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ACQUISITION OF SPACE WEAPONS, THE LEGAL, POLITICAL AND MILITARY IMPACT FOR INTERNATIONAL PEACE AND SECURITY

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Abstract

At the dawn of a new century an immediate danger is upon us: The weaponization of outer space, including potential cost implications of ushering an era of peace and prosperity. Can such statements be explained as pure sentimentality for hopes of a new era? Or is the danger misplaced that the threat to peace and security is an ever more ominous? The Outer Space Treaty prohibits placing in orbit nuclear and other weapons of mass destruction, but this does not include other military systems. These other systems may involve anti-satellite weapons, (ASATS), directed and Kinetic Energy Weapons that may emit laser beams or use their mass from space to intercept ballistic missiles, hostile satellites and eventually ground targets. The Outer Space Treaty states that space should be for peaceful purposes, but what does that mean in the context of acquiring space weapons? Reaching consensus upon delimitation question would be useful to determine when a space weapon is a space weapon. The fabric of these legal implications is being held together with a single thread through political mistrust and self-interest motivated by national security measures. Adopting a more progressive use of outer space this will immediately enhance political relations and global stability.

Militarization of outer space has been a source of debate since Russia launched their first satellite, Sputnik-I as the potential of space was realised, the space race begun. This would not, however, have been possible if it was not for the development of Rocket, which culminating from centuries of technological development into establishing modern astronautics and aviation.

The origin of rocket warfare can be traced as early as thirteen century AD where the Chinese used black powder to create an explosive force. The propellant did not reach Europe until mid thirteen century which was through an English scientist called Roger Bacon. During the beginning of the 1800's the rocket went through a number of improvements the first being in India where they adopted the use of metal cylinders, secondly Sir William Congreve made it possible to choose between a ball charge or incendiary warhead. He also greatly improved the accuracy of the rocket. Thirdly, William

Hale successfully designed the rocket to spin. However the gun became an extremely effective weapon for the military thus the use of rockets declined up until the beginning of the Second World War 1939.

The vision for rockets, however, had changed in between the end of nineteen century to the start of W.W.II. Russian engineer Konstantin Tsiolkovsky was stimulated by the ideas of space travel and was also greatly influenced by Jules Vernes, a fiction writer. Born death; and at the age ten caught scarlet fever and also with the death of his mother a few years later required him to study at home. Books became a great interest, particularly in the area of mathematics and physics. Tsiolkovsky worked as a teacher and also a researcher in to aeronautics and astronautics. His ideas and experiments were highly developed and ingenious. Tsiolkovsky was the first in Russian to build a wind tunnel using a modest grant from the Academy of Sciences. He went on to develop innovative aircraft designs. He published his first book regarding the possibilities of using rockets as means to travel into space, in 1895 and was called 'Dreams of Earth and Sky'. However it was his thesis that dealt with the possibility of using multi stage, liquid-fuelled rockets that marked his most serious work on astronautics. Tsiokovsky's paper was called 'Exploration of space Using reaction Devices' and dealt with the theoretical problems may arise through space travel, describing in detail a full mission into space, as well as laying down fundamental mathematical principles in order to gain an understanding to these problems. Tsiokovsky only theorized and chose never to build a rocket, he envisaged his ideas would not come about until 21st century.

Robert Goddard, an American scientist and founding father to modern rocket science continued Tsiokovsky's work, although he was unaware that a schoolteacher in Russian shared an almost identical vision for outer space. Goddard was greatly influenced by H G Wells novel, 'War of the Worlds'. His ultimate goal was to create a workable machine that could propel into space and eventually mars. He was the first to design high altitude rockets, establishing the nozzle and combustion chamber he went on to constructing and launching them. He also explored the use of liquid oxygen and hydrogen as propulsion and also being the first to build a rocket motor using liquid fuels that was used later by the Germans for the design of the V-2 rocket. After initial experiments with liquid fuelled rockets in Roswell, he published his findings in 1936 called 'Liquid Propellant Rocket Development'. Goddard's experiments in Roswell closed upon the decline in interest in rocket science. He died of throat cancer just before rocket propulsion took another leap forward.

Although the idea of space travel was yet to be fully accepted amongst, the public and it took the work of Hermann Oberth of Germany, founder to German Rocket Society, to engage the publics' imagination as well as fellow scientists. His famous paper in 1923 'The Rocket Into Interplanetary Space' and in 1929 'Ways to Space flight' advanced previous theories of the problems that may be encountered by manning a space flight e.g. space walks, interplanetary travel and using liquid propellant rocket motors. He worked for Wernher Von Braun in Peenemünde where the first ballistic missile was tested the V-2, which was subsequently used for space travel.

