftermath of space exploration. They also decided that those prospects are to be governed by international law[8]. In other words, the principal thrust of Article III of the Outer Space Treaty is to establish the applicability of international law to activities in outer space. Here the vital question is whether applicability of international law imply the application of its various branches, like international trade law. If the nature of international law is looked at, then it is explicit that as parts of a single integrated system the basic principles, various branches, and institutions of international law are mutually interrelated[9]. Also, for its part, international law often seeks to regulate possible future changes in the relations between States[10]. Bearing in mind this nature of international law, and if read in the light of the vision provided in the Preamble, it is unambiguous that the Outer Space Treaty, in order to deal with the current commercial trend of space law permits the rules of international trade law to be applied for commercial space activities[11].

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[6] See Bin Cheng, *Studies in International Space Law* (Oxford: Clarendon Press, 1997), p.230. The exclusion of territorial jurisdiction from outer space and celestial bodies does not mean that either quasi-territorial jurisdiction or personal jurisdiction may also not be exercised.

[7] See Karl-Heinz Bocksteigel, "Commercial Space Activities Their Growing Influence on Space Law", *Annals of Air and Space Law*, vol. XII, 1987, p.191; White, n.5.

[8] See Article III-"States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including moon and other celestial bodies, in accordance with international law ...".

[9] G.I. Tunkin, ed., *International Law* (Moscow: Progress Publishers, 1986), p.78.

[10] Ibid.

[11] This could be treated as a major point of departure for applying the "Agreement on Trade Related Aspects of Intellectual Property Rights" (TRIPs) of General Agreement on Tariffs and Trade, (GATT) 1994, which is now an integral part of international trade law.

The major beneficiaries of intellectual property protection with regard to space related activities are space agencies and private entities. Activities of both these actors are justified under the Outer Space Treaty by virtue of Article VI[12]. But the only specialty of Article VI in the present context is that it underscores the role of private entities as a player in the space segment[13].

Finally, yet importantly, Article VIII[14]provides some connection with private rights like intellectual property, since it provides for the retention of jurisdiction and control, by the State of Registry over its space objects and personnel while being in outer space. This clause offers the possibility to extent a state's national laws to activities performed in outer space[15].

Barring the Outer Space Treaty, none of the space law conventions will be of relevance to the present context. Though the Liability Convention gives the impression of having a dispute settlement mechanism, the Convention itself limits its scope only to damages caused by space objects[16].

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[12] Article VI-" State Parties to the Treaty shall bear international responsibility for national activities in outer space, including 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 activities of non-governmental entities in outer space, including moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the State Parties to the Treaty participating in such organization".

[13] It seems that the main objective of Article VI is to attribute responsibility to the State for the action of its governmental agencies and non-governmental entities. Since the expression, non-governmental an entity includes private corporations as well, and responsibility could be attributed to a State for the wrongful acts of the corporations, the clause serves its purpose. See *Barcelona Traction case*, ICJ Reports (1980); *Trail Smelter Arbitration*, US vs. Canada, (1938). But, though this kind of responsibility is assumed by the State, the questions like whether it extends to certain contractual liabilities like intellectual property remain ambiguous.

[14] Article VIII- "A Stare Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body ..."

[15] See n.14 The jurisdiction referred to in Article VIII is quasi-territorial rather than personal in character for it applies not only to the space craft but also any personnel on board, irrespective of their nationality. Furthermore, this jurisdiction of the State of Registry applies to these persons not only when they are on board but also when they are outside their vehicle. The Treaty envisages that all persons in outer space will be subject to the quasi-territorial jurisdiction of the State of registry of their respective spacecraft, irrespective of their nationality. Hence, a Japanese member of a US registered spacecraft will be subject not to Japanese jurisdiction but to United States jurisdiction while in outer space. See n.6, pp.231-33.

[16] In its Preamble the Liability Convention says that " *Recognizing* the need to elaborate effective international rules and procedures concerning liability for damage caused by space objects, ..."

III.1.2. Intergovernmental Agreement[17]

Intergovernmental Agreement of 1998 (IGA) is the only international instrument that has a direct clause on the space applications of intellectual property. Article 21[18] of

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[17]. Agreement among the Government of Canada, Governments of Member States of the European Space Agency, The Government of Japan, The Government of the Russian Federation, and the Government of the United States of America Concerning Co-operation on the Civil International Space Station, 1998, generally known as Intergovernmental Agreement, otherwise known as International Space Station Agreement is an international treaty signed on January 29, 1998 by the fifteen governments. Initially such an agreement was put forward on 29 September 1988. This was later on replaced by another one in 1998. This key instrument establishes a long-term international co-operative framework on the basis of genuine partnership, for the detailed development, operation, and utilization of a permanently inhabited civil Space Station for peaceful purposes in accordance with international law. This legal framework defines rights and obligations of each of the countries and their jurisdiction and control with respect to their space station elements. For more details see International Space Station-Legal Framework, *www.esa.int, visited* on 24/9/2002. Also see O.Vorobieva, "Intellectual Property Rights with respect to Inventions Created in Space", in Sa'id Mosteshar, ed., *Research and Inventions in Outer Space* (London: Kluwer International, 1997), pp.179-83.

[18] **Article 21- Intellectual Property-** 1. "For the purpose of this Agreement, 'intellectual property' is understood to have the meaning of Article 2 of the Convention Establishing the World Intellectual Property Organization, done at Stockholm on July 1967.

2. Subject to the provisions of this Article, for the purpose of intellectual property law, an activity occurring in or on a space station flight element shall be deemed to have occurred only in the territory of the Partner State of that element's registry, except that for ESA registered element any European State Partner may deemed the activity to have occurred within its territory. For avoidance of doubt, participation by a Partner State, its Co-operating Agency, or its related entities in an activity occurring in or on any other Partner's Space Station flight element shall not in and of itself alter of affect the jurisdiction over such activity provided for in the previous sentence.

3. In respect of an invention made in or on any space station flight element by a person who is not its national or resident, a partner state shall not apply its laws concerning secrecy of inventions so as to prevent the filing of a patent application (for example, by imposing a delay or requiring prior authorization) in any other Partner State that provides for the protection of the secrecy of the patent applications containing information that is classified or otherwise protected for national security purposes. This provision does not prejudice (a) the right of any Partner State in which a patent application is first filed to control the secrecy of such patent application or restrict its further filing; or (b) the right of any other Partner State in which an application is subsequently filed to restrict, pursuant to any international obligation, the dissemination of an application.

4. Where a person or entity owns intellectual property which is protected in more than one European Partner State, that person or entity may not recover in more than one such state for the same act of infringement of the same rights in such intellectual property which occurs in or an ESA-registered element. Where the same act of infringement in or on an EAS-registered element gives rise to actions by different intellectual property owners by virtue of more than one European Partner State's deeming the activity to have occurred in its territory, a court may grant a temporary stay of proceedings in a later-filed action pending the outcome of an earlier filed action. Where more than one action is brought, satisfaction of a judgment rendered for damages in any of the actions shall bar further recovery of damages in any pending or future action for infringement based upon the same act of infringement.

5. With respect to an activity occurring in or on an ESA-registered element, no European State shall refuse to recognize a license for the exercise of any intellectual property rights if that license is enforceable under the laws of any European Partner State, and compliance with the provisions of such license shall also bar recovery for infringement in any European Partner State.

6. The temporary presence in the territory of a partner state of any articles, including the components of a flight element, in transit between any place on earth and any flight element of the space station registered

this Agreement tries to resolve problems relating to intellectual property rights developed or used on board the space station. Based on the principle of registration[19] of the particular elements of a space station, this agreement has created a working framework for the determination of the territory where an invention has been made and of the jurisdiction applicable to the activity on the station.

According to Article 21 of IGA, "an activity occurring in or on board a space station flight element shall be deemed to have occurred only in the territory of the partner state of that element's registry".

The only thing that is unique about this Agreement is that it has a clause on intellectual property, which is perhaps the only provision directly dealing with space related intellectual property rights. But on a careful analysis, it seems that Article 21 is poorly drafted and is inconsistent with the current intellectual property regime under WTO.

Firstly, Article II of IGA points out that the utilization, development, and operation of International Space Station shall be in accordance with international law. This indicates that the provisions of IGA should be consistent with international law including its various branches.

Article 21 says, "for the purpose of intellectual property law, an activity occurring in or on a space station flight element shall be deemed to have occurred only in the territory of the Partner State of that element's registry". Here Article 21 creates a micro territory on board the space station. And this as per Article 21 is for determining intellectual property rights, in particular patents. This clause is built-in in IGA mainly in the form of a cure for the existing patenting convolutions with regard to inventions made in outer space. It is submitted here that it somewhat is outspoken and brawls for solutions to an issue which is not existing. This is because under the current global IPR regime,[20]

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by another Partner State or ESA shall not in itself form the basis for any proceedings in the first Partner State for patent infringement.

[19] Article 5 of Intergovernmental Agreement highlights the fact that the jurisdiction clause of the Agreement owes its inspiration to the Registration Convention.

[20] By the expression "current regime", indication is made towards the WTO system, where Agreement on Trade Related Aspects of Intellectual Property Rights governs the global IPR regime. See Michael J.

all discrimination "as to the place of invention" for the grant of patents[21] stands eliminated.

The thrust given by Article 21 of IGA to 'place of invention' as a factor for determining the granting of patents thus remains incompatible with TRIPs provisions and there by is inconsistent with international law.

Perhaps one reason for the presence of such a jurisdictional yardstick is that IGA was drafted for the first time in the pre-Uruguay round, when there existed the notion of 'place of invention' for the grant of patents. But it is surprising to note that the same provision finds its place even in the 1998 draft.

Secondly, assuming that the provisions of Article 21 are justifiable. Even then, it poses certain problems while practically executing it. It is that, the logic behind Article 21 stems from Article VIII of Outer Space Treaty and Article II of Registration Convention[22] both of which deal with jurisdictional aspects. The jurisdiction referred to in these articles is quasi-territorial in character. It applies not only to the spacecrafts but also to personnel on board irrespective of their nationality[23]. Furthermore, the jurisdiction of the State of registry applies to these persons, not only when they are on board but also when they are outside their vehicle[24]. Thus, those personnel will be subject to the quasi-territorial jurisdiction of the State of registry of their respective spacecraft, irrespective of their nationality. So, a Japanese member of a United States shuttle will be subject to United States jurisdiction and not Japanese jurisdiction[25].

Trebilcock and Robert Howse, *The Regulation of International Trade* (London: Routeledge, 1995), pp. 248-73; John H. Jackson, *The World Trading System* (Cambridge: The MIT Press, 1994).

[21] According to Article 27 of TRIPs- "... patents shall be available and patents rights enjoyable without discrimination as to the place of invention, ..."

[22] This is explicitly provided in Article 5 of IGA, which says "In accordance with Article II of the Registration Convention, each Partner shall register as space objects the flight elements listed in the annex which it provides, the European Partner having delegated this responsibility to ESA, acting in its name and on its behalf.

2. Pursuant Article VIII of Outer Space Treaty and Article II of Registration Convention, each Partner shall retain jurisdiction and control over the elements it registers in accordance with paragraph 1 above and over personnel in or on Space Station who are its nationals. The existence of such jurisdiction and control shall be subject to any relevant provisions of this Agreement, the MOUs, and implementing arrangements, including relevant procedural mechanisms established there in".

[23] Cheng, n.6, p.231.

[24] The expression 'thereof' found in Article VIII makes this point explicit; also see Cheng, n.5, p.232.

[25] See n. 15

When this comes to International Space Station (ISS), which comprises of various elements registered in different Partner States, and crew who comes on spacecrafts registered in other countries, several practical problems may materialize. Going behind the logic of 'jurisdiction' under Article VIII of Outer Space Treaty it is to be presumed that a European astronaut to the ISS in an American registered shuttle will be subject to American Jurisdiction and will be bound by American laws. If he is assigned to experiment in a European registered element, then as per article 21 of IGA he should be subject to European jurisdiction and law[26].

The drafters of IGA do not envision this jurisdictional clash. The raison d'être behind Article VIII of Outer Space Treaty and Article II of Registration Convention is to make states accountable and to determine liability[27]. There is nothing in these clauses, which is to be perceived as an enabling factor for determining patentability with regard to inventions made in outer space. This is the point where the drafters of IGA went wrong.

III.1.3. Agreement on Trade Related Aspects of Intellectual Property Rights

The Agreement on Trade Related Aspects of Intellectual Property Rights is the most ambitious international intellectual property convention ever attempted[28]. As a result of TRIPs Agreement, the protection of intellectual property has become an integral part of the multilateral trading system, as embodied in the World Trade Organization

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[26] One possible argument, which could be raised here, is that "retaining jurisdiction and control" does not mean extending national laws to outer space. But theoretically, this argument cannot find much strength as "state jurisdiction" means legal competence that a state enjoys over the territory, which belongs to it.

[27] As reflected in the preamble of the Convention on Registration of Objects Launched into Outer Space, 1975, its main objective is to make provisions for additional means to aid the identification of space objects. This Convention, which stemmed from Article VIII of Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including Moon and Other Celestial Bodies, 1967, will be of immense utility with regard to determining liability for damage caused by space debris. Its substantial value lies in making the 1972 Convention on Liability for Damage Caused by Space Objects more effective. For a detailed discussion on this, see Jasentuliana, n.2, pp.173-89.

[28] J.H. Reichman, "Compliance with TRIPs Agreement: Introduction to a Scholarly Debate", *Vanderbilt Journal of Transnational Law*, vol.29, no.3, 1996, p.366. The TRIPs Agreement, which came into effect on January 1, 1995, is to date the most comprehensive multilateral agreement on intellectual property. It deals with each of the main categories of intellectual property rights, establishes standards of protection as well as rules of enforcement, and provides for the application of the World Trade Organization's dispute settlement mechanism to resolve disputes between member states. The areas of intellectual property that it covers are: copyright and related rights, trademarks, including service marks; geographical indications, including appellations of origin; industrial designs; patents, including the protection of new varieties of plants; the lay-out designs of integrated circuits; and undisclosed information, including trade secrets. See Adrian Otten and Hannu Wager, Compliance with TRIPs: The Emerging World View, *Vanderbilt Journal of Transnational Law*, vol.29, no.3, 1996, pp.391-413.

(WTO)[29]. This Agreement heightens the level of world intellectual property protection by specifying certain minimum standards that are basic norms of developed legal systems. Also, TRIPs requires nations to incorporate certain specified norms and rules into national laws and to enforce the national law, and it provides for dispute resolution.

Thus, intellectual property protection currently has a new status. The status of occupying a prominent place in the multilateral trading system under the World Trade Organization[30]. All the 144 countries[31], which are parties to the GATT, 1994 will have to bring about the minimum standards stipulated by TRIPs Agreement into their national laws.

