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Articles

Eisenhower Center Program Summaries

Lawful Response to Attacks on Space Systems

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What means may a nation lawfully employ to respond to and to defeat threats and attacks on its space systems? Treaties and customary law provide a strong incentive to limit space activities to non-aggressive "peaceful purposes." They do not, however, proscribe space warfare or preparation for such conflict. Space system components are thus at risk, and can be attacked, degraded, or destroyed, simultaneously or each in detail. The use of force is allowed only in self-defense against an "armed attack" or in accord with authorization of the United Nations (UN). Kinetic, electromagnetic, or information operation attacks against space systems are each an "armed attack" to which the use of force is permitted. The right of self-defense is subject to the Law of Armed Conflict (LOAC) and other treaties and agreements. Even if lawful means and methods are employed and targets engaged, physical, technical, environmental, political realities, and their risks and benefits limit options to defend and fight space systems. Decades of senior policy-makers have recognized the importance of the space domain, assessed the risks in their context, and provided measured and calm global leadership to preserve access to it.

The United States (U.S.) utilizes space more than any other nation, not only for national security, but in the private sector as well. The complete mix of civil, military, national, and multinational commercial space capabilities are important enablers for successful 21st Century militaries, economies, information transfer, diplomatic communications, and collaboration. Space-based capabilities – precision-navigation-timing (PNT), battlefield and battlespace characterization, missile warning and defense, weather, communications, intelligence, surveillance, and reconnaissance – enable the U.S. and its allies to reach out, shape, support, and control events in any part of the globe.

Taking down space capabilities offers a means by which adversaries can degrade the significant asymmetric advantages offered. Consequently, the recent 11 January 2007 test of a Chinese ground-based, direct-ascent anti-satellite (ASAT) interceptor against one of their own defunct Feng Yun-1C weather satellites generated considerable concern across the U.S. and international space and related defense communities.

How should capabilities presented by space systems be protected? The U.S. approach to securing and protecting the space domain has been and will continue to be rooted in rational policy making and municipal (i.e., domestic, national) and international law. Long-standing treaties and policy support the peaceful uses of space for civil, commercial, and military purposes. Yet, these may fail in times of conflict. Accordingly, the U.S. cannot wholly depend on passive defensive capabilities, or diplomatic engagement and awareness, to secure itself.

Recognizing the importance of protecting satellites as strategic assets, the U.S. has employed a comprehensive strategy to accomplish this objective since the inception of the Space Age. During the Cold War, hardening military satellites against potential destruction was commonplace, though

"development of specific weapons to target hostile satellites or threats to U.S. satellites was politically eschewed. The U.S. desire to protect its satellites was overridden by wanting to avoid what were considered potentially destabilizing efforts, and what seemed as an inevitable arms race in space."[1] Contemporary and emerging capabilities posed by hostile states and non-state actors now serve as a catalyst for a reappraisal of tools one might employ to achieve deterrence and even defeat such threats.

Considering the complexities of the threat environment, the strategy to assure the U.S. and its allies have access to space capabilities depends on four mutually supportive elements or pillars:[2]

- Global Engagement.
- Space Situational Awareness (SSA).
- Responsive Infrastructure.
- Deterrence and Defense.

Global engagement leverages long-standing approaches to securing and protecting the space domain through recognized international law, policy, and diplomacy. SSA enables the monitoring of environmental factors and prediction of threats essential to decision-making to assure mission success. This allows a policy-maker or commander to differentiate between purposeful attacks and natural environmental hazards; to anticipate space events and clarify intentions; this, in turn, reduces the potential for misperception or miscalculation. SSA also enhances opportunities to avoid disruptive or destructive events. A robust and responsive infrastructure enables a spacefaring nation with the abilities to present agile responses to changes and threats in the space environment to assure viability of systems. Deterrence strategies and approaches are important and inhibit potential attacks by adversaries; however, they do not fully assure access to space. A variety of defenses can complement deterrence by giving tools needed to respond to human-made and environmental threats. In sum, employing these four pillars have in the past and will in the future enable U.S. and friendly space systems to continue to perform their missions for the short and long terms.

With the possibility of space conflict and combat, policy-makers and commanders must balance the benefits with the risks. Decisions to employ this conflict/combat aspect of the fourth pillar of space assurance, deterrence and defense, must not be taken lightly. Given their diversity, deterring, defeating, or eliminating human-made threats will be difficult to achieve. This is the case even though a myriad of combat tactics can be employed against those who attempt to deny access to space capabilities.

When planning to employ space defense strategies and respond to attacks on space systems, decision-makers must consider a particularly important factor – the law. Some rail against any use of force to protect access to space, unmindful of the risk, suggesting such actions could somehow constitute violations of treaty, custom, domestic law, policy, or LOAC. Granted, those who argue against "any use of force" are in a minority, but many do make earnest arguments for significant limitations to space warfare. In contrast, in the military space field only a decade or so ago people talked about Space Control. In fact, Space Control is still one of the four space mission areas discussed in Joint Publication 3-14, *Space Operations* (6 January 2009), and *Counterspace Operations*, Air

[1]Joan Johnson-Freese, "The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control, *INSS Occasional Paper* 30, U.S. Air Force Institute for National Security Studies (INSS), January 2000, p. 1.

[2]The four pillars of space assurance are more fully discussed in James Rendleman, "Space Assurance for the 21st Century," *High Frontier* 5: 2 (February 2009): 46-53.

Force Doctrine Document 2-2 (2 August 2004). Proponents have been arguing that the U.S. should prepare for winning in a contested space domain, a concept described as "space dominance;" this objective has been broadened by advocates to "full spectrum dominance."[3] The current 2006 U.S. National Space Policy precepts and space control doctrine suggest the U.S. should proactively control the environment – to assure access by U.S. and allied systems, defeat threats, and deny adversaries access to their own space capabilities if required.[4] There must be a proper balance of all these divergent interests.

Assuming the U.S. or any other nation believes it is compelled to use force to respond to threats or attacks on its space systems and/or those of its allies, the proposition to be surveyed and examined in this paper is: *what means may a nation lawfully employ to respond to and defeat threats to and attacks on its space systems?*

This paper will examine how relevant treaties, customary law, LOAC, and other legal principles substantially restrict space warfare options, but also reduce the potential for conflict among law-abiding spacefaring nations. We will identify legal principles supporting the right to defend a national or allied space system. Following this, we will apply these principles with a dose of engineering and policy concerns to discuss lawful and unlawful means and methods to prosecute the right of self-defense and to defeat threats to space systems.

Space Capabilities and Threats

Because the complexities of space combat pose significant legal issues, the technical, historical, and policy taxonomies of potential threats and attacks on space systems that could initiate such conflict must be fully understood. A satellite system consists not only of spacecraft, but supporting infrastructure, including ground stations, tracking and control links – commonly referred to as the tracking, telemetry, and control (TT&C) – and data links; launch facilities, supporting infrastructures and the industrial base are also vital. These components are all at risk to threats of physical and cyber attack and sabotage, and can be attacked, disrupted, degraded, or destroyed, simultaneously or each in detail.

Space-based threats to satellites are proliferating as a result of the ever-growing global availability of space technology; states can reach out to space and "touch" satellite payloads and their supporting buses through a variety of kinetic and non-kinetic means; even non-state actors could potentially access some of these technologies and space systems and cause problems. It takes little imagination to envision multiple means by which a satellite payload and/or its bus can be disrupted, degraded, destroyed, or otherwise disabled.[5] Spacecraft are vulnerable to direct ascent weapons as demonstrated by the Chinese ASAT test and also to a variety of other ground-based, airborne, and space-based ASAT systems. These require sophisticated boosters, launch facilities, and high-tech terminal guidance capabilities; this is not an easy system to generate and field without state sponsorship. Direct-ascent launched or orbit-

[3]Dwayne Day, "Space Policy 101," *The Space Review* 15 June 2009, http://www.thespacereview.com/article/1397/1 (accessed January 2010).

[4]*Fact Sheet on U.S. National Space Policy*, National Security Presidential Directive 49, 31 August 2006.

[5]Every satellite has a "payload" and a "bus." The payload contains all the equipment a satellite needs to perform its mission functions. The bus supports the payload and provides electrical power, computers, and propulsion for the entire spacecraft.

based nuclear devices can be detonated, generating energetic electrons and other particles, radiation belts, and other effects that can fry unshielded satellite circuitry over a wide lethal range. Space mines can be deployed in close proximity to satellites or be employed to generate debris clouds that destructively engage whole classes of low Earth orbit (LEO) satellites in the same orbital plane or in crossing orbits, or to create problems among satellites in geosynchronous orbits (GEO). Ground, space-based, or airborne lasers could wreak havoc upon satellite components. Blinding operations could be employed and achieve a variety of effects from a temporary "dazzling" with a laser to permanent burnout of optical or other sensors with an otherwise intense energy burst.

Vital command and control and communications stations, and their links to satellites and each other are also at risk.[6] At a fundamental level, they are vulnerable to classically accepted terrestrial land, sea, or air kinetic attacks, including sabotage.[7] Some unprotected stations, links, and user segments are susceptible to electronic attack that can degrade, neutralize, or destroy their capabilities. These threats and attacks encompass jamming and electromagnetic deception techniques. Jammers disable the means of command and control and data communications, and in this manner render satellites inoperable or unavailable. A variety of jammers emit signals that mask or prevent reception of desired signals; these methods can disrupt unprotected uplinks, downlinks, and even cross-links. Electromagnetic deception and spoofing techniques can be employed to confuse unprepared and unprotected systems; this could include sending false, but deceptively plausible, commands that cause spacecraft to perform damaging or wasteful maneuvers, modify databases or configuration changes, or otherwise destroy it. Similarly, supporting terrestrial ground stations, computer networks, and links are vulnerable to information operation attacks. This could involve executing denial of service tasks, injection of fake commands, malicious software and viruses, unauthorized monitoring and disclosure of sensitive information (data interception), and unauthorized modification or deliberate corruption of network information, services, and databases.

While achieving success would be difficult to achieve and is unlikely, offensive information operations can be undertaken against on-orbit satellites seeking to effect shutdown operations, where an adversary gains access to a satellite's control program and directs it to cease functioning for some length of time. This could be orchestrated to coincide during the initial critical moments of a simultaneous and parallel terrestrial attack, or involve a permanent command to never resume operations. While not physically damaging the satellite, the result would be the same. It would deprive the owner/operator of its use precisely when the system is most needed. Directing a permanent shutdown could cause total loss of for any owner not able to reaccess the platform and override the command. Similarly, an attitude movement could be directed by accessing the satellite's control program, ordering the satellite platform to rotate on its axis, or pointing the mission

[6]Control stations track and control satellites to ensure they remain in proper orbits and properly perform their missions. Communications ground stations process satellite mission data and link that data to ground-based networks and users. TT&C links exchange commands and status information between control ground stations and satellites. Data links exchange mission data between communications ground stations and satellites. These links may pass through ground stations or satellites and relayed as appropriate.

[7]Ground stations are often located in remote and hard to get to places. Orchestrating an attack on them is feasible, though perhaps impractical. Most sites are well protected and the logistics needed to achieve a successful attack could be difficult to assemble.

sensor, communications antennae, receiver, solar cells, or any other directionally-dependant system in the wrong direction. Such an attack would be effective against a satellite whose effectiveness depends on payload and commucication systems pointing at precise transponder and receiver targets, or sensors aimed at a particular area of interest.

A translation movement attack involves directing the activation of a satellite's thrusters and sending the platform into a new orbit. This could also cause loss of the satellite or require the system to expend vital on-orbit resources to correct its position; the expenditure of resources to correct the satellite's orbit or orientation could significantly limit the system's life. The destruction of the satellite could be accomplished by issuing damaging commands to its control program, e.g., to mismanage propellant temperature controls to the point of tank or propellant line rupture.

Lastly, an appropriation or impressment attack involves transfer of control of the satellite system to an adversary. The satellite's control program is accessed and altered, denying the launching state use of its own platform. Worse than mere destruction, the satellite's capabilities are then placed at the disposal of an attacking state.[8]

Given these threats, the 2007 Chinese ASAT test stoked the fires of a long-running debate over whether and how the U.S. and its allies should prepare for space conflict. More terrifying:

> Some have argued that the test is evidence of a lack of communication among various parts of the Chinese government, with the People's Liberation Army (PLA) carrying out the test without the knowledge of the Chinese Foreign Ministry or other parts of the governmnt. "Put bluntly, Beijing's right hand may not have known what its left hand was doing," writes Bates Gill and Martin Kleiber… "This may be a more troubling prospect than anything the test might have revealed about China's military ambitions or arms control objectives."[9]

Moreover, Chinese military strategist, Wang Fa'an, has proposed the PLA set up its own space forces in the future to protect China's growing space assets.[10] However, Chinese capabilities do not pose the only concerns. There have been attacks on space systems by other actors and the U.S. and the global space community have had good reason to take notice. Given the proliferation and diversity of other global threats, China's ASAT test only served to provide an important exclamation point on the specter of space conflict. As observed by retired Congressman Terry Everett in his Fall 2007 article written for *Strategic Studies Quarterly*:

> …In the past few years, we have seen a handful of global positioning system (GPS) and increasing numbers of satellite communications (SATCOM) jamming incidents. In the early stages of Operation Iraqi Freedom, U.S. forces encountered a GPS jamming situation. In this case, precision munitions were used to hit these jamming sources, which allowed our forces to quickly resume operations. We have seen several SATCOM jamming incidents, including Iranian jamming of a U.S.

[8]For a worthwhile overview of potential attacks on space systems, see Thomas C. Wingfield, *Legal Aspects of Offensive Information Operations in Space*, 23 March 2000, pp. 3-4 [unpublished manuscript], http://www.au.af.mil/au/awc/awcgate/dod-io-legal/wingfield.doc (accessed January 2010).

[9]Jeff Foust, "The Chinese ASAT enigma, *The Space Review* 7 May 2007, http://www.thespacereview.com/article/864/1 (accessed June 2009).

[10]Peng Kuang and Cui Xiaohuo, "PLA Should Play Role in Space: Strategist," *China Daily*, 16 June 2009.

> satellite from Cuba in July 2003; ongoing jamming by Iran against PanAmSat Corporation, Asia Satellite Telecommunications Co. Ltd., Arab Satellite Communications Organization, and Eutelsat S.A. from June 1997 to July 2005; and Libyan jamming of two international SATCOM systems in December 2005. Last fall it was reported that a Chinese ground-based laser illuminated a National Reconnaissance Office intelligence-gathering satellite. What is most troubling is that these attacks are coming during a period of widespread use of GPS, satellite communications, and space-based imagery.
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> …There is a spectrum of potential threat capabilities looming on the horizon to include electronic jamming, low-power laser blinding, high-energy lasers, microsatellites, direct-ascent ASATs, cyber attacks, physical attacks to ground stations, and possibly even a nuclear explosion. These threats can target satellites in orbit; their communications links to and from the ground; and their ground-based command, control, and receive stations. All produce the same general result – they render our space capabilities temporarily or permanently useless. Many of these anti-satellite technologies exist today, and many are dual-use in nature, including a microsatellite that could be used as an experimental spacecraft or, with a simple command, could shadow or collide with another satellite.
>
> Space is no longer a sanctuary. Those who wish to challenge America's role in the world increasingly recognized the strategic importance of space and are more willing to deny us freedom of action in space by employing a wide range of methods.[11]

In sum, the contemporary, emerging threats to space systems posed by hostile states and non-state actors are fundamentally different from that experienced during the Cold War. Vulnerabilities span the whole of the space community, and these weaknesses have been studied by adversaries to the U.S. and its allies. These adversaries are now much more diverse, sophisticated, and technologically competent; they are equipped and able to disrupt space activities. Defending space assets demands new tools as deterring or eliminating evolving threats will be difficult.

Securing the High Frontier of Space

U.S. law and policy place great emphasis on diplomacy and international engagement; it is a centuries-old practice that has secured borders, enhanced commerce, and brokered and resolved disputes. Assuming adversaries, and friends, pay heed to customary and treaty-based provisions of international law, the global engagement pillar of space assurance affords the space community a respectable measure of confidence they can all have assured access to space. Even so, given the present minimal international law restrictions on space activities, smart decision-making is also vital to operate safely and securely. The complete span of international legal, policy, diplomacy, and engagement implications should therefore be fully considered when planning for and executing space assurance activities. The U.S. has done this for decades; it has applied significant experience and

[11]Terry Everett, "Arguing for a Comprehensive Space Protection Strategy," *Strategic Studies Quarterly* (Fall 2007): 23-24, citing Jim Garamone, "CENTCOM Charts Operation Iraqi Freedom Progress," *American Forces Press Service*, 25 March 2003; Major General William L. Shelton, commander, 14th Air Force, "Update on Space Operations," Air Force Association National Symposium on Space, Beverly Hills, California, 17 November 2006; Warren Ferster and Colin Clark, "NRO Confirms Chinese Laser Test Illuminated U.S. Spacecraft," *Space News 2* October 2006; and Office of the Secretary of Defense, *Military Power of the People's Republic of China 2007*, Annual Report to Congress (Washington, DC: Department of Defense, 2007).

wisdom to prepare for and take care of threats posed by ASAT and other systems for the entirety of the Space Age.

What are the applicable foundations of international law? First, treaties and other bilateral agreements to which sovereign states are signatories, and which govern issues of interest; and second, multinational agreements among sovereigns. International agreements are governed, not by contract law, but by the *Vienna Convention on the Law of Treaties*.[12] Under the *Vienna Convention*, states can do anything they want and agree to, unless what is contemplated violates a peremptory norm (i.e., a fundamental principle of international law that is accepted by the international community of states as a norm from which no derogation is permitted). While the U.S. has not ratified the *Vienna Convention*, it treats the bulk of its rules as compelling under customary international law, which is a third foundation of international law. The fourth foundation deals with general principles common to mature legal systems. And the fifth, deals with the subsidiary "municipal" determinations of law (e.g., national decisions, such as those rendered by the U.S. Supreme Court).[13]

International law is an integral part of the U.S. legal system. Its founding fathers convened at the 1787 Philadelphia Constitutional Convention to revise the unwieldy and moribund Articles of Confederation; the impetuses for their meeting were intractable commercial, trade and defense issues, also important in the international arena. The framers knew international law existed, its importance, and the document reflects this. The Constitution, Article I § 8, Clause 10 sets out in pertinent part: Congress has the power "to define and punish offenses… against the Law of Nations." Treaties are concluded under the authority of the Constitution, Article II § 2, Clause 2 , which declares the President "shall have Power, by and with the Advice and Consent of the Senate, to make treaties, provided that two-thirds of the Senators present concur."[14] Article VI, Clause 2 provides: "…all Treaties made, or which shall be made, under the Authority of the U.S. the name of the U.S., shall be the supreme Law of the Land."[15] Generally, treaty terms take precedence over conflicting U.S. statute terms.[16]

With relatively few treaty restrictions governing activities in space for military or other purposes, some might think the U.S. is faced with a dilemma – should it only abide by a permissive "letter of the law" standard or the "spirit of the law"? If only the letter of the law, what approach should it want to see adopted by current or fledging space nations? Actually, the choice is not between the letter and spirit of the law; on the whole, the U.S. abides by both standards. Decades of senior policy-makers within the Executive and Congressional branches of the U.S. Government have recognized the importance

[12]See *Vienna Convention on the Law of Treaties*, 23 May 1969.

[13]Article 38 of the *Statute of the International Court of Justice* defines its sources. See Nathaniel Burney, "International Law: A brief primer for information purposes only," http://www.burneylawfirm.com/international_law_primer.htm (accessed January 2010).

[14]Under international law, the terms "treaty" and "international agreement" are synonymous, although the terms do have different meanings within the U.S. Department of Defense (DOD). DOD Document 5530.3, *International Agreements*, 11 June 1987, Enclosure 2, defines "international agreement" more broadly, to include agreements between lower levels of nations' governments (e.g., the U.S. Departments of Defense) that are under the umbrella of a treaty, but have not themselves been ratified ("advice and consent") by the U.S. Senate.

[15]Customary law is not part of the "supreme Law of the Land" though some U.S. Supreme Court Justices are now making some rather disconcerting noises about incorporating portions of such law into the U.S. constitutional system.

[16]The major exception to this is when Congress intends for a later statute to override the conflicting treaty provision.

of the domain; assessed risks associated with not providing measured and calm global leadership to preserve access to it; and made decisions in accord with those assessments.[17] In turn, the U.S. encourages comparable policy-making by other states of the global community.

As it executes global engagement activities, the U.S. has been and will be on the receiving end of criticisms and exhortations that it does not follow the spirit of the law when refusing to accede to new agreements, standards, rules, and practices affecting space activities. But this refusal involves instruments whose terms lack precision, are unverifiable, fail to comprehensively address issues, or place the U.S. and its allies' defense and economic security interests at risk. These critiques must be expected in the rough and tumble of the global stage, where each state jockeys for its own national or regional advantage.

Treaties, conventions, and agreements already in force regularize space activities despite their minimalist nature. As such, they help protect capabilities of systems that have been or are about to be placed on orbit. Bilateral and multilateral arms control treaties also preserve some of the sanctuary aspects of space by prohibiting "interference" with "national technical means" (NTMs), which can include missile warning and reconnaissance satellites used to verify treaty compliance. Confidence-building procedures have been agreed to and these have improved opportunities for transparency between potential adversaries, perhaps improving dialogue to prevent any dispute from devolving or escalating into armed conflict or to a nuclear catastrophe. Other treaties and conventions, such as those involving the International Telecommunications Union (ITU) address vexing spectrum management issues, which have profound impacts on military, civil, and commercial space systems. The ITU presently attempts to equitably reconcile the explosion of information technologies, exponential user growth and needs, all within nature's limited useable bandwidth in the electromagnetic spectrum.

The *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies* of 1967, or the Outer Space Treaty (OST) as the treaty is informally known, forms the basis for much of international space law, including its important legal principles and prohibitions. Under the treaty, all nations share the global space commons; notably, it is also an important foundation of the entire U.S. military, civil, and commercial space programs. The treaty was consummated at a time when U.S. policy-makers concluded space offered unique benefits for the military and political dimensions of the Cold War national security strategy. They hoped to fashion an agreement to preserve access to the domain, and these motivations and the document have endured and continue to serve the U.S. and its allies' national interests. Assuming the mantel of the world's leading spacefaring nation, the U.S. helped lead the way on discussions relating to the treaty's formation, crafting the treaty instruments, and forging a global consensus to set a tone and worldview that space activities should be prosecuted for peace and the benefit of mankind.

[17]While diplomatic engagement has been helpful, there is an element of risk in relying solely on it to assure access to space capabilities. Enforcement mechanisms for violating treaties and agreements relating to space are rather limited. There are no specific enforcement mechanisms in place to address violations of space related treaties, and this increases the risk of depending on such documents and handshakes to protect or assure access to space. Violations of treaties and other agreements should nominally be responded to through economic means and diplomatic consultation, and if necessary, other sanctions, assuming a nation or some part of the global community agree to them.

As a signatory to the OST, the U.S. supports freedom of access to space by all spacefaring powers, agreeing to treaty language that provides: "Outer space …shall be free for exploration and use by all States without discrimination of any kind…"[18] The treaty also declares nations should have "freedom of scientific investigation in outer space." Addressing topics that affect the potential for space conflict, the OST provides that international law applies. "…Article III [of the OST] incorporates the application of international law, and specifically the Charter of the UN, in outer space, making it a vital part of the *corpus juris spatialis*."[19] This incorporation of international law, not just the UN Charter, is important and guiding.

Every major spacefaring nation is a signatory to the OST. Rights and obligations of non-signatories can be found in international customary law. Customary international law "...consists of rules of law derived from the consistent conduct of States acting out of the belief that the law required them to act that way."[20] OST signatories can look to both treaty and customary law sources, as customary law may be applied whether or not a state is a treaty party. The vast majority of the world, including the U.S., accepts in principle the existence of customary international law even though there are often differing opinions as to what rules are contained in it. Article 38(1)(b) of the Statute of the International Court of Justice (ICJ) acknowledges the existence of customary international law, and the ICJ rules are incorporated into the UN Charter by Article 92, which sets out in pertinent part: "The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply...international custom, as evidence of a general practice accepted as law."[21]

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Customary international law is something done as a general practice – not because it is expedient or convenient, but because it is considered law, arising out of a sense of legal requirement. According to Shabtai Rosenne, there are three elements that must be satisfied before one can conclude a rule is part of customary international law. First, a rule can be discerned by a widespread repetition by states of similar international acts over time (state practice); second, the acts by states related to the rule must occur out of a sense of

[18]See *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* (Outer Space Treaty).

Article I – "The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind. Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies. There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation."

Article III – "States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the UN, in the interest of maintaining international peace and security and promoting international co-operation and understanding."

Article IV – "States Parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner…"

[19]P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis,*" IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008.

[20]Shabtai Rosenne, *Practice and Methods of International Law* (Oceana Publications, July 1984), p. 55.

[21]UN Charter, Article 92.

legal obligation; and third, these acts must be taken by a significant number of states and not be rejected by a significant number of states. A marker of customary international law is consensus among states exhibited by widespread conduct together with a discernible sense of obligation.[22]

Under customary international law, what is done, written, or said can establish legal precedent. But not always as such matters do not usually undergo examination in a courtroom setting. This presents an opportunity for mischief, even if only in a diplomatic drama. This explains why U.S. policy-makers feel compelled from time-to-time to rein-in senior officers and officials who speak out on topics or matters related to space security, space conflict, or other important issues before a decision has been made by the entire U.S. national security policy community. Uncoordinated speeches, doctrine, concepts of operations, and other instruments can have a corrosive effect on the formation of space policy. They can, unwittingly, establish policy and potentially legal precedent in advance of a comprehensive interagency consensus. While fundamental principles of good faith and equity apply in international law, no seemingly innocuous comment goes unpunished. Actions and words can have a legal, policy, and diplomatic effect – even where no specific legal document or other agreement memorializes them.

Under customary international law, what is done, written, or said can establish legal precedent.

Three concepts apply to the formulation of customary law – recognition, acquiescence, and estoppel. According to Malcolm Shaw:

> Recognition is a positive act by a state accepting a particular situation, and even though it may be implied from all the relevant circumstances, it is nevertheless an affirmation of the existence of a specific factual state of affairs even if that accepted situation is inconsistent with the term in a treaty. Acquiescence, on the other hand, occurs in circumstances where a protest is called for and does not happen, or does not happen in time in the circumstances. In other words, a situation arises, which would seem to require a response denoting disagreement, and since this does not transpire, the state making no objection is understood to have accepted the new situation. The idea of estoppel in general is that a party, which has made or consented to a particular statement upon which another relies in subsequent activity to its detriment or the other's benefit, cannot thereupon change its position.[23]

Provocative or unintentional jamming or dazzling incidents involving space systems may require immediate response and even protest, or a state may risk a determination in customary law that it has acquiesced to the events.

Estoppel involves a legal concept "whereby states deemed to have consented to a state of affairs cannot afterwards alter their position."[24] As an example, State Party A states something to induce an expectation, stating: "Party A will monitor the space environment and warn all spacefaring nations of potential space collision threats." Though

[22]Shabtai Rosenne, *Practice and Methods of International Law* (Oceana Publications, July 1984).