However from 1936, it was the renewed military interest in the rocket that led to the development of the V-2 in Germany,

subsequently the visions of space travel were put on hold. This was exactly as military interests declined during end of the nineteenth century to 1930, when space travel then took precedence.

Von Braun read Hermann Oberth's paper 'The Rocket Into Interplanetary Space' which encouraged him to apply himself at school, in particular to mathematics because it was a source of frustration for him in his inability to understand Oberth's mathematical principles. The capabilities of Von Braun and liquid fuelled rockets attracted attention from Capt. Walter R Dornberger who provided Von Braun with financial support through arranging a research grant from the Ordnance Department of Germany. Von Braun's early interest in space was replaced during the Second World War. Rocket science was suffering from financial difficulties as military interest intercepted through renewed rigor thus firmly grounding the rocket as an effect weapon capable of causing huge devastation. Von Braun and his team of scientists designed the long range V-2 ballistic missile and Wernher Von Braun remarked upon Goddard's work by saying how Goddard had taken years off their work enabling them to complete the V-2 much earlier than expected and this was due to Goddard's experiments.

The V-2, meaning Vengeance Weapon 2 was successfully tested in Peenemünde, north-eastern Germany, proclaiming Germany as the forefront of technology. This was the site where they launched many V-2 missiles against England, France and Belgium inevitably causing immense destruction and causalities.

After the Second World War Braun and his team of scientists surrendered to the U.S. troops and they transferred to the US Ordnance Corps at White Sands where advanced studies were made into captured V-2 missiles. However, space, was not a high priority until the launch of the Sputnik-1 in October 1957 from the Soviet Union. The space race had begun. Braun and his team of scientists subsequently launched the first USA Satellite just 3 months later (January 1958), called the Explorer 1. Also, the US government in 1958 established National Aeronautics and Space Administration (NASA).

The Soviet Union were the first to launch a manned space flight Vostok 1, where Yury A Gargarin was the first cosmonaut in 1961, one trip was made around the earth, lasting for just over hour and a half. The first woman cosmonaut was Valentina V. Tereshkova in June 1963. Voskhod was the next step in Soviet technologies, which enable the soviets to launch a flight that had the capability of taking more than one cosmonaut. Voskhod 2 was launched on March 18th 1965 and Alexei Leonov conducted the first space walk making it (approx) sixty-two years later from Tsiokovsky's paper prophesizing that such events would not occur until 21st century. Soviet Union did not launch a manned flight to the moon choosing to send lunar probes to collect data. Neil A Armstrong and Edwin E. Aldrin were the first USA astronauts to walk on the lunar surface from the Apollo 11 mission in 1969 conducting scientific experiments and collecting samples. The potential of space was being acknowledged with great importance, particularly as a means to extend military operations through satellite and strategic defense initiatives.

Thus, military presence in space is not founded just on weapons but also through military surveillance systems. These include image satellites, which are high-resolution

cameras to identify images /objects on the ground and radar satellites. Electronic Intelligence systems are spy satellites that intercept data, international voice traffic and faxes, etc. Nuclear test detectors: Infrared satellites, which can detect thermal radiation and act as a missile warning system and Geodetic satellites for self guided cruise missiles. Other such satellites, known as support systems, such as communication/relay satellites ensure command and control in exchanging information between other relay satellites; weather satellites and navigation satellites that are part of the Global Positioning System. It is interesting to note that there is both a civilian and military purpose to satellites as well as to launch vehicles and ground stations. For example through Disarmament Treaties ballistic missiles that are to be retired can be used as civilian satellite launchers. Also, high-resolution imagery for remote sensing used for civilian purposes such as monitoring climate change and natural hazards can be used as a support to planning military operations. This highlights the problem of how the distinction between military and space systems has become blurred with dual- purpose technology.

Militarization of outer space has been a source of ongoing debate since the launch of Sputnik but what exactly is meant by it?

In the Oxford Dictionary, the general meaning of militarization appears to be dependant upon interpretation, for example, to utilize and equip [space] with military forces and defenses. Infact this interpretation is quite convenient as missile defense could easily be read into the meaning. Also, by adding 'weapons' alongside forces a definition is arising but it remains inadequate as defenses is too general and is silent upon the uses of military satellites. On the other hand, militarization could simply be used as a 'means to give space a military usage' or perhaps 'to adapt space for military use' and again highlights the same problems found in the first interpretation. Thus establishing a definition upon the 'militarization of outer space' presents immediate difficulties. I have highlighted two aspects that perhaps require clarification. The first, that militarization is through acquisition of 'space strike weapons' which has the capabilities of destroying ballistic missiles as well as destroying any ground, sea and air based weapons systems which pose a threat to space satellites and/or space defense systems.