In the present context, for the protection of outer space related intellectual property rights too, the minimum standards of TRIPs must be followed, as almost all the nations with space technology are parties to the TRIPs Agreement[32].

Obviously, "outer space" might not have entered the schema of drafters while brawling with TRIPs negotiations. But apart from the command, profundity, and compass regarding intellectual property that it proffers, there are certain strong factors, which enthuse one to think in terms of TRIPs. Firstly, it is a comprehensive legal framework, which covers all aspects of intellectual property rights into its ambit[33]. Secondly, service related aspects of telecommunications, which is a space related activity falls under the

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[29] The protection of intellectual property is one of the three pillars of the WTO, the other two being trade in goods and trade in services. For details see Trebilcock, n.19, pp.248-73.

[30] One of the important features of the multilateral trading system under World Trade Organization, in contrast to its predecessor GATT is that all countries which are parties to it will have to accept all the main WTO Agreements, including the TRIPs Agreement. See Carlos A. Primo Braga, "Trade Related Intellectual Property Issues: The Uruguay Round Agreement and its Economic Implications" (Jan 26-27,1995), Unpublished paper presented to the World Bank Conference, *Uruguay Round and the Developing Economies*, Washington D.C.

[31] *www.wto.org*, visited on 21/4/2003.

[32] Countries with space technologies like United States, Canada, Japan, China, India, Germany, France, Brazil, and Argentina are members of WTO. As far the membership of Russia is concerned, negotiations are in process.

[33] The TRIPs Agreement covers seven categories of intellectual property, namely copyright and related rights, trademarks, geographical indications, industrial designs, patents (which includes "micro organisms" and "plant varieties"), integrated circuits, and trade secrets. The Agreement also addresses the applicability of basic GATT principles and those of relevant international intellectual property agreements; the provisions of adequate intellectual property rights; the provision of effective enforcement measures for those rights; multilateral dispute settlement; and transitional arrangements. See "Introduction to the Results of Uruguay Round", *GATT Agreement: Results of Uruguay Round* (Bombay: World Trade Centre, 1995), pp.265-82. All kinds of intellectual protection, which the space activities require, finds place in TRIPs Agreement.

WTO package[34]. And thirdly, regarding the protection of remote sensing data and transmissions the much sought after Berne and Rome Conventions[35] are reflected in TRIPs.

It is beyond doubt that intellectual property aspects with regard to outer space activities are inimitable in nature, which comes in an assortment and pose a formidable threat to many existing intellectual property notions[36]. Taking into consideration the significance of TRIPs Agreement, it is inevitable to see how effectively could it take in hand the current issues.

Hence, few pages are set aside for an examination of TRIPs text. The blueprint is an itemization of the text and a dissection of those clauses that may bear an impact on space related activities.

III.1.3.1. TRIPs Provisions with respect to Outer Space Activities

In its Preamble[37] TRIPs recalls several underlying considerations and their conflicting dynamics[38]. On the one side mainly the need for industrial nations to

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[34] The annex on telecommunications under the General Agreement on Trade in Services (GATS) relates to measures, which affect access to and use of public telecommunications services and networks. In particular, it requires that such access be accorded to another party, on reasonable and non-discriminatory terms, to permit the supply of service included in its schedule. Conditions attached to the use of public networks should be no more than is necessary to safeguard the public service responsibilities of their operators, to protect the technical integrity of the network and to ensure that foreign service suppliers do not supply services unless permitted to do so through a specific commitment. The annex also encourages technical co-operations to assist developing countries in the strengthening of their own domestic telecommunications sector. For the full text, see *General Agreement on Trade in Services, The Results of the Uruguay Round of Multilateral Trade Negotiations* (Geneva: GATT Secretariat, 1994), pp.327-64 at pp.359-64.

[35] The Berne Convention for the Protection of Literary and Artistic Works, 1886 and the Rome Convention for the Protection for Performers, Producers of Phonograms and Broad casting Organizations, 1961. Article 9 of TRIPs says- "Members shall comply with Articles 1 to 21 of the Berne Convention", whereas Article 14(6) highlights the applicability of Rome Convention with regard to the protection of performers, producers of phonograms and broadcasting organizations. For a detailed discussion on this, see Daniel Gervais, *The TRIPs Agreement Drafting History and Analysis* (London: Sweet & Maxwell, 1998), pp.71-79 and 91-100.

[36] For details, see chapter II that discusses the major space related intellectual property issues.

[37] Preamble- *Desiring* to reduce distortions and impediments to international trade, and taking into account the need to promote effective and adequate protection of intellectual property rights, and to ensure that measures and procedures to enforce intellectual property rights do not themselves become barriers to legitimate trade;
Recognizing, to this end, the need for new rules and disciplines concerning:
a) the applicability of the basic principles of GATT 1994 and of relevant international intellectual property agreements or conventions;
b) the provision of adequate standards and principles concerning the availability, scope and use of trade related intellectual property rights;

anticipate the counterfeiting of goods, while on the other side the need to protect the least developed countries and their thirst for development. In outer space activities, there is a high probability of such potential conflicts being materialized. Further, in paragraph three TRIPs recognize the technological objectives of states for the protection of intellectual property rights. This provision in the present context asserts that those states with space technology and "space" as focus in their agenda can use IPRs as a tool for the development of their spatial technology.

Definition- Article 2(1) and 2(2) are non-derogation clauses that preserve the existing 'WIPO Treaty System'[39]. This implies that WIPO system still acts as the basic platform for TRIPs[40]. Though TRIPs text defines "intellectual property", it does not clearly specify its ambit of protection[41]. Hence, reliance should be made on WIPO system.

Article 2(8) of the Convention Establishing WIPO defines "intellectual property" as including literary, artistic, and scientific works, ... inventions in all fields of human

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c) the provision of effective and appropriate means for the enforcement of trade-related intellectual property rights, taking into account differences in national legal systems;
d) the provision of effective and expeditious procedures for the multilateral prevention and settlement of disputes between governments and
e) transitional arrangements aiming at the fullest participation in the results of the negotiations;
Recognizing the need for a multilateral framework of principles, rules and disciplines dealing with international trade in counterfeit goods;
Recognizing that intellectual property rights are private rights;
Recognizing the underlying public policy objectives of national systems for the protection of intellectual property, including development and technological objectives;
Recognizing also the special needs of the least-developed country Members in respect of maximum flexibility in the domestic implementation of laws and regulations in order to enable them to create a sound and viable technological base;
Emphasizing the importance of reducing tensions by reaching strengthened commitments to resolve disputes on trade related intellectual property issues through multilateral procedures;
Desiring to establish a mutually supportive relationship between the WTO and World Intellectual Property Organization as well as other relevant international organizations.

[38] The Preamble of TRIPs Agreement is an essential part of it. Under "GATT Law", preambles are on occasion relied up on to a considerable extend by panels when the wording of a provision is not clear or where it is susceptible to divergent interpretations.

[39] Both Paris and Berne Conventions were administered by WIPO. The drafters of TRIPs decided to preserve this treaty system under WIPO. See Gervais, n.35, p.16.

[40] Article 2(1) of TRIPs requires that Members comply with Articles 1 to 12 and 19 of the Paris Convention. Added to the obligation to comply with the Paris Convention, an echo of which may be found in Article 9(1), which requires compliance with Articles 1 to 21 of the Berne Convention as regards copyrights. Article 2(2) thus confirms the fact that TRIPs is "Paris plus" and "Berne plus" agreement.

[41] TRIPs Agreement defines intellectual property in a pragmatic way it comprises the forms of intellectual property that are the subject of sections 1 through 7 of Part II.

endeavor and scientific discoveries[42]. The expressions "scientific works" and "inventions in all fields of human endeavor" have broader connotations, which cover all creations of human mind irrespective of the field or technology. And outer space related activities are no exception to this.

Scope- Like the pre-existing international intellectual property conventions, the TRIPs Agreement is a minimum standards agreement. It leaves members free to provide more extensive protection of intellectual property[43]. Members may do so for purely domestic reasons or because they conclude international agreements in this regard, whether bilateral, regional or multilateral[44]. This is made clear in Article 1(1) of TRIPs, which provides that members may, but shall not be obliged to, implement in their law more extensive protection than is required by this Agreement, provided that such protection does not contravene the provisions of the Agreement. If applied to the present context, a nation desiring to have intellectual property protection for its space related endeavors has considerable amount of freedom to legislate. As far as space related intellectual property issues are concerned this provision has both positive and negative facets. It is positive in the sense that it enables nations to go ahead with the proposed changes in space law[45]. It is negative in the sense that all the extended protection should be compatible with the standards fixed by TRIPs. Here if the peculiar nature of space activities is concerned, it is yet to be decided whether TRIPs standards are affordable for space related activities. Any final word in this regard could be made only on completion of this analysis.

Article 8 could also be read along with Article 1(1), which permit member countries to adopt measures necessary to promote their public interest in sectors of vital importance. For countries with space technology, desiring to have more intellectual

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[42] Article 2(viii) of the 1967 Convention Establishing WIPO defines "intellectual property" as namely rights relating to: literary, artistic, and scientific works; performances of performing artists; phonograms and broadcasts; inventions in all fields of human endeavor; scientific discoveries; industrial designs; trademarks; services marks; and commercial names and designations; protection against unfair competition and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields.

[43] Article 1(1) of TRIPs- "Members shall give effect to the provisions of this agreement. Members may, but shall not be obliged to, implement in their law more extensive protection than is required by this Agreement, provided that such protection does not contravene the provisions of this Agreement. Members shall be free to determine the appropriate method of implementing the provisions of this Agreement within their own legal system and practice".

[44] Otten, n.2[illegible], p.394.

[45] A new space law covering all the commercial aspects is in the anvil. See Bocksteigel, n.[illegible], pp.175-91.

property protection in order to attract more investment into the space sector, this clause is of high utility.

Objective-Article 7[46] of TRIPs sets out its objectives. This 'should' provision will likely be one of frequent use, notably in dispute settlement procedure, because it lays down five basic tests to determine proper enforcement and protection of intellectual property rights. So, for a right to be of proper enforcement and protection it should:

- Promote technological innovation
- Transfer and disseminate technology
- Be of mutual advantage to producers and users
- Be conductive to social and economic welfare
- Balance rights and obligations[47]

If the nature of space related activities and its impact on society are considered, it seems that it goes in consonance with and accomplishes all the objectives enshrined in TRIPs[48].

Copyright Provisions- The need for copyright surfaces when the issue regarding the protection of remote sensing data and satellite transmissions comes forward. In this

[46] Article 7- "The protection and enforcement of TRIPs should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conductive to the social and economic welfare, and to a balance of rights and obligations".

[47] Since this clause encloses the very philosophy of intellectual property like balancing "creation and stimulation with "diffusion" and "rights" with "obligations", it could act as a strong safeguard for the interests of those states, which have at the present time, little or no active space programme of their own. It could also be a good check upon those space related intellectual property frameworks, which has a higher accent on "rights" and a deliberate dodging of duties and liabilities. For details, see Peter Drahos, *The Philosophy of Intellectual Property* (Dartmouth: Applied Legal Philosophy Series, 1996).

[48] As far as the existing philosophy and commercial nature of space related activities are concerned, it satisfies all the yardsticks stipulated in the TRIPs Agreement. It is beyond doubt that advancement in space technology promotes technological innovation, which in turn is transferred and disseminated through bilateral technology transfer agreements between space agencies. Telecommunications is the typical example of rights, which is of mutual advantage to the producers and users. Above all space activities are highly conductive to social and economic welfare. See Myres McDougal and others, *Law and Public Order in Space* (New Haven: Yale University Press, 1963); Traa-Engelman, n.4.

regard, Article 10(2)[49] is an innovative one, which confirmed, for the first time, in any multilateral instrument the protection of database[50].

This clause seems to be the one, which could protect the rights of governmental, inter-governmental, and private agencies, indulged in the remote sensing of earth's surface. It is beyond doubt that the proper form of protection for remote sensing data from improper appropriation, reproduction, and distribution is copyrights. The Berne Convention and its subsequent modifications allow protection through copyrights. The Berne Convention from Articles 1 to 21 minus Article 6*bis* is reflected in TRIPs for copyright protection. But, firstly, the Convention only mentions a collection of "works" and not a collection of "data", and protects "originality" and the "fruit of the intervention of a human mind"[51]. Secondly, TRIPs also have imbibed these as qualifications[52].

However, Article 10(2) of TRIPs rectifies the first drawback by including protection for "data". But then emerges the question whether Article 10(2) accommodates remote sensing data or not[53]. Article 10(2) clarifies that database or other compilation of data or other material shall be protected under copyright even where it includes data or other material that, as such, is not protected under copyright, if, by reason of the selection or arrangement of its contents, the database or other compilation constitutes an intellectual creation[54]. The provision thus protects any kind of data. But the only stipulation is that it should constitute an intellectual creation by reason of its selection or arrangement of its contents.

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[49] Article 10(2)- "Compilations of data or other material, whether in machine readable or other form, which by reason of the section or arrangement of their contents constitute intellectual creations shall be protected as such. Such protection, which shall not extend to the data or material itself, shall be with out prejudice to any copyrights subsisting in the data or material itself".

[50] Though laws in many countries had been amended in 1990 to include computer programs in the list of protected works, the extend of protection remained unclear. According to a survey, 22 countries mentioned them explicitly by 1992. See the Report of the Office of Technology Assessment (U.S.) entitled "*Finding a Balance: Computer Software, Intellectual Property and the Challenge of Technological Change*", Washington, 1992.

[51] Gabriella Catalano Sgrosso, "Remote Sensing Data Protection and Data Distribution Policy", *International Organizations and Space Law*, Proceedings of the Third ECSL Colloquium, Italy, 1999.

[52] Article 10(2)

[53] From the drafting history of Article 10(2) it seems that protection offered here is mainly included in order to protect computer programs.

[54] As regards copyright protection itself, the text used is similar to that of Article 2(5) of Berne Convention, which should serve as a basis for its interpretation. The test of that Article may be summarized as the need for the maker of the database to use creativity in the selection or arrangement, an intellectual effort to choose the material or to arrange it in the database.

Now what needs to be tested is whether remote sensing data constitutes an intellectual creation by reason of its selection and arrangement.

Remote sensing data mainly comes in three forms. Primary data, processed data and analyzed information. Primary data is the raw data or unenhanced data[55], and processed data means the product resulting from processing. Analyzed information means the information resulting from the interpretation of processed data. As far as primary data, which are mainly electromagnetic waves transformed into numeric signals by the satellite, is concerned it is difficult to attribute "intervention of human mind". But for processed data and analyzed information, with an extensive interpretation that considers the technical evolution that works have suffered (documentary added value) it is possible to find human intervention and originality[56].