[23]Malcolm Nathan Shaw, *International Law* (Cambridge University Press, 5th Edition, 2003), p. 437.
[24]Ibid., p. 439.

no specific agreement is made with Party A for the provision of such services, State Party B justifiably believes Party A's statements that Party A will employ its SSA capabilities as stated. Party B refrains from securing such tools, and relies on Party A in operating its space systems. Assuming a Party B satellite is damaged by a collision to which Party A had the sufficient resources and specific information to warn of the problem, then the doctrine of estoppel could offer Party B some possible legal or diplomatic recourse.

The classic example of actions having legal effect or precedent in the space context is the launch of the Sputnik satellite system over a half-century ago. This launch established the legal precedence and customary international law for free passage of space systems and over-flight rights while on-orbit. Some suggest that President Dwight Eisenhower directed a slowing of pending U.S. space launch activities so the Soviets could successfully launch first, allowing their actions to establish customary over-flight rights. According to Nancy Gallagher and John D. Steinbruner:

> A 1950 RAND report that has been called "the birth certificate of American space policy" underscored the practical importance of legal justification. The report emphasized the "vital necessity" of improved intelligence about the closed Soviet Union, but cautioned that because the existence of spy satellites could not and should not be kept secret for long, creating a favorable context in which to use the new technology would be just as important as developing the capability itself. The authors recognized that reconnaissance satellites would pose a dilemma for Soviet leaders, who would see the loss of secrecy as a major violation of sovereignty and a quasi-permanent threat to security. But U.S. satellites would be too high to shoot down, at least initially, so Soviet response options would be limited to legal and diplomatic protests, attacks on ground stations, or total war. If the U.S. paid careful attention to political and psychological issues associated with space technology, the RAND report argued, it could constrain the Soviet counter reaction, strengthen deterrence, reduce Politburo resistance to international inspections of atomic installations, and possibly elicit a radical reorientation of Soviet behavior along more cooperative lines.
>
> To establish a favorable political context and set a precedent that could be used to legitimize future reconnaissance satellites, the Eisenhower administration decided to start by launching a scientific satellite even though military alternatives would have been ready sooner. The launch coincided with the International Geophysical Year, and the satellite, launched using a modified research rocket, was placed in an orbit that would not traverse the Soviet Union. The U.S. decision to wait until it could launch a scientific satellite allowed the USSR to create a public sensation by being the first country to launch a man-made satellite, but one of Eisenhower's military advisors remarked that the Soviets "had done us a good turn, unintentionally, in establishing the concept of freedom of international space." That judgment reflected an appreciation that space could not be physically controlled by military force in the manner that territory on Earth or the airspace over it is controlled.
>
> Some accommodation in space for mutual benefit would be necessary even in the context of global confrontation. Khrushchev appeared to have recognized this logic, as well. After the Soviets shot down an American U-2 reconnaissance plane in May 1960, Charles de Gaulle asked about cameras in the Sputnik orbiting over France, and Khrushchev said that he objected to airplane

> overflights, not satellite-based surveillance.[25]

The Eisenhower Administration's objective to obtain universal acceptance of the concept of satellite free passage and overflight rights was more fully achieved years later when these customary law principles were included in the OST. In the meantime, statements of such principles were presented and discussed within various global community and UN forums, and can be found in a number of disparate documents including the 1958 National Aeronautics and Space Act, and UN General Assembly resolutions.

Free passage and overflight rights continue to be matters that warrant interest. This is an important issue as air space is subject to sovereignty rules; in contrast, signatories to the OST make no such claims on outer space. If violated, this may justify self-defense or reprisal responses by objecting states, especially with regard to spacecraft and related equipment transiting what would traditionally be considered air space during spacelift or de-orbit mission phases. Current international community treaty and customary law treatments of free passage and overflight rights have been pushed to the limits by the rogue North Korea bogeyman. North Korea arguably exploits the rules to facilitate and prosecute provocative ballistic missile development activities. It has launched long-range ballistic missiles over the Japanese Islands, but claims its launches are part of developing a new satellite system. The North Korean April 2009 launch has contributed to the controversy.

> North Korea claims that the mission was a peaceful attempt to launch a communications satellite into orbit, but the image suggests otherwise, according to Geoffrey Forden, a physicist and arms-control analyst at the Massachusetts Institute of Technology. Forden triangulated the trajectory of the rocket using the contrail in the image, the position of the satellite taking the picture, and North Korea's declared 'splashdown zones' for the first and second stages.
>
> Based on his analysis, the TD-2's [Taepodong 2] course appears to be too shallow to be a space launch. To reach orbit, Forden says, the rocket should have been travelling almost vertically in an attempt to gain altitude early on in its flight. Instead, it appears to be pitching horizontally, sacrificing height for distance in a trajectory that would allow it to sling a warhead as far as possible. Such a trajectory could be consistent with that of an intercontinental ballistic missile (ICBM).[26]

Presenting a threat to peace, the North Korean ballistic missile and nuclear proliferation activities have been deemed violations of UN Security Council Resolution 1718, which demands the country not conduct new nuclear tests nor launch a ballistic missile.[27] Nevertheless, North Korea, who only recently acceded to the OST on 3 May 2009, insists its April 2009 rocket launch is part of an effort to

[25]Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, American Academy of Arts and Sciences, Reconsidering the Rules of Space Project, Cambridge, Massachusetts, 2008, pp. 7-8. The adviser was Donald Quarles, Eisenhower's assistant secretary of defense for research and development. See A. J. Goodpaster, "Memorandum of Conference with the President," 8 October 1957, Dwight D. Eisenhower Presidential Library. Also, see Dwight D. Eisenhower, *Waging Peace* (Doubleday, 1965), p. 556; and George B. Kistiakowsky, *A Scientist at the White House* (Harvard University Press, 1976), p. 334. "In other settings, the Soviets did not initially distinguish between satellite and aerial overflights and denounced both as an illegal infringement on national sovereignty." See Gerald Steinberg, *Satellite Reconnaissance: The Role of Informal Bargaining* (Praeger, 1983), pp. 26–29.

[26]Geoff Brumfiel, "Analysts spar over launch image", *Naturenews* 8 April 2009.

[27]Joanne Irene Gabrynowicz, "Satellite spots activity at North Korean missile site, officials say," *Res Communis* 29 March 2009, http://rescommunis.wordpress.com (accessed March 2009).

put a satellite in orbit; it argues this activity falls under the treaty's allowances that outer space "shall be free for exploration and use by all states without discrimination of any kind."[28] The argument has gained traction in parts of the global community. China has refused to condemn the launches asserting North Korea has the right to peaceful use of space.[29] Even Japan agrees North Korea has a right to a space program, "but only after it denuclearized and no longer posed a threat."[30]

"The Korean communist regime has been careful to follow the spirit of the treaty, keeping the world appraised of its plans, unlike its unannounced missile launches in 1998 and 2006."[31] In asserting its rights to launch a satellite, North Korea notified the International Civil Aviation Organization and International Maritime Organization that it intended to launch an "experimental communication satellite."[32] It also made a notification of the launch in accord with the Registration Convention.[33] Despite these efforts, and underscoring the potential for an underlying deception, North Korea did not follow all necessary international procedures for launching a satellite:

> The Radio Regulations of the International Telecommunication Union (ITU), to which North Korea also belongs, stipulates that the launch of a communications satellite needs to be announced in advance. The regulations also require member states to give prior notice of a satellite's operating frequency, its orbital location and other information to the ITU two to seven years before a satellite goes into use. However, North Korea did not give such prior notice to the ITU, the sources said.[34]

The North Koreans protest that they are only engaged in *peaceful* space activities. Yet they make bellicose threats of dire consequences for any one attempting to interfere with them or other state activities. These mixed signals complicate planning for potential missile defense intercepts of these launched systems, since the U.S., its allies, and most nations subscribe to the free passage rules for space. The U.S. does not want to be seen as denying that right even if the complaining nation is involved in a ruse.

Beside the North Korean launches, other proposals related to free passage remain in controversy, and could also be sources of conflict involving space systems. For example, some argue for a new legal definition for the demarcation between a country's air space (Earth's atmosphere) and outer space. The U.S. does not officially accept a specific "boundary;" instead, it employs a functional approach to assert space-related free passage and transit rights. Unfortunately, if boundaries for the definition of space are strictly defined sometime in the

[28]Joanne Irene Gabrynowicz, "North Korea launch a test for international law", *Res Communis* 2 April 2009, http://rescommunis.wordpress.com (accessed April 2009).

[29]"China says North Korea has right to peaceful use of space," *The China Post* 8 April 2009.

[30]"Japan Says North Korea Space Program OK after Denuclearization," *Space War* 7 April 2009, http://www.spacewar.com/reports/Japan_Says_NKorea_Space_Program_OK_After_Denuclearisation_999.html (accessed April 2009).

[31]Joanne Irene Gabrynowicz, "North Korea launch a test for international law" *Res Communis* 2 April 2009, http://rescommunis.wordpress.com (accessed April 2009).

[32]Joanne Irene Gabrynowicz, "North Koreans have notified several UN agencies that they plan on launching", *Res Communis* 12 March 2009, http://rescommunis.wordpress.com, quoting, Robert Wood, U.S. Department of State, Daily Press Briefing – March 12 (accessed March 2009).

[33]Joanne Irene Gabrynowicz, "North Korea Accedes to Registration Convention", *Res Communis* 11 March 2009, http://rescommunis.wordpress.com (accessed March 2009).

[34]Joanne Irene Gabrynowicz, "North Korea 'ignored satellite procedures'", *Res Communis* 8 April 2009, http://rescommunis.wordpress.com, citing The *Daily Yomiyuri* (accessed April 2009).

future by action of treaty or through customary international law development, this could dangerously affect necessary space-related rights. The development of customary law on the subject of free passage and transit rights has been described by Isabella Diederiks-Verschoor:

> Some seem to accept silent acquiescence as sufficient ground for the existence of a rule of custom, others feel that explicit recognition is an essential requirement… Clearly, the crux of the matter centers around the element of 'recognition' as evidence of acceptance of a specific practice, and the form such recognition can take.
>
> …Van Bogaert considers it an essential necessity that states show 'by diplomatic intercourse' that they recognize a certain norm as legally binding. Custom inevitably implies a certain period of time, but Van Bogaert feels that there is no need for a practice to be long-lasting, provided recognition is properly signaled. He also notes that it might be logical to consider approval by the UN General Assembly as an expression of such recognition.
>
> As regard to the time factor, Judge Lachs of the International Court of Justice agrees that that a short period of time is not in itself a bar to the formation of a new rule of customary law. He suggests that a kind of 'right of innocent passage' has evolved on the basis of reciprocity, pointing out that on a number of occasions states engaged in space activities, which did not inform other states of their plans to launch space objects or ask permission to pass through the airspace of other states, did not meet objections from the states concerned, nor did those states reserve for themselves the right to object to such flights.
>
> The debate on this matter has hitherto remained entirely academic: both the USA and the former USSR, responsible as they are for most space object launchings, have always been careful to carry them out from their own territories, and no protests have ever been recorded in respect of any launchings, wherever they took place. However, as Wassenbergh observes, 'There is not a right of instant customary international law that space objects can "freely" transit through foreign airspace. The fact that in practice so far no objections have been raised against foreign space objects transiting a State's airspace is no reason to refer to a customary right of transit, as too few States are considered to be confronted with such transit (and none have been), and no *opinion juris* with respect to such practice has been pronounced as yet.
>
> Even if a right of transit for space objects through the airspace of foreign countries is universally agreed upon it will always have to be subject to guarantees of safety and security.
>
> All this leads you to conclude that customary law is already playing a significant role in space law, and that states have evidently found it necessary, if not expedient, to abide by its rules.[35]

Some proponents argue space should be defined as beginning at 100 kilometers (km) above sea level. This is known as the Kármán Line, calculated by and named for Theodore von Kármán. This demarcation has been accepted by the Fédération Aéronautique Internationale (FAI).[36] However, if adopted by action of treaty or customary law, returns of U.S. and allied spacecraft could be threatened. The threat would not be limited to just purely military systems, as civil and commercial systems would be put at risk. The Soviet

[35]See Isabella Henrietta Philepina Diederiks-Verschoor, *An Introduction to Space Law* (Kluwer Law International, 1999), pp. 11-12.

[36]See "The 100 km Boundary for Astronautics," Fédération Aéronautique Internationale Press Release, 24 June 2004, http://www.fai.org/press_releases/2004/documents/1204_100km_astronautics.doc (accessed June 2009).

Union reserved the right to shoot or bring down aircraft in its airspace, and did so with alarming and tragic deadly effect for Korean Air Lines 007 during the early 1980s, and with other highly publicized commercial aircraft incidents. Given the risks, the U.S. and its allies might be forced to employ deterrence strategies and/or prepare for conflict if a state wanting adoption of the Kármán Line also threatens spacecraft that cross below it above their territory. Given these complications, the U.S. has not agreed to the definition.

Another important legal concept, the peremptory norm (also called *jus cogens*, Latin for "compelling law"), affects state and non-state actor obligations with regard to space conflict. The concept is related to, but differs, from customary law. The peremptory norm is a principle of law from which no violation is permitted, even by treaty. "Unlike ordinary customary law that has traditionally required consent and allows the alteration of its obligations between states through treaties, peremptory norms cannot be violated by any state."[37] Under the *Vienna Convention*, any treaty that conflicts with a peremptory norm is void.[38] New peremptory norms can develop under the Convention,[39] but the document does not itself specify any specific norms or how they are developed or created.

Peremptory norms have not been fully itemized, but they include injunctions against waging aggressive war, crimes against humanity, war crimes, maritime piracy, genocide, apartheid, slavery, and torture. These norms have arisen out of case law and changing political policy-making attitudes, and can be found where there is a clear international disapproval of specific practices or acts.

There is some disagreement over how peremptory norms should be acknowledged and put into force. The relatively new concept conflicts with the traditional consensual nature of treaty and customary international law that ensures state sovereignty. According to Rafael Nieto-Navia, there are three pre-requisites (some a bit tautological in nature) for a norm to be "elevated" to the status of a norm of *jus cogens*.[40] First, the peremptory norm must be a norm of general international law. General international law is international law binding on most, if not all, states; however, not all facets of general international law have the character of *jus cogens*. The rules do not exist "to satisfy the need of the individual states, but the higher interest of the whole international community…"[41] This need can be seen in rules created to achieve humanitarian purposes.

Second, the norm must be "accepted and recognized by the international community of States as a whole."[42] Accepting and recognizing a norm within the international community can be either express or implied. Ascertaining the minimum breadth necessary for acceptance is subject to debate; the international community tries to avoid situations whereby one or a few rogue states can effectively negate any decision to designate a norm as peremptory. Thus, a norm can be considered as *jus cogens* if it is accepted and recognized by the international

[37]U.S. Legal Definitions, "Peremptory Law & Legal Definition," http://definitions.uslegal.com/p/peremptory (accessed January 2010).

[38]*Vienna Convention on the Law of Treaties*, Article 53.

[39]"Emergence of a new peremptory norm of general international law (jus cogens): If a new peremptory norm of general international law emerges, any existing treaty which is in conflict with that norm becomes void and terminates." See *Vienna Convention on the Law of Treaties*, Article 64.

[40]Rafael Nieto-Navia, "International Peremptory Norms (Jus Cogens) and International Humanitarian Law," 2003, http://www.iccnow.org/documents/WritingColombiaEng.pdf, (accessed June 2009), p. 10.

[41]Ibid.

[42]Ibid.

community of States as a whole; consent of all states is not required (similar in the way in which principles of general customary international law are formed). In this way, norms of *jus cogens* can be drawn from the traditional sources of international law – treaties, international custom, and the like.[43]

It is a well-accepted principle that treaties do not bind non-parties without their consent. Nieto-Navia contends that exceptions to this principle are those conventions or treaties whose objects and purposes render them *more important*. Ultimately, if provisions of treaties or conventions satisfy the *more important* criteria to be recognized as *jus cogens*, states not party to them will also be bound by their provisions. Of course, a large portion of international law remains customary in nature and treaties often only codify the existing customary law rules, and do not establish peremptory norms.[44]

Without question, international law undergoes continuous change and is constantly evolving.

As a third prerequisite, the norm must be one from which no derogation is permitted. It can be modified only by a subsequent norm of general international law of the same character. This "is in fact the main identifying feature and "essence" of a norm of *jus cogens*."[45]

Nieto-Navia suggests it is possible to classify norms that are not subject to derogation by treaties or otherwise. These are: norms that have a fundamental bearing on the behavior of the international community of states as a whole and from which no derogation is permitted at all; norms which are necessary for the stability of the international juridical order; norms having humanitarian objects and purposes including certain principles of human rights and international humanitarian law; norms of general interest to the international community as a whole or to international public order; and norms, which are binding on all new states even without their consent as being established rules of the international community.[46]

Without question, international law undergoes continuous change and is constantly evolving. This means new norms of *jus cogens* should at least in theory continue to develop with respect to the law of space systems, their operations, and space warfare. Examples of acts being contrary to the norms of *jus cogens* would appear to include interfering with some important space systems, especially those presenting NTM, missile warning, emergency communications, and even PNT capabilities.

Space-borne NTMs serve an important role: assuring adversaries that they have complied with arms control treaty terms; providing transparency, enhancing confidence in actions of others, and diffusing tensions; and helping stem the potential of a nuclear holocaust, which would produce a catastrophe whose damaging effects would be global in nature. Reserving access to such NTM systems by antagonists would therefore appear to be a peremptory norm; hence, this would proscribe any attacks on such systems to destroy, disable, or otherwise interfere with them. Proscribing such attacks would satisfy the higher needs and general interest of the whole international community.

Interestingly, the term "National Technical Means" (NTMs) was not specifically defined

[43]Ibid., pp. 10-11.
[44]Ibid., p. 11.
[45]Ibid., p. 12.
[46]Ibid., pp. 12-13.

and detailed in the original Anti-Ballistic Missile (ABM) Treaty, nor in subsequent arms control treaties. Some argue this could lead to a finding that if satellite systems were not specified and described fully in the treaty they should somehow not warrant the treaty's protection.[47] While not specific, the "NTM" term references the variety of land, air, sea, and space technologies and systems that can be used to monitor and verify treaty compliance. If the treaty's language could be interpreted to disallow classifying of any system as an NTM, even a space system, then the provision barring interference would appear to have no meaning or effect. Nothing in the record supports such a result as the intent of the signatories. The *Vienna Convention* holds that treaties are to be interpreted "in good faith"[48] and "ordinary meaning given to the terms of the treaty in their context and in the light of its object and purpose."[49] Consent may be implied if the other parties fail to explicitly disavow an initial unilateral interpretation, particularly if that state has acted upon its view of the treaty without complaint. For the purposes of this discussion, satellite systems can be employed to monitor treaty compliance and thus can be classified as NTMs.

Indeed, this point was raised in a formerly classified document, where the late Secretary of Defense Melvin R. Laird argued the U.S. should acknowledge:

> …the fact that national technical means of verification for the U.S. and the USSR include satellite based reconnaissance. We should further state that all our legitimate national technical means, including satellite based reconnaissance, taken together, give us confidence that we can verify compliance with the provisions of these agreements within satisfactory limits… the fact of U.S. satellite reconnaissance is widely known. I believe that acknowledging this fact in connection with the strategic arms limitation agreements has the important advantage of muting possible adverse reaction…[50]

The Russian and the U.S. positions on limiting interference with NTMs have been set out in treaty and agreement. China, Canada, the United Kingdom, France, and other significant spacefaring powers have made pronouncements condemning interference with such systems, and supporting the transparency efforts. A norm that favors protection of spaceborne NTMs should be supported at least by global spacefaring nations, if not the international community of states as a whole; no overarching alternate norm, stripping these protections, has been proposed.

Similar arguments can be made with regard to spaceborne missile warning and emergency communication capabilities that these should not be attacked or interfered with. These systems would help adversaries to understand,

[47]Peter L. Hays suggests that the language of the ABM Treaty "clearly stops well short of being a blanket anti-satellite (ASAT) weapons ban or even a clear approval of all spying from space." He argues: "it is questionable just how much protection or legitimization it provides for NTM or satellites more generally." See Peter L. Hays, "U.S. Military Space: Into the Twenty-First Century," *INSS Occasional Paper* 42 (U.S. Air Force Institute for National Security Studies (INSS) and Air University Press, 2002), p. 58.

[48]"Every treaty in force is binding upon the parties to it and must be performed by them in good faith." See *Vienna Convention on the Law of Treaties*, Article 26.

[49]"A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose." See *Vienna Convention on the Law of Treaties,* Article 31.1.

[50]See Melvin R. Laird, "Memorandum for Assistant to the President for National Security Affairs, Subject: Revelation of the Fact of Satellite Reconnaissance in Connection with the Submission of Arms Limitation Agreements to Congress," 8 June 1972, http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB231/doc02.pdf (accessed January 2010).

manage, and limit the extent of damage associated with exchanges of weapons of mass destruction, all to the benefit of the global community. Arguments that peremptory norms proscribe attacks on space-based PNT capabilities could also be made. Proponents for this position would be bolstered by demonstrating the dimensions of the effects and global chaos that could occur in the commercial and civil communities as a result of the destruction of these capabilities. While these arguments are less compelling from ones tied to preventing conflict with weapons of mass destruction, they could be made just the same and, perhaps, accepted.

No matter their importance, it would seem NTMs and/or other systems would warrant less protection if their mission payloads become blended with other more active, non-protected warfighting functions (e.g., supporting integrated fire control and targeting functions for missile defense, or deploying spacecraft platforms or collocating command and control stations that involve a myriad of payloads, not just protected missions and payloads, but other militarily important payloads). If a peremptory norm applies, this could complicate national security space system acquisition and operational strategies, limiting how systems could be configured, in order to preserve any *jus cogens* protection rights. Since NTMs and other systems are usually employed to support a wide variety of warfighting missions, this reality could swallow whole the concept of a peremptory norm protecting them, unless their mission attributes and operations are carefully restricted. Protections for such blended systems would need to be found elsewhere in treaty or customary law.

Peter Hays spotted this problem when he posed the following questions and suggested the ABM Treaty might not provide protected status to some spy satellite activities:

> How are the parties to judge whether space-based NTM are engaged in legitimate treaty compliance verification or in general espionage and how much noninterference should they be given in either case? An ASAT attack on space-based NTM attempting to verify compliance with the treaty would surely constitute "interference," but how about lesser levels of nondestructive interference such as laser "dazzling?" What about interference that takes place in portions of the orbit that do not pass over the territory of the treaty signatories? Based on these questions and despite the NTM protection these provisions were often alleged to provide in the heyday of détente, the provisions in the ABMT [ABM Treaty] should not be seen as constituting an ASAT prohibition or as granting a strong and specific level of legal protection for NTM at all times. Even more importantly, the amount of "protection" this language provides for all other civil, commercial, and military space systems – including commercial remote sensing systems that might or might not be performing NTM missions – would seem to be even more tenuous.[51]

Treaties and Customary Law

Article III of the OST declares that states parties must conduct their space activities "in the interest of maintaining international peace and security." The treaty's preamble also recognizes "the common interest of all mankind in the progress of exploration and use of outer space for peaceful purposes."[52]

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[51]Peter L. Hays, "U.S. Military Space: Into the Twenty-First Century," *INSS Occasional Paper* 42 (U.S. Air Force Institute for National Security Studies (INSS) Air University Press, 2002), pp. 58-59.

[52]Article IV places the "peaceful purposes" restriction on the Moon and other bodies; it suggests that States may engage in non-peaceful activity in space as long as it does not occur on a

Though crafted before the space era, a careful reading of the UN Charter shows its terms are fully consistent with and encourage peaceful space activities. The first purpose of the UN is to "maintain international peace and security, and to that end: to take effective collective measures for the prevention and removal of threats to the peace, and for the suppression of acts of aggression or other breaches of the peace, and to bring about by peaceful means, and in conformity with the principles of justice and international law, adjustment or settlement of international disputes or situations which might lead to a breach of the peace."[53]

The UN and its 1945 Charter arose out of the ashes of the League of Nations and failures of the international community that led to World War II. Despite its inadequacies, the League helped establish the groundbreaking *Kellogg-Briand Pact* of 1928, also known as the Pact of Paris – this treaty is continues in force today. In Kellogg-Briand, the signatories condemned recourse to war as a solution to international controversies, and renounced it as an instrument of national policy in their relations among each other. It proscribed the threat and use of force in contravention of international law, and territorial acquisitions resulting from such actions.[54]

The UN Charter's language expands on the terms set out in Kellogg-Briand Pact. Article 2(3) provides: "All members shall settle their international disputes by peaceful means in such a manner that international peace and security, and justice, are not endangered."[55] Article 2(4) of the Charter presents another significant rule: "States shall refrain from the threat of or use of force against the territorial integrity or political independence of any state.[56] The phrase "international peace and security" contained in Article 2(3) is echoed in the later agreed-to OST. The repetition of the words "international peace and security" in the OST links "peaceful purposes" back to norms of "peaceful means" enunciated in the UN Charter.[57]

Some believe that under the UN Charter, war was outlawed.[58] While not entirely correct, the Charter firmly establishes the general principle that armed conflict is neither proper nor inevitable, irrespective of the political purposes or merits. This new view replaced the ancient Augustinian "just war" formulation.[59] Still, despite its imperative for preserving international peace and security, the Charter does not ban all use of force. The document outlaws the aggressive use of force, and the aggressive use of force has become an international crime.[60]

"Acts of aggression" are not defined within the Charter. Indeed, the definition for "act of aggression" has been debated over the decades. Some argue the term was left undefined on purpose, that if a list of acts were specifically set out as "aggression." then anything not making the list might not count;

celestial body. Indeed, some argue this is how the U.S. officially interprets this article.

[53]UN Charter, Article 1(1).

[54]The Pact was concluded outside the League of Nations and remains a binding treaty. Importantly, the Kellogg-Briand Pact was used as a foundation for the post World War II prosecutions at Nuremburg.

[55]UN Charter, Article 2(3).

[56]UN Charter, Article 2(4).

[57]J.P. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis,*" IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p.3.

[58]Oscar Schachter, "The Right of States to Use Armed Force," *Michigan Law Review* 1620 (1984).

[59]Saint Augustine believes that a war was just when it was waged in order to redress a wrong or unjust enrichment.

[60]See UN Charter 1(1), and, generally, Antonio Cassesse, *International Criminal Law* (2003), pp. 110-125.

the signatories did not want to leave an opening for unseemly argument by aggressors.[61] Even so, insight into the term's meaning can be found in UN General Assembly Resolution 3314 (1974).[62] "This resolution defines aggression as 'the use of force by a State against the sovereignty, territorial integrity or political independence of another State, or in any other manner inconsistent with the Charter of the UN.' Since one of the UN Charter's purposes is to maintain international peace and security, States may not use force in a way that disturbs international peace and security."[63]

Given the over-half century of rule-making and statecraft just discussed, P.J. Blount argues the OST's principles of peaceful purposes for outer space can now be found in international customary law. According to Blount:

> The principle of the peaceful uses of outer space can be found throughout the literature on space law; however, the Outer Space Treaty only uses the term "peaceful purposes" to refer to outer space in the preamble of the treaty. It is used in the body of the treaty to refer to the Moon and other celestial bodies, but not to outer space in general. There is, however, strong support for the term applying to outer space via customary international law from the term's use in the preambles to both the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space and in the Outer Space Treaty to its use in laws, policies, and official statements of numerous States dealing with their respective space programs.[64]

While the principle of "peaceful purposes" has most likely entered customary international law and now applies to space activities, the meaning of that term is even now a bit uncertain – uncertain in part because the phrase is undefined and because nations apply it in different ways.[65] Some argue the phrase means any military use of space violates the treaty.[66] This is a decided minority view. Though there are limits, the alternate U.S. view is military space activities are presumed to be allowed unless specifically prohibited by law. Naturally, the permissive U.S. position generates consternation within peace elements of the international community, who argue the U.S. seeks to preserve its hegemony in and dominance of the space domain. Nevertheless, the U.S. view is compelling, convincing, and clarifying – longstanding customary practice and law permits military use of space. As noted by Adam Frey:

> Military use of space in support of operations – such as communications, intelligence gathering, and precision targeting – is commonly considered peaceful if it does not violate other international law. In other words, space operations are considered peaceful, provided they are not "aggressive." Space may still be used as a medium of warfare: the treaty does not prohibit anti-satellite (ASAT) weapons or even nuclear weapons that merely transit space. Other weapons may be deployed in

[61] "Indirect aggression," however, has not found favor as an "act of aggression."