The second aspect is that militarization occurred upon launching satellites solely for military purposes. This view, however, is not shared, in particular by Russian if one recalls the debates and proposal submitted by Russia to the UN in 1958 and again in 1981; the draft treaty entitled 'Treaty on the Prohibition of the Stationing of Weapons of Any Kind'. However, other countries such as Italy in their draft proposals to the UN believe surveillance systems should also be included in the total prohibition and condemnation of all military activities in outer space. Although these technologies do provide verification on arms control, which some countries have argued in support of such systems, which are needed to adhere to various international agreements, verifying Chemical Weapons Conventions and reducing the number of nuclear weapons and generally maintaining strategic stability. Also, military surveillance systems should not be included as militarizing outer space and subsequently in the debate for prohibition, particularly as they would prevent an adversary from launching a surprise attack. On the other hand, this could provoke an outbreak of hostilities, as it is possible to miscalculate the

other countries capabilities thus intensifying an arms race in outer space by intensifying the debate on space defense systems. Difficulty can be highlighted upon analyzing the peaceful and non-peaceful uses of outer space, which is synonymous to establishing a definition.

Thus, not only had the technology which opened space for scientific exploration became dual purpose as they were cultivated through weapons, space itself was being contemplated as a means to conduct and control warfare through the use of space based laser and X ray weapons through strategic defense initiatives. The technology, behind the idea was not available, however, the United Nations recognized that space in the future might become the new battlefield to direct wars on the terrestrial surface, subsequently recognizing the need to establish new rules governing the conduct of human activities in space. Thus in 1967 the Outer Space Treaty was signed focusing on the peaceful uses of outer space and to explore space 'in the interest of maintaining international peace and security and promoting international cooperation and understanding,' Article 3 Outer Space Treaty.

In the preamble of the Treaty it states, 'recognizing the common interest of all mankind in the progress of the exploration and the use of outer space for peaceful purposes', also in Article IV paragraph 2, "the moon and other celestial bodies shall be used exclusively for peaceful purposes...'. Peaceful has remained undefined in the Treaty and has caused considerable difficulty resulting in, as highlighted above, two schools of thought as to what constitutes the military uses of outer space. Article 31(1) of the Vienna Convention on the Law of Treaties states that the ordinary meaning must be interpreted to words in a treaty. However before a meaning to the peaceful uses of outer space can be ascertained it would be prudent to define the boundaries of outer space so one can further define when a 'space weapon' is a space weapon.

Satellites also require detailed analysis arriving at criteria to its components, functions and users, thus, making it easier to highlight any aggressive nature that may interfere with the 'peaceful uses of outer space'. The attempt is to arrive at a compromise and resolve the different schools of thought within space law so international space law can forge ahead with the development of new technologies.

The starting point is the delimitation of the boundaries of outer space. The Outer Space Treaty 1967 is silent upon the definition of outer space. Thus how has the Treaty worked without such a definition? Space capabilities have considerably advanced since the signing of the Treaty as space is in danger of evolving predominately into a base to utilize space based military operations.

In 1959, the ad hoc Committee of UN concluded upon the question of delimitation of boundaries that it was not something that required immediate priority. However in 1966 COPOUS as requested by General Assembly (UNGA Res 2222 (XXI Dec 19 1966) to initiate the study upon the delimitation of boundaries. The question was henceforth on the agenda of the Legal Sub Committee (see Report of the Legal Subcommittee on the work of the sixth session 19-may –14 July 1967 to the COPUOS UN Doc A/AC .105 /37of Jul 14 1967) and has continued to do so going through various transitions before settling in the 24th Session of LSC, for a current version.

There are two different approaches to delimitating the boundaries. The first is known as the spatial definition. This area is dependant upon the properties of the earth's atmosphere. Layers of the atmosphere are divided into trosphere, stratosphere, mesosphere and thermosphere establishing the altitude to each layer with the aim of delimitating where a spacecraft can, without any further application of force, complete a full orbit around the earth.