Hence, though processed data and analyzed information may fall under Article 10(2), primary data will fall short of protection. But it is submitted here that the stipulation of "intellectual creation" taken from Article 2(5) of the Berne Convention may be explained as stating simply that compilations that pass the test are protected as literary and artistic works, since the expression "intellectual creation" may be deemed synonymous of "literary and artistic works".

Geographical Indications- Article 22[57] is yet another provision in TRIPs that may have an impact on space applications. Here the question is whether earth observation imagery of specific territories corresponds to the identification of what a geographical indication is[58].

Geographical Indications under TRIPs are any indication pointing to a given country, region or locality, and it identifies a good. There is no doubt as to its application

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[55] For details on primary, processed and analyzed data see note 25, chapter 2.
[56] This is hardly applicable to primary data, which is a fruit of an automated process.
[57] Article 22(1)- "Geographical Indications are, for the purposes of this agreement, indications which identify a good as originating in the territory of a member, or a region or locality in that territory, where a given quality, reputation, or other characteristic of the good is essentially attributable to its geographical origin".
[58] Patrick-Andre Salin, *Satellite Communications Regulations in the Early 21st Century* (The Hague: Martinus Nijhoff, 2000), pp.76-77.

in the case of tangible and earthly goods, e.g. Dairy products, wines, furniture, crops, medicinal herbs, and plants.

The question relevant to the present context[59] is, whether what appears on a film tape after the transformation of digital information into a picture, which is visible to the eye, fall into the category of geographical indication. In other words, is it an indication, which appears on a picture in the territory of a member? If so, could it be protected?

Article 22 does not define in particular terms what is eligible for protection as a geographical indication. The Article says that a geographical indication to be protected as such needs to be "an indication", but not necessarily the name of a geographical place on earth[60]. This "indication" has to identify goods as originating in the territory of a member. The provision also provides members with alternatives to link the protected geographical indication with the product, i.e., quality, reputation, or other characteristics of the goods.

Here it seems that the main test to qualify for a geographical indication is that, it should be an indication and has to identify goods as originating in the territory of a member. The second part mainly qualifies the indication by means of quality or reputation or other characteristics. But the Text uses the expression "essentially attributable", which implies that this is mandatory requirement for all its intents and purposes.

Now if the question regarding the applicability of Article 22 to an indication, which identifies the earth lines and forms, is repeated it won't sound inconsequential. It is obvious that this could easily satisfy the first test stipulated in Article 22(1). As regarding these three alternatives, the subject matter protected as geographical indication should be qualified by any of it. It could either be quality, reputation, or other characteristics.

As far as the subject matter, which demands protection in this context, is concerned, it is difficult to attribute quality or reputation to it. Then left with is "other characteristics". Since the Text is silent as to what are "other characteristics", it should be

[59] Though Patrick-Andre Salin raises the question, he does not come out with an answer and throws it at the reader for further analysis. Here an effort is made to look for an answer to these questions.

[60] There are a number of examples of a geographical indication whose expression does not correspond to the name of a territory, region, or locality of that territory. See the list of examples of geographical indications attached as Annex A to the *WTO Note from the Secretariat*, JOB (00) 5619, pp.71-78.

decided on a case-to-case basis. Here one postulation, which could be made, is that "other characteristics" may comprise the economic and commercial aspects of the good. Then, perhaps the question could be put forward like this. "Is it an indication, which identifies earth lines and forms, and information regarding natural resources, which appear on a picture, to which high economic and commercial value is attributable?

Perhaps the answer to this question could be given in affirmative. In such a situation, Article 22(1) could be invoked wherever copyright fails.

Industrial Designs- Designs law should be looked at, when the question of the protection of space vehicular designs materializes. Article 25(1)[61] of TRIPs that deals with designs lays down two criteria to qualify for protection. One is that the design should be independently created and the other is novelty or originality. So, in order to resort to the protection offered by Article 25(1), the design should be new and shall not be a copy or imitation of any existing designs.

But the last sentence of Article 25(1) gives an option to member countries to exclude from protection those designs that are dictated mainly by technical or functional considerations. It seems that this clause emanated from the expression "originality" as stipulated in the second sentence of Article 25(1), which refers to choices made by the designers other than those dictated by such considerations. Thus, TRIPs offers protection only to the rights of those designers, who shape an article in order to make it appealing to the eye of a customer and not to those who make the article perform certain functions or a specific function.

Though the restriction here is optional, it thwarts designs protection under TRIPs from being extended to space vehicular designs, which are dictated purely by technical and functional considerations.

[61] Article 25(1)- "Members shall provide for the protection of independently created industrial designs that are new or original. Members may provide that designs are not new or original if they do not significantly differ from known designs or combinations of known design features. Members may provide that such protection shall not extend to designs dictated essentially by technical or functional considerations".

But despite the restriction under Article 25(1), TRIPs provides an alternative in it, which could be resorted to for the protection of spacecraft designs. If Article 9(1)[62] is looked at, it recognizes the Berne Convention, which protects literary and artistic works. As per Article 2(1) of this Convention, drawings or diagrams on the basis of which the articles are made are "artistic works" and those articles being three-dimensional representations of the drawings are reproductions in material form of the drawings. Thus, such drawings and articles may enjoy the benefit of copyright protection.

But the most effective form of protection for spacecraft designs would be as utility models[63]. The vitality of utility models in this regard is that its key to patentability is "functionality". TRIPs does not have a direct clause on utility models. But Paris Convention covers utility models as a protectable subject matter[64]. Since TRIPs is a Paris-plus agreement, which requires the members to comply with Articles 1 to 12 and 19 of Paris Convention[65], it automatically empowers TRIPs to set minimum standards in respect of the legal protection of utility models.

Patents- The principle that the creations of intellect should be rewarded is largely recognized through the world. This principle has no less application even in case of outer space related activities. The conduct of research and development activities in outer space result in the creation of material that in a terrestrial setting would attract entitlement to registration as a patent.

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[62] Article 9(1)- Members shall comply with Articles 1 through 21 of the Berne Convention (1971) and the Appendix thereto. However, members shall not have rights or obligations under this Agreement in respect of the rights conferred under Article 6bis of that Convention or of the rights derived there from.

[63] A utility model or utility patent covers a useful process, machine, article of manufacture, or composition of matter. Utility models are granted legal protection like inventions protected by a patent, when they are new. But compared to the latter it should not involve so high inventive step. The inventive step of a utility model may be conventionally identified as a new engineering solution providing a useful technical result.

[64] See Article 1 of Paris Convention for the Protection of Industrial Property-"The protection of industrial property has as its object patents, utility models, industrial designs, trade marks, service marks, trade names, ..." Also, utility models are dealt with in several other clauses of the Convention. See in particular, Articles 4, 5, and 11.

[65] Article 2 of TRIPs.

Articles 27-34 of TRIPs deals with patents. The first sentence of Article 27(1)[66] asserts that patents should be provided irrespective of technology, which is sufficient to highlight that space technology cannot be exempted from patent protection. Another important element is the elimination of discrimination "as to the place of invention" for the grant of patents. These "welcoming clauses" confirm the applicability of TRIPs regarding patents to outer space activities.

But Article 27(1) stipulates 3 mandatory requirements of patentability i.e., novelty, industrial application, and inventive step (obviousness).

As far as industrial application is concerned, its requirements are minimal and could be straightforwardly satisfied[67].

Secondly, TRIPs stipulates the presence of a novel step in an invention[68]. In space environment, it is probable to accomplish results not obtainable on earth[69]. For example, it is possible to produce a level of purity in pharmaceutical products otherwise not possible on earth, also in the very exceptional conditions of weightlessness fundamental experiments can be carried out with great precision when sample are manipulated without physical contact. If the purity level and precision is such that the new product is distinguishable from the prior art, the product qualifies for patent under the novelty prerequisite.

There is also a high prospect of producing a new product in microgravity by repeating a process familiar in gravity present environment. Certainly, this could satisfy

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[66] Article 27(1)- Subject to the provisions of paragraph 2 and 3, patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application. ... , patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced.

[67] The requirement that a patentable invention be susceptible or capable of industrial application had no direct counterpart. The concept is concerned with the categories of subject matter that fall within the sphere of the patent system.

[68] It is the classic rule of intellectual property law is that an invention, in order to be patentable must be new. Thus, novelty in the alleged invention is an essential prerequisite for obtaining a patent grant. Lack of novelty is therefore a ground of revocation. It is also referred to as anticipation Lack of novelty has to be determined having regard to what was publicly known or publicly used. See P.Narayanan, *Intellectual Property Law* (Kolkata: Eastern Law House, 2001), pp.78-81; W.R Cornish, *Intellectual Property* (New Delhi: Universal Law Publishing Co., 2001), pp.148-61.

[69] Sa'id Mosteshar, "Intellectual Property Issues in Space Activities", in Sa'id Mosteshar, ed., *Research and Inventions in Outer Space* (London: Kluwer International, 1997), p.192.

the novelty condition regarding the product. But since protection offered by TRIPs covers process also, novelty requirements regarding process remains unfulfilled. But one point, which is to be noted here is that, a process includes many factors, one of which is the atmosphere in which the process is performed. If this is applied to the present context, then by performing a process familiar in the gravity-ridden environment in microgravity, it becomes a new process and hence easily qualifies for novelty requirements. Such a situation gives a high possibility for infringing patents well protected on earth.

In such ambivalent situations, the third check set in TRIPs should be employed i.e., invention shall involve an inventive step. In other words, it should be non-obvious. But TRIPs text uses the expression "inventive step" and not "non-obviousness". Obviousness and inventive steps are antithesis. What is obvious cannot be inventive and what is inventive cannot be obvious. So to determine inventiveness first it should be decided whether the invention is non-obvious or not. The test here is whether what is claimed is so obvious that it could at once occur to any one acquainted with the subject. So, the general criterion seems to be that "is it such a development, as an ordinary person skilled in that art could if he wished to do so, naturally, make without any inventive step. This application could, to a great extent solve the aforementioned problems.

The concept of non-obviousness if applied to inventions in outer space and if viewed in a broader perspective will certainly assume a dissimilar dimension. The first question here is, non-obviousness as to what? Normally an invention involves three stages: (1) the definition of the problem to be solved, or the difficulty to be overcome, (2) the choice of general principles to be applied in solving the problem, and (3) the choice of the particular means to be used. Merit in any one of these stages, or in the whole combination may support the invention. So, non-obviousness should be attributed to the invention either at any one of these stages or at all stages.

As regards space products, the only distinguishing feature in arriving at the product is the performance of procedures in outer space. So, non-obviousness of the invention should be put to test at the third stage. Here non-obviousness exists with regard to process conditions and process reactions in outer space.

The concept seems to be an exceedingly convoluted one and finding a way out is a much more insurmountable one. It is up to the competent dispute settlement authority to resolve the matter, which demands an examination on a case-to-case basis.

Undisclosed Information- Another TRIPs provision[70] that has impact on space related activities are the one regarding undisclosed information[71]. The United States, for the protection of the remote sensing data, has resorted to the protection of trade secrets[72]. Article 39[73] of TRIPs Agreement deals with protection of undisclosed information. This

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[70]TRIPs is the first multilateral instrument dealing in any detail with the protection of what in various national laws may be called "trade secrets", "confidential information" or the like and is often protected not by specific intellectual property legislation but by general civil law standards. This field is not regulated by multilateral conventions, apart from the general obligation in respect of unfair competition found in Article 10*bis* of Paris Convention.

[71] "Information" in this context must be used in the widest sense, and covers all types of data, including test formulas and test data, as long as the information is identifiable.

[72] A trade secret can be any information that derives independent economic value from not being generally known or readily ascertainable. Among the things that can be trade secrets are a formula, pattern, compilation, program, device, method, technique, or process; Section 204(a) j.o. 602(e), (f). Land Remote Sensing Commercialization Act, 1984; The law of United States does not imply a protection of the remote sensing data by use of copyright, which would have created a legal protection ergaomnes and a free exploitation by its owner, but through the use of the confidential trade secrets procedure. The information is a confidential trade secret of EOSAT and its reproduction would cause a misappropriation of the trade secret itself. See Gabriella Catalano Sgrosso, "Remote Sensing Data Protection and Data Distribution Policy", *International Organizations and Space Law*, Proceedings of the Third ECSL Colloquium, Italy, 1999. Also, see Agreement for the Purchase and Protection of Satellite Data between the Department of Commerce and EOSAT, September 1985. In France, on the contrary to what happened in United States, no law regulates the legal regime of the activities of the SPOT remote sensing satellites. The law of July 3rd 1985 on the "logiciels" protected by copyright is applied analogically also to the collection of the remote sensing data. The private commercial company SPOT IMAGE has a license for the distribution, on a world wide basis, of the data coming from the SPOT satellites whose copyright belongs to the Centre National d'Etudes Spatiales CNES).

[73] Article 39- " In the course of ensuring effective protection against unfair competition as provided in Article 10bis of the Paris Convention (1967), Members shall protect undisclosed information in accordance with paragraph 2 and data submitted to governments or governmental agencies in accordance with paragraph 3.

2. Natural and legal persons shall have the possibility of preventing the information lawfully within their control from being disclosed to, acquired by, or used by others without their consent in a manner contrary to honest commercial practices as long as such information:

a) is secret in the sense that it is not, as a body or in the precise configuration and assembly of its components, generally known among or readily accessible to persons within the circles that normally deal with the kind of information in question;

b) has commercial value because it is secret; and

c) has been subject to reasonable steps under the circumstances, by the person lawfully in control of the information, to keep it secret.

3. Members, when requiring, as a condition of approving the marketing the pharmaceutical or of agricultural chemical products, which utilize new chemical entities, the submission of undisclosed test, or other data, the origination of which involves a considerable effort, shall protect such data against unfair commercial use. In addition, Members shall protect such data against disclosure, except where necessary to

provision is mainly drafted with a view to protect those data, which are submitted to governments and governmental agencies[74]. But it is submitted that rather than going by a narrow interpretation that limits the scope of Article 39 only to the data submitted to governments and its agencies, what sounds sensible is to go by the wordings in Article 39(2) which, apart from defining the actual scope of the protection[75], covers any lawful information within the control of any natural or legal persons. Article 39(3) should be treated as a specific provision exclusively for data submitted to governments and its agencies.

So, it presumed that Article 39 protects any data that is lawfully[76] obtained, which is secret and has commercial value. Such an interpretation will certainly entail remote

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protect the public, or unless steps are taken to ensure that the data are protected against unfair commercial use".