[62] See Definition of Aggression, UN General Assembly Resolution 3314, UN GAOR, 29th Session, Supplement No. 31, UN Doc. A/9631 (1974).

[63] P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis,*" IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008.

[64] Ibid., p. 2.

[65] Ibid., p. 2.

[66] Adam E. Frey, "Defense of U.S. Space Assets: A Legal Perspective," *Air & Space Power Journal* (Winter 2008), http://www.airpower.maxwell.af.mil/airchronicales/apj/apj08/win08/frey.html (accessed June 2009). Also, see Joan Johnson-Freese, "The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control," *INSS Occasional Paper 30* (U.S. Air Force Institute for National Security Studies (INSS), January 2000), p. 10.

> space so long as they are neither nuclear weapons nor weapons of mass destruction. Furthermore, self-defensive acts in space are also permissible, provided they do not violate other treaty restrictions.[67]

As touched on above, the "U.S. employs a permissive interpretation of the OST and the other rules regulating military activities in space."[68] The traditional U.S. interpretation, shared by most other spacefaring countries, is "nonaggressive" military support activities are not inconsistent with the peaceful-use principle.[69] But what are "aggressive acts" in space? How should they be defined? Should such acts be defined and limited to effects produced on just spacecraft, or should effects to the entirety of space systems be considered (e.g., spacecraft, their constellations, links, footprints for sensor and communications activity, ground control stations, or even sustainment and acquisition activities)? Some suggest the definition of "aggressive acts" should encompass actions, such as the use of force from space or in space when not consistent with exceptions found within the UN Charter. Others argue the "peaceful purposes" clause should be interpreted to mean states cannot use outer space for full-scale warfare, particularly nuclear war.[70]

Those who continue to argue any military use of space violates peaceful use principles ignore reality of the long-standing militarization of space by the global powers.[71] The intent of the OST's framers and an interpretation of its terms allowing military activities in space can readily be ascertained by looking to the practices of major spacefaring powers. They continue to use space for military purposes following endorsement of the OST.

When U.S defense officials' writings mention the OST, they typically insist U.S. policy and military uses of space not explicitly prohibited in Article IV (i.e., no weapons of mass destruction in orbit and military activities on celestial bodies) are permitted.[72] Some suggest this posture ignores Article III's declaration that space activities must be performed in accord with international law, including the UN Charter's rules about the threat or use of force.[73] Nonetheless, and consistent with its views, the U.S. has steadily expanded the scope of its "peaceful" non-aggressive

[67]Ibid.

[68]Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, American Academy of Arts and Sciences, Reconsidering the Rules of Space Project, Cambridge, Massachusetts, 2008, p. 42.

[69]Ivan Vlasic, "The Legal Aspects of Peaceful and Non-peaceful Uses of Outer Space," in *Peaceful and Non-peaceful Uses of Space*, Bhupendra Jasani, ed., (Taylor and Francis, 1991), pp. 37–55.

[70]Christopher M. Petras, "Space Force Alpha: Military Use of the International Space Station and the Concept of 'Peaceful Purposes,'" *Air Force Law Review* 53 (2002): 157-61.

[71]According to Thomas C. Wingfield, "Legal Aspects of Offensive Information Operations in Space," 23 March 2000, p. 6, *http://*www.au.af.mil/au/awc/awcgate/dod-io-legal/wingfield.doc (accessed January 2010): "Nowhere in the Outer Space Treaty is the term ["Peaceful purposes"] defined, and two opposing views have developed. The majority opinion, certainly among spacefaring nations, is that "peaceful" means "nonaggressive," a relatively high standard allowing for considerable military operations in space. The minority view, more common among the less advanced, non-spacefaring nations, is that "peaceful" means "nonmilitary," setting such a low threshold that even routine, peacetime military business, such as communications and weather observation, would be prohibited."

[72]Interestingly, during hearings on the ratification of the Outer Space Treaty, it was noted that "Secretary of State Dean Rusk asserted that while the U.S. was confident in its ability to adequately verify the OST prohibition on nuclear weapons and weapons of mass destruction, that 'the treaty does not inhibit, of course, the development of an anti-satellite capability in the event that should become necessary." See Peter L. Hays, "U.S. Military Space: Into the Twenty-First Century," *INSS Occasional Paper* 42 (U.S. Air Force Institute for National Security Studies (INSS), Air University Press, 2002), p. 70.

[73]Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, American Academy of Arts and Sciences, Reconsidering the Rules of Space Project, Cambridge, Massachusetts, 2008.

military space activities, often for the betterment of the global community and benefiting potential adversaries. GPS (Global Positioning System) PNT, SSA, missile warning, and communication services operated by U.S. military systems have been used and exploited by global military, civil, and commercial communities.

A tacit acceptance of the U.S. behavior has emerged; indeed, all of the major spacefaring nations have expanded their military activities in space. Also, performing military activities in space may have inherently humane ends, even in support of destructive or deadly military operations. Elizabeth Waldrop correctly notes LOAC principles of discrimination and proportionality are enhanced by the use of space assets "to successfully carry out near-surgical strike with minimum civilian casualties."[74] In the end, however, the "various unopposed military uses of space may as a practical matter enlarge the unofficial definition of 'peaceful purposes' to the point that specific arms control agreements may be the only effective limitation on development and deployment of various weapons in space."[75]

Space Warfare

Despite the histrionics of the peace and disarmament community, the conduct of military space activities is an accepted practice and consistent with the OST and other agreements. Plainly, the OST, conventions, and international agreements do not foreclose space warfare or preparation for such conflict. There are caveats to this point, however. The OST expressly limits placement of nuclear weapons and weapons of mass destruction on orbit, and restricts such weapons and military bases on celestial objects. In parallel, the Limited Test Ban Treaty restricts nuclear explosions in space.[76] Even so, the UN Charter and OST do "not prohibit States from placing weapons of a defensive nature in space (unless some further meaning can be attributed to the term peaceful purposes) or from placing weapons required by order of the UN Security Council in order to maintain international peace and security. Probably the difference between an aggressive weapon and a defensive weapon can almost always be found in its use."[77] Or, the difference can be found in the politics or diplomacy of its use.

What is a "space weapon?" The devil is in the details, especially given the variety of ways we discussed above in which space systems can be attacked and degraded. Should the definition of space weapon include systems or combat operations that attack terrestrial components of space systems, or jam or interfere with system command and control? Should it encompass seemingly innocuous civil satellites or microsatellites that can be vectored to kinetically engage adversary systems; or systems left dead in orbits, without executing end-of-life super-sync or other operations to reduce chances of collisions with other satellites. Perhaps, the definition of "space weapon" should be broad: an instrument or instrumentality of attack or defense used to fight space systems or from the space domain.

[74]Elizabeth Waldrop, "Weaponization of Outer Space: U.S. National Policy," *High Frontier* (Winter 2005): 40–41.
[75]Ibid., 36–37.

[76]Article IV of the Outer Space Treaty restricts military activity and prohibits placing "nuclear weapons or any other kinds of weapons of mass destruction" into orbit or permanently affixing them to a celestial body. Also, the Moon and other celestial bodies may be used only for "peaceful purposes," and they cannot be used for military bases or weapons testing.
[77]P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis,*" IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p.4.

U.S. Congressman Terry Everett argues:

> Some believe a space weapon is purely a weapons system based in space that collides with another space object or intercepts a missile traveling through space. However, I would argue, the damage caused by a ground-based high energy laser is just as severe for a target satellite as the damage caused by a physical on-orbit collision. The key difference is the latter may create unacceptable debris field, posing further risks to satellites.
>
> It is the ambiguity in definition that makes arms-control measures, which ban space weapons difficult to implement and nearly impossible to enforce. This is compounded by the fact that satellites have tremendous dual-use value, making it very difficult to distinguish a non-weapon space system from a weapon space system. Any satellite could be maneuvered in such a way as to collide with a target satellite. Any ballistic missile, with sufficient orbital ephemeris data and software changes, could be used to target a satellite.[78]

Dr. Michael Rance, a United Kingdom missile defense and space policy expert and leader proffers:

> There is no formal definition of "weaponization of space" or "space weapons," but some have tried. Michael Krepon and Michael Katz-Hyman propose this (citation omitted): "terrestrially based devices specifically designed and flight-tested to physically attack, impair, or destroy objects in space, or space-based devices designed and flight-tested to attack, impair, or destroy objects in space or on Earth." Bruce DeBlois suggests something similar: "A space weapon is that which is built with destructive intent to be used in a terrestrial-to-space, space-to-space, or space-to-terrestrial capacity" …I recognize that alternatives exist, usually depending on which side of the debate the definer sits. Contention focuses on whether ground-based weapons should be included… Some definitions include as a space weapon a defensive interceptor such as THAAD or Aegis SM-3 when the planned interception is OUTSIDE the atmosphere, but exclude the use of Patriot PAC-3 and THAAD when the planned interception is WITHIN the atmosphere. This is a particular issue for THAAD which has both an exo- and an endo-atmospheric capability. There is no consensus [on the definition].[79]

Michael Krepon and Michael Katz-Hyman believe their definition:

> …respects the distinction between capability and actuality. It excludes residual or latent space warfare capabilities, such as ballistic missiles. Also excluded in this working definition are satellites that provide essential military functions, but do not serve as weapon platforms. In other words, the definition used here clarifies the essential distinction between the current military uses of space and the flight-testing and deployment of space weapons that some wish to pursue in the future. This definition also excludes activities that are specifically designed to interfere with the uplinks or downlinks of satellites. Jamming is treated separately from direct, physical attacks against satellites because jamming has long been considered a part of warfare, whereas direct attacks in or from space would

[78]Terry Everett, "Arguing for a Comprehensive Space Protection Strategy," *Strategic Studies Quarterly* (Fall 2007): 32-33.

[79]Michael Katz-Hyman and Michael Krepon, "Viewpoint: Space Weapons and Proliferation," *Non Proliferation Review* 12: 2 (July 2005): 325-326.

> be consequential firsts in the history of warfare.[80]

The challenge of identifying space weapons in terms of just exactly where and under what conditions they exist is highly complex. Robert A. Ramey opines:

> (The) basic term space weapon lacks definition in international law. As a result, the concept it represents, which broadly speaking includes any implements of warfare in space, is difficult to isolate. Without this foundational definition, one cannot define phrases on which it might rely. The difficulty comes into particular focus by observing that any comprehensive definition of space weapons will include space systems equally used for nonmilitary, nondestructive, and nonaggressive purposes. Though space weapons may seem to include only a discrete class of armaments with easily definable characteristics, a closer examination "reveals a less obvious and more inclusive set of systems."[81]

Despite the challenges in the definition, no treaty bans conventional space weapon systems, so it can be concluded that "nonnuclear ASAT weaponry is… legal."[82] Yet a conclusion that ASAT weapons are legal does not give state parties license or authority to use or station conventional weapons in outer space (on orbit or otherwise); such activities must be conducted within the framework offered under treaties and customary international law, which encourage the non-aggressive "peaceful use" of space. In the end, these activities and interests must be balanced against the other.

Bruce Hurwitz argues in *The Legality of Space Militarization*, "Considering the spirit of the law, the conclusion appears to be that anti-satellite weapons are legal, *de lege late*, but should be illegal, *de lege ferenda*."[83] The principle of non-aggression places an affirmative duty on States not to station weapons of an aggressive nature in outer space; examples of such provocative aggressive acts could be the deployment of a co-orbital mine in the vicinity of a competitor's military space asset, performing "intercepts," or creating conditions for or causing conjunctions between satellites and objects on orbit.

Despite the steady expansion in military use of space by global space powers, considerable mutual restraint has been exercised with respect to deployment of space-based weapons. No space-based weapon, that is, an instrument or instrumentality of attack or defense used to fight space systems or from the space domain, is deployed on-orbit today. This reality has occurred because global policy-makers have come to appreciate the terrifying practical consequences of space weaponization and resulting conflict: the debilitating problems and physics of resulting space debris if the weapon systems are used; the indiscriminate nature and consequences of employing nuclear weapons in space as borne out by the Starfish Prime experiment conducted by the U.S. in the early 1960s; the stakes space-dependent nations risk if they plan for such conflict; and the loss of stability in the space domain, which is increasingly globalized in an interdependent world. Keeping in line with this thinking, proscribing interference with NTM monitoring capabilities was a rather pragmatic choice to enable the super powers to advance nuclear weapons reductions over the past four decades.

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[80] Ibid.

[81] *Independent Working Group on Missile Defense, the Space Relationship, and the Twenty-First Century*, *2007 Report* (Institute for Foreign Policy Analysis, 28 August 2006), p. 73.

[82] See Bruce A. Hurwitz, *The Legality of Space Militarization* (North-Holland, 1986), p. 127.

[83] Ibid., p. 128.

Some states protest the continuing expansion of some U.S. military space activities, believe more should be done to limit them, and have pushed for adoption of proposed treaties, such as the *Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT)*, presented as part of the UN Conference on Disarmament's (CD) discussion on the Prevention of an Arms Race in Outer Space (PAROS). The proponents suggest the progress of science and technology make it necessary to strengthen international principles relating to reducing potential threats. The Chinese argued that a peaceful and tranquil outer space free from weaponization and arms race serves the common interests of all countries, and the Russians argued that the security of outer space is facing serious challenges."[84] The PPWT seeks to ban two interrelated conducts: the placement of weapons in outer space; and the threat or use of force against outer space objects.

The proposed PPWT treaty defines "weapon in outer space" as:

> Any device placed in outer space, based on any physical principle, which has been specifically produced or converted to destroy, damage, or disrupt the normal functioning of objects in outer space, on the Earth or in the Earth's atmosphere, or to eliminate a population or components of the biosphere, which are important to human existence or to inflict damage on them.[85]

The "threat of the use of force" is defined as:

> Any hostile actions against outer space objects including, inter alia, actions aimed at destroying them, damaging them, temporarily or permanently disrupting their normal functioning or deliberately changing their orbit parameters or the threat of such actions.[86]

However, as conceded by Russians and Chinese, verification of such a PPWT treaty would be extremely difficult. Also, the PPWT does not ban development and testing of Earth-based ASATs. Even disarmament groups, like Project Ploughshares, concede the "the PPWT lacks precision, has potential loopholes, or is subject to interpretation."[87] This is a sad state of affairs for a major arms control proposal. Given these defects, the Russians and others suggest agreements on *Transparency and Confidence Building Measures* could be implemented to compensate for them and move the process along.

For its part, the U.S. has pushed back, first abstaining, then voting "no" to reject the PAROS proposals. Under the George W. Bush administration, it argued the existing multilateral arms control agreement regime is "sufficient," there is no present "problem in outer space for arms control to solve, and the proposed treaty does adequately dispose of threats posed by ground based systems."[88]

Despite its own issues associated with complying with space-related treaty obligations, especially with its 2007 ASAT

[84]"China and Russia jointly submitted the draft Treaty on PPWT to the UN Conference on Disarmament," Ministry of Foreign Affairs of the People's Republic of China, 12 February 2002, http://www.fmprc.gov.cn/eng/wjb/zzjg/jks/jkxw/t408634.htm (accessed January 2010).

[85]Proposed *Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects*, Article 1C.

[86]Ibid, Article 1E.

[87]Cesar Jaramillo, "In defense of the PPWT Treaty: Toward a space weapons ban," *The Ploughshares Monitor* 30: 4 (Winter 2009): 4.

[88]See *Government space arms control proposals*, Secure World Foundation, http://www.secureworldfoundation.org/index.php?id=151&page=Governmental_Proposals (accessed June 2009).

test, China's representatives disingenuously charge recent U.S. space activities "run counter to the fundamental principle of peaceful use of outer space" and contend the U.S. goal in outer space is to "defy the obligations of international legal instruments and seek unilateral and absolute military and strategic superiority."[89] These specious claims do not reflect the totality and reality of U.S. space efforts, which span a spectrum of civil, commercial, and military activities and missions. No doubt the Chinese actions and attendant diplomatic overtures are part of a strategic messaging campaign to champion the internal, regional, and global interests of its government. Some could characterize the Chinese actions as a form of "lawfare." "The term lawfare describes the growing use of international law claims, usually factually or legally meritless, as a tool of war. The goal is to gain a moral advantage over your enemy in the court of world opinion, and potentially a legal advantage in national and international tribunals."[90]

…"peaceful purposes" in space should be construed to mean "non-aggressive;"…

For years, the U.S. has acknowledged the diplomatic posturing relating to space weaponization, summarizing only the points made, but not conceding them. Furthermore, though it has tinkered with the technologies and possibilities from time-to-time, the U.S. has yet to deploy any space-based weapon system. The Obama Administration and its domestic allies propose to negotiate a ban on space weapons, however defined, and even though there is uncertainty about exactly what would be considered acceptable or workable. Interestingly, but not lost on the arms control and space policy community, while references to negotiating such a ban were first posted in January 2009 on the White House website, they were removed only a few months later.[91] This more than likely transpired due to the realities of interagency process, which require measured and thoughtful policy making. Still, the Obama Administration has now endorsed the PAROS-based discussions within the UN CD.

Despite the difficulties, the U.S. should strive to sort through the intractable issues presented by space weapons and weaponization and help establish normative space community behaviors relating to them. It has assumed similar leadership roles for the entirety of the Space Age, serving as a rule-setter and guide to achieve best space practices. It has leveraged its position as the preeminent space

[89]Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security*, American Academy of Arts and Sciences, Reconsidering the Rules of Space Project, Cambridge, Massachusetts, 2008, p. 42, citing the "Statement by H.E. [His Excellency] Mr. Li Changhe – Chinese Ambassador for Disarmament Affairs, Head of the Chinese Delegation for the Conference on Disarmament – at the Plenary Meeting of the CD," 12 March 1998, www.nti.org/db/china/engdocs/ lich0398.htm (accessed June 2009); Fu Zhigang, "A Chinese View of Star Wars," *The Spokesman* 72 (2000): 17–18; and "Statement by Ambassador Hu Xiaodi for Disarmament Affairs of China at the Plenary of the Conference on Disarmament," 7 June 2001, http://www.nti.org/db/china/engdocs/cd060701.htm (accessed June 2009).

[90]David B. Rivkin, Jr. and Lee A. Casey, "Lawfare," *Wall Street Journal* 23 February 2007, A11, http://online.wsj.com/article/SB117220137149816987.html (accessed December 2009).

[91]After Obama was sworn into office, the official White House Web site was updated with a set of policy guidelines including one on restoring U.S. leadership in space. Under the heading "Ensure Freedom of Space," the statement said the White House would seek a ban on weapons that "interfere with military and commercial satellites." See Turner Brinton, "Obama's Proposed Space Weapon Ban Draws Mixed Response," Space.com, 4 February 2009, http://www.space.com/news/090204-obama-space-weapons-response.html (accessed January 2010). According to John Logsdon, former director of the George Washington University Space Policy Institute, the text originated from an Obama campaign white paper that was transferred verbatim to the White House website without input from any of the government bodies that manage national policy..

power and used its bully pulpit to influence the global space-airing community. The U.S. assumed such a leadership role on space debris and end-of-life operations back in the 1980s when analysis showed an alarming expansion in space debris arising from space operations.[92]

Self-Defense and International Peace and Security

As noted above, "peaceful purposes" in space should be construed to mean "nonaggressive;" hence, any use of a weapon in space or any attack on a space system would have to conform to the exceptions to the ban on the use of force found in the UN Charter.[93] The first exception applies if the use of force is authorized by the Security Council in order to maintain international peace and security. As a second exception, Article 51 reaffirms that nothing in the Charter should be construed to impair the inherent right of self defense against armed attack**.** This right of self-defense has always been recognized, whether in municipal or international law, and existed well before the advent of the UN Charter.

Thus, under Article 51, if a state is subject to an armed attack, it may use force to repel the attackers and stop the attack. Alternatively, if it is unclear whether an action constitutes such an attack, Chapter VII of the UN Charter gives the UN Security Council the authority and responsibility to determine the existence of any "threat to the peace" or acts of aggression. The Council can then recommend and lead an appropriate response; however, because Security Council actions are subject to international political negotiation, any response would not likely be quick or a significant deterrent to an aggressor.[94]

In *Nicaragua v. U.S. (1986)*, the ICJ offered insight into the meaning of the Article 51 right of self defense against armed attack.[95] In that case, the Soviet Union and Cuba were accused of assisting the Nicaraguan Sandinistas, who were alleged to have committed acts of destruction and atrocities against Honduras and Costa Rica. On the other side, the Nicaraguan Contras were fighting the Sandinistas, and the U.S. was assisting in their counter-revolution against the Soviet-sponsored Marxist regime. The U.S. was accused by the Sandinistas of unauthorized overflights, mining a harbor, and training rebels at an alleged CIA training camp.

In its ruling, the ICJ held it is no longer acceptable to settle disputes with force, what had been customary law for millenniums. Importantly, the court held the use of force could now only be justified in one of three ways: (1) self-defense activities recognized as rights under Article 51 of the UN Charter; (2) enforcement actions under Chapter 7 of the UN Charter; and (3) possibly through application of pre-UN anticipatory defense rules of necessity and proportionality.[96] The

[92]See *Fact Sheet on Presidential Directive on National Space Policy,* 11 February 1988, which provides in pertinent part: "The directive further states that all space sectors will seek to minimize the creation of space debris. Design and operations of space tests, experiments and systems will strive to minimize or reduce accumulation of space debris consistent with mission requirements and cost effectiveness."

[93]P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis,*" IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p.3.

[94]Jia Huang, "New Challenges to the Traditional Principles of the Law of War Presented by Information Operations in Outer Space," *Journal of Politics and Law* 2: 1 (2009): 40.

[95]As was its right, the U.S. did not agree to subject itself to jurisdiction by the ICJ, which then proceeded and based its finding of fact based on the presentations made by the Sandinistas. The U.S. still disputes facts in the case, as well as the actual outcome, but it does endorse substantial portions of the ruling and cites it in other cases.

[96]The U.S. and a few other countries assert this third principle of anticipatory defense from time to time; they are the rules

court held states have a right of collective self-defense only if they are under armed attack. Finally, in making an armed response in self-defense under Article 51, a state must also immediately report the fact of the armed attack to the UN Security Council, and the state must also promptly report its own actions in response.

According to the ICJ, the sole justification for U.S. actions in *Nicaragua v. U.S.* was collective self-defense under Article 51. However, the court found none of the states involved the purported collective self-defense reported to the UN that they were subject to armed attacks. In addition, nobody reportedly asked the U.S. to help, nor did the U.S. report an attack to the UN. Hence, the ICJ concluded, the right of collective self-defense could not be invoked.

The ICJ ruled self-defense rights could not be invoked if the threshold of actual armed attack was not reached.[97] The UN' definition of aggression provided the court a foundation to establish the threshold for an armed attack. According to the Court, an "armed attack" is not the same as an act of aggression. A mere threat of force is not an armed attack, nor would all acts of aggression count. Hence, an opposing state may engage in an illegal use of force, yet that may not constitute an armed attack allowing for the use of force in self-defense. According to the ICJ, even though Nicaragua may have been guilty of odious violations of international law, absent an armed attack there was no right of collective self-defense that could be invoked by U.S. or its allies and friends. According to the court, the words "an armed attack occurs" speak of the actual commencement of physical violence by armed forces. As we will see, the ICJ ruling on this point is somewhat unrealistic if applied to attacks on space systems.

Use of Force and Self-Defense

Must space systems be subject to some sort of physical violence before a response, armed or otherwise, can be initiated? Should non-kinetic types of attacks against space systems qualify as armed attacks? In short, the answers are "No" and "Yes," respectively.

Threats are no longer presented just in the terrestrial ground, sea, and air environment, or just with classically recognized kinetic weapons. They are now manifested in space, through new and exotic electromagnetic means or information operations. Since the venues and mechanisms for attack are evolving, so too must the vague definition of "armed attack" at least with respect to space systems.

According to Jia Hueng:

> …the current international laws have not given any definite definition of the term "use of force" and the information operations in outer space have brand-new features, which are apparently different from those of traditional armed conflicts characterized by the mass of troops and armaments and the invasion of territory. So, we have to consider what actions by or against objects in space will be considered to be uses of force. The international community would probably not hesitate to regard

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from *The Caroline Affair* discussed later. In *Nicaragua v. U.S.*, the ICJ held that the UN Charter did not supersede custom, but exists alongside it. The U.S. position is that anticipatory self-defense is inherent in the right of self-defense. The ICJ, however, expressly held that it did not address the legality of anticipatory self-defense because the issue had not been raised. See Joshua E. Kastenberg, "The Use of Conventional International Law in Combating Terrorism: A Maginot Line for Modern Civilization Employing the Principles of Anticipatory Self-Defense and Preemption," *Air Force Law Review* 55 (Spring 2004): 114.

[97]The ICJ also held there is no such thing as a right of "collective" armed response to acts, which do not constitute an "armed attack."

> as a use of force the destruction of a satellite by a missile or a laser. It would probably react similarly if it could be proven that one nation took over control of another nation's satellite by electronic means and caused it to fire its retro rockets and fall out of orbit. In such a case, the consequences will probably matter more than the mechanism used. The reaction of the international community to lesser kinds of interference is hard to predict. For example, if one nation were able by electronic means to suspend the operations of another nation's satellite for a brief period, after which it returned to service undamaged, it is likely that the international community would consider such an action as a breach of the launching nation's sovereign rights, but not as a use of armed force.[98]

To hold intentional dazzling, electromagnetic, or information operation activities that target, seek to damage, and actually disable, destroy, degrade, or interfere with space systems as not "armed attacks" would render the word "attack" meaningless. International law must preserve peace and security and, by extension, protect space systems from a wide variety of threats and in venues not contemplated within the UN when it was founded in 1945. In our modern world, a state secures and defends its territory, political independence, and elements of national power (diplomatic, information, military, and economic) with space and space-enabled information systems. They provide the state a myriad of essential services – communications, warning, intelligence, weather, PNT, and missile and space defense. A state must assure itself of the right to exercise jurisdiction and control over these systems free from interference; to do so a state must have the right to defend them against attack. Limiting the right of self-defense in response to attacks on these capabilities would be illogical, especially since they can be essential to the survival of a state. Such a holding – that there is no such right – would mean the rights of free passage of space systems codified in the OST and found elsewhere within customary law and treaty would be just empty words and mean little. "The maintenance of the right of self-defense is critical for protection of the space network, but recent attempts by international bodies to limit this right signal an apparent trend toward the devolution of the inherent right of self-defense."[99]

Defining intentional and also damaging electromagnetic and information operations as armed attacks are consistent with a necessary expansive reading of Article 51's right of self-defense. Two divergent views have developed concerning Article 51's right of self-defense. The expansive view maintains the word "inherent" in Article 51's right of self-defense provides the customary international law rights of self-defense remained intact and Article 51 simply confirmed the right of self-defense in the particular situation of an armed attack, but did not deny it in others. This is the U.S. view – states retain their rights under international law, especially self-defense principles of necessity and proportionality, except those specifically surrendered under the UN Charter.