There are two different approaches to delimiting the boundaries. The first is known as the spatial definition. A detailed explanation can be found in the paper called Boundaries in Space by Caesar Voute in the book 'Peaceful and Non Peaceful Uses of Outer Space... edited by Bhupendra Jasani (14). In a brief explanation of Caesar Voute paper the spatial approach is where layers of the atmosphere are divided to determine the altitude to each layer with the aim of delimiting where a spacecraft can, without any further application of force, complete a full orbit around the earth. By delimiting the boundaries 'air' i.e nitrogen and oxygen is found in the heterosphere, which consists of troposphere, stratosphere and the mesophere at an altitude of 90-100 km. The temperature reversals between these layers are also relevant to delimitation of air from outer space. Beyond this altitude the concentration of nitrogen and oxygen change and this can be considered as outer space. This region is known as homosphere. The lowest perigee of an orbiting satellite, which without using any further propulsive force to complete a full orbit around the earth would be impossible, as it would burn up or re-enter in the earth's atmosphere, is at an altitude below 100/110km. However tethered satellites can move below an altitude 100-110km in a full orbit, but in order to sustain its orbit it must be maintained by an upper satellite, which is moving beyond this altitude.

Some space weapons orbiting in a transition zone between the altitude of 70km and 110km, where the air would be sufficiently thin, could still be effective. Here is the difficulty in defining a space weapon. The delimitation according to the lowest perigee of a satellite has been favored by those states preferring the spatial approach, at an altitude of 100km above sea level. However, this approach does not consider tethered satellites, as they are an important exception to the 100km proposed altitude delimitation. Although as it is dependant upon the upper satellite to maintain its orbit it would make further sense to consider the tethered satellite as an extension of the upper satellite, which is moving above an altitude of 100-110km. In this instance, the tethered satellite would reside under space law. Whether the space powers would agree to such rigid interpretation is doubtful, as it may work too disadvantageous to the space power. Although if one followed a strict spatial approach, by defining the layers, temperature and air density the extension argument would have no foundation as it is moving in 'airspace'. A way round this would be to apply a functional approach to tethered and its connected upper satellite by establishing its nature and type of space activity. If a non-peaceful activity was discovered and its purpose is to function as a space weapon the tethered satellite would automatically fall under the extension principle and be governed by space law. It would be useful to list permitted military activity for example for verifying arms control, which should fall under the guidance of an International Arms Verification Agency.

Thus a possible definition could be:

Outer Space (according to the lowest perigee

of an orbiting satellite; [except in the case of a tethered satellite where sec 1 (b) applies]) is;

1 (a) where an object which is orbiting at an altitude of 100km and upwards and/or travelling in the 'homosphere' region can;

i) Complete a full orbit without any artificial propulsion system
and/ or prevented from the atmospheric density causing the object to burn up or re-enter the earth's atmosphere;

ii) Where the eccentricity of the space object is dependent on the density profile of the atmosphere, which varies greatly with temperature and pressure and changes with time, outer space shall fall beyond the final temperature reversal between mesosphere and thermosphere boundaries.

i) 'Temperature reversal' in this instance is the difference between lowest perigee of an orbiting satellite [tethered satellites being the exception] and the altitude at which the final temperature reversal occurs between the mesosphere and thermosphere boundaries.

Exceptions;
1 (b) i)Space Weapons see below for definitions and 1(c).

ii)Tethered Satellites are two satellites connected by a rope or chain;

Where one satellite moves in outer space as defined in 1 (a) maintains the orbit of the second satellite that is moving below 100km.

In this instance the satellite moving below 100km shall be considered a space object irrespective of the altitude it is moving in if;

i) the nature of the mission is astronautical and/or objectives is military the rules of space law shall apply...

The second approach is as stated above the functional approach to the question of delimitating outer space. The location of the boundaries between air and outer space would no longer be necessary by adopting this approach; rather it would require a definition of the nature of the space activity. However further problems arise as a distinction would need to be made between spacecraft and aircraft and this would further involve a definition of spaceflight and air flight. A catalogue of all useable orbits for civilian and military satellites would need to be established perhaps by an International Satellite/Launch Agency. Although such an Agency would be extremely beneficial anyway as most useable orbits have limited places e.g. geostationary orbit and through this proposed agency they can monitor and keep track of all civilian satellites. There could be a sub-committee for commercial satellites and those that are not would fall under the main head of the agency. Military satellites would fall under as proposed above an International Arms Verification Agency. A current map of all satellites currently in orbit would also be useful.

This approach does not define outer space at all but analyses how space is used and seems quite favorable in that respect. It is very possible to have the best of both worlds and adopt a spatial to delimitating space and functional approach to catalogue civilian and military satellites.

The next question is how the spatial and the functional approach compare with the characteristics of the space weapon. It might be useful to define the different kinds of space weapons before proceeding any further.
There are four kinds of space weapons

summarized from a very good book by Bob Preston called Space Weapons and Earth Wars 2002 Rand see chapter 3 and associated appendixes for more detailed definitions, (13).

Directed Energy Weapons (DEW), which travel at long distances at the speed of light.