[74] See Gervais, n.35, p.187. Article 39(3) is in fact a second part of the Article, deals with what is described in the first paragraph as "data submitted to governments or governmental agencies". Daniel Gervais views that; "the provision applies to any such data. However, in the same way that the expression "undisclosed information" also used in the first paragraph must be read "in accordance with" the second paragraph. The data referred to in that paragraph are those referred tc in the third paragraph, namely data submitted to governments and governmental services or agencies required "as a condition for approving the marketing of *pharmaceutical* or of *agricultural chemical* products which utilize new *chemical entities*".

[75] Article 39(2) specifies the conditions governing protection. Firstly, the information should be lawfuly. Secondly, the information is secret in the sense that it is not generally known among persons that normally deal with the kind of information in question. Thirdly, It must have commercial value. In other words, it must give a competitive advantage and, lastly, the requirement regarding reasonable steps.

[76] Right from the time when the use of remote sensing began, there have been debates among the international community on the controversial implications of this technology. The basic cause of these debates was the perception of several countries that their sovereignty was being challenged. There were also questions as to whether such action amounts to interference in internal affairs of another sovereign country. If so, is it a legitimate activity? In the context of remote sensing apart from the traditional issues of sovereignty, the lawfulness of the data (mainly with regard to intellectual property) obtained through such activities may also materialize. "The UN Principles Relating to Remote Sensing of the Earth from Outer Space, 1986", stipulates that "remote sensing activities shall be conducted in accordance with international law including the charter of United Nations". It also requires the sensing state to respect the principle of full and permanent sovereignty of all states over their wealth and natural resources nor shall they be conducted in a manner detrimental to the interests of the sensed state. These entails the sensing state to respect and comply with several sacred principles of international law like, good neighborliness, and *Jus Cogens* like non-intervention and permanent sovereignty over natural resources. This gives more emphasis on the legality of remote sensing and the question regarding prior consent of the sensed state. The question of legitimacy of remote sensing assumes a greater dimension when the issue of proprietary rights over the data obtained through such an activity comes. But it is generally agreed that remote sensing is a legitimate activity. For details see B.L. Deekshatulu and others, "Overview of the Legal Aspects of Remote Sensing", in V.S.Mani and others, eds., *Recent Trends in International Space Law and Policy* (New Delhi: Lancers Books, 1997), pp.221-34; V.S. Mani, "The Emerging Legal Regime of Remote Sensing: A General Survey", in V.S. Mani and others, eds., *Recent Trends in International Space Law and Policy* (New Delhi: Lancers Books, 1997), pp.235-54; Cheng, n.6, pp.572-97. Also, see Principle III and IV, Principles Relating to Remote Sensing of the Earth from Outer Space, 1986, UNGA Res. 41/65, of 3 December 1986; *UN Doc. A/AC.105/572/Rev.1*, at 43.

sensing data to be protectable under Article 39[77]. This is notwithstanding the fact that even provisions of Article 39(3) will be of high utility in several spatial contracts[78].

Control of Anti Competitive Practices in Contractual Licenses- It is one of the criticisms aimed at intellectual property systems that the legal monopoly right provides opportunities for right owners to engage in anticompetitive arrangements when granting licenses to use soughtafter rights[79]. In other words, some licensing practices may adversely affect trade and impede the transfer and dissemination of technology. With regard to space related activities, where licensing arrangements are gaining prominence[80], there may materialize several such anticompetitive practices. Article 40 of TRIPs acts as a check on such practices[81].

Enforcement Provisions- The minimum standards laid down by TRIPs pertains not only to the substantive provisions but also to its enforcement. The Agreement leaves the entire enforcement phase to the member countries and sets standards to be followed in this regard[82]. The obligations set out in this regard are of two main types. The first are those,

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[77] Protecting remote sensing data under trade secrets law or as undisclosed information might be more effective than copyright protection, which stipulates the criterion of "intellectual creations" and thereby thwarts protection to primary data or unenhanced data. If going by the protection under Article 39 of TRIPs, where the data needs to be only of commercial value, a secret and should be lawfully obtained, even unenhanced data could be effectively protected.

[78] See Article III Handling of Users Provided Data and Data from the Payload, Provisions of STS Launch Services Agreement; Article VIII of Joint Endeavor Agreement between NASA and Mc Donnell Douglas Astronautics Company on Material Processing in Space.

[79] Philip Griffith, "Trade Related Aspects of Intellectual Property Rights-Commentary", *TRIPs Agreement and Current Trends in Intellectual Property*, Seminar Organized by University of Hong Kong, 14th January 2002.

[80] See Model Exclusive Patent License Agreement, 2001, Intellectual Property Division, National Aeronautics and Space Administration, *www.hq.nasa.gov*. Also see Section 305(g) of NASA Act, 1958- "The Administration shall determine and promulgate regulations specifying the terms and conditions upon which licenses will be granted by the Administration for the practice by any person (other than an agency of the United States) of any invention for which Administration holds a patent on behalf of the United States".

[81] The Article requires members to prevent all kinds of practices that constitute an abuse of intellectual property rights having an adverse effect on competition either through exclusive grantback conditions, conditions preventing challenges to validity, and coercive package licensing or through consultations.

[82] During the negotiations, it was found that high substantive standards of intellectual property protection are of little use if rights cannot be effectively enforced. Thus, a major set of obligations in the TRIPs Agreement requires members to provide domestic procedures and remedies so that right holders can enforce their rights effectively. These provisions aim to recognize basic differences between national legal systems, while being sufficiently precise to provide for effective enforcement action as well as safeguards against abuse in the use of enforcement procedures. These rules constitute the first time in any area of international law that such rules on domestic enforcement procedures and remedies have been negotiated. See Otten, n.28, p.403.

which prescribe procedures and remedies, and second are those, which may be described as "performance" requirements in relation to the workings of these procedures and remedies in practice[83]. It is the second kind of obligation that will be of a superior impact on space related activities. Even the Agreement makes a distinction between infringing activity in general and counterfeiting and piracy. Counterfeited and pirated goods are in essence goods that involve copying of a trademark and goods that violate a reproduction right under copyright or related right[84]. The border measurers and criminal remedies provided for in the Agreement for counterfeiting and piracy will certainly act as a strong check against pirated remote sensing data. Also, the inclusion of 'related rights' with in the purview of "piracy" will extend the aforementioned check even for satellite transmissions.

Dispute Settlement- One unique feature of GATT dispute settlement system is that it gives practical means of recourse to governments that believe that another member state is not living up to its obligations. The same applies to all agreements of the Uruguay Round Final Act, including TRIPs. Article 64(1) of TRIPs confirms the application of the "full" dispute settlement mechanism under the Dispute Settlement Understanding with regard to all trade related intellectual property rights[85]. When applied to the question of complying with TRIPs standards regarding space activities, there may materialize quite a

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[83] For example members must permit effective action against infringing activity, provide expeditious and deterrent remedies, and be applied in a manner that will avoid the creation of barriers to legitimate trade.

[84] The definitions are contained in footnote 14 to Article 51, which reads:
For the purpose of this Agreement:
a) ...
b) "Pirated copyright goods" shall mean any goods which are copies made without the consent of the right holder or person duly authorized by the right holder in the country of production and which are made directly or indirectly from an article where the making of that copy would have constituted an infringement of a copyright or a related right under the law of the country of the importation.
See Otten, n.27.

[85] But unlike other agreements TRIPs initially gives access to the dispute settlement mechanism only on the failure of another member to carry out its obligations under the Agreement (until January 2000). This is otherwise called violation complaint. Apart from this Dispute Settlement Understanding also provides for "non-violation complaints" and situation "complaint", where the aggrieved party can have access to the available conflict resolution mechanism where it is of the opinion that a benefit accruing to it directly or indirectly under an agreement covered by the Understanding is being nullified or impaired either as a consequence of the application by a member of any measure or as a consequence of any situation. For details see Asif H. Qureshi, *The World Trade Organization: Implementing International Trade Norms* (New York: Manchester University Press, 1996), pp.97-107. Also see A Jayagovind, "The Dispute Settlement Understanding: A Critique", *Indian Journal of International Law*, vol.41, no.3, 2001, pp.418-34.

number of vital issues. It is assumed that the access to the 'mighty' dispute settlement mechanism will give those nations with space technology a fair deal in the enforcement and management of intellectual property rights.

Provisions on Transitional Arrangements- In order to meet the minimum standards fixed by it, TRIPs gives member countries transitional periods. Many such transitional arrangements like, "non-backsliding"[86], "mailbox"[87], "Exclusive Marketing Rights" etc., may be decisive and imperative for many space faring nations. But any final word regarding its impact could be said upon considering the intellectual property standards adopted, so far, by such countries.

III.1.3.2. Analysis

A general outlook, which is gaining vigor, is that the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs) has ushered in an era of a "New Intellectual Property Order" (NIPO). One justifiable philosophy behind TRIPs jurisprudence is that there should emerge an intellectual property order throughout the globe, which bears certain minimum standards. Since its inception, TRIPs as a standard setter has grabbed the domestic implementation grids of member countries, demanding a high echelon of compliance concerning minimum standards well within the transition periods stipulated.

As regards the domain of outer space activities, during its initial stages the concept of intellectual property was virtually unknown. But the recent budge towards commercialization, well propped by certain social and political factors, has brought intellectual property notions at the portals of space sector. At this juncture, it is inexorable on the part of the space segment to espouse the Intellectual property protection that they were yearning for. Acceptance of such protection by space savvy nations (who are members of WTO) twist their arms to adopt the minimum standards stipulated by the new intellectual property order.

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[86] Generally, Article 65(5), which forbids countries from using the transition period to reduce the level of protection of intellectual property in a way that would result in a lesser degree of consistency with the requirements of the Agreement, is called as non-backsliding clause.

[87] If a member did not as on January 1, 1995, make available patent protection for pharmaceuticals and agricultural chemical products in a way that is compatible with Article 27, that member must, for the filing of applications for patents for such invention create a facility called "mailbox" or "Black box".

The chore undertaken in the above paragraphs divulges that outer space activities though inimitable in nature, while wrapping itself with intellectual property protection need to maintain TRIPs standards. What comes into picture is that such standards are well within the means of space related activities. What is needed to be analyzed is whether existing intellectual property protection for outer space allied activities are compatible with TRIPs standards or not.

At one point, discussions were made about an Intergovernmental Agreement (IGA) concerning the inventions made in international space station[88]. Article 21 of this IGA states, "for the purpose of intellectual property law, an activity occurring in or on a space station flight element shall be deemed to have occurred only in the territory of the Partner State of that element's registry". And this provision creates a micro territory on board the space station. Here the purpose of this territorial approach is to determine the country of inventorship[89] and this as per Article 21 is for determining intellectual property rights, in particular patents.

If this clause is viewed in the light of TRIPs Agreement, there seems to exist certain discrepancies. Article 27(1) of TRIPs is the provision that fixes standards regarding patentability. Under this provision any discrimination "as to the place of invention" for the grant of patents[90] stands eliminated. Exceptions are provided for certain developing countries and for those members that have resorted to "mailbox" facility[91]. But none of the countries that are parties to the Intergovernmental Agreement, 1998 falls in the aforementioned category[92]. As per Article 65(2) of TRIPs, those countries that did not fall in that category is obliged to apply the provisions of TRIPs by 1 January 1996.

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[88] See n. 18, p.4

[89] Marguerite B.Broadwell, "Intellectual Property and the Economic Development of the International Space Station", *Space Technology and Applications International Forum,* Albuquerque, NM, February 2000, p.5.

[90] According to Article 27 of TRIPs- "... Subject to paragraph 4 of Article 65, paragraph 8 of Article 70 and paragraph 3 of this Article, patents shall be available and patents rights enjoyable without discrimination as to the place of invention..."

[91] See Articles 27(1), 65(4), and 70(8).

[92] Intergovernmental Agreement is signed between United States of America, Canada, Japan, Russia, and ten European collaborates. Here Russia is so far not a party to GATT, 1994.

Here it appears that the shove given by Article 21 of the Intergovernmental Agreement to "place of invention" as a factor for determining the granting of patents stands incompatible with TRIPs Agreement. All bilateral Agreements and domestic legislations that were enacted based on this clause of IGA will also remain inconsistent with TRIPs standards. Since this stands as a ground for "violation complaint" as per the Understanding on Rules and Procedures Governing the Settlement of Disputes, the party aggrieved due to the existence of such a situation can access the Dispute Settlement Mechanism under WTO[93].

III.I.4. North American Free Trade Agreement (NAFTA)

North American Free Trade Agreement[94] (hereinafter NAFTA) is a regional trading agreement between the United States, Canada, and Mexico. Articles 1701 to 1721 of NAFTA deals with intellectual property aspects. These provisions are largely built on the TRIPs Agreement of the Uruguay Round Final Act[95]. Most of the NAFTA provisions on intellectual property provide standards of protection at par with TRIPs agreement[96].

There are two provisions in NAFTA, which may have a bearing on space activities. One is the copyrights provisions and the other those on trade secrets. Copyright

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[93] Though Article 64(2) places a restriction on the lodging of a "situation complaint" and "violation complaint", it is applicable only till January 2000.

[94] NAFTA came into effect on January 1994 as an agreement between the United States, Canada, and Mexico. The main NAFTA agreement covers trade in goods, technical barriers to trade, aspects of government procurement, investment, services and related matters, intellectual property, and dispute resolution. For the complete legal text of NAFTA see *North American Free Trade Agreement* (Ottawa: Supply and Services, 1992); For discussions on the provisions of NATA see S. Globerman and M.Walker eds., *Assessing NAFTA: A Trinational Analysis* (Vancouver: The Fraser Institute, 1993), Also see Michael J. Trebilcock and Robert Howse, *The Regulation of International Trade* (London: Routiledge, 1995), pp.45-48.

[95] NAFTA's scope of intellectual property protection includes copyright, trademarks, trade secrets, and patents. In addition, NAFTA also protects semiconductors, geographical indications, satellite broadcast signals, industrial designs, and sound recordings. NAFTA's benefits are not limited to those industries whose primary goods rely on intellectual property rights protections, but rather for any company that seeks to protect its trademarks, logos, and/or trade secrets.