The 2006 U.S. National Space Policy is in accord with the expansive interpretation. It frames the primary objective of the Policy as preserving a relative national U.S. advantage,

[98]Jia Huang, "New Challenges to the Traditional Principles of the Law of War Presented by Information Operations in Outer Space," *Journal of Politics and Law* 2: 1 (2009): 40, citing DOD General Counsel, *An Assessment of International Legal Issues in Information Operations* (May 1999), p. 27.

[99]See Gregory E. Maggs, "The Campaign to Restrict the Right to Respond to Terrorist Attacks in Self-Defense Under Article 51 of the UN Charter and What the U.S. Can Do About It," *Regent Journal of International Law* 4:149 (2006): 155-167.

rather than establishing a mutual benefit, by declaring that freedom of action in space is as important to the U.S. as air power and sea power. The 2006 National Space Policy asserts a broad array of U.S. rights and vital interests in space. It rejects any limitations on the fundamental right of the U.S. to operate in and acquire data from space. The policy also emphasizes that the U.S. is prepared to take unilateral action to dissuade, deter, defeat, and, if necessary, deny space-related activities hostile to its interests.

The alternate restrictive view asserts that the UN Charter allows only for a narrow right of self-defense – a right to respond only in the specific situation of a prior armed attack.

> [The restrictive] view has considerable support and is consistent with a number of resolutions passed by the Security Council. Proponents of this view see Article 51 as a partner to Article 2(3), which requires peaceful settlement of disputes, and Article 2(4), which outlaws the use of force. They consider "the permission in Article 51 [to be] exceptional in the context of the UN Charter and exclusive of any customary right of self-defense." This restrictive approach addresses the fear that expansive interpretations of Article 51 create a loophole through various countries could rationalize military adventurism.[100]

Aggression not formally amounting to "armed attack" can also be just as threatening to the sovereignty and the existence of a state as full military hostilities. Spacefaring states defend their political independence within the confines of the UN Charter. They exercise jurisdiction and control over their space systems, and by preventing and defeating attacks on those activities. The jurisdiction and control element is quasi-territorial according to Bin Cheng, and this provides accord for a state asserting rights of self defense for space systems as a defense of national sovereignty, territorial integrity, or political independence.[101]

Those that argue for narrow, and limiting interpretation, only provoke resort to self-help by states outside the bounds of the Charter. "A legal system which merely prohibits the use of force and does not make adequate provision for the peaceful settlement of disputes invites failure."[102] Though a bit counter-intuitive, the use of force in self-defense, in turn, enables attainment of the overarching objectives of international peace and security.

Some suggest the restrictive view of self-defense is more analytically sound and widely accepted than the other view. They argue an expansive reading of Article 51 conflicts with the letter and spirit of the UN Charter. Scholars arguing for a restrictive interpretation fail to adequately address the practicalities of modern warfare; a narrow interpretation and definition of attacks and permissible self-defense is simply unworkable as there does not appear to be a happy medium, which actually preserves and protects the spacefaring rights of nations. The covert nature of modern forms of diplomatic, information, military, and economic conflict and the potential for crippling destruction and damage continues to evolve with a potential for catastrophic

[100]Norman Menachem Feder, "Reading the UN Charter Connotatively: Toward a New Definition of Armed Attack," *NYU Journal of International Law & Policy* 395 (1987): 404.

[101]"…since territorial sovereignty has been banned from outer space and, with it, territorial jurisdiction, the overriding jurisdiction in outer space is quasi-territorial jurisdiction. Bin Cheng, "The Commercial Development of Space: The Need for New Treaties," *Journal of Space Law* 19: 1 (1997).

[102]Norman Menachem Feder, "Reading the UN Charter Connotatively: Toward a New Definition of Armed Attack," *NYU Journal of International Law & Policy* 395 (1987), citing Waldcock, "The Regulation of the Use of Force by Individual States in International Law," *Recueil Des Cours* 81 (1952): 455-456.

consequences.[103] Kinetic, electromagnetic, and cyber attacks intentionally targeting, damaging, and interfering with satellites and their supporting terrestrial systems would appear logically and realistically to satisfy conceptions of armed attack that would warrant and allow a proportionate response (as provided in the LOAC, described in more detail below) in accord with the UN Charter and customary law of self-defense exceptions. Such attacks should therefore trigger a right of self-defense.

Concluding there is a right of self-defense for attacks on space systems requires an analysis to assess whether an actual attack has taken place. As will be discussed later in this paper's discussion of the ICJ *Case Concerning Oil Platforms*, there are considerable challenges to U.S. abilities to identify, classify, characterize, and attribute space threats and events. Within the hostile physical environment, varied energetic and kinetic events affecting space systems occur on a recurring basis; moreover, satellite electronic, sensor, or other glitches could exhibit attributes of an attack until analysis has resolved the issue. Ultimately, even if one concludes there has been an attack, attributing the source of the event to a particular state or non-state actor could prove to be extremely difficult.

The challenge to resolving information attacks would be similar. According to Jia Huang:

> …if an aggressor uses information techniques to conduct the operation and inflicts little or no physical destruction, whether this kind of attack can be regarded as "armed attack" is disputable. If an information attack cannot be characterized as an "armed attack," then a conventional response may not be warranted. A conventional response, in this case, may in fact be considered the "armed attack" under Article 51. A response alike would not constitute an "armed attack," but there are still at least three obstacles for the retaliation side as follows. Firstly, it is difficult to identify the attacker. Information attack in outer space has the characteristics of long-range and anonymity and the attacker can conduct information attack against space assets in or through foreign countries. Information can flow across international borders while a nation's military, judicial, and security agencies cannot carry out investigations in a foreign country at will and this kind of investigation may be considered as spy so it cannot gain cooperation from related countries. Secondly, it is difficult to produce evidence. Space assets are in an abominable environment characterized by intensive radiation, extreme temperature, and micro-gravity. Occasionally, they may be stricken by small meteors or space debris, which runs at high speed. So they may be damaged by the natural cause. A space asset usually consists of many complex systems and there are frequent malfunctions and program errors. Because of these factors, the offended state cannot produce sufficient evidence that it has suffered from intentional attack. Finally, even though the attacker can be identified and proven to be supported by a foreign government, this foreign country may lack the space information infrastructure that would make it vulnerable to a response alike.[104]

[103]The increasingly covert nature of modern form of aggression and their greater potential for devastation have made both scholars and states dissatisfied with the limited legal availability of the justification of self-defense. Ibid., p. 418.

[104]Jia Huang, "New Challenges to the Traditional Principles of the Law of War Presented by Information Operations in Outer Space," *Journal of Politics and Law* 2: 1 (2009).

Anticipatory Self-defense for Space Systems

Some states maintain that within the right of self-defense is a right to prevent an armed attack from occurring by using anticipatory self-defense.[105] The U.S. is one such state. *The Caroline Affair* dispute with the United Kingdom in 1837 gave rise to a formal interpretation in international law setting out the elements of lawful anticipatory self-defense. The case stands for the proposition that the use of force in anticipatory defense may be justified and employed only in matters in which the "necessity of that self-defense is instant, overwhelming, and leaving no choice of means, and no moment for deliberation." The use of such force must also be proportional. The criterion of immediacy and necessity must be based upon the very fact that there is no other course available to prevent the threatened attack from being executed. By nature, this excludes execution of pre-planned attacks.

Can an anticipatory defense be presented in response to an imminent threat to U.S. space systems? Physics and engineering realities make the immediacy criterion rather difficult to achieve. There will always be time lag and latency associated with detecting and analyzing an event, ascertaining the source and potential for damage, determining that a party intended to cause the damage, and then mobilizing weapons in response to perform space or terrestrial-based combat. Complicating these problems, U.S. SSA assets are underfunded and overtaxed though they have been described repeatedly by U.S. Department of Defense (DOD) and U.S. Air Force space officials as a top priority; the shortfalls exacerbate the time lag and analysis challenges.

Assuming they have been identified as a lawful target, terrestrial components of space and ASAT systems can be struck within days, hours, or minutes depending upon the proximity of military forces to the target. The U.S. Strategic Command and Air Force Space Command have toyed with the idea of a conventional strike missile from time to time, though that system is subject to a number of limitations, and developing workable rules of engagement for its employment should prove difficult. As to potential space-based targets, systems could be deployed to engage such targets, but the delay could be hours, days, weeks, months, or even more; the timing for strikes with kinetic or particle beams, or other systems would be dependent on the prospective target's orbit, intercept physics, and readiness of the sensor, shooter, and command and control systems employed.

The case for using force for anticipatory defense of space systems can be compared to performing anticipatory defense in the event of a potential nuclear strike. The signs of preparedness for employing nuclear weapons would have to be so overwhelming that only a definite intention to use them would logically explain the actions being undertaken. Since the risks of inaction could be catastrophic, they would demand immediate action. However, Louis-Philippe Rouillard suggests the fueling of one missile or even of a region's missiles might not be enough to justify an attack based on anticipatory self-defense, since some might think no country would use a limited amount of nuclear weapons on a first strike as this would leave it open to utter destruction upon a retaliatory strike.[106] Would

[105]Some argue the drafters of the UN Charter intended to restrict the right of self-defense under the Charter and customary international law and state practice involving anticipatory defense measures was not accepted.

[106]See Louis-Philippe Rouillard, "The Caroline Case: Anticipatory Self-Defense in Contemporary International Law," *Miskolc Journal of International Law* 1: 2 (2004): 117.

an analogous circumstance apply to a potential attack on a space system? Probably not. The loss or potential loss of a single satellite or redundant ground node of a space system should not present a serious enough threat that a state should not first attempt to resolve the developing dispute through diplomatic, economic, or global engagement means. Law on the use of force only "allows States to respond with force when a peaceful settlement of the dispute cannot be negotiated."[107]

Law of Armed Conflict

"States may use force to defend themselves or to defend others, however, there are accepted limitations to this exception."[108] Before using force, one must evaluate not only space law, but also assess use of force and LOAC humanitarian law considerations. The LOAC is a body of international law that sets boundaries on the use of force during armed conflicts through application of fundamental principles or rules.[109] LOAC principles and rules combine elements of treaty and customary international and municipal law. The LOAC sets limits on when and to what degree force may be used, targeting, and treatment of noncombatants, civilians, and prisoners of war. Its fundamental targeting rules are very relevant to concepts of space warfare. The overarching LOAC considerations are: necessity, distinction or discrimination, proportionality, humanity, and chivalry.

Space warfare possibilities present policy and law challenges, but rules for them can be derived and applied through analogy from terrestrial venues. As one might expect, the traditions, principles, and rules that might apply in space arenas were initially developed to apply in traditional terrestrial venues – land, sea, and air. Important components of space systems are terrestrially based; LOAC targeting considerations for targeting and also defending terrestrial components are better understood and established. Even so, not all rules are directly translatable to the space environment. Some even believe LOAC principles are inapplicable to unmanned space-based components of satellite systems, but that is, however, a rather limited viewpoint. In the end, each LOAC considerations must be considered before prosecuting military conflict in space or against terrestrially-based space system support, command and control, and user components.

The first LOAC principle to consider, "military necessity," provides "a person or object should not be targeted unless doing so gives an attacker some real advantage."[110] Military necessity requires combat forces engage in only those acts necessary to

[107] P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis,*" IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p. 4.

[108] Ibid.

[109] DOD policy is to comply with the Law of War "in the conduct of military operations and related activities in armed conflict, however such conflicts are characterized." See *DOD Law of War Program*, DOD Directive 5100.77, 9 December 1998. Chairman, Joint Chief of Staff Instruction (CJCSI) provides that the U.S. "will apply law of war principles during all operations that are categorized as Military Operations Other Than War." See *Implementation of the DOD Law of War Program,* CJCSI 5810.01, 27 August 1999. Under the U.S. military's Standing Rules of Engagement (SROE), "U.S. forces will comply with the Law of War during military operations involving armed conflict, no matter how the conflict may be characterized under international law."

[110] Adam E. Frey, "Defense of U.S. Space Assets: A Legal Perspective," *Air & Space Power Journal* (Winter 2008), http://www.airpower.maxwell.af.mil/airchronicales/apj/apj08/win08/frey.html (accessed June 2009). According to Frey, "The principle has four elements: the user of force must be capable of regulating it; force must be necessary to achieve, as quickly as possible, the enemy's partial or complete submission; it must be no greater in effect on the enemy's personnel or property than needed to achieve victor; and it must not otherwise be illegal."

accomplish a legitimate military objective. "The U.S. formally acknowledged this principle when it signed the 1907 Hague Convention, which prohibits any action to destroy or seize the enemy's property, unless such destruction or seizure is imperatively demanded by the necessities of war. The Nuremberg trials also explained that destruction as an end-in-itself is a violation of international law. There must be some reasonable connection between the destruction of property and the overcoming of the enemy forces."[111]

Military necessity only allows that degree of force required to defeat an enemy. In addition, attacks must be limited to military objectives whose "nature, purpose, or use makes an effective contribution to military action and whose total or partial destruction, capture, or neutralization at the time offers a definite military advantage."[112] In applying military necessity to targeting, the rule generally allows targeting those facilities, equipment, and forces which, if destroyed, would lead as quickly as possible to the enemy's partial or complete submission.

Applying the rule of necessity in engaging space systems, warfighters must take into account the nexus between the adversaries' war effort and the space system. Importantly, targeting on-orbit spaceborne assets may be unnecessary if the same military necessary result can be obtained by targeting terrestrially-based components, or jamming up and down links.

Related to necessity, the central idea of distinction is one may only engage valid military targets. Military objectives must be separated and distinguished from protected civilian objects to the maximum extent possible. An indiscriminate attack is one that strikes military objectives and civilians or civilian objects without an attempt to distinguish between military and nonmilitary targets. Additional Protocol 1 to the Geneva Conventions limits targets "strictly to …those objects which by their nature, location, purpose, or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage."[113] Civilians and civilian property are prohibited targets.[114]

Distinction also requires defenders to separate military objects from civilian objects to the maximum extent feasible.[115] If system is to be civilian in nature, it needs to be separated from military systems. This is difficult and complex to achieve with some spaceborne systems – communications, PNT, weather, or classically constituted imagery systems have dual civilian and military applications. For example, the global PNT resource, GPS, is operated by the U.S. Air Force, and it produces vital effects for the civil and commercial communities. Important weather satellites relied on by the U.S. military and its allies, but also global civil and commercial communities, are operated by the U.S. Department of Commerce; the U.S. Air Force provides a back-up command and control center for the Defense Meteorological Satellite Program (DMSP). The U.S. obtains large portions of its satellite communications

[111]See "Convention (IV) Respecting the Laws and Customs of War on Land and Its Annex: Regulations Concerning the Laws and Customs of War on Land, the Hague, 18 October 1907," Article 23(g), International Committee of the Red Cross (ICRC) International Humanitarian Law Database, http://www.icrc.org/ihl.nsf/385ec082b509e76c41256739003e636d/1d1726425f6955aec125641e0038bfd6 (accessed June 2009).

[112]See *Protocol Additional to the Geneva Convention*s, 12 October 1949, Articles 51-54.

[113]See Ibid., Article 52(2).

[114]See Ibid., Articles 51-54.

[115]In a space context, it would be inappropriate to locate a civil space habitat for spacecraft personnel next to an adjoining space weapon or military system.

capability by leasing international commercial transponders, as do other militaries, civil, and commercial users. Similarly, significant portions of remote sensing and supporting launch capabilities are produced by commercial providers, consistent with U.S. remote sensing and commercial space launch policies that encourage such relationships. Attacking such objects may hinder an enemy, but civilians would suffer tremendously as an outgrowth of this mixed civil and military use of space systems.

Under Additional Protocol 1 to the Geneva Conventions, limits are imposed on attacks on civilian objects[116] and attacks that cause "widespread, long-term, and severe damage" to the environment.[117] Consequently, a weapon must be targeted with discrimination. What then should be done to address the tricky issue of space debris? The creation of space debris must be expected and considered if kinetic or otherwise destructive weapons are about to be employed. Substantial debris fields should be reasonably foreseen to cause damage to other civilian space assets. Since kinetic or otherwise destructive engagements could break the threshold of "widespread, long-term, and severe damage" to the environment, the focus should be on assessing the number and size of pieces of expected space debris, their orbits, the length of time on orbit, the ability to track the debris, and potential damage. The 2007 Chinese ASAT left thousands of pieces of space debris on orbit, at altitudes where they will remain on orbit for hundreds to thousands of years, presenting long-term threats to imagery, environmental, and communication systems.

Given the prevalent global understanding of the problems of space debris and their physics, a spacefaring state cannot reasonably contend it could not foresee the damage that would occur as a consequence of initiating a kinetic or other destructive ASAT event. If so employed, it could be reasonable to conclude the attacking state executed an indiscriminate attack, one where the means of attack "employs a method or means of combat the effects of which cannot be limited as required."[118] For this reason, employing ASAT weapons would appear to be unlawful if they create space debris that damages civilian space systems, regardless of whether or not the damage occurs during or after the time of conflict.

Would deploying or exploding space mines be lawful? Probably not, but this assumes the mine is designed to explode, fragment, and riddle space with debris.[119] What if the mine is kept on orbit for an extended period? In such event, P.J. Blount opines we should look by analogy to the restrictions placed on unsecured naval mines:[120]

> According to the Hague Convention VIII, these mines must be disabled within an hour of release due to the way in which they might move and destroy nonmilitary objectives. While the ban is not directly translatable to space due to physics, the principle behind this ban is. So placing a weapon in space that engages targets at random would also be unlawful. The principle could be extended by an analogy to torpedoes, which must be disabled if they miss their targets.

[116]See *Protocol Additional to the Geneva Conventions*, Article 52.

[117]See Ibid., Article 55. Protocol Additional restrictions' apply to land, sea, and air combat and these limitations are echoed elsewhere in other treaties and in customary international law.

[118]Ibid. and *Relating to the Protection of Victims of International Armed Conflicts* (Protocol 1), 8 June 1977, Article 51(4).

[119]It might be possible to develop and field space mines designed to minimize space debris or other long-term problems.

[120]"These would be contact mines that are not secured by a mooring or anchor and have the ability to be swept away in a current."

> A weapon in space that misses its target and continues to poses a threat due to its capabilities might also be illegal (e.g., a warhead being used as an ASAT that misses its mark).[121]

Another distinction relates to a potential for causing damage or injury to humans in space. Civilians may not be made the object of a direct attack; however, the LOAC recognizes a military target need not be spared because its destruction may cause collateral damage that results in unintended death or injury to civilians or damage to their property. Commanders and their planners must take into consideration the extent of unintended indirect civilian collateral destruction and probable casualties that will result from a direct attack on a military objective and, to an extent consistent with military necessity, seek to avoid or minimize civilian casualties and destruction. Anticipated civilian losses must be proportionate to the military advantages sought. In the end, it could be difficult to justify some losses without compelling "survival of the State" rationales. It would appear to be illegal to conduct activities that might cause damage to the International Space Station, or other manned civil space systems, or injury to their space personnel, whether on orbit, or during lift and return operations.

Proportionality prohibits the use of any kind or degree of force exceeding that needed to accomplish a military objective. An attacker must therefore balance the expected damage against the military advantage to be gained.[122] This requires a balancing test between the substantial, actual, and direct military advantage anticipated by attacking a legitimate military target and the expected incidental and unfortunate civilian injury or damage. Under this test, excessive incidental losses are prohibited. This principle encourages combat forces to minimize collateral damage – the incidental, unintended destruction that occurs as a result of a lawful attack against a legitimate military target, and leverages the rules relating to necessity and discrimination. This principle is also reflected in Additional Protocol 1, which prohibits "an attack, which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated."[123]

An action causing excessive or catastrophic damage to civilians or property should be illegal. Since Additional Protocol 1's test is subjective, commanders could reasonably disagree on whether attacking these objects truly "offers a definite military advantage."[124] The principle of proportionality offers some guidance with regard to using force against space systems: since collateral damage to civilians is considered a natural consequence of combat, the proportionality test should be applied to determine if an attack on a dual-use object warrants the consequences to the

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[121]P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis,*" IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008. Kinetic ASATs are typically launched on sub-orbital trajectories so if they miss they come right back down, like an ICBM warhead. Co-orbital ASATs generally require larger boosters to achieve their mission objectives.

[122]Robert A. Ramey, "Armed Conflict on the Final Frontier: The Law of War in Space," *Air Force Law Review* 48 (2000): 79-82. "The proportionality test is the U.S.' preferred method of determining whether a target is a permissible one. The U.S. has declined to sign certain treaties, or portions thereof, that prohibit certain targets without any balancing test."

[123]*Protocol Additional to the Geneva Conventions* and *Relating to the Protection of Victims of International Armed Conflicts* (Protocol 1), Article 51(5)(b), ICRC International Humanitarian Law Database, http://www.icrc.org/ih1.nsf/FULL/470 (accessed June 2009).

[124]J. Ricou Heaton, "Civilians at War: Reexamining the Status of Civilians Accompanying the Armed Forces," *Air Force Law Review* 57 (2005): 182-183.

innocent.[125] Hence, attacking and destroying vital PNT systems, such as GPS, may be held illegal since global society at large relies upon the use of these systems.[126] The same conclusion may apply to attacks on environmental monitoring systems, especially if used to protect civilians from weather, natural disaster or other environmental threats. If necessary to engage these systems, then it may be more acceptable, and lawful, if the damaging effects are reversible or temporary during specific periods of military activity.

What of nuclear weapons? The OST bans the stationing of nuclear weapons and weapons of mass destruction in space. Also, "the Nuclear Test Ban treaty prohibits states from causing nuclear explosions in outer space."[127] Such weapons present significant distinction/discrimination challenges. As noted, the space and defense communities learned of these issues during the 1960s Starfish Prime and other upper atmospheric nuclear weapons experiments. So the use of nuclear weapons in space, aside from transit of a nuclear warhead that most concede can be legally executed in certain conflicts, should, on first blush, be completely foreclosed. However, according to Blount:

> …the International Court of Justice's (ICJ) *Advisory Opinion on Legality of the Threat or Use of Nuclear Weapons* might have created an exception to this rule. The ICJ ruled that in general the use of nuclear weapons would be "contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law." However, the court states that a State may use a nuclear weapon when the "very survival of a State would be at stake." Since the court treats this as a moment of necessity in which both customary and treaty law can be suspended, it is feasible that the Outer Space Treaty and the Limited Test Ban Treaty could also be suspended and that a State may, during "an extreme circumstance of self-defense" use a nuclear weapon in space.[128]

Under what circumstances employment of a nuclear weapon in space could be legally envisioned? Perhaps to defeat on-orbit weapons of mass destruction or nuclear weapon system posing a serious violation of the Outer Space and Limited Test Ban treaties or an otherwise serious provocation. Such use would require balancing the risks to the space environment and other space systems, and considering peace and security options associated with failure against possibilities of defeating the threat. Could using the same argument allow use of nuclear weapons against pure space assets presenting communications, PNT, warning and other capabilities that enable 21st Century militaries operations by adversaries? Probably not, but

[125]The expression "definite military advantage" is derived from the Hague Rules of Air Warfare. The idea conveyed is that of "a concrete and perceptible military advantage rather than a hypothetical and speculative one. The advantage must be military and not purely political, and involve an evaluation of the long-term military benefits of any action contemplated. See *Yoram Dinstein, The Conduct of Hostilities under the Law of International Armed Conflict* (Cambridge University Press, 2004), pp. 83-86.

[126]The U.S. GPS system is a free global utility, but until recently the U.S. reserved the right to control and degrade its signal. Current U.S. policy is to distribute the system's PNT signal without any control or degradation. In September 2007, the U.S. announced its decision to procure the future generation of GPS satellites, GPS III, without the selective availability (signal degradation) technical feature. "DOD Permanently Discontinues Procurement of Global Positioning System Selective Availability," *DOD News Release* 1126-07, 18 September 2007. Russia, China, Europe, Japan, and India have deployed, or plan to deploy, their own spaceborne PNT systems.

[127]*Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*, 10 October 1963, Article 1.

[128]P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis,*" IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p. 8.

approving that argument would create an exception that would negate arms-control and peacekeeping aspects and limitations imposed by the Outer Space and Limited Test Ban treaties, the UN Charter, and other bilateral agreements.

A state must do "everything feasible to verify that the objectives to be attacked are military objectives."[129] However, operations in this context, requires use of the panoply of space capabilities – satellite imagery, satellite PNT systems, satellite communication systems, and even meteorological data. Denying an adversary access to space systems may relieve him of some portion of this important obligation to mitigate civilian casualties by employing such techniques and technologies.[130] Furthermore, a weapon that could be used in a nondiscriminatory manner or in such a way it would cause unnecessary suffering is only banned if it can also be used in a discriminatory manner and cause limited suffering. "In such a case it is the illicit use of the weapon that is outlawed and not the weapon itself."[131]

War must be waged in accordance with widely accepted formalities, and avoid unlawful treachery. These principles impose an obligation to reduce noncombatant civilian casualties and damage, but this can be difficult to achieve as military and civilian space systems become more and more intertwined. The concept of "neutrality" may also limit military space conflict activities. Belligerents should have no right to attack neutral satellite communications systems, even in self-defense. Articles 8 and 9 of the Hague Convention V, which was concluded in 1907, decades before satellite communications systems were even envisioned, provide a neutral state is not required to restrict a belligerent's use of "telegraph or telephone cables or of wireless telegraph apparatus belonging to it or to companies or private individuals" as long as these facilities are provided impartially to both belligerents. It appears these Articles would apply to modern day satellite communications, though some think this remains an open question.

Another issue that must be addressed is how to treat neutrality rights in time of conflict. Since space law accords states the responsibility over their private entities involved in space operations, an argument can be made to hold a neutral state responsible for the actions of its private entities. According to Elizabeth Waldrop:

> …when a State issues a license authorizing a private entity to provide certain services, there can be little argument that the State should be held responsible for subsequent conduct of the private entity. Accordingly, if a neutral State permits its space systems to be used by a belligerent military, the opposing belligerent would have the right to demand that the neutral State stop doing so. If the neutral State is unwilling or unable to prevent such use by one belligerent, it would seem reasonable to authorize the other belligerent to prevent the offending use. In the context of space systems used in time of conflict, before resorting to force a belligerent could (or should) demand a neutral nation not to provide satellite imagery, navigation services, or weather information to its adversary.[132]

[129] *Protocol Additional to the Geneva Conventions*, Article 57(2)(a)(i).

[130] Of course, denying an adversary access to space assets might save lives if the adversary is using them to target innocent civilians.

[131] P.J. Blount, "Limits on Space Weapons: Incorporating the Law of War into the *Corpus Juris Spatialis,*" IAC-08-E8.3.5, Presented to the International Institute of Space Law Colloquium, International Astronautics Congress, Glasgow, UK, October 2008, p. 6.