The next three weapon systems use either their own velocity and mass or conventional explosives, by using the chemical energy that is stored in these explosives to destroy their targets.

Kinetic-Energy Weapons against missile targets (KEWAMT)
Kinetic Energy Weapons against Surface Targets (KEWAST)
Space-Based Conventional Weapons against Surface Targets (SBCWAST)

More weapons systems that are specific are Anti-Satellite Weapons (ASAT) their sole purpose is to either impair or destroy command and control satellites. The emerging issue is the destabilizing effect to international peace and security if such weapons were used particularly if there is heightened tension between those states that may use ASAT capabilities.

DEW consists of laser torches, where enough power must be given to the beam to reach a destructive level. Thus enough energy must accumulate whilst the beam holds it target in order to destroy it. To destroy ballistic missiles it would require millions of watts of power and huge logistics costs for developing and deploying such weapons. Electronic Jammers are also DEW, which are tuned into the frequency ranges around target areas by using a radio transmitter. They generate enough power by focusing on those target receivers to compete with their intended signals.

Some of the problems associated with developing and deploying DEW's include:

1. The distance between the laser and missile launch points fluctuates in such a predictable way giving the opponent the opportunity to launch as many missiles as possible to saturate the defense. In this situation, the laser torch must be able to quickly retarget, after destroying the first initial target, with sufficient fuel to destroy the next target:

2. Vulnerable in boost phase as well as being restricted to the amount of targets the laser can destroy during this phase.

3. The altitude of the DEW is of importance as the further away the weapon is from the target the fewer missiles it can destroy during boost phase.

Thus, the effectiveness of DEW is compromised the higher the altitude the intensity of the beam decreases and in turn the kill rate decreases. Even if the weapon traveled at a low altitude, there is still the possibility of saturating the defense. To remedy that problem a constellation of weapons would need to be deployed. For purposes of a Missile Defense program, other weapon systems would need to be augmented to prevent saturating the defense.

Listed above are three different kinds of mass to target weapons; KEWAMT is confined to targets that are either leaving the atmosphere or are above the atmosphere; the other two, KEWAST & SBCWAST need to penetrate the atmosphere in order to reach their targets.

KEWAMT would be effective in providing an additional layer of defense to DEW's by intercepting the target using a high velocity impact. The weapon is then very small but as

in DEW, their response time is very short so a constellation of weapons would be required to prevent defense saturation. The propulsion costs would be kept to a minimal as each weapon leaves its orbital base. The base would have to be at a low altitude; otherwise, the interceptor may burn out before the target is destroyed. Otherwise, additional propulsion and costs would be needed, as low mass objects would not retain their velocity at higher altitudes.

The problems associated with DEW's are essentially those of KEWAMT as well as the interceptor needs to stay in the atmosphere and this means that it will unable to engage in targets below 60kim. However more importantly the target missile may carry chemical or biological material and upon its interception hazardous debris might survive re-entry, disperse, and fall within the vicinity of a state's homeland.

KEWAST use their own mass to destroy targets at extremely high velocities. Thus they must be large enough to survive re-entry, as they do not destroy their targets outside the atmosphere, but must penetrate the atmosphere at a speed that will generate a destructive effect. The orbit of these weapons, to maintain their accuracy in a vertical trajectory, could either be low, where a great number of weapons near the target area would be needed; or at a higher altitude where a smaller number of weapons could be deployed. The most suitable orbit could either circular for more global coverage or an elliptical orbit, which is less costly and reduces the coverage.

KEWAST are effective against slow-moving targets such as ships and fuel tanks. However to achieve the high velocity impact needed to cause a destructive effect the velocity would need to match that of an intercontinental ballistic missile.

The advantages of acquiring KEWAST and basing them at a high altitude would be the distance between ground sensors thus saturation would be less likely and this would increase the coverage of space. The downside would be the logistical cost and the effort involved deploying such weapons as well as the length of time it would take to reach the target.

Conventional Weapons against terrestrial targets are more responsive and easier to maneuver compared to the high velocity KEWs need to re-enter the atmospheres. To respond promptly to targets on earth multiple weapons would need to be in orbit.

Space weapons can then be divided into categories; ground to space; air to space, space to ground, space to air. These could be further divided into the lowest perigee of a space weapon and a provision could be included that such weapons shall be governed by space law and a subsequent provision could also be included in space law, for example.

1) (c) Military satellites shall be permitted if in this proviso;

i. the nature of the mission and the objectives is to comply with existing treaties on verifying arms control, which shall be monitored by an International Arms Verification Agency.