[96] NAFTA provides adequate and effective protection and enforcement of intellectual property rights among the United States, Canada, and Mexico. It provides a comprehensive definition of "intellectual property rights" by fixing minimum standards for intellectual property protection and by requiring each country to accord to nationals of another Party treatment that is no less favorable than it accords to its own nationals.

protection offered by NAFTA in Article 1705, apart from the including the conventional copyright fortification, offers protection to any new subject matter discovered through technological innovation that qualifies, as original expressions[97]. This provision takes into account the pace of continuing technological change in high technology and multimedia industries and obviates the need to amend NAFTA in the future to accommodate new technologies. The provision will be of high utility for the protection of the much-debated remote sensing data and satellite transmissions. Here copyright protection will be available subject to one condition i.e., the protected matter should personify "original expression". Unlike TRIPs, NAFTA does not stipulate "intellectual creation", which generally thwarts the protection of primary data[98]. But Clause (b) of Article 1705(1) of NAFTA retains this qualification[99]. But it is submitted that clauses (a) and (b) need to be read only as illustrations of works that embody original expressions[100]and not as the only two instances where the protection in Article 1705(1) is available.

Trade secret law, as discussed earlier, is designed to prevent the unauthorized use and disclosure of confidential information[101]. In space sector the lack of protection can frustrate development projects and wreck strategic alliances and will be critical to the transaction. NAFTA requires each member country to provide legal means to prevent unauthorized disclosure of trade secrets that are in a tangible form[102].

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[97] Article 1702: Copyright- "Each Party shall protect the works covered by Article 2 of the Berne convention, including any other works that embody original expression within the meaning of that convention. In particular a) all types of computer programs are literary works within the meaning of the Berne Convention and each Party shall protect them as such; and b) compilations of data or other material, whether in machine readable or other form, which by reason of the selection or arrangement of their contents constitute intellectual creations, shall be protected as such".

[98] See n.54.

[99] See n.97.

[100] Article 1705 (1) highlights that Copyright protection is available for any works that embody original expression... Then the text uses the wording "in particular" and goes on pointing out the two illustrations in clauses (a) and (b).

[101] See n.65, p.21.

[102] Article 1711; The matter may be protected as a trade secret if it is not generally known, even if certain information about the trade secret is publicly available. Further, subject matter is protectable as a trade secret if it has either actual or potential commercial value as a result of not being generally known. NAFTA permits the Parties to require documentation as a precondition to trade secret protection. For example, the trade secret matter may be evidenced by documents, electronic or magnetic means, optical discs, or other similar instruments NAFTA most likely will not protect "know-how" that is not specifically embodied in

Under NAFTA, a breach of contract, breach of confidence or inducement to breach, which results in the wrongful acquisition of proprietary information is actionable only if the acquiring Party knew or was grossly negligent in failing to know that such practices were involved in its acquisition. Under NAFTA, therefore, "commercial dishonesty" is measured by reference to bad intent or grossly negligent action, a difficult standard of liability to prove in most trade secret and unfair competition cases. Trade secret and unfair competition enforcement under NAFTA is weakened by this high standard of culpability. This certainly may pose serious intricacies when trade secrets are used mainly for the protection of remote sensing data as well as other spatial information.

III.1.5. European Patent Convention

European Patent Convention[103](hereinafter EPC) is another regional intellectual property convention, which is of significance to the present context. Under the Convention, for an invention to be patentable, it shall be novel, which involve an inventive step and shall be susceptible of industrial application[104]. These three criteria are similar to other intellectual property instruments. But what makes EPC unique is Article 54, which elucidates how to establish novelty[105]. What does not form part of the "state of the art" or "prior art"[106] is novel as per EPC.

Regarding the patentability of an invention made in outer space this provision will be highly functional. As discussed in chapter 2, when an inventor invents a new product in micro-gravity using a known process of gravity, the crucial question arises as to whether he is eligible for a patent or not. Debate will crop up mainly regarding the novelty of the process. Here what is needed to be determined is whether the alleged process is previously known or not. Obviously, it is well known in gravity-ridden environment and forms a part of the state of the art. But performing that process in a

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documents or drawings. NAFTA protection of trade secrets ordinarily is perpetual, so long as the information remains a secret and has not become generally known to the public.

[103] European Patent Convention (EPC), 5 October 1973. The main objective of the convention is to create a single procedure for the grant of patents and to establish certain standard rules governing patents.

[104] Article 52(1) of EPC- "European patents shall be granted for any invention which are susceptible of industrial application, which are new and which involve an inventive step".

[105] Article 54 of EPC-"An invention shall be considered to be new if it does not form part of the state of the art".

[106] The expression prior art or state of art denotes that which is known in a particular field.

different environment, whether, amount to "be a part of the state of art" is the imperative aspect of the problem. Certainly any final word in this regard could be made only on a case-to-case basis by the competent dispute settlement authority.

III.1.6. European Union Directive on the Protection of Data Bases

The European Union Directive on the Legal Protection of Data Bases (hereinafter "The Directive") is a highly progressive legislation[107]. The Directive is of significance in the present context, if viewed in the direction of the legal protection of remote sensing data and satellite transmissions. One unique feature of the Directive is the *sui generis* protection it offers[108]. Here the databases that do not meet the "originality" criterion for copyright protection are protected by the *sui generis* right, because of the economic and commercial investment made by the maker of the database. This *sui generis* right gives the maker of a database the right to prevent extraction or re-utilization of substantial parts of the contents of that database[109].

Presently, one major drawback with respect to the protection of remote sensing data is the criterion of "intellectual creation", which has foiled the extension of copyright protection to unenhanced data (primary or raw data). But under the *sui generis* system of the Directive, the only yardstick that exists is that the data should attest to a qualitatively and quantitatively substantial investment. Thrust here is given to the value of the data

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[107] EU Directive 96/EC of 11 March 1996 on the Legal Protection of Data Bases, OJ LO77, 27/3/1996 p.20-226. It took eight years of intensive preparatory work and discussions with interested circles and within the European Union's institutional bodies for the drafting of the Directive. The Directive gave a period till 1st of January 1998 for its implementation. Only three Member States (Denmark, Sweden, and United Kingdom) implemented the Directive in time and a fourth one (Austria) shortly after, whereas five implemented in 1998, two in 1999, two in 2000 and against the last two ones (Ireland and Luxemburg) infringement proceedings are still pending before the European Court of Justice for non-implementation. For details of implementation aspects see Christian Auinger", Implementation of the Database Legislation in the EU and Plans for Review", *Proceedings of the Seminar on databases*, Baveno, 14 October 2000.

[108] Article 7- "The maker of the data base which shows that there has been qualitatively and /or qualitatively a substantial investment in either the obtaining, verification or presentation of the contents, has the right to prevent extraction and/or re-utilization of the whole or of a substantial part evaluated qualitatively and/or quantitatively, of the contents of that data base".

[109] The EU Directive makes a clear distinction between the copyright protection and the new sui generis protection of database. Roughly speaking copyright protects the structure, whereas the sui generis right protects the contents of the database. The Directive allows the combination of both protections for databases that meets the specific conditions for protection.

both in terms of its content and money. Apart from protecting unenhanced data, this yardstick even qualifies satellite images and aerial photographs for legal protection.

Finally, it should be verified whether the definition of a "database" sufficiently covers the current subject matter of protection or not. The Directive covers all databases. As per the Directive, it offers protection not only to digital databases but also to data collections accessible by any other means. Hence, it goes without saying that the Directive is applicable to geographic databases[110].

III.2. International Custom

Customary law has not yet had sufficient time to make itself felt as a regulator in the commercial space activities of states. Yet considering the importance of international custom as a major source of space law, effort is taken to unearth laws regarding space related intellectual properties from this source[111].

General international law or international custom is formed where there is a sufficient number of *opiniones individuales juris generalis* among States to constitute together an *opinio juris generalis*-a general *opinio juris* among States as to what is the content of a rule of general international law[112]. What is required here is a general consensus and not a contractual *consensus ad idem*; a meeting of wills creating a tacit

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[110] Geographic databases, particularly remote sensing data are organized either as a collection of unlinked vectors, or as a collection of structured data creating links between the individual elements. In the first case, the databases will receive protection through sui generis right. In the second case, they will be protected by copyright. For details see M.C. Stacino, "The EU Directive 96/9/EC of 11 March 1996 on the Legal Protection of Databases: Application of Some Aspects of the Directive to Geographical Databases". *www.europa.ac.*

[111] Under Clause I (b) of Article 38 of the Statute of the International Court of Justice of the United Nations, the court evokes international custom in settling international disputes. The International Court of Justice was established and functions on the basis of rules contained in Chapter XIV of the United Nations Charter and Court's Statute. In accordance with Article III of the Outer Space Treaty, 1967, the Charter of the United Nations is one of the regulators of space activities. The logical conclusion from this is that international custom is the second source of international law. See A.S. Piradov, *International Space Law* (Moscow: Progress Publishers, 1976), pp.74-77. Further the reference to "international law" twice in the Outer Space Treaty (in the Preamble and in Article III), once as specific rules and then as an alternative in case the specific rules fails to address any relations arising between states in connection with their space activities, confirms the applicability of general principles of international law to space activities.

[112] Cheng, n.6, p.678.

agreement. If the yardsticks[113] for the determination of the existence of an international custom are considered, it seems that many principles embodied in the Outer Space Treaty, 1967 has attained the status of customary international law[114].

Among such principles[115], the principles of state responsibility and co-operation will be of high relevance to the commercial space activities, in particular intellectual property. The principle of international responsibility of states for national activities in outer space has become a fundamental principle of international space law. As per this principle though private companies are allowed to operate in space sector, the responsibility for all their activities rests entirely with the state. The rationale behind this principle is that, granting a concession to a private company for a certain type of space activity without continuing supervision by the state concerned is incompatible with the obligations arising out of the principle of the international responsibility of states for national activities in outer space.

Similarly, the fundamental principle of 'co-operation', along with 'good faith'[116] and respect for the interests of others, in the exploration and use of outer space and

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[113] Generally for the crystallization of an international custom there are three main yardsticks viz. duration, uniformity, and generality and consistency of the practice. For a detailed discussion on this see Brownlie, n.3, pp.4-11.

[114] The Outer Space Treaty, 1967 has so far been a subject of wide consensus and compliance by the member States. As far as the question of duration is concerned, if consistency and generality of practice is proved then no duration is required for the emergence of an international custom. See Brownlie, n.3, p.5. Also see *North Sea Continental Shelf Cases*, ICJ Reports (1969), where the Court held: "Although the passage of only a short period of time is not necessarily, or of itself, a bar to the formation of a new rule of customary international law on the basis of what was originally a purely a conventional rule, an indispensable requirement would be that within the period in question, short though it might be, State practice, including that of States whose interests are specially affected, should have been both extensive and virtually uniform in the sense as of the provision invoked;- and should moreover have occurred in such a way as to show a general recognition that a rule of law or legal obligation is involved".

[115] The Outer Space Treaty, 1967 formulates nine basic principles of international space law. They are (1) Freedom of exploration and uses of outer space and celestial bodies, (2) Non-appropriation of outer space or celestial bodies, (3) Exploration and uses of outer space and celestial bodies in accordance with the fundamental principles of international law, including the basic principles of United Nations Charter, (4) Partial demilitarization of outer space and total demilitarization of celestial bodies, (5) Retention by states of sovereign rights over objects launched, (6) International responsibility of states for national activities in space, including liability for damages caused by space objects, (7) Prevention of potentially harmful consequences of experiments in outer space and on celestial bodies, (8) Assistance to personnel of space craft in the event of accident, distress, or emergency landing, and (9) International co-operation in the peaceful exploration and use of outer space celestial bodies. For a detailed discussion on these principles see A.S. Piradov, *International Space Law* (Moscow: Progress Publishers, 1976), pp.81-108.

[116] The principle of good faith has a vital application in contractual obligations. It has come to be accepted as a general principle of law recognized by civilized nations and a fundamental principle of international

celestial bodies will have a high bearing on commercial space activities like the International Space Station, remote sensing etc.[117]. The principles of good faith and co-operation and interlinked in such a way that good faith contributes to the development of co-operation among states.

III.3. General Principles of Law

It is believed that outer space allied activities bear a superior plane of intellectual property protection at domestic level than at regional or international level[118]. If one considers the present state of affairs, it seems that intellectual property protection for space related activities is still a matter of national concern. Though it assumes international character, its enforcement and implementation are to be made nationally. In the ensuing paragraphs, efforts are taken to see how far the domestic laws and policies of space savvy nations ensure intellectual property protection for their space related activities. Due to the involvedness of a comprehensive coverage, the analysis is confined only to the laws of the Republic of India, Russia, and United States.

III.3.1. India

India is one among the space faring nations. Though she does not have a space policy of her own, India has achieved considerable self-reliance in space technology for national development and promotes its commercial utilization[119]. India has incorporated in the Union List of its Constitution a number of items relating to space activities[120].

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law. Good faith applies even to those rules of international conduct, which are unwritten, or not explicitly stated in legal texts. For a detailed discussion see V.S. Mani, *Basic Principles of Modern International Law* (New Delhi: Lancers Books, 1993), pp.200-219. Though the principle is not explicitly stated in the Outer Space Treaty, it has its application mainly through the principle of co-operation and as a Charter obligation. See Article 2, paragraph 2, read with Article 2, paragraph 6, and Article 103 of the Charter of the United Nations. Also see Article III of the Outer Space Treaty.

[117] The International Space Station 'Freedom' is a glaring example of international co-operation in the commercial utilization of outer space. For details see Intergovernmental Agreement (IGA), 1998.

[118] See Questionnaire, Appendix 1.

[119] As a part of its commercial program, Indian Space Research Organization (ISRO) has established the Antrix Corporation in 1992. The Corporation's prime objective is to market space products and services in India and abroad. It also co-ordinates the space hardware and software products between ISRO and Indian industry involved in the space program. For details see V. Balakista Reddy, "Space Law and Policy in India", in V.S. Mani and others, eds., *Recent Trends in International Space Law and Policy* (New Delhi: Lancers Books, 1997), pp.115-39.

[120] Under the Indian Constitution, a number of items on the Union List relate to and has a bearing on space related activities. Some of them are a) entering into treaties and agreements with foreign countries and implementing of treaties (14), b) broadcasting and other forms of communications (31), c) insurance (47),

Though India is a party to all the space treaties, She has not enacted any domestic space legislation. As far as space related intellectual property rights are concerned, in India, its various intellectual property laws administer it[121].

Till date, Indian space program has not encountered any major intellectual property challenges. Still if one considers the current pace at which it is moving, it is beyond doubt that the day is not far when India will be at parity with other space powers. In the ensuing paragraphs, efforts are taken to see how far Indian intellectual property laws are fit to handle the legal convolutions that may crop up with regard to its space activities.

For patents, the Patent Act, 1970, which is in the "mailbox"[122], is in the process of imbibing the standards set by the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs)[123]. The Act specifically describes the inventions, which are not patentable[124]. This section will be of very high utility for determining the patentability of an invention made in outer space. Clause (a) of Section 3 states that a frivolous invention and an invention contrary to the natural laws are not patentable[125]. If the second part of this clause is measured, it may have negative impacts on inventions made in outer space where anything may go against the well-established natural laws. Though the invention is of utility this clause may avert it's patenting.