[132] Elizabeth S. Waldrop, "Integration of military and civilian space assets: legal and national security implications", *Air*

Law on the Use of Force

Given the realities of operating in space, its global nature, and the fact threats are manifested nearly always outside the territory of a state, self-defense measures invariably require military activities conducted outside the confines of that state. Some suggest the ICJ objected to such extra-territorial self-defense measures in its 6 November 2003 ruling in the *Case Concerning Oil Platforms* (Islamic Republic of Iran v. United States of America), a dispute involved issues arising out of the Tanker War of 1984-1988 and analogous to space conflict.

> The term Tanker War was first applied to a series of naval battles and incidents in the Persian Gulf from 1984-1988 that was part of the larger Iran-Iraq War that spanned most of the decade. For two years, the U.S. was involved in the Tanker War to counter the hostile actions of military and paramilitary forces of the Islamic Republic of Iran. These forces engaged in a broad pattern of low-level, yet unlawful, uses of force, targeting not only U.S. forces, but also U.S.-owned and flagged commercial shipping, foreign commercial activities, and the strategically important Persian Gulf waterway itself in the form of mine-laying in international waters.[133]

In arriving at its ruling, the ICJ addressed issues associated with the "inherent right of self-defense." It held the facts presented with regard to missile attacks on U.S.-flagged tankers and mining incidents and attacks on U.S. warships in the Gulf were not sufficient to support an invocation of an inherent right to exercise self-defense under international law. In disposing of the U.S. position, the Court expressed interest and concern with where the vessels were attacked, especially since they were not located in U.S. territorial waters. The ICJ concluded the U.S. could not assert a right of self-defense in defense of third parties unless those parties requested "collective self defense," and mere ownership of a vessel was not sufficient to assert the right. The ICJ placed the burden on the U.S. to show the attacks on its vessels were of such a nature as to be qualified as armed attacks within the meaning of that expression in Article 51 of the UN Charter, and as understood in customary law on the use of force.[134] The ICJ concluded the right of self-defense can be asserted only if it can detect, and attribute, and conclusively prove, an attack by the hostile actor.[135]

Confirming the applicability of the international law criteria of necessity and proportionality in relation to the use of force in self-defense, the ICJ ruled it was not satisfied the U.S. attacks were necessary to respond to the shipping incidents in the Gulf and constituted a proportionate use of force in self-defense. Some suggest this formulation could have strict and adverse implications for future claims of a right of anticipatory or pre-emptive self-defense insofar as it holds that an armed attack is a prerequisite to the right of self-defense under Article 51 of the UN Charter and under customary international law.[136] Darren Huskisson has written a critique of the ICJ *Oil Platforms* decision and its potential importance.[137] The case presents

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Force Law Review, Spring 2004, 157-231, citing DOD General Counsel, *An Assessment of International Legal Issues in Information Operations* (May 1999).

[133]Darren Huskisson, "Protecting the Space Network and the Future of Self-Defense," *Astropolitics* 5 (2007): 123-143.

[134]*Case Concerning Oil Platforms* (Islamic Republic of Iran v. United States of America).

[135]Ibid.

[136]The Court was not faced with an issue of anticipatory or pre-emptive self-defense since the alleged attacks against U.S. flagged and owned shipping had already occurred.

[137]See Darren Huskisson, "Protecting the Space Network and the Future of Self-Defense," *Astropolitics* 5 (2007): 123-143.

substantial implications for space conflict issues:

> A Space War would have factual similarities to the 1987-1988 phase of the Tanker War. One could envision a regional conflict, even one in which the U.S. is not directly involved, that would have spill-over effects on the U.S. space networks as the belligerents attempted to deny the other the use of space services, just as Iran and Iraq tried to deny each other the commercial use of the Persian Gulf during the Tanker War. The U.S. would likely use force in response to any severe instances of harmful interference, such as attacks against U.S.-owned and registered space systems and foreign commercial systems and even potentially in response to the emplacement of space mines. Due to limited space situational awareness (SSA), the U.S. could expect a space adversary to conduct its operations under an even stealthier cloak of deniability than existed in the Tanker War.
>
> The specter of a Space War raises many questions… May the U.S. defend portions of the space network located outside the U.S. territory? Would it be permissible to use force to defend non-U.S. territory? Would it be permissible to use force to defend non-U.S. registered space assets? What is the standard of proof for establishing an "armed attack" on the space network, thus triggering the right of self-defense? Must the U.S. ascertain the intent of the attacker before initiating an armed response? Is the gravity of the attack on the space network relevant to the triggering of the right of self-defense?[138]

No doubt, the ICJ was unwilling at any level to conclude the myriad of actions taken by the Iranians arose to any level constituting an "armed attack." At best, the ICJ ruling can be viewed as a political verdict,[139] perhaps mischaracterizing the evidence on a shooting war that took place nearly two decades earlier during the Reagan Administration, then shaping its decision to telegraph displeasure with the George W. Bush Administration's campaign to develop and employ a coalition to remove the murderous Sadaam Hussein regime from power in Iraq, and battle Al Qaeda proxies in Afghanistan and globally. Despite these faults, the Court's reasoning cannot be dismissed as wholly in error. Yet careful analysis shows the ruling does not impose new or unreasonable burdens on those, such as the U.S. and its allies, who seek to defend their space systems.

The Court was clearly troubled the U.S. had reflagged U.S. and non-U.S. owned vessels and inserted itself into the controversy and shooting war between Iran and Iraq and between other states in the region of the Persian Gulf/Gulf of Arabia. The ICJ looked for and apparently required a stronger nexus and compelling interest for self-defense between the Tankers being attacked and their relationship with the U.S. The ICJ was looking to see if sovereigns having significant local territorial interests in protecting the tankers invoked collective self-defense obligations with the U.S. That had not happened, nor was there any general invocation by the parties of the right of collective defense.

Given the foundational defects in the *Oil Platforms* ruling, Huskisson's analogy between the tankers and space systems being attacked is incomplete. Contrary to the situation involving tankers in *Oil Platforms*,

[138]Ibid.

[139]The Court found no evidence of intent by Iran to specifically target U.S. ships with either a missile strike or mining operations, even if they were fired; thus the court concluded no "armed attack" occurred which could give rise to self-defense measures.

U.S. space systems present clear and compelling capabilities vital to insuring the extensive and instant U.S. global diplomatic, informational, military, and economic interests. This is in accord with the OST, which provides spacefaring powers retain jurisdiction and control over their space objects and operations even if no signatory shall assert rights of sovereignty to portions of outer space. A state must be able to defend such jurisdiction and control rights.

By his complaint, Huskisson presents the very solution necessary to perfect the right of self-defense for a U.S. owned space asset, or defending a foreign registered system. U.S.-owned space systems need only be registered by the U.S. If the U.S. proposes to invoke self-defense rights for a foreign registered space system that must involve and be performed in accord with an invocation of collective defense rights by the registering State. Although the current version of the Registration Convention does not direct re-registration of space objects launched into space upon transfers of ownership, control, and operation (this is a subject for a future modification of the Convention or a treaty affecting the use of force and LOAC).[140] Pending such changes, perfecting self-defense rights for transferred systems could be achieved by invocating the rights with an Article 51 submission to the UN Security Council.

Huskisson worries the Court's opinion establishes a burdensome requirement to identify the hostile actor attacking a U.S. space system. He rightly concedes an important point of international law relating to the use of force that a nation asserting a right of self-defense must attribute an attack to a specified hostile actor. With regard to LOAC issues, a military action must be necessary and distinguish between combatants and noncombatants. Huskisson dismisses these evidentiary requirements of ascertaining the hostile actor as unreasonably difficult to achieve given the current state of SSA capabilities; he correctly spots SSA challenges as its capabilities are best equipped to provide a forensic understanding of recent events rather than real-time feedback on on-going events. Huskisson wrongly infers the evidentiary requirement should be partly ignored or accommodated because it could be overly difficult to satisfy.

Current SSA tools and overall capabilities need to be improved given the ICJ's opinion in the *Oil Platforms*. This is a correct result, and encourages appropriate planning and resource development. It would be far more destabilizing to encourage commanders or national leaders to authorize or engage in military actions based on "hunches" that an attack has or is about to happen, and "hunches" as to who made the attack.

Huskisson also complains about the Court's requirement that a state ascertain the intent of the attacker before initiating an armed response. Again, Huskisson misses the Court's important point. Not all events causing damage to space systems are the result of an attack. To find otherwise would ignore a half century of space physics, engineering, and operational experiences. This would risk peace and security over accidents or other non-hostile events. Space systems are continually battered with a variety of environmental events – space debris, electrical charging, cosmic rays and energetic particles, and others. Assuming an event can be traced to some state or actor, a strong factual determination must nonetheless be made as to whether the interference or damage occurred inappropriately or by accident. For example,

[140] *Convention on the Registration of Objects Launched into Outer Space*, 15 September 1979, also known as the Registration Convention, at Article II.

jamming incidents affecting space systems occur in many venues, most inadvertent, some not. An assessment and inquiries must be made to determine the true context of the event to satisfy LOAC requirements of necessity, distinction, and proportionality.

Finally, Huskisson complains about whether the gravity of an attack on a space system is relevant to the triggering of the right of self-defense. Huskisson again missed the ICJ's point. The ICJ ruling encourages application of classic necessity and proportionality rules when executing purported self-defense actions. Peace and security interests can best be achieved and preserved if necessary and proportionate responses are presented in response to armed attacks.

Attacks on Space Systems

Conflict in outer space or affecting the domain is also limited by a myriad of space governance, environmental, disarmament, and arms control agreements. There are boundaries on these limits. For example, under the Vienna Convention during time of conflict, treaty terms inconsistent with a state of armed conflict may not apply between belligerents, unless the terms of the treaty itself are specifically intended to apply during conflict.

The Liability Convention[141] expands on a topic noted in the Outer Space Treaty that "launching states" are liable to other states for damage caused by space objects, including debris. States are liable only for direct damage caused by a space object (i.e., loss of life, personal injury or other impairment of health, or loss of or damage to property). If damage is caused to another space object in outer space, liability is based on fault. On the other hand, if damage is caused by a space object on earth or to an aircraft in flight, liability is absolute.

Notably, there can be more than one launching State – a launching state is any state that launches an object, procures the launch of an object, or from whose territory or facility an object is launched. If there is more than one launching State, joint and several liability rules would apply. States may make indemnification agreements and apportion liability among themselves. Since allied nations supporting space conflict activities could be construed as launching states, liability issues and allocation of liability issues should be resolved before engaging in such activities.

Does the Liability Convention offer an exclusive remedy for rights of a state in event of an attack on its space systems? No – the Liability Convention does not exclude or limit the right of self-defense affirmed in Article 51 and such a reading cannot be found in its negotiation or record of the U.S. Senate ratification. The Liability Convention presents other challenges, however, and does not offer a satisfactory disposition to attacks. According to Adam Frey:

> Although it clarifies some of the Outer Space Treaty's ambiguity, the Liability Convention still faces criticism. First, its definition of an "object" as including "component parts" does not specify whether this includes debris, so some suggest a launching state might not be liable for debris-based damage. Second, although the convention imposes a "fault" standard for damages, it does not define how much care should be exercised during a launch. In other words, if two space objects collide, one state could argue that it took all reasonable precautions, while the injured state could argue that it did

[141] See *Convention on International Liability for Damage Caused by Space Objects*, September 1972, known as the Liability Convention.

> not. Third, fault may be difficult to prove since specific pieces of debris can be difficult to identify and track, and the cause of a collision can prove equally elusive… the mere fact of a collision does not automatically put the state that created the debris at fault. Finally, there is no established system for processing claims or for interpreting or enforcing the convention's terms. The convention's litigation mechanisms have never been used, so their effectiveness remains unknown.[142]

Similar to the Liability Convention, the OST does not set out substantive remedies for a state that has had its space assets attacked by another state or non-state party. Nonetheless, some, including Frey, suggest the OST may provide "an appropriate response" if a state interferes with another's space activities. It is based on consultation:

> Articles [VI] and [VII] hold states liable for damage caused by their space activities and launches, whether such activity is conducted "by governmental agencies or by non-governmental entities" within the state. Further, Article [IX] requires states to avoid the "harmful contamination" of outer space and celestial bodies. If a state believes that its activities could cause such harm, it must undertake "appropriate international consultations" before proceeding. Conversely, if a state believes it could be harmed by another's actions, it "may request consultation concerning the activity or experiment." Article [X] further allows states to request observation of each other's launches, and Article [XII] requires any space facilities and equipment to be open for observation. However, the treaty provides no right of appeal if two states cannot resolve these issues themselves.[143]

In the end, the Liability Convention's real limitations on space conflict activities arise out of its provision for liability associated with causing damage to third-parties. These liability issues must be evaluated, addressed, and/or mitigated by law-abiding states before performing self-defense military activities that could cause damage to third-party space systems. Planners must account for payment of damages or plan to limit such problems.

The 1963 *Treaty Banning Nuclear Weapon Test in the Atmosphere, in Outer Space, and Under Water*, also known as the Partial (or Limited) Test Ban Treaty (PTBT), prohibited "any nuclear weapon test explosion, or any

[142]Adam E. Frey, "Defense of U.S. Space Assets: A Legal Perspective," *Air & Space Power Journal* (Winter 2008), http://www.airpower.maxwell.af.mil/airchronicales/apj/apj08/win08/frey.html (accessed June 2009). The statement by Frey that "fault may be difficult to prove since specific pieces of debris can be difficult to identify and track, and the cause of a collision can prove equally elusive… the mere fact of a collision does not automatically put the state that created the debris at fault" has been forced to the forefront by the 10 February 2009 collision between the Iridium 33 and Cosmos 2251 communications satellites. The impact between the Iridium Satellite LLC-owned satellite and the 16-year-old defunct Russian military satellite occurred at 780 kilometers, a low Earth orbit (LEO) altitude used by satellites that monitor weather and carry telephone communications. It is considered the most crowded area of space. See "When Satellites Collide: Iridium 33 Strikes Defunct Russian Sat in Unprecedented Accident," *GPS World*, 12 February 2009.

[143]Adam E. Frey, "Defense of U.S. Space Assets: A Legal Perspective," *Air & Space Power Journal* (Winter 2008), http://www.airpower.maxwell.af.mil/airchronicales/apj/apj08/win08/frey.html (accessed June 2009). On the matter of consultation, while it appears the Chinese did not offer to engage in such discussions, it appears from news reports of the incident the U.S. knew the ASAT test was pending. "The events show that the [U.S.] Administration felt constrained in its dealings with China because of its view that it had little leverage to stop an important Chinese military program, and because it did not want to let Beijing know how much the U.S. knew about its space launching activities." Further, the U.S. did not request consultation even though the Outer Space Treaty states this was its right. Had the U.S. been willing to discuss the military use of space with the Chinese that might have been enough to dissuade them from going through with it. See Michael R. Gordon and David S. Cloud, "U.S. Knew of China's Missile Test, but Kept Silent," *The New York Times* 23 April 2007, http://www.nytimes.com/2007/04/23/washington/23satellite.html?_r=2&hp=&pagewanted=print&oref=slogin (accessed June 2009).

other nuclear explosion" in the atmosphere, underwater, or in outer space.[144] PTBT is superseded by the Comprehensive Test Ban Treaty (CBTB) that bans all nuclear testing in all mediums, though the CTBT has not as of yet entered in force.[145] The OST does not specifically prohibit testing weapons in outer space itself, as opposed to on celestial bodies, instead it proscribes the stationing of nuclear weapons on orbit. With PTBT and CBTB, testing and subsequent use of nuclear weapons in response to attacks on space systems appear to be banned, unless employed in a possible narrow exception that allows such devices to be employed to preserve the "survival of a State." Employing nuclear weapon systems against conventional space systems probably could not be shown to support such a survival objective.

A series of bilateral agreements between the U.S. and the former Soviet Union, now held to be binding on Russia by protocol, prohibit interference with early warning systems and NTMs. As noted earlier, NTMs include a variety of technologies and systems. The definition should include space (e.g., photo-reconnaissance satellites) and terrestrial assets (e.g., land-based radars, seismographs, radar and intelligence systems on ships and aircraft, etc.) that can verify arms control treaty compliance. Since they provide transparency, NTM systems are thought to help reduce the risk of nuclear war. The earliest of these provisions was contained in the 1972 ABM Treaty between the Soviet Union and the U.S.[146]

While the U.S. has withdrawn from the ABM Treaty, other treaties in force today contain this same prohibition, including the 1987 Intermediate-Range Nuclear Forces Treaty (INF), 1992 Strategic Arms Reduction Treaty (START I), and 1990 Treaty on Conventional Armed Forces in Europe (CFE). Recognition of the important role played by NTMs has been made evident. Given the importance of spaceborne NTMs role in stemming the potential of a nuclear holocaust, non-interference rules that preserve and allow adversary access to their systems would appear to be taking on the trappings of a peremptory norm that nations may want treaties to perfect.

The Environmental Modification Convention of 1978[147] prohibits all military or hostile environmental modification techniques that might cause long-lasting, severe, or widespread environmental changes in Earth's atmosphere or outer space. "Each State Party to this Convention undertakes not to engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting, or severe effects as the means of destruction, damage, or injury to any other State Party."[148] "Widespread" is defined as "encompassing an area on the scale of several hundred square kilometers;" "long-

[144]Nuclear powers France and China did not sign or ratify the PTBT. Also, the PTBT did not ban underground nuclear testing.

[145]Nuclear powers China, Israel, and the U.S. signed, but have not ratified the CTBT. As of October 2009, 151 States have ratified the CTBT. Thus, one could argue that the norms of the Treaty to ban all nuclear testing in all mediums is emerging as a universal norm binding upon states that have not ratified the Treaty. Entry into force of the CTBT is an achievable goal. The CTBT is entering "the most defining period of its existence," as there has been a "paradigm shift" in support for the Treaty since U.S. President Obama set out the U.S. agenda for non-proliferation and arms control in April 2009 followed by his agreement with Russian President Medvedev in London in 2009 to seek entry into force of CTBT, http://www.ctbto.org/press-centre/press-releases/2009/after-ten-year-hiatus-entry-into-forceof-comprehensive-test-ban-treaty-an-achievable-goal (accessed January 2010).

[146]See *Treaty between the U.S. of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems*, 3 October 1972, but no longer in effect as of 13 June 2002 due to U.S. withdrawal.

[147]*Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques*, 5 October 1978, known as the Environmental Modification Convention.

[148]Ibid., Article I(1).

lasting" is defined as "lasting for a period of months, or approximately a season;" and "severe" is defined as "involving serious or significant disruption or harm to human life, natural and economic resources, or other assets."[149] The Environmental Modification Convention focuses on proscribing military weapons, tactics, and techniques that deliberately change natural processes.[150]

Would the use of nuclear weapons in space violate the Environmental Modification Convention? Perhaps, yes, but only if used with hostile intent, to deliberately manipulate space environmental processes, with widespread, long-lasting, or severe effects, causing damage or destruction to space-based systems, and directed against another party to the treaty.

Would employing systems attacks that create widespread, long-lasting, or severe space-based debris fields, be unlawful? Again, yes, if the essential elements of the Convention are violated. A state that creates debris intentionally in order to ruin the environment for use by its adversary would violate the Convention.

What should be concluded if a party protests the effects and damage were unintended? Some suggest a state that creates orbital debris while targeting specific adversary targets would not violate the Convention, but that act would instead only constitute a violation of the Geneva Additional Protocol 1. However, as to the space environment, the science and danger of orbital debris is now very much acknowledged, notwithstanding denials and protests of any potential offending state. Perhaps the requisite hostile intent and deliberate manipulation elements could be deduced from the willful and wanton disregard for the damage that occurs and the recklessness of the act. This same reasoning could also be made to prohibit the use of nuclear weapons in defense of space systems.

Agreements, such as the 1971 Accidental Measures Agreement (updated in 2004), the 1988 Ballistic Missile Launch Notification Agreement, and the 1990 Dangerous Military Activities Agreement address dangerous laser use and dangerous interference with nuclear weapons command and control systems, and so potentially limit possible space warfare activities.[151] They are intended to prevent outbreak of nuclear war due to misunderstanding, accidental launch, or misinterpretation of unidentified objects detected by early warning systems, and are primarily focused on the topic of intercontinental ballistic missiles (ICBMs). These agreements basically seek to prevent miscalculation by requiring parties to provide notice whenever there is an accidental launch of a ballistic missile in the direction of the

[149]Ibid.

[150]The U.S. Delegation Statement provides: "The Environmental Modification Convention is not an Environmental Protection Treaty; it is not a treaty to prohibit damage to the environment resulting from armed conflict. Rather, the Environmental Modification Convention fills a special, but important niche reflecting the international community's consensus that the environment itself should not be used as an instrument of war." The U.S. position on "criteria that have been established for determining what constitutes a prohibited action under the convention: first, the convention specifies military or any other hostile use. The U.S. understanding is that hostile intent is a precondition for a violation; second, it must meet the definition of an environmental modification technique, that is the deliberate manipulation of a natural process; third, effects must be widespread, long-lasting or severe as defined in Article II and related understandings; fourth, these effects must be the means of destruction, damage or injury; and fifth, it must be directed against another state party. Only if all of these criteria are met is an action prohibited by the convention."

[151]See *Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between the U.S. of America and the Union of Soviet Socialists Republics*, 30 September 1971; *Ballistic Missile Launch Notification Agreement*, 31 May 1988; and *Agreement between the Government of the U.S. of American and the Government of the Union of Soviet Socialist Republics on the Prevention of Dangerous Military Activities*, 12 June 1989.

other party, or when a party's early warning system detects an unidentified object.

These agreements affect the prosecution of self-defense in response to attacks on space systems. For example, the Accidentals Measures Agreement with Russia requires the parties to take measures to guard against an accidental or unauthorized use of nuclear weapons. It requires a party to notify the other immediately if an accidental or unauthorized incident occurs, if an early warning system detects an unidentified object, or if there is any other unexplained event involving possible detonation of nuclear weapons.

Importantly, the Accidental Measures Agreement requires a party to provide advance notice of any planned missile launches beyond the territory of the launching party and in the direction of the other party. The Launch Notification Agreement requires a party to provide at least 24-hour advance notice of the date, launch location, and estimated impact area for any ballistic missile launch. These notification requirements could require potentially disruptive or compromising information exchanges with Russia before prosecuting military space activities, especially if space launches are required. Such exchanges could limit the ability of the U.S. to prosecute space-related military/conflict-related activities.

Although not traditional space "arms control" agreements, the U.S. is party to numerous bilateral or multilateral agreements that may restrict and limit "space activities" from being performed in or from the territory of another state party. For example, in the U.S. pursuit of a global ballistic missile defense system, it is entirely foreseeable that states where key components are located could impose restrictions on U.S. space or other activities in exchange for the U.S. right to base ground- or link- segments in that state. In the recent past, several long-standing allies limited their cooperation with the U.S. on missile defense related activities, not wishing to participate, support, or cause a potential violation of the ABM Treaty, even though they were not signatories to that agreement. These positions have evolved as perceptions of threats to national interests changed and the U.S withdrew from the ABM Treaty in 2002. The existence of such agreements and potential limitations on space activities should not be ignored in a discussion of the law relating to space conflict activities.

Citing a changed global environment, the U.S. withdrew from the ABM Treaty in 2002. Assuming a new ABM Treaty is negotiated on the same or similar terms, where would such a treaty leave ASATs from a legal perspective? There is, not surprisingly, more than one answer. Some analysts suggest that it may be impossible to distinguish between ABM directed-energy space vehicles and those deployed exclusively for anti-satellite purposes.[152]

Hurwitz argues that "all extraterrestrial autonomous weapons are illegal. However, non-nuclear weapons, which are not autonomous, may be stationed and, in accordance with generally accepted principles of international law, used in Earth orbit."[153] In short, while the ABM Treaty appears to prohibit the use of directed-energy weapons in an ABM mode, "the same technology when used in the development/testing/deployment of ASATs is not prohibited.

Given the overlap of technologies, careful consideration must be given to whether

[152]Joan Johnson-Freese, "The Viability of U.S. Anti-Satellite (ASAT) Policy: Moving Toward Space Control, *INSS Occasional Paper 30,* U.S. Air Force Institute for National Security Studies (INSS), January 2000, p. 16.

[153]Bruce A. Hurwitz, *The Legality of Space Militarization* (North-Holland, 1986), p. 135.

systems might be favored in one case as an ABM system, but not as an ASAT, or vice versa. This issue generated considerable political debates in the 1980s, when debates involving the SDI were also fought over ASAT technologies, options, opportunities, and related programs.[154] U.S. ASAT technology development efforts have continued on and off for decades. Peace and disarmament advocates now attack U.S. missile defense systems as fledgling ASAT systems, a topic brought to the forefront by the 2008 interception of the disabled USA 193 intelligence satellite by a modified Aegis cruiser and missile defense missile over the Pacific.

Conclusions

"Arming the heavens" might seem a most tempting option to respond to threats to U.S. space systems. Regardless of the wisdom of such action, the facts remain that the U.S. is dependent on use of space systems for military operations and security; that these systems are vulnerable to disruption, attack, and even destruction; and that at stake are the asymmetric advantages space capabilities provide the U.S. and its allies. Adversaries can easily see the tremendous leverage they can obtain by disrupting space systems. Given these pressures, space presents a feasible arena for conflict activities.

"Arming the heavens" might seem a most tempting option to respond to threats to U.S. space systems.

Policy, law, and resulting strategy formulation for defense of space systems requires more sophistication. Provocateurs advocating and planning for unconstrained space warfare have been marginalized over the decades as seasoned and knowledgeable leaders in the executive and military departments, congressional delegations, and international community approach such options with extreme caution. If performing self-defense activities, lawful options must be considered and selected by a state in event an adversary or entity threatens or attacks its space systems? Employing space systems in accord with international law is vital to ensure continued access to space capabilities and that the space domain remains a peaceful environment as envisioned by the OST Regime. By doing this, the U.S. will maintain not only an ultimate strategic high ground, but also a moral one.

We know that under treaty and customary law, the U.S., as well as member states of the UN and states that have ratified OST, must use space for peaceful purposes, refrain from using space aggressively, take care to preserve the space environment, and be prepared to indemnify if it damages another non-belligerent state's assets. Applicable international treaties, conventions, customary law, and LOAC principles do not specifically describe what the U.S. should or can do in preparation for or in response to an attack on space systems. Rather, as some contend, they highlight what cannot be done.

The right to respond to attacks against space systems is limited. Relevant treaties,

[154]Once the Strategic Defense Initiative was politicized during the 1980s, debates ran the gamut of the defense and policy communities. Opponents posed objections, most technical, to missile defense claiming – the Soviet ABM radars complexes were not violations of the ABM treaty; propulsion, sensor, and targeting systems could not be miniaturized for a kinetic kill vehicle; kinetic kill technologies could not be integrated on the battlefield; command and control systems could not be developed to engage ballistic missiles; software programs needed to manage an effective ABM system requires too many lines of code; lasers cannot engage and defeat missile targets; withdrawal from the ABM treaty would lead the U.S. straight into World War III; and the like. Each of the technical objections has been defeated by "smart" technical programs.

customary law, the LOAC, and other legal principles substantially restrict space warfare options and the potential for such conflict among law-abiding nations. The use of force is allowed only in self-defense or in accord with authorization of the UN to maintain international peace and security. Kinetic, electromagnetic or information operation attacks against space systems are each an "armed attack" to which the use of force is permitted in accord with the self-defense exception. The right to conduct conflict and space warfare activities involving space systems is constrained by the LOAC, and the right of anticipatory self-defense may lawfully be employed in defense of space systems only in limited circumstances.