Using the above descriptions of the different kinds of space weapons one could attempt to arrive at definition. However, it would be very difficult to arrive at a neat definition, as the simplest way would be generate a list, which would constantly be generated of all

space weapons and future weapons with description of all their capabilities. The next stage could be either to ban them or allow states to acquire and deploy such weapons. There can be no provisions for limited use of space weapons as once acquisition occurs other counties (as with nuclear weapons) will eventually acquire and deploy such weapons and if those countries have an existing dispute international peace will be adversely affected if such weapons were used threateningly. Further problems will arise in arms controls for such weapons and by not allowing acquisition these problems can be avoided.

The next issue is whether the acquisition of Space Weapons would be fully compatible with Article 2 under the UN Charter, which prohibits the use of force or the threat of use of force, and Article 51 when faced against an armed attack the right to self defense. Satellites and the space activities of another State would be protected as Article 2.4 would prohibit any aggressive interference. Thus implying any introduction to weapon systems in outer space could constitute a threat of force including weapon systems such as KEWAST and DEW designed to destroy ground targets on Earth by directing their mass or energy beam from outer space would be prohibited. The open question is whether interference with space weapon systems would be justified under Article 51 as a right of defense? However there is continued debate as to whether 'armed attack' described in the Treaty means for example justifying a preemptive action or opposing views stress Article 51 can only be uterlised within the 'context of an armed attack' as opposed to responding to a threat with an preemptive action.
'Peaceful' in the Outer Space Treaty 1967 remains very contradictory particularly after the above analysis as two possible interpretations could be attributed to it, either 'peaceful' means non-military or apart from those that are prohibited by international law. Since the sSputnik launch, space powers have used space technology to effect military planning. As previously highlighted it can be quite problematic in distinguishing between civilian or military satellites. Perhaps an approach would be to follow the suggested list approach to define space weapons, although would it be possible to cover all eventualities? The easiest approach is to exclude such weapons then have to go through eliminating or controlling them.

However in attempting to define 'peaceful' other tTreaties have adopted the term therefore this would be a useful starting point to analyze how these treaties have interpreted peaceful. Article 1 Antarctic Treaty 1959 states:

"Antarctic shall be used for peaceful purposes only...' and prohibits ' any measures of a military nature...as well as any weapons. ' Although it is a very good guide it may prove extremely difficult to apply to the Outer Space Treaty, as it clearly does not ban all military uses of space. This can be seen as an example of the continuing military interest on space by not defining clearly what is or not permitted.

The UN convention on the Law of the Sea 1982 adopts the term peaceful purposes. Article 88 suggests that peaceful does not mean non-military as naval vessels are on the high seas and explosive tests have been conducted on the high seas. So where does the Outer Space Treaty stand? The difficulty surrounding the Treaty regarding the military uses of space is its inability to define in clear terms 'weapons of mass destruction'.

Article IV (1) does not permit states to place 'in orbit around the earth any objects carrying nuclear weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.' The general meaning of weapons of mass destruction is understood to include nuclear, biological and chemical weapons. Thus if the destructive capability is equivalent to the above weapons then future weapon systems may fall under the treaty.

Article IV (2) explicitly bans the establishment of military bases and testing of weapons on the moon and celestial bodies as they are exclusively for peaceful purposes. Also Article XII of the Outer Space Treaty gives other States party to the Treaty the right of inspection of all installations, equipment, stations and space vehicles, subject to notice and minimal interference with operations, on the moon and celestial bodies only. Outer space is not provided for in this provision.

However Article IX gives States party to the treaty the right to request a consultation if they have reason to believe an activity or experiment planned by another State Party in outer space, including the moon and other celestial bodies would cause harmful interference with activities in the peaceful exploration of outer space, the moon and celestial bodies, and interfere with activities of other State Parties. There are safeguards in the Outer Space Treaty to ensure space is used peacefully, although it does not go far enough.

The place to start is to find the ordinary meaning to peaceful, as stated in the Vienna Convention on the Law of Treaties 1969 Article 31 (1). To determine whether some or no military uses is permitted. However 'some military uses' may prove problematic as does this mean just surveillance / arms verification or can weapons which are not covered in the space treaty be included. Thus, it would be useful to analyze the practice of the states upon application and interpretation of the treaty Article 31(3). Thus, 'peaceful' cannot mean non-military, as using a satellite to aid ground control and targeting could be argued as a non-peaceful use of outer space. The ordinary meaning of peaceful according to The Concise Oxford English Dictionary (1989 pg 753) Peaceful is 'characterized by 'peace' one belongs to a state of peace and not violating or infringing peace.' Thus, 'peace' in the Oxford English Dictionary means freedom from war and harmony between people.