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d) patents, inventions and designs, copyright, trademark and merchandise mark (49). Above all by virtue of item number 97 read with Article 248, Parliament retains residuary legislative power in respect of "any matter not enumerated" in any of the lists. The Concurrent List of the Constitution covers items like contracts and partnerships and other special forms of contracts. Most importantly, Article 253 of the Constitution empowers the Parliament to make any law for the whole or any part of the territory of India for implementing Treaties, international agreements and conventions. See Reddy, n. 108, p.130.

[121] India's intellectual property laws include Patents Act, 1970 (as amended in 1999, 2001 and is awaiting another amendment), Trade Marks Act, 1999, Copyright Act, 1957 (as amended in 1994), Geographical Indications of Goods Act, 1999, Designs Act, 2000 Protection of Plant Varieties and Farmers Act, 1999 and Information Technology Act, 2000. Most of the intellectual property legislations were amended in order to make in conformity with the standards put forward by the Agreement on Trade Related Aspects of Intellectual Property Rights.

[122] See n. 87.

[123] As per Article 65 of the TRIPs Agreement a developing country member may avail a period of 1+4+5 for making its intellectual property laws in tune with TRIPs. For India the transition period extends till January 2006.

[124] Section 3.

[125] Section 3(a)- What are not inventions "An invention which is frivolous or which claims anything obviously contrary to the well established natural laws".

Another provision that will be of relevance in this context is clause (d)[126], which points out that the mere use of a known process is not patentable unless it results in a new product. The first part of this clause gets in the way of repeating a well-known process of gravity in micro-gravity. But the second part validates that repetition, if it results in a new product. Owing to this feature, section 3(d) will have a momentous impact on inventions made in outer space and could be effectively used while settling disputes regarding patentability of an invention made in outer space.

As regarding copyrights, the Indian copyright law underwent amendment twice in the post Uruguay Round. In order to comply with TRIPs standards, computer programmes were included within the ambit of protection. But India's Copyright Act is deficient in the standards set by TRIPs on the subject of the protection of databases and hence does not offer adequate protection to remote sensing data or satellite transmissions.

For the legal protection of space vehicular designs, Designs Act, 2000 of India has very little scope of application. The Act defines a design[127] as some thing, which is judged solely by eye. Though it does not explicitly exclude "functional designs", it excludes any principle of construction or any thing, which is in substance a mere mechanical device. If both the qualifications are read together, it seems that the Act does not intend to protect those designs that are governed solely by "function". This indirectly thwarts designs protection to spacecraft designs, which are governed solely by function.

This brief assessment of Indian intellectual property laws reveals that India has a long way to go in order to ensure proper IP protection to its space related activities. The inadequacy may be due to the current state of Indian space program. However, ensuring

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[126] Section 3(d)- "The mere discovery of a new property or new use for a known substance or of the mere use of a known process, machine or apparatus unless such known process results in a new product or employ at least one new reactant".

[127] Article 1(d) of Designs Act, 2000- " 'Design' means only the features of shape, configuration, pattern, ornament or composition of lines or colors applied to any article whether in two dimensional or three dimensional or both forms, by any industrial process or means, whether manual, mechanical or chemical, separate or combined, which in the finished article appeal to and are judged solely by the eye; but does not include any mode or principle of construction or any thing which is in substance a mere mechanical device, and does not include any trade mark as defined in clause (v) of sub-section (1) of section 2 of the Trade and Merchandises Marks Act, 1958 or property mark as defined in section 479 of the Indian Penal Code or any artistic work as defined in clause (c) of section 2 of Copyright Act, 1957.

fullest protection of competitive intellectual property from Indian R&D programs and designing an IPR system, which specially protect technological innovations, are matters of high priority in India's Science and Technology Policy for the year 2003[128]. This could be viewed as a progressive step towards a strengthened space allied IPR regime.

III.3.2. Russia

Russia is one among the leaders in space science and technology. She is a signatory to all the space treaties. In Russia, law relating to space activities is mainly governed by Russian Federation Law on Space Activity, 1993[129] (hereinafter 'the legislation'). Space policy for Russia is determined by the Supreme Soviet of the Russian Federation and implemented by the President. Space Activities are carried out mainly by the Russian Space Agency (*Rosaviakosmos* in Russian).

As far as commercial aspects are concerned, the legislation deals nowhere explicitly about it. But its provisions have a shove towards commercial aspects[130] and private participation. The legislation has well justified the purpose of intellectual property

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[128] See India's Science and Technology Policy 2003, Generation and Management of Intellectual Property- "Intellectual Property Rights (IPRs) have to be viewed not as a self contained and distinct domain but rather as an effective policy instrument that would be relevant to wide ranging socio-economic, technological and political concepts. The generation and fullest protection of competitive intellectual property from Indian R&D programs will be encouraged and promoted.

The process of globalization is leading to situations where the collective knowledge of societies normally used for common good is converted to proprietary knowledge for commercial profit of a few. Action will be taken to protect our indigenous knowledge systems, primarily through national policies supplemented by international supportive action. For this purpose, IPR systems, which specially protect scientific discoveries and technological innovations arising out of such traditional knowledge, will be designed and implemented effectively.

Our legislation with regard to patents, copyrights, and other forms of intellectual property will ensure that maximum incentives are provided for individual inventors, and our scientific and technological community, to undertake large scale and rapid commercialization, at home and abroad.

The development of skills and competence to manage IPR and leveraging its influence will be given a major thrust. This is an area calling for significant technological insights and legal expertise and will be handled differently from the present, and with high priority".

[129] Article 1 of Russian Federation Law on Space Activity, 1993, points out that apart from this principal legislation space activities in Russia shall also be regulated by other laws and normative acts of the Russian Federation issued in accordance with the Constitution of the Russian Federation.

[130] Firstly, In Article 2 which explains the concept of space activity there include certain commercial space activities like remote sensing, manufacturing materials in outer space etc. Secondly, Article 8, which deals with the Federal Space Program, one of the major factors that have to be taken into consideration while framing the Program, is the situation in the world space market. Thirdly, Article 17 permits foreign direct investments and highlights the importance of intellectual property rights in this regard.

rights, which is used as a tool for ensuring protection of foreign investments[131]. Intellectual property rights are exercised in the context of dissemination of information on space activity, use and transfer of space hardware, and products created in outer space[132]. In all these contexts, the legislation has designated the intellectual property laws of the Russian Federation to govern these activities.

Though not a party to the TRIPs Agreement, Russia has enacted laws on almost all aspects of intellectual property rights. For patents, they have the Patent Law of Russian Federation, 1992. Unlike TRIPs, this law provides patents only for those inventions, utility models, and designs that are subject matter in the Russian Federation[133]. At this point Russian Law stands as a major departure from TRIPs standards, which places no territorial discrimination as to the place of invention.
For its extra terrestrial applications, Russian Law will have to rely upon the jurisdictional yardstick stipulated by Intergovernmental Agreement. But space vehicular designs will receive effective protection as utility patents under Russian Law.

When Russian copyright law[134] is looked at for the protection of remote sensing data, it has its applicability to all works of science irrespective of a purpose and merits of the work, as well as to a method of its expression. But Russian law like all other laws in this regard puts forward the criterion of "creativity"[135].

III.3.3. United States

United States has a comprehensive legal framework to deal with space related intellectual property issues. Apart from public laws, US space agency National Aeronautics and Space Administration (NASA) has its own intellectual property

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[131] See Article 12- Financing Space Activities and Foreign Investments- "Foreign investments in space activity of organizations and citizens of the Russian Federation shall be guaranteed by their assets or by their intellectual or other property".
[132] See in particular Articles 3(3), 16(1), and 16(4).
[133] Article 2, Patent Law of Russian Federation. Under this law, patents are granted not only to inventions but also to utility models and industrial designs. They are known as invention patents, utility patents, and Design patents respectively. Invention patents are granted for a term of 20 years, utility patents for 5 years, and design patents for 10years. See in particular, Article 3. The three criteria stipulated for patentability are novelty, inventive step, and industrial applicability.
[134] The Law of the Russian Federation on Copyright and Allied Rights, 1993.
[135] Article 6

framework and division[136]. Due to its immensity and considering the focus, the present analysis is confined only to 35 United States Code 105 (hereinafter "the Code"), which has a crucial bearing to the current issue.

This Code[137] is a reflection of Article 21 of Intergovernmental Agreement. For the purpose of determining patentability, this code has highlighted that any invention made on a space object under the jurisdiction and control of United States shall be considered to be made within United States. Like IGA, this Code also is not in conformity with TRIPs standards, which has rejected any discrimination as to the place of invention. Here, being a party to TRIPs Agreement, United States has failed to fulfill its international obligations.

I.4. Writings of Jurists

Juristic works, though not an independent source of law, sometimes do lead to the formation of international law. Article 38(1)(d) of the Statute of International Court of Justice, which accepts the teachings of most highly qualified publicists as subsidiary means of the determination of rules of law emphasizes the evidentiary value of juristic works. Space law field has received a high level of intellectual nourishment through juristic writings[138]. But as regards the commercial space activities, in particular intellectual property the writings are mostly scanty. But under the auspices of the International Institute of Space Law (IISL) and International Astronautical Federation (IAF), through its colloquia on the Law of Outer Space, the subject is somewhat getting scholastic attention.

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[136] NASA's Intellectual Property Division has its own legal framework, which mainly comprises of Executive Orders, Codes, and Memorandum of Understandings.

[137] " Any invention made, used or sold in outer space on a space object or component thereof under the jurisdiction or control of United States shall be considered to be made, used, or sold in outer space for the purpose of this title. Except with respect to any space object or component thereof that is specifically identified and otherwise provided for by an international agreement to which the United States is a party, or ... carried on the registry of a foreign state in accordance with the Convention on Registration of Objects Launched into Outer Space".

[138] To name a few, "Law and Public Order in Space" by Mc Dougal, Lasswell and Vlassic, "Controls of Outer Space and Antarctica Analogy" by Philip C. Jessup and Taubenfeld, Wilfred Jenks' "Space Law", A.G. Haley's "Space Law and Government", Carl Q. Christol's "International Law of Outer Space", "The Orbit of Space Law" by Wadegaonkar, "Legal Controls of Outer Space" by S. Bhatt, "Studies in International Space Law" by Bin Cheng etc., have contributed substantially to the gamut of space law. Apart from this, various jurists through their writings in the Journal of Space and Annuals of Air and Space Law have made yeomen contributions to the literature on space law.

III.5. Conclusion

From this analysis, it seems that space related intellectual property rights go well in tune with the current intellectual property order, the one under TRIPs. For free-trade agreements, the real matter of concern will be the compatibility of its intellectual property clauses and protections thereunder with international standards. But there are quite a lot to be absorbed from regional intellectual property conventions and directives. Though less in magnitude international customary law too has a good share to contribute, whereas domestic laws still lack the vision to accommodate space related intellectual properties.

Chapter IV

Perspectives of Participants in the Space Sector

No analysis on space law will be complete which is devoid of the perspectives of various actors in the space segment. Firsthand information and data on issues strengthen the study and enables the pollster to ensnare it more effectively. A modest effort has been made to procure and congregate the point of views of various partakers in the space sector[1]. This is achieved by sending questionnaires to certain select audience.

Questionnaires[2] on legal aspects of outer space related intellectual property issues were mailed to various actors in the space sector, mainly to academicians and space agencies. It also targeted a few practitioners. By reason of the unique nature of the topic, questionnaires were open and unstructured and respondents were requested to provide the answers with reasons. In order to assist the respondents and to facilitate them to give focused answers, a bird's eye view of the issues was provided in the questionnaire.

IV.1. Responses from Questionnaires

Questions were raised mainly under 7 headings, 1) General, 2) Inventions in Outer Space, 3) Space Vehicular Designs, 4) Satellite Remote Sensing, 5) Transmissions, 6) Dispute Settlement, and 7) Miscellaneous. In this chapter also it is presented in the same progression.

IV.1.1. General

Majority of the respondents are of the view that intellectual property protection is needed for space related activities. According to 70 percent of them, mainly academicians and representatives of space agencies, it is to encourage creativity. Whereas few among the practitioners say that no clear answers could be given to this question. It depends on whose intellectual property is to be protected and under what circumstances. One practitioner has opined that the relative social merits and economic benefits, and prosperity of the parties will be a relevant factor.

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[1] The entire chapter is based on the questionnaires mailed to space agencies, practitioners, and academicians. It is mainly a portrayal of the views congregated. Though an appraisal of their views is made here, it is put to test only in the concluding chapter.

[2] See appendix 1.

Respondents were also requested to choose among 8 intellectual property rights that will be of relevance to space related activities[3]. Sixty percent of them, mostly academicians, have chosen all the eight. Thirty percent highlighted the applicability of patents, copyrights, neighboring rights, and trade secrets, whereas the rest ten percent has pointed out the relevance of patents and copyrights only.

When queried about the existing state of intellectual property protection for space related activities, all the academicians and those from space agencies are of the view that there is no legal vacuum and some sort of protection is available, mostly under United States Law and under the laws of some European States. Fifty percent of the respondents have drawn the attention to the Intergovernmental Agreement (IGA), 1998[4]. In the view of some practitioners, there exists very strong protection under certain domestic jurisdictions and in their observation, non-domestic instruments can only extend the application of domestic laws. In this regard, some academicians have expressed concern over the limited number of ratifications of the Intergovernmental Agreement.

IV.1.2. Inventions in outer space

Under this heading, respondents were asked whether there is any difficulty in determining patentability of an invention made in outer space. Eighty percent of them opined that, though there existed certain difficulties, it now stands cleared with the enactment of the Intergovernmental Agreement and its implementation. They were further asked about the efficacy and adequacy of Intergovernmental Agreement. Majority gave the answer in affirmative. Practitioners say that, though it clearly provides a basis for determining which law governs, its adequacy depends on how effectively it is implemented domestically.

Respondents from the United States emphasized that the issue of patentability is sufficiently dealt with in their domestic legislation. Those from Canada replied that the issue is under consideration. Respondents from certain European Countries also gave a

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[3] Choices were to be made from 1) patents, 2) trademarks, 3) copyrights, 4) designs, 5) utility models, 6) geographical indications, 7) neighboring rights, and 8) trade secrets.

[4] Agreement among the Government of Canada, Governments of Member States of the European Space Agency, The Government of Japan, The Government of the Russian Federation, and the Government of the United States of America Concerning Co-operation on the Civil International Space Station, 1998.

positive reply. To those that have a domestic law in this regard, an additional question was put, as to how far the law has been successful. Among them sixty percent answered that it is successful only to a limited extend. Ten percent answered that its application has not arisen.