The right to respond to attacks against space systems is limited.

If engaged in space-based warfare, a state must comply with the legal obligations set out in the OST, Registration Convention, Liability Convention, PTBT/CTBT, Environment Modification Convention, and other treaties. Certain satellite systems and their supporting ground-based, and command and control systems should not be attacked; this could include spaceborne components of NTMs, especially if they are necessary and important to reduce chances of a full-fledge nuclear conflagration, or resolution of such a conflict. Even if lawful means and methods are employed and targets engaged, physical, technical, environmental, and political realities, and their risks and benefits, still limit options to defend and fight space systems; specifically, they limit the when, where, and how adversary space systems can, or should not, be engaged.

The U.S. can lawfully take a passive approach to defend its space systems, allowing it to treat some attacks and threats as a mere distraction. Satellite vulnerabilities can be reduced by using anti-jamming measures; hardening to protect against electromagnetic pulses, radiation, or explosions; improving maneuverability to actively avoid attacks. Yet as we have seen with developments in North Korea, developing states and terrorist groups can gain access to space system and propose to engage in serious mischief. Attacks could range the span of space systems – terrestrial, link, and on-orbit assets. There is no assurance a self-restraint option will protect orbital assets.

If deterrence fails, a lawful self-defense "punishment strategy" can be employed. Absolute flexibility should be maintained by the U.S. and its allies in the way they wield such deterrence, if they choose to wield it at all. The lawful range of diplomatic, information, military, and economic instruments of national power should be considered and employed. These instruments are not limited to just offensive or defensive counterspace or space control activities, though preparing for destructive space-based combat activities must be carefully considered and generally deferred given the risks such conflict presents to the very space environment the U.S. wishes to protect. Nevertheless, preparing to employ a complete suite of these instruments "would signal to any adversary considering U.S. space systems as a legitimate target that the U.S. has the means and resolve to respond if it so chooses."[155] Preparing for the lawful use of U.S. and allied retaliatory measures can encourage or, if necessary, compel offender reconsideration of its course of action and compliance to international morays or legal obligations if engagement cannot succeed.

[155]See John B. Sheldon, "Space Power and Deterrence: Are We Serious," *Marshall Institute Policy Outlook* (November 2008): 3-4.

Important, but lost on many who seek to contest the space domain, a retaliatory deterrence strategy for the U.S. has little credibility if directed at adversary space assets since the U.S. "…is the most space-reliant country today. Threatening to attack adversary satellites in response to attacks on U.S. systems may prove fruitless if the adversary in question does not leverage significant military, diplomatic, and economic power through such systems…"[156] Presently, the U.S. is the only globally space-enabled power, so adversary spaceborne components probably should not be engaged tit-for-tat.[157] Such would only be a pyrrhic act. This may change as other nations gain the wherewithal, experience, and access to space capabilities and fully exploit them for military purposes.

Non-aggressive weaponization of space is legal as is the use of force in self-defense against space systems components whether in space or the terrestrial environment. Treaty and U.S. policy allows developing and deploying systems designed to protect satellites, or defeat ASAT and strategic threats (e.g., ICBMs). Employing a weapon system in self-defense to engage targets, whether ground, air, or space-based, if accomplished in such a way the combat event does not create space debris, and is targeted in accord with LOAC principles, appear to be lawful under current treaty and customary law. Jamming technologies can be employed to deny adversary access to space and protect spacecraft, and their effects may be reversible and not contaminate the environment. SSA and other sensor systems, command and control, and shooter capabilities may not be powerful and nuanced enough over the near-term to achieve all the results needed and desired. That may change as space control technologies evolve.

In the event of war, the U.S. and its allies may defend components of their space systems that are subject to jamming and cyber attack since such attacks can be considered armed attacks in a modern context. In doing so, they must accurately determine the source of the attack and confirm adversary state or non-state actors intended to target the system at issue and cause destructive effects. The U.S. should be able to treat certain adversary satellites and supporting systems as legitimate targets only after ensuring that satellite's loss would not excessively harm civilians or the space environment, or violate other peremptory norms. The U.S. response must be necessary and proportional; not more than that amount necessary to accomplish military objectives to defeat adversary forces and to achieve the enemy's partial or complete submission.

Attacks against adversary NTMs capabilities should be avoided as attacking them could violate peremptory norms to take all actions necessary to prevent nuclear war, ensure compliance with nuclear weapons arms control agreements, and prevent attacks by weapons of mass destruction. On the other hand, the U.S may lawfully respond to attacks against its own national NTMs and nuclear command and control capabilities under rules relating to self-defense and, if necessary, reprisal.[158]

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[156]Ibid.

[157]Joint Publication 3-14, 6 January 2009, p. II-5. Negation includes "Active and offensive measures to deceive, disrupt, deny, degrade, or destroy an adversary's space capabilities. Negation includes actions against ground, data link, user, and/or space segment(s) of an adversary's space systems and services, or any other space system or service used by an adversary that is hostile to U.S. national interests." Also, see the 2006 U.S. National Space Policy which states: "…the U.S. will …deny, if necessary, adversaries the use of space capabilities hostile to U.S. national interests."

[158]Reprisals are acts taken in response to LOAC violations. Such an act of reprisal would be otherwise forbidden if it was not for the prior unlawful act of the enemy. A lawful act of reprisal cannot be the basis for a counter-reprisal. To be lawful, a reprisal must: timely respond to grave and manifestly (clearly) unlawful acts; be for the purpose of

Conflict involving space systems need not be space-based. In defending its systems, the U.S. could lawfully use existing terrestrially-based military systems to defeat and/or prevent adversary weapons from entering space, or from being successfully operated there. Adversary ground control stations could be engaged and command and control linkages interrupted, reduced, or destroyed.

If facts establishing conditions of immediacy and necessity to U.S and allied systems are satisfied, anticipatory self-defense actions could be undertaken. The goal of such anticipatory self-defense actions could involve targeting the enemy's systems before and during launch. Jammers could also be located, degraded, and destroyed; e.g., GPS jammers were engaged and destroyed during Operation Iraqi Freedom by GPS-aided Joint Direct Attack Munitions described as precision guided munitions or "smart bombs." Spacelift facilities could also be engaged to disable adversary launch capabilities.

The U.S. is obligated to protect the space environment. Obligations imposed by the Outer Space and Environment Modification treaties, Liability Convention, and other agreements, and physical reality, make it politically wise, and immensely practical to keep space safe and usable. As the nation that exploits space capabilities to their maximum extent, the U.S. has the most to lose if the domain is compromised and lost to unwise operations or conflict. Self-defense acts that seek to or actually damage the space environment for extended periods may be impermissible; hence, the U.S. must observe the obligation to avoid and minimize the creation of debris when operating defensive space weapons. "Soft-kill weapons that disable are clearly acceptable and favored if weapons need to be employed against space based components. Explosive weapons, such as space mines surrounding satellites, are not, especially since they can create significant space debris."[159] Given the potential for resulting debris, taking action to destroy or damage adversary space systems "may violate the duty to avoid the harmful contamination of space" except in the most pressing circumstance.[160]

The U.S. is the global leader in space and has filled this role for half a century. Its systems work and have been revolutionary in presenting new capabilities in the civil, commercial, and military arenas. As it has done for decades, the U.S. enjoys a unique position to shape the direction of global space activities for this new century. With this position comes great responsibility – to forge behaviors to mitigate space debris, prevent armed conflict, and enhance the peace, security, and prosperity of spacefaring nations and the rest of the world. Space capabilities are at risk to a myriad of threats, but continued efforts to improve space governance by international treaties, customary law, best practices, policy, strategy, and overarching global behaviors will secure the high frontier.

compelling the adversary to observe the LOAC and not for revenge, spite, or punishment; give reasonable notice that reprisals will be taken; have had other reasonable means attempted to secure compliance; be directed against the personnel or property of an adversary; be proportional to the original violation; be publicized; be authorized by national authorities at the highest political level. Only the President of the U.S., as Commander-in-Chief, may authorize U.S. forces to take such actions.

[159]Adam E. Frey, "Defense of U.S. Space Assets: A Legal Perspective," *Air & Space Power Journal* (Winter 2008).
[160]Ibid.

The New Space Order: Why Space Power Matters for Europe

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More than fifty years since the dawn of the Space Age and twenty years since the end of the Cold War, space affairs and politics remain interlinked. Space activities are increasingly tied to national power for major world powers, and political objectives are still the driving force for most space activities. Yet in an ever more globalized and competitive multipolar world, status and power that arise from the employment and access to the most advanced technologies are now widely perceived as key to the powers and standings of states. The importance of space activities is increasing, transitioning in terms of perception by today's world leaders from a "nice to have" to a "need to have" status. A sound understanding of the nature and exploitation of space power is critical for Europe as it provides tangible and intangible benefits back on Earth that allow Europe to maintain its position in the global "space hierarchy" in the 21st Century.

The world, since the end of the Cold War, is increasingly interlinked and interdependent at many levels. At the same time, the balance of powers across the world is changing and shifting with emerging world powers rising, particularly in Asia. This is complicated by the fact that there exists a renewed emphasis and importance accorded by states on spheres of influence based on geography or on topical issues. In particular, a greater importance is placed on a country's ability to innovate as a source of competitive advantage. The world is becoming at the same time both "flat" and "spiky."[1] Science and Technology (S&T) prowess is one of the key elements of this emerging flat/spiky system of competitive multipolarity. Governments are fully engaged in improving their national economies and overall competitiveness, but also because they realize that it represents for them a means, among others, for achieving national objectives, including foreign policy motives, especially in the domain of "S&T politics," such as nuclear energy, but also in the area of space affairs.

In the early years of the Space Age, the performances of the United States (U.S) and Soviet Union in space activities came to be interpreted as a measure of their relative military, economic, and scientific strength on the world stage. During the Cold War, human and robotic space accomplishments became on the geopolitical level an element of a country's power and influence. Space, since the 1950s, is a key attribute of a state's power. However, since the 1990s, the space context is dramatically evolving. Similar to the process of internationalization of innovation, space activities are expanding beyond the traditional

The world is becoming at the same time both "flat" and "spiky."

[1] A "flat" world implies that the world is more globalized and interconnected. See Thomas Friedman, *The World Is Flat: A Brief History of the Twenty-First Century* (Farrar, Straus and Giroux, 2005). A "spiky" world suggests that by almost any measure the international landscape is not at all flat. On the contrary, the world is spiky with concentrated centers of power, influence, economic horsepower and cutting-edge innovation. See Richard Florida, "The World is Spiky," *The Atlantic Monthly*, October 2005.

spacefaring countries[2] to new global players, such as China and India, as well as other emerging countries, with changing patterns of international space relations leading to a new space order.

In this evolving geopolitical context, the importance of space power is increasing as space remains a proxy demonstrating power and because more actors are using space. Although there is a great deal of rhetoric about the impact of S&T on international affairs, there is relatively little analytical work on the link between space and national power, as well as between space power and international affairs. This paper aims to provide a preliminary overview of a complex and wide-ranging subject that brings together the important issue of space power and European influence in international relations.

Towards a New Space Order

Since the pioneering of space activities, the geopolitical context of space affairs changed dramatically.[3] The history of space activities can be structured into three phases, each having distinct features and characteristics: (1) "proto-space age" (pre-World War II); (2) "Space 1.0" (Cold War); and (3) "Space 2.0" (post-Cold War).[4]

Space 1.0 took place from the late 1950s to the late 1980s. For more than three decades, space was viewed as one of the emblematic elements of the Cold War rivalry between the U.S. and the Soviet Union, principally as a substitute for armed conflict.[5] During this phase, space activities were limited to a small number of other countries, primarily in Europe and Asia, but with more limited capabilities than the two superpowers. Indeed, the technical difficulties and financial burdens associated with the full range of space activities remained prohibitive for most countries; only a limited number of countries were able to benefit from the use of space technologies and activities due to the inherent technical complexity, high costs associated with space activities, and the necessity for a high-skilled workforce.

…the importance of space power is increasing as space remains a proxy demonstrating power...

The current space phase, Space 2.0, which started at the beginning of the 1990s as a result of the changing geopolitical context linked to the end of the Cold War, is characterized by a multipolar world and the rise of many new actors with increasing technical capabilities, advancing an internationalization of space.[6] In particular, a technological revolution linked to the development of small satellite technology, the increasing reliability and accessibility of commercial-off-the-shelf (COTS) technology, and the multiplication of commercial services leading to a reduction of the price of access to space facilitate the involvement of non-traditional actors in the space arena.[7] Countries previously unable to pursue space activities now have a greater opportunity to

[2]The term spacefaring country defines a country capable of developing, launching, and operating satellites in space autonomously. This implies the state possesses a fairly robust launch infrastructure and indigenous capabilities to manufacture and operate space systems.

[3]Nicolas Peter, "The Changing Geopolitics of Space Activities," *Space Policy* 22 (2006): 100-109.

[4]Nicolas Peter, "Space Power and Europe in the Need for a Conceptual Framework," paper presented at the 59th International Astronautical Congress, Glasgow, Scotland, 29 September - 3 October 2008.

[5]Nicolas Peter, "The Changing Geopolitics of Space Activities," *Space Policy* 22 (2006): 100-109.

[6]Ibid.

[7]Ibid.

enter the space arena; the space environment is no longer the exclusive province of a handful number of countries as it was during the Cold War.

Spacefaring powers are joined by other countries that have some degree of space involvement. An increasing number of countries have acquired over the years space capabilities for national reasons (e.g., support national economy and overall competitiveness, public services, and ensure national security), as well as international reasons (e.g., regional influence and prestige). They recognize the advantages of space activities from the tangible aspects of positioning-navigation-timing (PNT), remote sensing, and telecommunications to the more abstract aspects of political influence and prestige. There are tangible benefits that result from investing in space, such as job creation; stimulation of national interest in Science, Technology, Engineering, and Mathematics (STEM); and spin-off technologies resulting from research and development (R&D). There are intangible benefits as well – a successful space program brings heightened global prestige and increased domestic credibility and prowess.

While few countries have independent launch capability (nine total), and even less have human spaceflight capabilities (three total), the number of players controlling their own communications systems have doubled since the end of the 1980s.[8] There are, as of December 2009, 27 countries with satellite-based Earth observation resources compared with three in 1980, not to mention the numerous countries that have their own image receiving stations for remote sensing systems.[9]

The multiplication of actors in the post Cold War context is accompanied by an emerging globalization of space activities with actors now scattered all over the world and no longer limited to the "North."[10] The multipolar space environment and the resulting new space order is characterized by the rapid integration of China and India as new space powers, and the entry of countries particularly from the "South," like Malaysia, Thailand, and Indonesia.[11] New ambitions to create dedicated space agencies are surfacing on all continents and more countries are formulating space policy to guide their domestic and international space activities with the principal aim being to improve their capabilities and competitiveness.[12]

…a successful space program brings heightened global prestige and increased domestic credibility and prowess.

[8]Bertrand de Montluc, "The New International Political and Strategic Context for Space Policies," *Space Policy* 25 (2009): 20-28.

[9]Ibid.

[10]It is important to note that national organization of space activities and the weight of national budgets differ greatly among countries around the world. Not all countries involved in space activities do posses a national space agency, and the national authorities responsible for space matters vary widely. A first category is composed of countries with their own agencies devoted more or less exclusively to space. In a second category, space affairs are directly handled by a ministry (education, research and technology, industry or trade, defense, etc.) or by an inter-ministerial entity. See Nicolas Peter, "The Changing Geopolitics of Space Activities," *Space Policy* 22 (2006): 100-109.

[11]The use of the term "South" refers to all developing countries, as well as all Least Developed Countries (LDCs). It rests on the fact that the entire world's industrially developed countries (with the exception of Australia and New Zealand) lie to the North of developing countries. However, the diversity of countries in the South must be kept in mind. Some countries, such as Argentina, Brazil, China, India, Mexico, South Africa, and South Korea have enviable records of technical and scientific achievements compared to others in the South and even the North.

[12]Nicolas Peter, "Space Power and Europe in the 21st Century," European Space Policy Institute Perspectives 21, May 2009, http://www.espi.or.at/images/stories/dokumente/Perspectives/espi%20perspectives%2021%20.pdf (accessed January 2010).

As a reflection of the international system, the current space environment is characterized by a growing number of countries with varying ranges of space capabilities (e.g., technical and scientific). This, in turn, is leading to more options for international cooperation in the second space phase as there is a growing pool of potential partners to take part in space activities.[13] States around the world are now looking to a variety of partners as they plan their future endeavors since partnerships are helpful to transfer technologies and explicit and tacit knowledge. Those partnerships are driven by scientific and technical motives, often with "high politics" as objectives. There is a mushrooming of bilateral and multilateral cooperation, including regional cooperation, and there is the development of a complex and multidimensional web of relations in the space arena.[14]

There is a mushrooming of bilateral and multilateral cooperation….

A bipolar space world has been replaced by a pluralistic space context marked by a plethora of complex relationships. The early years of international space cooperation were characterized by power asymmetries in the two superpower's favor vis-à-vis their partners as illustrated with U.S.-European space relations. However, the traditional asymmetry in space activities, while still existing in term of resources, tends to disappear in regard to capabilities with the emergence of spacefaring countries with similar capabilities to the historical two space powers, the U.S. and Soviet Union/Russia. Roles and relationships in space are being redefined in the new space order. The U.S. and Russia are no longer the only players that can lead cooperative projects. There are now numerous actors with varying degrees of capabilities allowing them to lead cooperative ventures as well.

The patterns of relations in space are fundamentally changing. There is now a variety of cooperation possibilities leading to new relations evolving beyond the traditional "North-North" cooperation and the unilateral "North-South" axes of cooperation of the first space phase. The new axes of "South-South" cooperation has been growing in recent years in many fields, such as in energy, and space is no exception as they are now more countries from the South with mature technical capabilities that are using space to reach out to new partners. This leads to the development of new networks of cooperation as there are cooperation possibilities with new hubs and centers of gravity appearing in Asia and centered on China and India. New axes of cooperation are arising; some are deepening, while others are weakening.[15] The multiplication of space actors and the new relations among institutional entities are leading to the emergence of a new space order that was unforeseeable twenty years ago.

…being involved in space affairs is increasingly being seen… as a necessary element to being, at a minimum, a regional or continental power.

In the current phase of space activities, there is also a growing diversity in the types of actors involved in space affairs that influences the overall space context. The involvement of non-governmental organizations (NGOs) and

[13]International cooperation in space can be defined as any sharing of knowledge or technology between two, or more, states within the context of mutually acceptable conventions for the exchange of that knowledge or technology. It can take many forms, but in general both parties can derive benefits.

[14]Nicolas Peter, "The Changing Geopolitics of Space Activities," *Space Policy* 22 (2006): 100-109.

[15]Ibid.

other non-state actors, like private enterprises, are leading to a multiplicity of actors and stakeholders in the space environment. Dozens of companies offer services in open global markets and states can now meet much of their need for space benefits in the market place due to the wide array of communications, navigation, reconnaissance, weather satellite, and launch services commercially available. Commercial technology and know-how transfers have made possible the global distribution of space technologies. The declining price, widening availability of satellite construction, and space launch capabilities allow an ever growing number of states to establish a presence in space. While to date only a few states have mastered the full range of space capabilities, the proliferation of space products and services are allowing states, and non-state actors, to benefit from the advantages provided by space activities without developing, launching, and operating indigenous space systems. Private companies of traditional space powers are the main drivers in this process. Also, new and emerging actors, as they climb the global "space hierarchy," are providing new sources of technologies and fostering the proliferation of space technologies worldwide.

While the internationalization of space is not entirely new, it is now taking place at a much faster pace. The space system is now more open and dynamic than during the Cold War. Space is spreading more widely, including to developing countries, and involves more than simply purchasing technologies. This trend is likely to progress even more rapidly over the coming years. This means that a country does not have to be a technologically advanced country to acquire space capabilities and this makes all countries potential space players. The asymmetric advantage the superpowers once enjoyed because of their space prowess is eroding because many countries can now, by partnering with other states or commercial entities, receive certain kinds of space support.

The space context is evolving towards a new space order where space activities are becoming more widespread. However, space activities are prioritized differently depending on the country, and consequently the objectives of space programs differ accordingly. A growing number of states are using space programs for political and symbolic objectives, such as demonstrating and increasing national pride and to achieve national independence, regional influence, and technological maturity.[16] In the current space phase, being involved in space affairs is increasingly being seen, even by newcomers to the space arena, as a necessary element to being, at a minimum, a regional or continental power. For world powers, space is increasingly perceived as an indispensable element of national power. The importance of being involved in space affairs is growing in the unfolding new space order, and no country can now be regarded as a world power, or remain one, unless it possess cutting-edge and diversified space capabilities.

The Growing Importance of Space Power

In recent years, with the aforementioned evolution of the geopolitical context, traditional bases of national power have been fundamentally transformed. Military and economic metrics are no longer the sole indicators of national power.[17] Other variables are increasingly important, such as S&T prowess, and in the 21st Century the overall political, economic, and technological

[16]Bertrand de Montluc, "The New International Political and Strategic Context for Space Policies," *Space Policy* 25 (2009): 20-28

[17]Herein, national power is defined as the capacity of a country to pursue strategic goals through purposeful action.

leadership of a country must be shown in many areas, space being one of them.

Having now passed its 50th anniversary, the Space Age has attained a great degree of maturity.[18] Space activities are indispensable tools for modern society that have proliferated globally. When a state seeks to garner more power, it is increasingly being involved in space affairs as this is a symbol of technology progress. The range and pervasiveness of activities in space resulted in these activities becoming tied, over the years, to national power. Space activities represent a definitive measuring device for the relative status of countries and an indicator of a state's weight and influence on the global scene.

Concomitantly, the proliferation of space capabilities in recent years has not elevated every country into the spacefaring category. Only a certain number of attributes confer this status: access to space and the ability to pursue activities autonomously. Nonetheless, a sound understanding of the nature and exploitation of space power is necessary because it has consequences and profound implications, both domestically and internationally, and gives additional overall national power to a state as space provides for soft power projection.[19]

The body of space power literature lacks a single comprehensive theory that thoughtfully defines, explains, and predicts the nature, significance, and functioning of space power.[20] According to Colin Gray, "space power suffers from an unusual malady: an acute shortage of space-focused strategic theory and the lack of a binding organizing concept to aid understanding of what it is all about."[21] Nevertheless, there is no void of space power theory. There are numerous proposed space power theories, but none has achieved consensus in the space community; more than five decades since the first steps into space, there is no definitive work on space theory comparable to the writings of Clausewitz, Mahan, and Mitchell among others in their respective fields.[22] Space power still lacks a holistic approach and its elements remain disjointed and embryonic in comparison to other domains of land, sea, and air.

Space power is not simply satellites and access to space; it is anything and everything a country can achieve through space.

One of the most pervasive elements confronting the space community is the lack of common vocabulary. The need for a solid definitional construct is of pivotal importance to develop a better understanding of the practice of space power, including its potential and its implications. While different definitions emphasize different aspects, no definition covers all aspects of the actors, capabilities, functions, and purposes of space

[18]Nicolas Peter, "Space Power and Europe, in the Need for a Conceptual Framework," paper presented at the 59th International Astronautical Congress, Glasgow, Scotland, 29 September - 3 October 2008.

[19]Nicolas Peter, "Space Power and Europe in the 21st Century," European Space Policy Institute Perspectives 21, May 2009, http://www.espi.or.at/images/stories/dokumente/Perspectives/espi%20perspectives%2021%20.pdf (accessed January 2010).

[20]Nicolas Peter, "Space Power and Europe, in the Need for a Conceptual Framework," paper presented at the 59th International Astronautical Congress, Glasgow, Scotland, 29 September - 3 October 2008.

[21]Colin Gray, "The Influence of Space Power Upon History," *Comparative Strategy* 15 (1996): 293-308.

[22]Nicolas Peter, "Space Power and Europe, in the Need for a Conceptual Framework," paper presented at the 59th International Astronautical Congress, Glasgow, Scotland, 29 September - 3 October 2008.

power. The most common definition is one from the work of Lupton. He defines space power as the "the ability of a nation to exploit the space environment in pursuit of national goals and purposes, and includes the entire astronautical capabilities of the nation."[23]

Yet this definition does not capture some important realities of the emerging space order. Space power can be defined herein as the "total strength and ability of a state to conduct and influence activities to, in, through, and from space to achieve its goals and objectives (security, economic, and political) to affect desired outcomes in the presence of other actors on the world stage, and if necessary, to change the behavior of others by exploiting space systems and associated ground infrastructure as well as political leverage it has garnered."[24]

…as long as there is not major conflict, the most important form of space power is non-military.

This definition is inclusive of the essential elements for any definition of space power. It focuses on states as the main space actors, on national objectives, the use of space as a medium distinct from other media, and the use of capabilities that are required by the space medium. Space power is about the exploitation of the space environment, and the purpose of that exploitation is to achieve some national objectives or purposes. It is the ability to use space to get desired outcomes by influencing the environment and the behavior of others. In other words, space power is the pursuit of national objectives through the use of space affairs.[25]

Space power has the potential to provide significant contributions to the political and strategic objectives of governments that undertake space activities. It can, for instance, support a country's overall national power and international standing. Space power alone, however, cannot ensure the attainment of terrestrial political objectives; it must be combined with other power elements. Nonetheless, space power is a major element of national power, and it is becoming a strategic concern for many countries. Space power is not simply satellites and access to space; it is anything and everything a country can achieve through space.[26]

The foundations of space power range from obvious hardware elements (e.g., launch sites; launch vehicles, telemetry, tracking, and communications sites; on-orbit satellites; and other spacecraft), to socioeconomic elements (e.g., human capital), and to political and regulatory elements (e.g., number of seats in international organizations and other relevant bodies).[27] Spacefaring countries possess inherent attributes of space power. Any state's approach to space power depends on its perception of the strategic environment and its position relative to other space actors, and the inherent value of space power depends on what it allows you to do. Moreover, a spacefaring country can be a major actor in domains linked with space activities (e.g.,

[23]David Lupton, *On Space Warfare: A Space Power Doctrine* (Air University Press, 1988).

[24]Nicolas Peter, "Space Power and Europe in the 21st Century," European Space Policy Institute Perspectives 21, May 2009, http://www.espi.or.at/images/stories/dokumente/Perspectives/espi%20perspectives%2021%20.pdf (accessed January 2010).

[25]Ibid.

[26]Nicolas Peter, "Space Power and Europe, in the Need for a Conceptual Framework," paper presented at the 59th International Astronautical Congress, Glasgow, Scotland, 29 September - 3 October 2008.

[27]Nicolas Peter, "Space Power and Europe in the 21st Century," European Space Policy Institute Perspectives 21, May 2009, http://www.espi.or.at/images/stories/dokumente/Perspectives/espi%20perspectives%2021%20.pdf (accessed January 2010).

technical and scientific activities), but this does not necessarily imply that this actor possesses the complete spectrum of space activities or that this actor can exercise space power to its maximum.[28]

Not all states have developed similar space capabilities (space is also spiky) and there exist gradations of advantage. It is necessary that a country fully demonstrate "political will" and develop the attendant national policy and strategy to exploit the elements of space power. Space policies and programs when well conceived, linked, and executed provide tangible and intangible space power benefits.

There are different elements in the space power continuum with a complex interaction between civilian, economic, and military programs and assets, as well as soft, economic, and hard powers.[29] Space power is multidimensional and demarcated by scientific, political, economic, and geopolitical dimensions. Exercising space power conveys a variety of benefits to space actors, such as national and international prestige, military advantage, economic competitiveness, and scientific and technical prowess. It also demonstrates the willingness of a state to increase its standing in the global "space hierarchy."