Perhaps the approach to define peaceful is to attempt to categorize all military including future uses and assess them on the merits as to whether these military/weapon systems would have serious consequences to international peace and security. By finding, the non- peaceful activities this may help to some degree in characterizing 'peaceful'. There is, however, an emerging issue that is unfolding in this analysis, it is not defining peaceful but defining what is the acceptable extent to the military uses of outer space and is consistent with the UN Charter and other obligations under international law. Thus to determine the acceptable extent to the military uses of space it is unfortunately dependant upon the national security interests of the concerned state. Thus if those interests are served through that particular activity then it will be deemed peaceful. For example the analogy of equating the law of the sea with outer space. the naval ships merely observing the high seas as are military satellites in space and therefore not contrary to international law. In addition, states see their observance satellites as maintaining international peace and security. Thus to

split the definition of peaceful and non-peaceful is only hindering the problem and how to move forward to present clear policies on the peaceful uses of outer space.

Other Multilateral treaties in the effort to use space for peaceful purposes are the Limited Test Ban Treaty of 1963, Convention on Environmental Modification of 1977 and the Moon Agreement of 1979 as model for the future use of outer space. Bilateral agreements such as SALT I and II and the Anti Ballistic Missile Treaty have prevented escalation of an arms race in space and what the future holds for these Agreements.

Article one of the Limited Test Ban Treaty states:

1. Each of the Parties to this Treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control:

(a) In the atmosphere; beyond its limits, including outer space; or under water, including territorial waters or high seas;

This was the first international Treaty, which addressed outer space and received over 100 ratifications. The concern for nuclear testing was radioactive debris that could contaminate the environment, which could have devastating effects. In paragraph 2 of Article 1 States must refrain from causing or participating in any nuclear test explosion in any of the prohibited environments listed in paragraph (a). The effect of a nuclear explosion in space would effectively destroy all satellites in orbit with possible radioactive debris re-entering the atmosphere. If any states should want to withdraw from the Treaty, it would be a devastating blow to nuclear reduction and international peace. Although it does not initially ban the development of nuclear weapons, it certainly hinders the process if it cannot be tested,

The Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification of 1977 (ENMOD) refers to the degradation to the environment through environmental modifications for military purposes. Thus by harnessing environmental modification and techniques for peaceful purposes could, 'contribute to the preservation and improvement of the environment for the benefit of present and future generations,' whereas 'military or any hostile use of such techniques could have effects extremely harmful to human welfare.' Article 1, States agree not to engage that would have severe long-term effects, in military or harmful use of environmental techniques. Article 2 defines techniques as' through the deliberate manipulation of natural processes.. The dynamics, composition or structure of the earth, including its biota, lithosphere, hydrosphere and atmosphere, or outer space.'

The Moon Agreement 1979 reiterates and enlarges upon the provisions in the Outer Space Treaty. Articles 3, paragraphs 3 extended the prohibition of placing nuclear weapons in orbit on or around the moons trajectory and other celestial bodies. Paragraph 4 in Article 3 forbids the establishment of military bases and testing of any type of weapons but allows military personnel for scientific research or for other peaceful purposes. Although a great deal of debate has arisen to the meaning of peaceful purposes in the Outer Space Treaty and this Treaty does not offer any resolution as to its meaning. Pargraph 2 is an interesting inclusion as it prohibits any threat or use of force or any other hostile act or threat of hostile act on the moon is prohibited...'

including committing or engaging in any such threat in relation to the earth , the moon, spacecraft, personnel of spacecraft or man-made space objects.' Although does this take away the right to self defense under Article 51 of the UN Charter?
Bilateral efforts to prevent an arms race in space resulted in SALT, Strategic Arms Limitation Talks, 1 Agreement of 1972. The Treaty Between the US and USSR on the Limitation Of Anti-Ballistic Missile Systems, ABM Treaty for short was the most important Treaty during the arms limitation talks to be concluded. Also the Interim Agreement on Strategic Offensive Arms was completed and adopted, where launchers to inter-continental ballistic missiles (ICBM) including submarine launchers have been frozen. Also each party must not interfere with national technical means of verification, but it does not mean ASAT weapons are prohibited, as protection is only given to systems that are used to verify the SALT 1 Agreement. SALT II Treaty on the Limitation of Strategic Offensive Arms was not ratified in 1979 but it has been accepted as an informal agreement amongst the parties.