Those who answered that it is not fully successful were further queried about how this should be addressed in order to make it effective. Most of the respondents gave a general reply that changes in this regard are relevant and should be comprehensive.

In order to see whether intellectual property clause in the Intergovernmental Agreement is compatible with the current multilateral trading system, the one under World Trade Organization, respondents were requested to give their outlook as to how far Article 21 of IGA is in tune with the Agreement on Trade Related Aspects of Intellectual Property Rights. Very few respondents gave their response and those who gave attributed it to several factors and issues.

The reason for the entire convolutions in this regard is due to the fact that inventions are taking place in a different and unusual atmosphere. Keeping this in mind respondents, mainly those associated with space agencies were asked whether a process well known in gravity if repeated in micro-gravity becomes a new process or not. Almost all of them feel that since the state of environment and physical conditions are quite different, and atmosphere is a very important variable in an experiment, the alleged processes will be a different one.

They were also asked whether legal complexities, mainly regarding patentability, which arises as a result of this, could be solved by applying the yardstick of 'non-obviousness'. In order to assist the respondents, detailed footnotes were also provided. All of them gave a sweeping reply that it would be relevant to a greater extent.

IV.1.3. Space Vehicular Designs

Regarding the space vehicular designs protection, questions were mainly targeted at space agencies. Surprisingly, those questions were not properly answered and few respondents have asked to direct the question to the patent offices of their respective countries. The questions were mainly concerning the kind of legal protection offered by

space agencies to spacecrafts, and its adequacy. But most of the academicians have attempted to answer the questions. Few of them highlighted that designs law offers proper protection to spacecraft designs. Others stood for utility patents.

In this area, in order to portray the clash between the natural laws of science and intellectual property laws, a hypothetical issue was given in the questionnaire as a footnote[5]. Respondents were then asked to respond to this situation. This question was answered by only twenty percent. Even they were of the belief that this puzzle could be entangled and a boundary line could be drawn between laws of science and intellectual property rights by probing various domestic laws.

IV.1.4. Satellite Remote Sensing

Primarily, respondents were asked what sort of legal protection could better guard remote sensing data. The question was put forward by giving three choices, 1) copyright, 2) trade secrets, and 3) any other form. To this, ninety percent have opted for copyrights. The rest ten percent have chosen trade secrets.

Space agencies were asked whether the data procured by their organization is sufficiently protected or not. Two space agencies replied that it is sufficiently guarded, one through copyrights and another through trade secrets.

Academicians and practitioners were asked whether there is sufficient protection for remote sensing data under their domestic laws. Those from United States and Europe answered in affirmative, whereas for Canada it has sufficiently been updated recently. Majority were not sure as to how far their data protection policy is compatible with the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs).

Finally, in this category, the respondents were asked, if there is any need for a new legal framework in this regard. All of them came forward with a positive reply.

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[5] Assume a scenario where 'A' creates a cone shaped design for a space vehicle. This is purely based on the natural law of science that a cone shaped design could easily penetrate atmospheric velocity better than a cylindrical or cube shaped design. Some how by interpreting designs law 'A' procures ownership over that design. Later 'B' uses the same design for another space vehicle. 'A' alleges infringement of his right over the design. 'B' contents that he has not violated the intellectual property rights of 'A' but have only complied with the laws of science.

Finally, a practitioner has drawn attention to a report obtained by European Commission regarding the legal protection of remote sensing data in 1993.

IV.1.5. Transmissions

The questions raised under this heading mainly related to the protection of data sent by major planetary missions and Hubble telescope. The questions mainly targeted space agencies. But among the 3 space agencies covered by the questionnaire, none has attempted this category. They were also queried about the state of protection offered by the Convention Relating to the Programme Carrying Signals Transmitted by Satellite, 1974. All the academicians have answered this question in negative. Few of them have expressed their discontent regarding the limited scope of protection by the Convention and its obsoleteness.

Finally, in this category a question was raised about giving performers' right to an astronaut who makes a planetary landing or a space walk. This was also met with negative answers.

IV.1.6. Dispute Settlement

Only 3 questions were put forward under this heading, of which 2 were for organizations. They were asked whether their organization ever faced any intellectual property related disputes. All replied in negative. Third question in this category was an open one, where respondents were asked regarding the proper forum for the settlement of commercial space disputes especially intellectual property.

Ninety percent of the respondents have opted for international arbitration. Its efficiency, cost effectiveness, and flexibility are the positive points, which they found in arbitration. The rest ten percent stood for resorting to domestic jurisdictions.

IV.1.7. Miscellaneous

In the last part of the questionnaire, respondents were requested to make a choice. They were provided with 2 options, either to vote for a new legal framework or to find out answers for all theses convolutions in the existing frameworks. Ninety percent of the respondents answered this question and all of them have opted for a new legal regime.

But one of the academicians remarked that though he is voting for the former it would not be practically achievable unless space activities become routine.

To gather respondents' views regarding the position of space related intellectual property rights in the new multilateral trading framework, they were requested to give their opinion regarding the role of the Agreement on Trade Related Aspects of Intellectual Property Rights in the present context. But only ten percent of them have responded to this query. They feel that it would be of a very limited application.

Lastly, in the column meant for overall remarks and suggestions some of the respondents wrote that there is an urgent need for bilateral and regional agreements on space related intellectual property rights. Some others, mostly practitioners, argued for stronger protection at the domestic level.

IV.2. Appraisal

So far, the perspectives of various partakers in the space segment are articulated in a progression. But this is done more or less plainly and is devoid of any analysis. It will be of high relevance to see how far the perspectives of various players in the arena are in consonance with the findings of the researcher and hence should be put to test. This is, for the most part, undertaken in the concluding chapter. But an appraisal of the responses received though the questionnaires seem relevant at this juncture and hence is made at this point.

Majority of the respondents feel that outer space related activities need intellectual property protection in order to encourage creativity. If this answer is taken in isolation, it is not sure how far it justifies the current philosophy of intellectual property laws[6]. Perhaps the respondents might have been enthused by the classic intellectual property concept of 'stimulation'[7]. In that enthusiasm, they have failed to comprehend the

[6] The current philosophy could be perceived as a mixture of 'creation' and 'profit'. Here one could witness a paradigm shift from the good old intellectual property philosophy of balancing 'creation and stimulation" with "diffusion". For a detailed discussion see chapter 1, p.18; Also see Stanley M. Besen and Leo J. Raskind, "An Introduction to the Law and Economics of Intellectual Property", *Journal of Economic Perspectives*, vol.5, no.1, 1991, pp.3-27; Alan H. Goldman, "Ethical Issues in Proprietary Restrictions on Research Results", *Science Technology Human Values*, vol.12, no.1, 1987, p.29; Justin Hughes, "The Philosophy of Intellectual Property," *Georgetown Law Journal,* vol.77, 1988, pp.287, 296-314.

evaporating facet of 'stimulation factor'. The reply given by one practitioner, who considered 'economic benefits' of the parties, reflects the new-fangled version of intellectual property (IP) philosophy. The concept of 'economic benefits' if removed from the verbal wrapper, means 'profits'. This profit motive rather than creativity has brought IP notions to the space sector[8]. One should be well aware of the fact that presently, IPRs are recognized only when they generate profits and not when they meet social needs. This does not mean that 'creativity' factor is to be fully nudged away. If 'stimulation' is removed from 'creativity' and is considered as a mere productive activity, then it will robotically do justice to the existing philosophy of balancing 'creation' and 'profit'[9].

When given an option to choose among 8 intellectual property rights respondents from space agencies have chosen only patents and copyrights. Since they are the one who has a day-to-day acquaintance with this issue, it is a clear indication that at present space related intellectual property issues are centered on inventions and protection of remote sensing data. To the same question, there were totally different reactions from the academic community. Some of them in spite of choosing relevant IPRs have also indicated the activities for which they have made that choice. This varied from trade marking of satellites to geographical indications for data. Most of it was based on presumptions and activities in the offing. But with regard to space activities as A.G. Haley has said "law should precede man in space"[10]. The vision displayed by them will make space sector better equipped to handle future challenges.

It is surprising that 50 percent of respondents are confident about the Intergovernmental Agreement (IGA). As stated earlier, the intellectual property clause of this Agreement is poorly drafted and is trying to create a storm in a teacup. Whereas the

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[7] See chapter 1, p.18. Also see B.S. Chimni, "The Philosophy of Patents: Strong Regime Unjustified", *Journal Scientific & Industrial Research*, vol. 52, April 1993, pp.234-39.

[8] See n, 66, chapter 1, p.18. This is also evident from the pre-globalization philosophy of space law, which was mainly based on the concept of sharing, co-operation, and mutual assistance. Intellectual property notions were virtually unheard of in the space sector till the commercialization of space activities. When economic aspects became the main objectives of space activities instead of research-based explorations, intellectual property notions started mushrooming in the space sector.

[9] One major reason for demanding more intellectual property protection for space related activities are that it should generate more investment.

[10] See Proceedings of the First Colloquium on the Law of Outer Space, 1958.

real issue which needs attention is its incompatibility with the present multilateral trading system. Practitioners' response here is more pragmatic. They feel confident of the laws in their respective jurisdictions. But it is contrasting that some of those practitioners are from those domestic jurisdictions that have implemented the IP clause of IGA.

No pragmatic suggestion to tackle the problem of patentability of an invention made in outer space has been received from the responses. In the questionnaire, question no. 12 was a scientific one and no. 13 a general principle of intellectual property law[11]. Both were interlinked[12]. Such a structuring was made with a view to club the views from 2 backgrounds and entangle the puzzle. For this purpose, answers to both the questions were inevitable.

All the respondents gave a positive reply to question no.12 with scientific clarifications and gave a generalized response to question no.13 without touching its core. This makes the issue remain half-resolved[13].

Satellite remote sensing is an area upon which all the respondents were loquacious. All of them showed absolute clarity and precision while answering the questions. Regarding the protection of remote sensing data, though 2 views surfaced, it is mainly due to the difference in the nature of protection offered by various countries. But the unanimous suggestion put forward by all the respondents for a new legal framework is a sign of their yearning to harmonize the nature of data protection. One disappointment in this regard is again regarding the dreary approach of respondents to the IP regime under the current multilateral trading framework.

The response of organizations concerning the settlement of disputes was not a lot enthusiastic. On the contrary, academicians came out with umpteenth number of suggestions. The fact that they were raring to go for a cost effective, speedy, and flexible system reflects their genuine concern regarding this area. Practitioners once again

[11] See appendix 1.
[12] In question no.12 the researcher has attempted to clarify the scientific point that, whether a process well known in gravity, if repeated in micro-gravity assumes the status of a new process. In case of a positive reply, there existed a threat to the general concept of patentability. Question no.13 was raised to see whether the yardstick of 'non-obviousness' could effectively take in hand this threat or not.
[13] This issue is dealt with in detail in the concluding chapter.

decided to remain in their own jurisdictional boundaries and upon a system with which they have routine acquaintance.

Since the areas in the questionnaire, concerning vehicular designs and transmissions received indistinct and somewhat zero response, a modest attempt is made to deal with it in the concluding chapter.

From the closing remarks given by the respondents, it seems that in the view of quite a few of them, the time has not yet ripened to ponder over space related intellectual property issues. The researcher had greater expectations from space agencies but they feel that rather than going by international standards it would be better to limit the whole issues within the circle of "spacetech" nations by concluding bilateral agreements.

Chapter V

Conclusion

The concept of outer space related intellectual property rights has strengthened tremendously in the previous two decades. Progress in science and technology well propped up by certain social and political factors supplemented a fillip to this. The mounting partaking by private entities in space related activities made intellectual property protection an indispensable tool, which attracts more investment to these activities. At this juncture, it became the chore of space law to offer a solid and impregnable protection to the intellectual properties in this segment.

But outer space related legislation, well known for its research-oriented thrust and for most part state-centric, proved ineffectual in giving the protection required. Hence, reliance is to be made on intellectual property (IP) laws, which is individual-centric in approach. In case of such a move, it should be born in mind as to what extent these branches of laws could reconcile with each other. This apprehension was remedied by a paradigm shift in the philosophies of both branches of law, from its classical approaches to a corporeal centric approach. Thanks to the changing world order.

When the spotlight rests on intellectual property rights, it should be accepted that none of the intellectual property laws, both national and international, were drafted by keeping outer space related activities in its scheme. Also, it needs to be corroborated whether space law consent to an intrusion by another branch of law. Another major concern is a propos the sphere from which fabrication of a regime should start, whether nationally, regionally, or internationally.

Accepting the role of international law as a standard setter, disentangling space related intellectual property issues would start at the international level.

First, focus will be given to space law. Though Outer Space Treaty, 1967 does not provide direct protection for intellectual property rights, it carries a vision in its preamble, i.e., to have greater prospects in the aftermath of space exploration. The Treaty further designates international law (including its various branches) to govern these prospects. This consents the application of international intellectual property conventions in space

endeavors. Moreover, its various clauses underscore private activities and activities of international organizations.

While speaking of international intellectual property protection, primary consideration should be given to the current IP regime, the one under General Agreement on Tariffs and Trade (GATT), 1994. Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs), which is an annex to GATT, comprises of a breadth of subject matter to which certain minimum standards are prescribed. And it is obligatory on the part of all members of World Trade Organization (WTO) to implement these minimum standards in their respective domestic legislations.

But while drafting the Agreement, protection of space related intellectual properties were not envisioned by the drafters. But from the analysis made in chapter III it is vivid that, though inimitable in nature, space related activities goes well with TRIPs standards, be it an invention in the microgravity of outer space or protection of remote sensing data. But TRIPs is in no way an armor but only a standard setter.

At this point in time, there are expectations from the participating countries. They have to accommodate ample intellectual property protection for space-allied activities in their domestic legislations. Such protection should be in conformity with the minimum standards prescribed by TRIPs. The sample analysis made in chapter III of various intellectual property laws of India, Russia, and United States reveal its inadequacy to protect the intellectual properties connected with space endeavors. Here, one should bear in mind that India and United States are WTO members who have almost imbibed TRIPs standards for the most part.

It is also time to have a re-thinking about the intellectual property clause in the much-glorified Intergovernmental Agreement (IGA). This clause, in spite of being poorly drafted tries to make a storm in a teacup by creating an issue regarding patentability and later attempts to solve it by applying a 'jurisdictional yardstick', which is incompatible with TRIPs standards.

But the analysis of Indian laws unveils the fact that conventional IP protection, though laden with minimum standards, will be out of place for space endeavors. Perhaps

an international convention on intellectual property protection for space endeavors may enable the nations to have it implemented in their domestic arena. It is accepting that accomplishing it in reality is a time consuming process. But barring this drawback, such a step could do away with the prevailing ambiguities and would better equip the participants to create a much stronger domestic system of protection for their space activities.