Using the traditional four effects of national power, the impacts of space power can be categorized as: (1) diplomatic; (2) economic; (3) military; and (4) cultural.[30]

1. Space power is a means of impressing the world through the possession of elaborate space capabilities illustrating an assertive global position that allows influence in the international context.
2. Space power allows for the development of a highly skilled technological workforce and a dynamic industrial base that are both critical for a country's economic competitiveness.
3. Space power can be used as a pressure point to support political decisions since it can be an element to dissuade targeted players of hostile actions and can also be used to apply force.
4. Space power can help to promote awareness of a common identity among citizens and demonstrate increased confidence in future capabilities.

There is no general hierarchy of these attributes since they do not exist in isolation from one another and various traits are tied together.[31] Space power leverages different elements and is a foundation for a state's total power capability and, by its very nature, enables the exercise of influence over a broad spectrum of areas. The relative value of space power depends on how much an actor uses them and for what. Space power can be applied in different ways. It can provide direct benefits to the owner of space assets, but it can also be used to encourage and reward others, dissuade targeted players, and ultimately, it can be used to apply force. All of these demonstrate the flexibility and versatility of space power.[32]

While the arguments over possible theories of space power continue, space power is being exercised by all spacefaring countries, purposefully or not. Today, space power is inseparable from all other forms of power due

[28] Ibid.
[29] Nicolas Peter, "Space Power and Europe, in the Need for a Conceptual Framework," paper presented at the 59th International Astronautical Congress, Glasgow, Scotland, 29 September - 3 October 2008.
[30] Ibid.
[31] Ibid.
[32] Nicolas Peter, "Space Power and Europe in the 21st Century," European Space Policy Institute Perspectives 21, May 2009, http://www.espi.or.at/images/stories/dokumente/Perspectives/espi%20perspectives%2021%20.pdf (accessed January 2010).

to the ubiquitous and pervasive nature of space activities. There are, however, only a few historical examples of the utilization of space power to date. This short history of space exploitation limits the evidentiary base from which cogent conclusions can be drawn. For example, only since the first U.S.-led Gulf War are there examples of the utilization of space power to support hard power (e.g., crisis in Yugoslavia, and the current conflicts in Iraq and Afghanistan). Despite this limited set of historical evidence, space power is an important reality. Also, as long as there is not major conflict, the most important form of space power is non-military. For space power, soft power and economic power are just as important as hard power. Space power has profound implications both domestically and around the world in terms of the credibility of a country's capabilities, and it provides both symbolic and political advantages that are beyond quantifiable material benefits.

Space Power and International Relations

The competition for status and global influence in many different domains remains a key feature of today's multipolar and heterogeneous international scene. With the recognition in recent decades of the increasing role played by S&T for innovation and economic development, more dedicated policies are implemented throughout the world to reinforce, protect, and enhance national technological capabilities. Governments from all over the world recognize the importance of S&T as a critical element contributing towards the development and implementation of strong economic, political, national, security, and social future of any country. They also recognize that S&T can provide external advantages at the international level as S&T prowess contributes to diplomatic leadership, creates respect in the international community, and raises the attractiveness of a country for partnerships.

Governments initiate or participate in international S&T cooperative ventures for a number of scientific or technological reasons that have been well documented. International S&T agreements are also used by policy-makers to serve foreign policy purposes; the signing of an international S&T agreement between governments or international organizations can indicate a willingness to improve relations among countries, leading to broader cooperation. S&T activities are often used to establish a network of international partnerships to attract other countries in someone's sphere of influence or reinforce existing relations as there are diplomatic gains to be made through partnerships. Many countries are using S&T as a political tool to reach non-traditional partners to build trusting relationships across political borders as international cooperation in S&T allows countries to engage in a public diplomacy of deeds/actions and not just words.

S&T diplomacy – defined here as scientific and technological cooperation and engagement with the explicit intent of building positive relationships with foreign governments – has played an important, often underappreciated, role in the foreign policy of world powers over the past fifty years. International cooperation in S&T has been growing steadily since World War II and can now be considered the biggest contemporary axis of civilian governmental cooperation.[33] Eugene Skolnikoff notes that these two systems, foreign policy and S&T, operate in an international environment that is increasingly overlapping and this aspect of the relationship continues to converge in recent

[33]Nicolas Peter, "Towards the Emergence of EU Space Diplomacy," *Space Policy* 23 (2007): 97-107.

years.[34] Increasingly, foreign policy contains issues with a scientific component and science grows more international in space.[35] Large-scale space projects are emblematic domains in which S&T is mobilized to serve foreign policy.

While S&T cooperation developed, until recently, largely independently of formal foreign policy objectives, for space this is a different. Space activities, since the beginning of the Space Age, are a tool for foreign policy used to directly achieve diplomatic objectives and to gather information on geopolitical events of concern (e.g., monitoring a crisis). There is also an element of soft power to reach out to partners and to impress others.[36] With the exception of scientific research or technology development missions, activities in space are no longer an end in-and-of-themselves, but a means for accomplishing other national objectives.[37]

Space assets are not only the eyes & ears of governments… they also allow governments to influence outcomes.

The role of "space in foreign policy" and of "foreign policy in space" is intricate. Space assets are not only the eyes and ears of governments and allow monitoring events around the world, but they also allow governments to influence outcomes. Space activities enable states to wield other instruments of national power with greater precision, timeliness, and effectiveness. Space activities blur the lines between domestic and international affairs due to their very international nature and due to the fact that domestic policies impact the global scene. Space affairs are an extension of the terrestrial political environment.

From a political point of view, space is rich with complex political and strategic relationships. Space affairs are an instrument of superpower status since the launch of Sputnik in 1957, and space power during the Cold War was a key aspect of the international system where countries jockeyed for position and global influence. Space power enhanced, for example, the Soviet Union's prestige by being first to launch an artificial satellite or the prestige of the United States by being the first to land humans on the Moon. Those achievements suggested that success in space were the luxuries of an advanced state – the product of the intellectual, engineering, and manufacturing elite of the country – and they became landmarks in the Cold War race for prestige and power demonstration.

Space put forward a new criterion to determine the global hierarchy along with nuclear power status. Space affairs, from the dawn of the Space Age, represent a measure of national prestige and are an indicator of a county's influence on the global scene. The spread of space capabilities and the rise of new spacefaring countries are now factors woven into existing patterns of international affairs. Geography is one of the bedrocks of international politics, like the board of a chess game. Space is bringing a novel redistribution of power, which reduces the importance of proximity and endows non-state actors with high levels of power. It is hard to imagine a strategic actor performing well in the 21st

[34]Eugene Skolnikoff, *The Elusive Transformation: Science, Technology and the Evolution of International Politics* (Princeton University Press, 1994).
[35]Caroline Wagner, "The Elusive Partnership: Science and Foreign Policy," *Science and Public Policy* 29 (2002): 409-417.
[36]Space assets have the potential to affect the behavior of an international actor by prestige projection, technology partnerships, access to space services, industry services, information exchange, and legal development among other factors.
[37]While space agencies are not responsible for making foreign policy, they play an important role in foreign policy's execution through international engagement.

Century without being engaged in space and understanding and taking into account space power. At the same time, the utilization of the space environment presents new vulnerabilities, as well as the opportunities discussed herein, for actors on the international scene.

Given the growing diversity and heterogeneity of the international system, one of the currencies of international relations is legitimacy in the eyes of both governments and citizens across the world. In this context, emblematic and ambitious space activities are an indispensable tool as it projects a high level of S&T capabilities and prowess used to demonstrate national power at home and abroad. With the on-going internationalization and globalization of space affairs, no country will be regarded as a world power, or remain a world power, unless it possesses cutting-edge and diversified space capabilities.

Space affairs are a currency to judge the standing of a state vis-à-vis neighbors and peers, and this is expected to remain so for the foreseeable future. Consequently, the ability to exercise space power will grow in importance. Space power alone cannot, however, ensure the attainment of political objectives. In conjunction with other forms of conventional power, space power can be of strategic value and benefit. Space power is a significant dimension of power in international relations and it is an important reality. Exercising space power on the international scene gives the ability to build international consensus by bringing recognition, by primacy and authority, on the part of other members of the international space community.

Space is bringing a novel redistribution of power...

Europe in the Unfolding New Space Order

There is a wide range of reasons why governments engage in space activities. The basic justifications are different among countries at different times. For instance, the "space race" between the U.S. and the Soviet Union was mainly driven by the willingness to demonstrate technological capability for national security reasons and to promote national prestige. In contrast to the two superpowers' space activities, European space activities were initially driven by scientific common endeavors and motives.

In Europe, space was originally dealt with by individual countries. But as early as 1959, the results of Europe's nuclear research facility (The European Organization for Nuclear Research, know as CERN) introduced a new model for space activities in Europe.[38] Subsequent discussions among European stakeholders led to the creation of the European Launcher Development Organization (ELDO) in 1964, the European Space Research Organization (ESRO) in 1964, and the European Space Agency (ESA) in 1975 by combining the two aforementioned organizations. Since then, ESA is the intergovernmental agency responsible for coordinating the collective, multinational European space program.[39]

ESA's contribution to the development of a collective European space capability is fundamental. The European space sector is now entering a new institutional evolution with the emergence of the European Union

[38]Kazuto Suzuki, *Policy Logics and Institutions of European Space Collaboration* (Ashgate Publishing, 2003).

[39]There are several other organizations with limited responsibilities for specific collective activity, including, for example, the European Organization for the Exploitation of Meteorological Satellites (Eumetsat) for operational meteorology.

(EU) as a space actor.[40] The EU realized in the 1990s that space can provide support for a host of its activities, and that space activities serve policy objectives and deliver substantial strategic, social, economic, and commercial benefits to the EU, its member states, and its citizens.[41] European space activities are mainly conducted within a framework of collaborative space endeavors, as well as in the context of national space programs serving particular political, economic, and security purposes.

There is a complex intertwining of national interests together with a growing consciousness of the need for greater cooperation at a continental level. The European space landscape is split into three distinct levels: (1) the overall European level with the EU; (2) intergovernmental organizations, like ESA and the European Organization for the Exploitation of Meteorological Satellites (Eumetsat); and (3) national space agencies. The recent entry (December 2009) into force of the Treaty on the Functioning of the European Union (TFEU), known as the Lisbon Treaty, enshrines space policy as an EU "shared policy." It gives a clear mandate to the European Commission to exercise its right of reinforcing the momentum of the European Space Policy embodied in Space Council resolutions and endorsed by the European Parliament.

The rise of new space actors is reshaping the space landscape.

For Europe as a whole, independent access to space, space applications for the benefit of citizens and governments, and space science are the traditional reasons for engaging in space activities. But as the EU has become aware of the importance of space activities for achieving a wide range of policy objectives, and as the international political significance of space has grown, space is now taking a high profile in the Union's dialogues with major partners.[42] The international dimension of civilian space activities is increasingly becoming a major element of the EU's relations with third parties both to reinforce existing relations and to establish new partnerships through its programs that include: Galileo and Global Monitoring for Environment and Security (GMES); the Framework Program (FP); and space dialogues with the United States and Russia and other international fora (e.g., International Code of Conduct for Outer Space Activities). The space context in which Europe will continue to operate is likely to evolve because of the emergence of new space actors being both users and sources of space technology. This does not necessarily posit a threat to Europe, but it needs to be reckoned with for the specific purpose of managing change in a balanced and effective way.

Since the end of the Cold War, under the influence of the overall process of globalization, sources and distributions of power are being transformed in a profound way, and multipolarity is expected to grow in the future making the space context even more heterogeneous. Consequently, the relative power of various emerging space actors will grow as these actors influence other countries.

[40]Nicolas Peter, "Towards the Emergence of EU Space Diplomacy," *Space Policy* 23 (2007): 97-107.

[41]In the late 1990s, the EU started its first two major space programs: the global navigation satellite system, Galileo, and the Earth observation system for Global Monitoring for Environment and Security (GMES). These two flagship programs are the cornerstones of the current EU space activities.

[42]Nicolas Peter, "Towards the Emergence of EU Space Diplomacy," *Space Policy* 23 (2007): 97-107.

This evolution will not radically alter the space context as did China and India recently. Emerging space actors will, however, have higher degrees of freedom to shape their space ties, rather than working only with the current spacefaring countries. New networks will form among states to pursue convergent goals and interests, and in some cases the nucleus will not be the traditional space powers. Emerging space powers will also seek greater leeway and autonomy to exert regional influence. Space has always included both competition and cooperation among states. This will not change and certain areas will not remain conducive to international cooperation. But an increasingly multipolar space order suggests a greater number of actors with whom Europe and others will have to contend with. Consequently, traditional spacefaring countries will probably find it much harder to set the space agenda and shape outcomes to their desired preferences.

The new space order is becoming genuinely global and multipolar with growing strength in emerging economies and a growing specialization in various parts of the world leading to greater overall system complexity. Legitimacy is expected to remain in the foreseeable future the hard currency of international space relations, possibly the most important asset to ensure long-term success of specific initiatives. Needless to say, unilateral action will always be an option for spacefarers, notably in the context of national objectives. Yet spacefaring countries do not, by and large, work in isolation. But the search for agreement in defining the international space agenda might prove more complicated, and thus, in the new space order, partnerships and cooperation will become more important in confronting many of the challenges of the international system. International leadership and cooperation will be necessary to face global challenges (e.g., climate change and to engage in long-term exploration of the solar system), and consequently, space power is essential for Europe now and in the future.

The rise of new space actors is reshaping the space landscape. The U.S., Russia, and Europe's preeminence cannot be taken for granted. The center-of-gravity for space activities is already starting to shift from West and East to the South, and the expected rise of new space actors will inevitably challenge Europe's position in the global "space hierarchy." Those global developments will entail fundamental changes to the distribution of resources and influence with the emergence of new players forging closer ties at the regional level, leading to a shift of power and influence. The role and position of Europe in this emergent space context will evolve. Europe will still have a great impact on space affairs, but it might have less power in such a multipolar space context than it has enjoyed in the last decades.

There is nothing preordained in the future shape of the space context and in Europe's place therein. It is a matter of political decision, drawing on Europe's comparative strengths and ambitions, and the ability to nurture and use space power more efficiently. A scenario of relative decline in the global "space hierarchy" will lead Europe to lose its flexibility in choosing between cooperative options and autonomy for cooperation, as well as remain the preferred option for partnerships among other states. Today, given the benchmark of Europe's S&T prowess, Europe continues to be viewed as the space partner of choice by existing and emerging space powers, as well as by new entrants in the space sector. For this to persist, multilateralism for Europe may prove as much a necessity as a choice. Working with partners needs, nonetheless, to be turned more explicitly and consistently into a vehicle for achieving effective multilateral solutions for giving Europe more visibility and clout.

The management of international cooperation must change as the geography of space develops new peaks around the globe; if Europe is not positioned to exploit potential links with emerging space actors, it will face significant opportunity costs. But to enable Europe to best exploit its partnerships and opportunities, a better realization of the benefits of space power and clear policy commitments will be needed to be able to shape the directions of those partnerships in the directions of its own preferences.

Space Power and Europe

Europe is now the second largest civilian power in space in terms of its consolidated budget. Collectively, it maintains launcher, satellite manufacturing, and research facilities in the whole spectrum of space activities except for human spaceflight. The combination of European capabilities coming from different European actors – European members states, ESA, and the EU – provide Europe with the status of a major space actor.[43] Europe possesses collectively critical technical assets (e.g., independent launch site, versatile launch vehicle fleet, diversified spacecraft, solid industry, and dynamic universities) and non-technical assets, such as high visibility in international organizations, like in the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), International Telecommunication Union (ITU), and United Nations Conference on Disarmament (CD), which are all necessary elements to exercise space power.[44]

[43]Nicolas Peter, "Space Power and Europe in the 21st Century," European Space Policy Institute Perspectives 21, May 2009, http://www.espi.or.at/images/stories/dokumente/Perspectives/espi%20perspectives%2021%20.pdf (accessed January 2010).

[44]Nicolas Peter, "Space Power and Europe, in the Need for a Conceptual Framework," paper presented at the 59th International Astronautical Congress, Glasgow, Scotland, 29 September - 3 October 2008.

European space programs are successful to date and European citizens embraced space-based services and support into many aspects of their everyday lives. Europe has achieved a number of impressive results (e.g., world class launch services and telecommunications industry, and numerous scientific achievements, such as the farthest landing on an object in our Solar System). Space is now enabling many activities of the European economy and is a critical building block of Europe's information infrastructure. It could therefore be concluded that because of this relevance and the pervasiveness of space activities a clear understanding of space power exists in Europe.

They are enormous shortcomings in Europe's ability to understand, develop, and exercise space power.[45] There is no mention of space power in policy or strategy documents. A sound understanding of the nature and exploitation of space power is, however, critical for Europe in the unfolding new space order as Europe's technical lead could be rendered less important, even where it does not shrink, and because of the expected dilution of its voice in international fora due to the changing space context. If Europe wishes to retain its space power now and in the future, it must better protect its interests in space.

Europe currently enjoys a leading position in the global "space hierarchy," but this might not last, and Europe's ability to exercise space power could decrease over time. To maintain a leading space role and to be able to exercise space power, Europe must foster more "political will" and develop associated policies and strategies. This further needs to be complemented by a series of programmatic elements facilitating policy implementation. Access to space, a competitive industrial and

[45]Ibid.

space services base, global navigation satellite systems (GNSS), space exploration, utilitarian space activities, space science, Space Situational Awareness (SSA), and Space Traffic Management (STM) are important building-blocks covering the whole spectrum of space activities as underlined in the European Space Policy that will allow to improve Europe's ability to translate its space clout into greater global influence.[46] These programmatic elements in combination provide Europe with greater diplomatic, economic, military, and cultural tools that enable Europe to face the challenges presented by the evolving new space order.

So far in Europe, space activities are justified from the point of view of their use for scientific research, technological advance, and economic gains. The time is ripe for a change in the thinking on space and Europe needs to become more aware of the political dimensions of the use of space. Decisions should not be based only on costs and benefits in financial, technological, and economic dimensions, but should also include the political dimension of space, including space power. Space power is also an increasingly important component to Europe's national powers, but often unnoticed. While the uses of space assets as military enablers are recognized in Europe, relatively no attention is given on how space assets can be used as elements of foreign policy and as tools of diplomacy.

European space assets are underestimated and untapped for diplomatic use, and space power in Europe is often an underappreciated factor. Europe needs to better appreciate how its space assets and activities can be used to directly support its diplomatic goals. Space affairs should be better used by policy-makers in Europe to achieve greater diplomatic advantage, particularly as a projection of soft power. Exercising space power could, for instance, allow Europe to influence the drafting of international regulations, and take the lead in strategic areas, such as environmental research and space exploration; it could affect as well the development of global standards and norms.[47] A formalized utilization of space power could also allow Europe to remain a center-of-gravity in international relations by attracting the best partners to cooperate not only in space, but in other domains, therefore increasing the capabilities and possibilities of European projects.

Space affairs are a highly symbolic representation of power and … national standing…

Space will play a growing role in determining influence, prosperity, technological achievements, and security in the global environment of the 21st Century. If Europe does not contribute significantly to space, it abdicates a role as a major actor in world politics. Influence on the future of space, such as in the area of space governance, will be wielded only by those who have real space assets and ambitions. The challenge of space can be met only with a common European effort. Space affairs should also be raised to the highest political level in Europe – heads of State and Government – to initiate major breakthroughs.

Quantitative and qualitative jumps in European space efforts are required to respond to the challenges outlined herein and harness the benefits that lie ahead. Exercising greater

[46]Ibid.

[47]Nicolas Peter, "Space Power and Europe in the 21st Century," European Space Policy Institute Perspectives 21, May 2009, http://www.espi.or.at/images/stories/dokumente/Perspectives/espi%20perspectives%2021%20.pdf (accessed January 2010).

space power allows Europe to protect its own interests and strengths, while meeting the challenges of the multipolar space order currently emerging. Europe's presence in space should translate into comparable influence, which has not always been the case. Europe has thus to realize that space power can provide support for a host of its activities and is a tool to serve its interests, including in the domain of foreign policy and soft power projection.

Conclusions

The unprecedented changes in the last decades have made the world an integrated and complex system in which space is an integral element. From its inception during the Cold War, space activities are driven by opportunities to serve national interests in the global context. With the changing geopolitics of space and the unfolding new space order, linked in particular to the internationalization and globalization of space activities, it is perceived that capacity in space technology has faded as a geopolitical factor as well as an element of national power, especially as space systems are more common and widespread.

Nonetheless, competencies in space activities are not becoming irrelevant to a country's international political position. On the contrary, almost all developed countries, and an increasing number of developing countries, feel it necessary to participate in space activities and develop for economic, military, or prestige reasons independent space capabilities. Space assets can help to directly achieve national objectives, and because of the close relationship between space assets and national power many states seek to improve and advance their space capabilities.

In this context, Europe should avoid being surpassed in the emerging new space order by making use of space activities to maintain, and even advance, its position in the global "space hierarchy." Europe should not create the impression that it is only a follower and lose its credibility as a reliable partner in space. Space affairs are a highly symbolic representation of power and will undoubtedly continue to be a persuasive method of demonstrating national power to the rest of the world.

The emerging space order will help to determine the structures and functions of the international system in the next decades. Space power will thus be key and it is very important that this is understood, so that it may be taken advantage of in the most desirable and feasible way. The broader geopolitical implications of the space domain are directly dependent on how effective can space power be in the "means-ends" world of international relations. Europe needs to realize and develop its space power potential because what is at stake is the future agenda-setting power of Europe in the overall international system beyond space affairs, its ability to shape the priorities and timing of events, and its ability to attract the best partners to be able to fully benefit from opportunities wherever these support European space objectives and wider European policy goals.

Europe currently enjoys a leading position in the global "space hierarchy" but this might not last…

European governments must accept the fact that Europe's future role and influence in world politics and in global markets may largely depend on Europe's capacity and willingness to use space to develop the necessary technology and to build the required

industrial infrastructure. Europe cannot afford to remain vague about its objectives in the new space order. A strategic reflection on the values, interests, and goals of Europe's space power in the context of its relations with other countries is needed.

There are many impediments the European space community must overcome to create an environment where space power is valued, accepted, and institutionalized. In particular, European space stakeholders have not, up-to-now, addressed the task of developing an integrated strategy for harnessing the benefits of space power on the international scene. The nexus between common values and common interest must be better articulated and in Europe they are all too often disjointed. In order for space power to reach its full potential in Europe and provide greater benefits, space must be recognized as a domain with direct and indirect implications for Europe, particularly at the foreign policy level, which is in a strategic sense no different from land, sea, and air mediums.

Europe and Security Issues in Space: The Institutional Setting

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In the current timeframe, the relevance of discussions on the existing use of space for national security purposes and the potential of it to be used for non-peaceful purposes are clearly increasing.[1] As a consequence, it becomes more important to address the role of Europe as a geopolitical, albeit far from monolithic, entity in this context.

From this perspective, the present paper analyzes some of the fundamental institutional parameters shaping the European presence in the space security domain, focusing on the two key players in space, which are truly European, the European Space Agency (ESA) and the European Union (EU).[2] Interestingly, the starting point for both entities was that the security domain was a "no-go" area, a starting point that only over the last two decades has begun to erode. That is why, in addition the Western European Union (WEU), Europe has a certain role in this context, precisely from the security perspective rather than from the space perspective.[3]

Even the European Community, as the most tightly developed "pillar" of the EU, could not be considered a supranational entity let alone a federal state. In all cases therefore, the individual member states of those organizations are still relevant as players in their own right. These states continue to be essential to determining the shape of European actions and approaches in the field of space issues, and this is even truer for the security domain.

The resulting complicated institutional landscape represents the backdrop against which, as well as a set of crucial parameters within which, European policies in the area of space are developed. This applies to the space security domain, whether one takes a broad approach as with Space Situational Awareness (SSA) and the handling of space debris, or a more limited one, focusing on international terrorism or the handling of export controls over dual-use sensitive goods.[4]

[1]Note that the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (hereafter, Outer Space Treaty or OST) only requires states to refrain from orbiting or otherwise placing weapons of mass destruction in orbit, as well as to undertake activities in exploring and using outer space "for the benefit and in the interests of all countries." The phrase of "peaceful purposes" is only applied explicitly to the Moon and other celestial bodies.

[2]ESA was established by means of the *Convention for the Establishment of a European Space Agency* (hereafter, ESA Convention); and the EU, as an overarching institutional structure encompassing in particular the European Community, was established by the *Treaty on European Union*.

[3]The Western European Union was established by means of the *Treaty of Economic, Social, and Cultural Collaboration and Collective Self-Defense*, Brussels, entered into force 25 August 1948.

[4]See Frans von der Dunk, "A European "Equivalent" to United States Export Controls: European Law on the Control of International Trade in Dual-Use Space Technologies," *Astropolitics* 7 (2009): 110.

The European Space Agency

The starting point for understanding the present and potential role of ESA in the wider context of European space security discussions is provided by the general institutional structure of the Agency. ESA, headquartered in Paris, France, but with additional establishments in a handful of other European countries, currently counts eighteen member states.[5] Thus, it clearly constitutes an intergovernmental organization in the classical public international legal sense of the word.

Given the complexities of European integration, ESA has, as of yet, no formal relationship with the EU beyond a number of cooperative agreements, of which the Framework Agreement is the most generic and broad one.[6] The Framework Agreement does establish a joint EU-ESA Space Council, but this Council's competences remain confined to "the coordination and facilitation of cooperative activities" under the Agreement, and thus present a forum for consultation and coordination of joint activities, not a means to impose such joint activities upon one or the other party.[7] From the same perspective, the joint EU-ESA European Space Policy of April 2007 is a political commitment to develop a coordinated policy, not for establishing legal obligations between the two parties regarding cooperation activities, either in general or in particular, and the high-level space policy group plays its role in exactly that context.

The Framework Agreement increased coordination and cooperation in policy matters and may well lead to the establishment of proper legal commitments of one party to the other, and/or official resignation of certain legal competences in deference to the other's competences at some point in the future. Presently, however, ESA is neither an agency of the EU nor legally subject to the extended legal regime developed on the basis of the European Community (EC) Treaty – and it does not even count the same European states as members – e.g., ESA member states Norway and Switzerland are not members of the EU and eleven EU member states as of yet are not member states of ESA.

ESA has two main organs. First, there is the Council, consisting of representatives of the sovereign member states, often at Ministerial level, and acting as the supreme body of the organization. The Council is tasked to lead: the annual work plans of the Agency; the annual general budget of the Agency; each program budget; the financial regulations and all other financial arrangements of the Agency; decisions on the admission of new member states; and all other measures necessary for the fulfillment of the purpose of the Agency within the framework of the ESA Convention.[8] In other words, the Council, and thereby ESA, has not, at the highest level, the formal competence to draft space policies – it is only charged with "elaborating and implementing a long-term European space policy" by means of the exercise amongst

[5]The list of member states comprises: Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. In addition, non-European Canada is a long-standing cooperating partner under a special agreement, whereas Hungary, Romania, and Poland qualify as European Cooperating States under another special agreement.

[6]*Framework Agreement Between the European Community and the European Space Agency* (hereafter Framework Agreement), entered into force 28 May 2004. See further Stephen Hobe, *et al*, A New Chapter for Europe in Space," *Zeitschrift für Luft- und Weltraumrecht* I: 54 (2005): 342-344.