The most significant provision in the ABM Treaty is Article V where 'each Party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air based, space based, or mobile land based.Article 2 defines ABM systems as, 'a system to counter strategic ballistic missiles or their elements in flight trajectory, currently consisting of ABM interceptor missiles, launchers and radars. However a single fixed land base system may be deployed within 150 mile radius centered on each countries capital.
Article IX provides that states do not deploy ABM systems outside its national territory assuring the viability and effectiveness of the Treaty. Also to assure 'compliance with the provisions of this treaty, each Party shall use national technical means of verification through for example surveillance measures employing satellites and radars. The Treaty is unclear as to whether conducting research on ABM systems would violate the Treaty. Each side has a different perspective to the interpretation of the Treaty. Plans for research in ABM systems that is specifically prohibited in Article V have intensified since the passing of the Treaty. Through this debate and the desire to deploy weapons with laser, particle or even x-ray capabilities, as part of a missile defense program appears to have rendered the ABM Treaty redundant, hence a rather abrupt analysis.

In the Text of the Joint Declaration by President George Bush and President Vladimir Putin on the New Strategic Relationship Between the United States of America and the Russian Federation dated Friday May 24, 2002....

'...the United States and Russia have agreed to implement a number of steps aimed at strengthening confidence and increasing transparency in the area of missile defense, including the exchange of information on missile defense programs and tests in this area, reciprocal visits to observe missile defence tests, and observation aimed at familiarisation with missile defense systems. They also intend to take the steps necessary to bring a joint centre for the exchange of data from early warning systems into operation.

The United States and Russia have also agreed to study possible areas for missile defense cooperation, including the expansion of joint exercises related to missile defense, and the exploration of potential programs for the joint research and development of missile defense technologies, bearing in mind the

importance of the mutual protection of classified information and the safeguarding of intellectual property rights. The United States and Russia will, within the framework of the NATO-Russia Council, explore opportunities for intensified practical cooperation on missile defense for Europe....'

This is a complete u-turn from the ABM Treaty and for the purposes of arms control it could be interpreted as huge blow particularly with the possibility of mass acquisition through NATO cooperation. Also the effect to the developing world through mass expenditure in deploying such systems where mutual distrust already exists could further alienate them where resources for humanitarian aid is urgently needed.

Conclusion

The inter-relationship between weapons and space systems have made the distinction between civilian and military satellites increasingly hard. This dual purpose technology has long followed space since the launch of Spuntnik and consequently where space has been seen as an attractive forum to further military capabilities. In 1967 a blueprint was set for the future conduct of space powers that space should be for the heritage of mankind but the vagueness of certain terms has lead to difficulty in defining 'peaceful' and 'weapons of mass destruction' (WMD) as there is much debate as to whether x-ray lasers are WMD. These vague terms can be seen as continuing the political military interests in developing and deploying space weapons. But in order to define space weapons a consensus to the delimitation question regarding outer space needs to be reached. This is a very problematic area as is defining space weapons and as I have demonstrated cannot easily be solved. This highlights the choicesthat need to made either all space weapons are banned, some selectively prohibited or all are allowed . If all weapons are banned then immediately this diffuses the definitions and arms control problems. The other two choices will create problems within verification procedures, particularly as mass acquisition occurs which can be seen as an inevitable consequence to weapons development.

Other Multilateral treaties, particularly Limited Test Ban Treaty work alongside the Outer Space Treaty very effectively, however the bBilateral treaties have suffered. With the withdrawal of ABM Treaty the deployment of space weapons is real possibility. This Treaty served as a very difficult legal implication to bypass same for the Limited Test Ban Treaty for hindering weapons development. The fabric of these legal implications is being held together with a single thread through political mistrust and self-interest motivated by national security measures. It appears each implication whether it is legal, political or military interlinks with each other. Therefore it follows one implication is a consequence from the other. Thus to avoid all the consequential implications of deploying weapons is to channel the resources for positive and more far reaching purposes; to the developing world. The immediate effect to international relations by creating a closer and efficient cooperation with developing countries would enhance international peace. By using the UN as a forum to enable and fund the participation and inclusion for space programs. This could be a foundation to adopting a more progressive use of outer space.

The acquisition of space weapons and the affect to the developing world will have serious implications in dividing the gap

further regarding the economic disparities for less powerful and rich countries. The expenditure involved in deploying space weapon systems could be strongly argued as taking away valuable resources in funding a more global civilian activity, whereby the developing world has increased opportunities to influence policy and participate in civilian activity. For example if the developed world placed factories for space components in the developing countries this will help to support their economy, as well as job and educational opportunities. Developing Countries could have the opportunity to bid for contracts in designing space technology through global tendering and in turn will help to circulate money around the world, giving the developing countries the opportunity to become self sufficient. Also extending science education and creating a program for astronauts in developing countries will have a positive psychological effect to relations and to global peace.

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