Yet another matter of concern is regarding the compatibility of a new convention, having a manner of protection that stands as a departure from the conventional style with the TRIPs standards. This point is elucidated in Article 1(1) of TRIPs, which gives members the freedom to have more extensive protection of intellectual property than is required by TRIPs, either for purely domestic reasons or because they conclude international agreements. The only pre-condition here is that such protection should not contravene TRIPs clauses.

The protection provided in such a convention should be in harmony with the inimitable nature of space related activities, be it an invention in outer space, remote sensing, satellite transmission or settlement of disputes.

As regards the inventions made in outer space/international space station, the entire convolutions emerge because of the fact that it is performed in a bizarre and dissimilar environment and followed by a series of issues regarding its novelty, obviousness etc. So, the law should also be congenial for such activities. Here one plausible suggestion is to take into factor the "metalaw" paradigm of A.G. Haley-"do unto others as they would have done to them"*. Despite the fact that Haley has advocated the concept in the context of finding other sapient forms in the universe, it will be of high significance and utility in the present context.

The law, which will be made for outer space related intellectual property rights, should be made in such way that it answers the question, "what would have been the law, had it been made for cosmic conditions". Though it sounds abstruse, the proposition is

*For a detailed discussion on the concept of 'metalaw' see A.G. *Haley Space Law and Government* (New York: Appleton Publishing Company, 1963), pp.394-416.

simple. The prospective law should absorb the exceptional conditions of microgravity like precision, process reactions, potential to create adapted products etc., as these would be crucial factors in determining novelty and obviousness.

Another area where haziness prevails is the protection of remote sensing data and satellite transmissions. In case of the former, different jurisdictions have resorted to different forms of protection. For example, in United States it is through trade secrets, whereas in many other countries it is copyrights. Majority of the partakers in the space segment also argues for copyrights. But firstly, neither creates a solid and spatial-friendly protection and secondly, the conventional copyright protection and the subsequent insertion of data protection do not carry a thrust for space activities. They are all shaped with a different perception. Regarding satellite transmissions, the haziness has a much colossal dimension.

In this context the need is for a protection that goes well with the current corporeal-centric and profit oriented philosophies of space law and intellectual property law. One probable key in this regard is to resort to the EU Directive on the protection of databases, which offers a sui generis protection that gives the maker of a database the right to prevent extraction or re-utilization of substantial parts of the contents of a database .The only criterion for protection here is economic and commercial investment made by the maker of the database. This type of protection proposed by the Directive make possible even satellite transmissions, be it images sent by a planetary missions or a digital data sent by Hubble telescope, to fall under the purview of the proposed protection.

Space vehicular designs is yet another topic of concern. If reliance is to be made on designs law, then perhaps this is the only area, which may not be in conformity with TRIPs standards, as TRIPs prohibits the protection of functional designs. Hence, for the legal protection of spacecraft designs that are based purely on function, reliance could be made on copyright protection as a three dimensional representation of an artistic work. Another substitute is to resort to protection as utility models.

Finally, yet importantly, there is the question of dispute settlement. Dispute settlement in this context means settlement of contractual disputes and those with regard

to violations of intellectual property rights. Disputes may arise normally between space agencies, between a space agency and a private corporation and between private corporations. In case of all contractual disputes, it is the Agreement that designates the mode of settlement of disputes. Here parties to the agreement can choose either commercial arbitration or can fix a domestic jurisdiction. In case of arbitration, the United Nations Commission on International Trade Law's (UNCITAL) model law will govern questions regarding the forum, place of arbitration, applicable law, enforcement of awards etc., As regards the forum, reliance could be made either on WIPO or on the Permanent Court of Arbitration (PCA). Barring these measures, another probable solution is that the prospective convention can establish its own mechanism for the settlement of space related intellectual property issues. But to have a *lex specialis* does not necessarily warrant an autonomous dispute settlement mechanism. Existing systems could be adapted, if adaptation is possible and viable.

The entire space related intellectual property rights surface in an obscure manner. Dealing with it is like solving a jigsaw puzzle, as words get arranged in appropriate columns the solver gets motivated. But an improper word can spoil the whole sequence and a proper word can robotically do justice to the game. Finding solutions for space related intellectual property issues would also confront with all such imbroglios. But reform is inevitable. In the current era of man investing in space endeavors, several space related products remain deficient of proper legal protection. In addition, a day will soon dawn when a permanently manned space laboratory will be operationalized. Hence, it is beyond doubt that law should precede man in space. What Justice Earl Warren said echoes this perception, "If men are to fly to moon and other planets, new powers entrusted to man, require new decisions by courts, new interpretations by theoretical philosophers and ethicists". This work needs no other rationalization.

Appendix-1

Questionnaire On Legal Aspects of Outer Space Related Intellectual Property Issues

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This questionnaire is mailed by the researcher to procure the perspectives of various partakers in the space sector. The data congregated will be used for the researcher's ongoing M.Phil. Dissertation entitled "Legal Aspects of Intellectual Property Rights in respect of Outer Space Activities", under Professor V.S. Mani, Professor of International Space Law, Jawaharlal Nehru University, New Delhi, India.

Objective

To get hold of the views of various participants in the space segment regarding certain intellectual property issues concerning outer space related activities. Questions are raised mainly with regard to 5 core areas 1) Inventions made in outer space 2) Space vehicular designs 3) Satellite remote sensing 4) Transmissions and 5) Settlement of disputes.

A Bird's Eye View of the Issues

The universe, where we live has always been a theme of nosiness for mankind. Their indefatigable quest for the convolutions of cosmos took him from daydreaming to the reality of a lunar landing and a permanently manned space platform. This conversion took place through astonishing human efforts based on creative thinking and directed towards innovation. Stemming from the scale of human capabilities in this process it is indispensable to provide them with ample incentives to marshal their full intellectual potential. This necessity prepared the backdrop for intellectual property to rap the doors of space sector.

'Intellectual Property' and 'Outer Space' have never been a 'bread and butter' sort of combination. But certain deep-rooted social and political factors fused both. The legal impact of that fusion was highly perplexing. IPRs like patents, copyrights and neighboring rights, designs, and even geographical indications found its application with regard to outer space activities. But owing to the unique nature of outer space related activities, its practical application remain more or less uncertain.

For patents, the micro gravity environment in outer space posed special problems in applying the criteria for patentability like novelty and non-obviousness. Added to that, the potential to create a new product in micro gravity by repeating a known process of gravity, posed a threat to the existing "product plus process regime" (when done in another environment the process becomes different).

As far as space vehicular designs are concerned designs law excludes those designs that are dictated purely by technical and functional considerations. Spacecrafts, which are normally designed, based upon function, will thus fall short to qualify for protection under designs law.

Copyrights will be in demand for the protection of data collected by remote sensing. But certain parameters laid down by copyright laws, like "intervention of human mind", thwarts copyright protection from being extended to at least certain types of data (unenhanced data). Notwithstanding this, indecisiveness prevails as to whether international conventions and those specifically on neighboring rights offer protection to the rights of space industry with regard to the signals and images transmitted by planetary missions and Hubble telescope.

Another vital issue is, geographical indications, if (by an extensive interpretation) extended in order to cover the data obtained by transforming digital information could substitute copyrights, which has its own limitations. Finally, yet importantly, the question is whether existing space law is fit to deal with commercial space law disputes like intellectual property. If not, then how and on what lines to develop a new and effective dispute settlement mechanism?

Still there remain quite a lot of questions in the offing, mainly with regard to the need for a commercial space law framework and how it will be reconciled by the current world trading system (especially Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs) under GATT, 1994).

Personal Information

- Name/Organization (If you represent an organization kindly provide your organization's views):
- Country:

The information, which you provide, will only be used for the purpose mentioned above. Filled-in questionnaire will not be passed to another individual or organization at any circumstances. Please mail the completed questionnaire to the following E-Mail address. cosmicipr@yahoo.co.in

Instructions for filling the questionnaire

- Please try to give answers with reasons
- Kindly include your suggestions wherever possible as it is considered highly valuable

- Individuals need not answer those questions which are meant for organizations
- For clarifications please refer foot notes
- If you have any difficulty in answering questions please write "cannot say"
- Please use additional pages if needed.

Questions

General

1) Do you feel that space related activities need intellectual property protection?

2) Among the following intellectual property rights, specify those that in your opinion apply to space related activities? Please explain why?

- Patents
- Trademarks
- Copyrights
- Designs
- Utility Models
- Geographical Indications
- Neighboring Rights
- Trade Secrets

(Kindly indicate the space activities for which you have chosen these rights)

3) Do you think that at present there is proper intellectual protection for space related activities?

4) Is there any international, regional, or domestic instrument in your view that comprehensively cover all space related IPRs that you have chosen?

Inventions in outer space

5) Do you feel that there is difficulty in determining patentability[1] of an invention made in outer space?

6) Do you think that Article 21 of the Intergovernmental Agreement[2] sufficiently addresses the legal issues of "inventions made in outer space"?

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[1] In order to qualify for a patent an invention should have novelty, industrial application, and non-obviousness. Novelty indicates that which are not known; 'industrial application' means that which are susceptible of industrial application. As far the criteria of "non-obviousness" are concerned, certain instruments use the term "inventive step". Obviousness and inventive step are antithesis. What is obvious cannot be inventive. So to determine inventiveness, first it should be decided whether the invention is non-obvious or not. The test here is whether what is claimed is so obvious that it could at once occur to any one acquainted with the subject.

[2] **Article 21- Intellectual Property-** 1. "For the purpose of this Agreement, 'intellectual property' is under stood to have the meaning of Article 2 of the Convention Establishing the World Intellectual Property Organization, done at Stockholm on July 1967.

2. Subject to the provisions of this Article, for the purpose of intellectual property law, an activity occurring in or on a space station flight element shall be deemed to have occurred only in the

7) If not how should this issue be addressed?

8) Does your domestic law deal with this issue?

9) If yes, how far is it successful in this regard?

10) If not how should this issue be addressed?

11) Are you of the opinion that Article 21 of IGA is compatible with the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs)?

12) Do you feel that a process well known in gravity, if repeated in micro gravity becomes a new process? (Please answer with reasons)

13) How far the criterion of non-obviousness[3] could be applied here?

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territory of the Partner State of that element's registry, except that for ESA registered element any European State Partner may deemed the activity to have occurred within its territory. For avoidance of doubt, participation by a Partner State, its Co-operating Agency, or its related entities in an activity occurring in or on any other Partner's Space Station flight element shall not in and of itself alter of affect the jurisdiction over such activity provided for in the previous sentence.

3. In respect of an invention made in or on any space station flight element by a person who is not its national or resident, a partner state shall not apply its laws concerning secrecy of inventions so as to prevent the filing of a patent application (for example, by imposing a delay or requiring prior authorization) in any other Partner State that provides for the protection of the secrecy of the patent applications containing information that is classified or otherwise protected for national security purposes. This provision does not prejudice (a) the right of any Partner State in which a patent application is first filed to control the secrecy of such patent application or restrict its further filing; or (b) the right of any other Partner State in which an application is subsequently filed to restrict, pursuant to any international obligation, the dissemination of an application.

4. Where a person or entity owns intellectual property which is protected in more than one European Partner State, that person or entity may not recover in more than one such state for the same act of infringement of the same rights in such intellectual property which occurs in or an ESA-registered element. Where the same act of infringement in or on an EAS-registered element gives rise to actions by different intellectual property owners by virtue of more than one European Partner State's deeming the activity to have occurred in its territory, a court may grant a temporary stay of proceedings in a later-filed action pending the outcome of an earlier filed action. Where more than one action is brought, satisfaction of a judgment rendered for damages in any of the actions shall bar further recovery of damages in any pending or future action for infringement based upon the same act of infringement.

5. With respect to an activity occurring in or on an ESA-registered element, no European State shall refuse to recognize a license for the exercise of any intellectual property rights if that license is enforceable under the laws of any European Partner State, and compliance with the provisions of such license shall also bar recovery for infringement in any European Partner State.

6. The temporary presence in the territory of a partner state of any articles, including the components of a flight element, in transit between any place on earth and any flight element of the space station registered by another Partner State or ESA shall not in itself form the basis for any proceedings in the first Partner State for patent infringement.

[3] See note 1.

Space Vehicular Designs

14) What kind of legal protection is being given by your organization for space vehicular designs (Please fill in only if it is applicable to you)?

15) Are you of the opinion that designs law sufficiently protects spacecraft designs?

16) If your answer is 'no', please give your reasons for that.

17) Do you feel that with regard to spacecraft designs there may arise a clash between the natural laws of science and intellectual property laws[4]?

18) If yes, where will you draw the boundary line between both?

Satellite Remote Sensing

19) What in your view is the proper form of protection for remote sensing data? (Copy rights/Trade Secrets/Any other form). Please give reasons.

20) Does the data procured by your organization is properly protected? (Only for space agencies)

21) How far your domestic law addresses the issue?

22) How far do you think TRIPs Agreement addresses the issue?

23) Is there any need for a new legal framework in this regard?

Transmissions

24) Do you currently offer protection to the data sent by major planetary missions/ Hubble Telescope? (Only for space agencies)

25) If yes, what kind of protection is offered?

26) Do you think that Brussels Satellite Convention[5] addresses the issue?

27) Do you feel that an astronaut who makes a 'planetary landing' or one performing a 'space walk' can have 'performer's right'?

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[4] Assume a scenario where, 'A' creates a cone shaped design for a space vehicle. This is purely based on the natural law of science that, a cone shaped design could easily penetrate atmospheric velocity, than a cylindrical or cube shaped design. Some how by interpreting designs law 'A' procures ownership over that design. Later 'B' uses the same design for another space vehicle. 'A' alleges infringement of his right over the design. 'B' contends that he has not violated the intellectual property rights of 'A' but have only complied with the laws of science.

[5] Convention Relating to the Programme Carrying Signals Transmitted by Satellite, 1974.

Dispute Settlement

28) Has your organization ever faced any intellectual property disputes? (Only for organizations)

29) If yes, then kindly provide the details?

30) In your view, which forum is to be used for the settlement of international commercial space disputes (mainly Intellectual property)? Please give reasons.

Miscellaneous

31) Please make a choice among the following (with reasons):

- There is need for a new international legal framework, which addresses all the space related intellectual property issues including dispute settlement.
- Answers for all these could be found in existing regimes.

32) What do you think should be the role of TRIPs Agreement in this regard?

Kindly offer your overall suggestions

Researcher: Sreejith S.G.
Supervisor: Prof. V.S. Mani

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