[7]Article 8(1), Framework Agreement. See also Article 2(1), providing for cooperation to take place "with due regard to their respective tasks and responsibilities;" Article 4(1), calling for "compliance with its own prerogatives, legal instruments, and procedures" of each party; and Article 5, detailing the way joint initiatives could be undertaken.

[8]See Article XI(5), ESA Convention.

others of such competencies as enumerated above.[9]

Second, the ESA Director General (DG) together with other ESA staff does not constitute a policy-making organ formally speaking. The DG is tasked to manage the Agency and execute any such programs "in accordance with the directives issued by the Council" as well as being entitled to submit proposals for future programs and projects.[10] As to that latter competence, the actual impact the DG may have on the formulation of programs and projects, and perhaps informally and/or indirectly of policies, depends upon a number of interlocking factors of a non-legal nature. Yet that impact would be subject to confirmation and a form of high-level control by the Council as enshrined in the latter's competencies and thus by ESA member states jointly.

ESA's general aims and purposes are summarized by the ESA Convention "to provide for and to promote, for exclusively peaceful purposes, cooperation among European States in space research and technology and their space applications, with a view to their being used for scientific purposes and for operational space applications systems."[11] For good reason, ESA has often been described as a vehicle for member states to both serve their individual space policy needs, where applicable, and try and establish a European space policy. Formally speaking, as discussed, the Council in using its competencies decides more on programs and projects, even if at a high-level, and thus gives substance and shape to policies largely emanating at the member state level.

The key to further understanding the proper role of ESA in the shaping of European policies and regulations relevant to space security therefore lies in the way in which ESA space programs are developed. Program development, generally speaking, can be one of three kinds.

Firstly, there are the "mandatory activities," in which all ESA member states are obligated to participate in. To approve a relevant proposal, to undertake an ESA program, and to establish it as a mandatory activity, a simple majority of the member states is required. However, the level of resources to be made available for that program requires unanimity, which allows individual states to exert considerable power on the overall process of making a program happen or not.[12]

Mandatory activities concern the execution of basic activities, such as education, documentation, studies of future projects, research work, and scientific programs including satellites and other space systems. To the extent follow-up activities on the ground are concerned, ESA should "collect relevant information and disseminate it to Member States, draw attention to gaps and duplication, and provide advice and assistance for the harmonization of international and national programs."[13] Further to the mandatory character of the participation of all member states in these scientific, non-space activities, the financing of such activities once properly agreed is taking place through a pre-determined scale of respective contributions.[14]

[9]Ibid., Article II(a).
[10]See Ibid., Article XII(1.b).
[11]Ibid., Article II.
[12]See Ibid., Article XI(5.a), sub-paragraphs (i), (ii) and (iii).
[13]Ibid., Article V(1.a), sub-paragraphs (i), (ii) and (iii). See further Kevin Madders, A New Force at a New Frontier: Europe's Development in the Space Field of Its Main Actors, Policies, Law and Activities from its Beginnings up to the Present (Cambridge University Press, 1997), 189, 223-235.
[14]See Ibid., Article XIII(1).

Secondly, ESA member states may agree on "optional activities" – again by a simple majority.[15] The optional character then manifests itself by way of an opt-out clause, as it is provided that "all Member States participate apart from those that formally declare themselves not interested in participating therein."[16] This results in the clear possibility for a member state, if it considers it not to be in its own interests, including security interests, to abstain from participation in ESA optional activities.

Optional activities also result in a different schedule for financing. Whereas the formula here is an opt-out from the standard rule of financing in proportion to the average national income over the most recent three years for mandatory programs,[17] in actual practice things turn out to work differently. Normally, individual member state contributions are decided from the ground up, i.e., each state promises as following from its own particular measure of interests in such activities to contribute a certain percentage to the proposed budget of a certain program. Once the proposed optional program reaches a certain threshold in terms of promised financing it is formally accepted as an ESA optional program.

Optional activities concern in particular the space programs, as opposed to preparation for them and their after-mission interpretation and usage: "the design, development, construction, launching, placing in orbit, and control of satellites and other space systems; and the design, development, construction, and operation of launch facilities and space transport systems."[18] Over the years, in monetary terms, programs with an optional character have made up 80% to 85% of the activities developed by ESA itself, as opposed to 15% to 20% being mandatory in nature.[19]

Many of the details of how programs are developed and executed follow from what is labeled "the industrial policy which the Agency is to elaborate and apply" as part of the broader aims and objectives under Article II of the ESA Convention, and Annex V, which elaborates that generic industrial policy.[20]

These cornerstones of ESA industrial policy are implemented by means of the "geographical distribution" approach, to "ensure that all Member States participate in an equitable manner, having regard to their financial contribution."[21] The result of that approach, further elaborated in Annex V to the ESA Convention, is often labeled "fair return," "industrial return," or "*juste retour*." Under *juste retour*, each member state should roughly see its investment in a particular program "returned" in the form of contracts for its space industry, preferably for the very program at issue, in the alternative as compensated by contracts in other programs.[22]

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[15] See Ibid., Article XI(5.c), sub-paragraph (i).

[16] Ibid, Article V(1).

[17] See Ibid., Article XIII(2).

[18] Ibid., Article V(1.b). See further Kevin Madders, A New Force at a New Frontier: Europe's Development in the Space Field of Its Main Actors, Policies, Law and Activities from its Beginnings up to the Present (Cambridge University Press, 1997), 189-195, 235.

[19] See Kevin Madders cited above, 189.

[20] Ibid., Article VII(1).

[21] Ibid., Article VII(1.c).

[22] See Ibid., Articles II, IV, and Annex V. While the ideal "overall return coefficient" [Article IV(3)] implies that every Euro contributed by a member state should be matched exactly by a Euro's worth of contract value for a company from that member state under a contract by the Agency, there are a number of complicated arrangements in place to allow for considerable flexibility. See further Madders, 384-8. Moreover, due to pressure from the EU in recent years, which views this system with some suspicion, as it may easily have anti-competitive effects within the European market, the general application of the concept has become more relaxed still.

The dichotomy between mandatory and optional activities has, throughout the decades of ESA operations, been shown to work as a remarkably pragmatic and workable compromise. It allows at the same time respect for the need for states to maintain their sovereign independence in choosing to contribute to and participate in actual space programs – on an *á la carte*-basis as it were – and serving the need for some coherence in ESA programs, in order for ESA to provide any added value in terms of real cooperation and an efficient pooling of resources.

The ESA Convention mentions a third category of activities, one not as such conjured up by or within the framework of the Agency itself, but undertaken upon the specific request of third parties, namely "operational activities."[23] As a consequence, these activities are not financed by the normal budget of ESA, but paid for, in principle on a full-cost, not-for-profit basis,[24] by the state, organization, or entity requesting such services.[25]

[23]See Ibid., Article V(2).

[24]Such a monetary reimbursement could of course be (partially or completely) waived to the extent ESA considers other interests to merit the provision of such service without (full) reimbursement, and/or ESA considers itself *de facto* reimbursed by in-kind compensation. For example in the context of the International Space Station (ISS), it is common practice that the partners exchange services and goods as much as possible on a closed-purse, no-exchange-of-funds basis. See Article 15(5), *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 Cooperation on the Civil International Space Station, Washington*, entered into force 27 March 2001.

[25]In the past, ESA has provided such services for individual states, other international organizations, such as the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT), established by the *Convention for the Establishment of a European Organization for the Exploitation of Meteorological Satellites* entered into force 19 June 1986, as amended 14 July 1994, and entered into force 27 July 1994, and private companies, such as Arianespace.

ESA Involvement in Space Security Issues

While as of yet not addressing to any specific extent the actual or possible role of ESA in shaping European space security issues, in general terms, the possibility to become so involved at various levels depends on the interest of individual ESA member states. In particular, the major investors in ESA and ESA programs – France, Germany, Italy, the United Kingdom, and Spain – need to possess the political will and wherewithal in having ESA become so involved.

Article II of the ESA Convention underscores this point, stressing that ESA activities should be for "exclusively peaceful purposes." To start with, the general discussion during the Cold War on the precise meaning of "peaceful purposes" is important to consider as this phrase was – with the same addition of "exclusively" – found in the outer space treaties.[26] Here, European states were inclined to occupy the middle ground between the liberal United States (U.S.) interpretation that peaceful purposes included military purposes as long as of a defensive nature and the stricter Soviet interpretation that any military use of outer space was prohibited under that concept.

The word "exclusively" constitutes an interesting addition here; *prima facie* it suggests that without that addition ESA would also be entitled to act not for peaceful purposes. If that were to be true, however, the phrase "peaceful purposes" without that addition would be devoid of any meaning – essentially stating that ESA would be entitled to conduct activities for peaceful purposes whilst leaving it open to also conduct non-

[26]See Article IV, Outer Space Treaty, also Article XI referring to "peaceful exploration and use;" and Article 3(1), *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* (hereafter Moon Agreement), entered into force 11 July 1984.

peaceful activities, since the addition of "exclusive" would be considered necessary to close the door on the latter option.

In other words: the addition of "exclusively" does not effectively add anything to the legal obligation, and should rather be understood as a politically-driven confirmation of an obligation already existing as regard to "peaceful obligations," to make sure no misunderstanding would arise on the scope of ESA's activities. ESA did not wish to antagonize the U.S. by contradicting its liberal interpretation, yet at the same time was not willing to allow any uncertainty regarding the legal inability of ESA to get involved in military and security-related space projects. Copying the adverb "exclusively" from the space treaties and inserting it in the ESA Convention precisely achieved both results simultaneously.

Following the Framework Agreement, even as this agreement did not refer in any manner to space activities with a security, defense, and/or military component, ESA has gradually adopted a more liberal interpretation.[27] At least the word "security" is no longer taboo now: an ESA Security Agreement, ESA Security regulations, and an ESA Security office were established, as was an ESA security classification system with an "ESA Secret" label where handling of relevant classified information was moved from the member states to ESA itself.

But as ESA re-interpreted "peaceful purposes" in 2003 to mean it could unambiguously be involved in military and defense related security activities, the aforementioned institutional structure remains in operation. ESA programs could only become a reality following a majority vote by the member states in the ESA Council on the program plus unanimity on the financing, and this would ensure that no ESA project would see the light of day unless member states were satisfied it would not unduly interfere with their sovereign security concerns, including compliance with their own understanding of "peaceful purposes." Only with the projects of Galileo and Global Monitoring for Environment and Security (GMES) to be discussed below, that started to change fundamentally, due as well to the role of the EU with these projects – and then still only so far as those member states allowed.

Further to that, ESA from the beginning could not completely escape from the inevitable relationship between space activities and the issue of security. Satellite-based Earth observation can without difficulty encompass "spying," the difference between launching a missile and launching a payload is often negligible from the technical perspective and the high-technology character and global scope of much of human spaceflight endeavors inevitably causes it to have important security angles. As such, the ESA framework has had to deal with security-sensitive aspects of its "exclusively peaceful" mandate.

For example, in deviation from the normal requirement to exchange data on programs, until the aforementioned recent establishment of an ESA Secret label, ESA member states were not required "to communicate any information obtained outside the Agency" if such communication would present a threat to its national security, would be inconsistent with its agreements with third parties, such as non-ESA partners in space cooperation ventures, or would be inconsistent with the terms and conditions under which it had

[27]See European Space Agency Council, "Position Paper on ESA and the Defense Sector," ESA/C 153 (1 December 2003): 7-8.

obtained the information at issue in the first place.[28]

Along similar lines, a fundamental technology-transfer control limitation was built into the ESA Convention. If technology or products developed in the context of ESA activities are to be transferred to non-ESA member states, a special authorization regime to be adopted by a two-thirds majority of member states in the ESA Council is required, ensuring that such authorization will not be lightly provided.[29]

In more general terms, not only the implementation of new programs, but also the admission of new member states to the Agency requires a unanimous vote in favor by the incumbent member states in the ESA Council.[30] This is a common provision in the charters of intergovernmental organizations, but in the present context it serves to scrutinize any potential new member from the perspective of security risks, since once such a state becomes a member it would be entitled to the default paradigm of free flow and exchange of relevant information on ESA programs, technology, and products.[31] For similar reasons, unanimity in the ESA Council is required before ESA may cooperate and conclude relevant agreements with other intergovernmental organizations, non-EU governments, and other non-ESA member state institutions.[32]

A final example of ESA's involvement in security issues concerns the development of the Ariane launcher. The single-most security-sensitive space sector is the production and operation of launch vehicles, in view of the very thin lines among a vehicle for launching, an explosive payload against a terrestrial target, and a vehicle for delivering a peaceful payload in orbit. Not accidentally, this area was the first to be subject to international, albeit largely voluntary, arrangements – the Missile Technology Control Regime (MTCR)[33] – to try and curb the proliferation of relevant technologies outside the circle of former Western allies.

As long as the Ariane launcher development project was an (optional) ESA program, the exclusively peaceful requirement of Article II of the ESA Convention precluded any Ariane vehicle being used for military or other security-related missions, under the European interpretation discussed before. Once the Ariane vehicle, however, had achieved operational status, i.e., could start to be used for regular flights on a commercial basis, ESA had to outsource operational and marketing activities, as ESA was also limited by its Convention to research and development (R&D), even if those terms were sometimes stretched considerably.[34]

In the case of Ariane, a separate private and commercial entity was established in 1980 called Arianespace.[35] Arianespace is a French company with international shareholding as well as ties with ESA and the ESA member states, but nevertheless operating on its own behalf in the emerging global commercial

[28]Article III(1), ESA Convention.
[29]See Ibid., Article XI(5.j).
[30]See Ibid., Articles XI(5.k), XXII.
[31]See Ibid., Article III *in extenso*.
[32]See Ibid., Article XIV(1).

[33]*Agreement on Guidelines for the Transfer of Equipment and Technology Related to Missiles* (hereafter MTCR), done 16 April 1987. Also, See Elisabeth S. Waldrop, "Integration of Military and Civilian Space Assets: Legal and National Security Implications," *Air Force Law Review* 55 (2004): 189-90; and Frans von der Dunk, "A European "Equivalent" to United States Export Controls: European Law on the Control of International Trade in Dual-Use Space Technologies," *Astropolitics* 7 (2009). All current 18 ESA member states are among the 34 state parties of the MTCR.
[34]Article II, ESA Convention.
[35]*Statuts de la Société Arianespace* (Arianespace Statute), 26 March 1980.

launch services market. Its operations, however, from the international space law perspective, remained under control of the ESA member states, by way of a complicated international legal structure with three documents at the core: the Arianespace Declaration,[36] the Arianespace Convention,[37] and the *Centre Spatial Guyanais* (CSG) Agreement.[38] Under the first two documents, Arianespace is obliged to operate strictly for peaceful purposes.[39]

Yet as a private French company, Arianespace remained under French governmental control. For example, prior to the MTCR, for the purpose of adhering to the Coordinating Committee on Multilateral Export Controls (CoCom) rules,[40] i.e., the North Atlantic Treaty Organization (NATO) regime[41] for controlling security-sensitive exports, Arianespace fell under French governmental control.

Thus, even the areas where the exclusively peaceful mandate for ESA could not as such avoid a possible entanglement in security or military issues, control mechanisms and procedures were in place. These mechanisms and procedures ensure that the potential threats to the security of individual member states emanating from such entanglement continue to be addressed without substantially infringing their sovereignty.

The European Union

The involvement in space and space policy issues, including space security, of the EU, as the successor at a political, if not completely at the legal level, of the European Community, stems from a completely different background compared to that of ESA. The Community, then Union became involved in European space activities and related policy issues primarily as a regulator, and has only recently become a player in its own right, even a policy-maker – but this remains a secondary role.

In spite of efforts to arrive at a European space policy,[42] driven by the European Commission's perception that space is a key sector to the future of Europe, in this area (as

[36] *Declaration by Certain European Governments Relating to the Ariane Launcher Production Phase* (hereafter Arianespace Declaration), entered into force 15 October 1981, renewal as of 4 October 1990, entered into force 21 May 1992.

[37] *Convention between the European Space Agency and Arianespace* (hereafter Arianespace Convention), signed 24 September 1992.

[38] Agreement between the French government and the European Space Agency with respect to the Centre Spatial Guyanais (CSG) (hereinafter CSG Agreement). See excerpts of French version in ESA Bulletin 80 (November 1994): 67.

[39] See Articles I.1.2(a), I.1.6(a), Arianespace Declaration, ESA/C(80)8, 11 January 1980; Articles 6.1, 6.2, and 6.3, Arianespace Convention, ESA/C(80)WP/8, rev.4, 18 November 1980; further see John Kriger, Arturo Russo, and Lorenza Sebesta, *A History of the European Space Agency 1958-1987: Volume II: The Story of ESA, 1973 to 1987*, ESA History Study Reports, SP-1235 (ESA Publications, 2000); and Gabriel Lafferranderie and Harry Tuinder, "The Role of ESA in the Evolution of Space Law," *Journal of Space Law* 22 (1994): 103.

[40] CoCom was established in 1949 as a joint organization of the member states of NATO, Japan, and Australia, to prevent the sale of weapons and technology to the Soviet Union and its communist allies. CoCom was disbanded in 1994, following the dissolution of the Soviet Union in 1991 and the concurring *de facto* end of the Cold War, which *inter alia* resulted in the opening up in principle of Russian and Eastern European markets. See Michael Lipson, "The Reincarnation of CoCom: Explaining Post-Cold War Export Controls," *The Non-Proliferation Review* 6 (1999): 33-51.

[41] NATO was established by the *North Atlantic Treaty*, entered into force 24 August 1949.

[42] See White paper: Space: a new European frontier for an expanding Union – An action plan for implementing the European Space policy, COM(2003) 673 final, of 11 November 2003; Communication from the Commission to the Council and the European Parliament – European Space Policy – Preliminary Elements, COM(2005) 208 final, of 23 May 2005. See further Stephen Hobe, et al, "A New Chapter for Europe in Space," *Zeitschrift für Luft- und Weltraumrecht* I: 54 (2005): 340.

in many others) the ultimate prerogative of giving substantial shape to space policies by implementing actual programs and projects rests with the individual, sovereign member states. As referred to earlier, a joint Space Policy has been accepted recently, in 2007.

This is clearly only a first step for the EU, whereas the second, more important step of being in charge of implementing such a space policy, of being able to force unwilling or conflicting national authorities in terms of their own space policies, and of developing its own space projects on its own behalf, is only beginning to be undertaken with Galileo. Currently, the first contracts for building of the Galileo satellites and deployment of the system have been signed.

A distinct and partly supranational legal order has by now emerged, where in many instances the EU can in law override the interests, policies, and even legislation of individual member states, yet in the last resort all that is still based on a number of treaties between sovereign states. Together these treaties form a body of primary EU law, *inter alia* creating the main Union organs, officially referred to as: the Council (of Ministers),[43] the European Commission,[44] the European Parliament,[45] the European Court of Justice,[46] and most recently augmented by a European Council comprised of heads of state and government entitled to develop policies – but based on consensus, and without being formally entitled to guide follow-on legislative measures.[47] The treaties also provided these organs with extensive legal competences, which they then used to jointly extend the scope of EU law immensely – by drafting and enunciating what is commonly called "secondary EU law."

Secondary EU law is composed of Regulations, Directives, and Decisions.[48] Regulations are essentially laws on a European level: they are phrased in general terms and apply comprehensively, at least as far as indicated or expressly provided for by the Regulations themselves. The same qualification as law applies to Directives to some extent, namely as far as the required end result is concerned: each state is free, however, to reach that end result in whatever way it sees fit, prior to a given deadline. Finally, Decisions also provide binding law, but only upon those entities to which they are explicitly or implicitly directed. In each case, they would override, wherever applicable, national law or regulation to the contrary.

At the same time, they are strictly legal instruments, designed and only to be used to implement and enforce higher-level policies, policy interests, and approaches as agreed by the EU with the Council, representing the interests of the individual member states, generally in a key role, not to develop and determine them. Not even the Treaty of Lisbon, the successor of the ill-fated effort to achieve a Constitution for Europe,[49] which had been hailed as the first document providing the EU with formal competence in matters of space and space activities, was to fundamentally change this situation. In consequence, the Union still pools together the

[43]See Articles 227-243, Treaty Establishing the European Community as Amended by the Treaty of Lisbon Amending the Treaty on European Union and the Treaty Establishing the European Community (hereafter Treaty on the Functioning of the European Union), entered into force 1 December 2009.

[44]See Articles 244-250, Treaty on the Functioning of the European Union.

[45]See Ibid., Articles 223-234.

[46]See Ibid., Articles 251-281: meanwhile renamed Court of Justice of the European Union.

[47]Ibid., Articles 235-236: see Articles 13(1), 15, Treaty on European Union as amended by the Treaty of Lisbon.

[48]See Ibid., Article 288.

[49]*Treaty Establishing a Constitution for Europe*, Rome, done 29 October 2004 and not entered into force.

regulatory efforts of the member states for specific purposes indicated in the relevant treaties and essentially limited to those – even as it established its own distinct legal order; a *sui generis*-construction, which may be referred to as a supranational "half-way house" between an international organization and a federation-like structure. At present, twenty-seven European states[50] have thus subjected themselves to a very extensive set of rights and obligations towards each other in the framework of the EU. As pointed out, this concerned a group of European states different from those interested in space and investing therein to become member of ESA.

The European legal framework was initially built through signature and ratification of the European Coal and Steel Community (ECSC) Treaty,[51] the European Atomic Energy Community (EAEC) or Euratom Treaty,[52] and the European Economic Community (EEC) Treaty[53] all in the 1950s, as duly amended by subsequent treaties in later years. Such treaties included, in addition to the various accession treaties allowing for new member states to join the EC, then Union, the Single European Act of 1986,[54] the Treaty on European Union of 1992,[55] the Treaty of Amsterdam of 1997,[56] the Treaty of Nice of 2001,[57] and the Treaty of Lisbon of 2007. Of these, as we shall see for our space related topic, the Treaty on European Union and the Treaty of Lisbon are the most important.

The European Union Legal Framework, Economic Activities, and Outer Space

The essential elements of the Union's legal order referred to above present the EU with its own measure of competencies and jurisdiction – over a wide range of economic or economy-related activities. Depending upon certain circumstances and legal preconditions, they can be directly applied not only to the member states themselves, but also to private persons and entities resorting under the domestic jurisdictions of these member states. In addition, in a number of cases the rights and obligations directly applicable to individual citizens and legal entities can also be claimed directly by those entities. Bypassing domestic jurisdictions of member states, the Court of Justice can be called upon in a number of instances by those concerned to judge upon the legality of EU as well as national actions. The existence of this body central to the EU legal order represents an essential measure of supranational adjudication.

As such, to what extent do the Union and its legal framework affect the space sector? Special as space is and distinct from and outside specific member state involvement, how would or could the EU expand such

[50]The list of member states comprises: Austria, Belgium, Bulgaria, the Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

[51]Treaty Establishing the European Coal and Steel Community, entered into force 23 July 1952.

[52]Treaty Establishing the European Atomic Energy Community, entered into force 1 January 1958.

[53]Treaty of Rome, or *Treaty Establishing the European Economic Community* (hereafter EEC Treaty), entered into force 1 January 1958.

[54]Single European Act, entered into force 1 July 1987. One major result of the Single European Act was the integration of the main institutions of the Communities concerned, in particular the European Commission and the Council of Ministers.

[55]Treaty on European Union, entered into force 1 November 1993.

[56]Treaty of Amsterdam Amending the Treaty on European Union, the Treaties Establishing the European Communities and Certain Related Acts (hereafter Treaty of Amsterdam), entered into force 1 May 1999.

[57]Treaty of Nice Amending the Treaty on European Union, the Treaties Establishing the European Communities and Certain Related Acts (hereafter Treaty of Nice), entered into force 1 February 2003.

impact to the extent considered necessary for the European greater common good?

The answers to these questions lie in understanding how the aforementioned competencies and jurisdictions are applied to concrete issues – the application has to be made by explicit primary EU law, secondary EU law (much more common), or from EU law no other conclusion can be drawn other than such applicability was implied. This is captured by the notion of "subsidiarity,"[58] which means that unless the competence to legislate on a certain issue has unequivocally, even if only implicitly, been transferred to the Union's organs the relevant power should still be deemed to rest with the national governmental authorities. If doubt arises whether an issue could be regulated more effectively and logically at the European level or at the national level, the presumption under subsidiarity is that the national level should prevail.

In practice, only to the extent that space-related activities are unequivocally covered by provisions in primary or secondary EU law, can any competence to legislate with respect to them be exercised by EU organs. Space activities, however, only constitute one among many topics from the Union's perspective. Hence, they were hardly mentioned explicitly in primary EU law and not in any appreciable detail in secondary law. As we shall see, space has only recently achieved some presence and prominence in that context.[59] Concomitantly, EU competencies and jurisdiction have been generally acknowledged in the economic domain, applying to all economic activities proper, i.e., without overriding public interests, such as those relating to military, social, or cultural issues being behind those economic activities. Consequently, space activities do at least fall within the EU legal order to the extent that they may be considered economic activities.

From such a perspective, the general application of EU law to economic activities is the main instrument for Union involvement in the space sector so far. Here, the central and most comprehensive aim of EU economic integration is the creation and maintenance of a common market.[60] Effectively, the Internal Market, being one side of the common market, was established as of 1993 following the entry into force of the Treaty on European Union.[61] This regime, in turn, is based upon several freedoms: the freedoms of movement of goods, persons, services, and capital;[62] an anti-trust regime combating anti-competitive behavior of governments (state aid) and companies (collusive conduct and abuses of dominant positions) alike;[63] and harmonization of relevant national legislation.[64]

Turning back to space activities from the perspective of how policies take shape within the EU, the Union's organs, in particular the Commission, have over time obtained some freedom to draft, or at least prepare, European

[58]Articles 5(1) and 5(3), *Treaty on European Union as Amended by the Treaty of Lisbon*. The latter thus extended the scope of application of the subsidiarity principle from the Community's actions (where it applied since 1993 under Article 5, EC Treaty as amended by the Treaty on European Union) to all actions taken in the name of the Union.

[59]For an excellent recent account of EU involvement in European space activities, see Imgard Marboe, "National Space Legislation: The European Perspective," *Nationales Weltraumrecht – National Space Law* (2008), 31-46; Further, see Kevin Madders, *A New Force at a New Frontier: Europe's Development in the Space Field of Its Main Actors, Policies, Law and Activities from its Beginnings up to the Present* (Cambridge University Press, 1997), 566-584.

[60]See Articles 3, 4(2.a), Treaty on the Functioning of the European Union.

[61]Articles 13-19, Single European Act.

[62]See Articles 28-37, 45-66, Treaty on the Functioning of the European Union.

[63]See Ibid., Articles 101-109.

[64]See Ibid., Articles 114-118.

policies, through such varying non-binding instruments as Resolutions, White Papers, and Green Papers.[65] Yet, even with the 2007 EU-ESA Space Policy the boundaries of that freedom are always those provided by the body of EU law, and the political will of the totality of EU member states to use their prerogatives, in particular through the Council, to allow any such policy initiative, to condition or control it, or even to obstruct it. Certainly, once a policy initiative is translated into new EU law, the Council of Ministers in its interplay with the Commission, the European Parliament, and the Court of Justice are able to control such a process to a large extent.[66]

European Union Involvement in Security Issues

It should not be a surprise that as a consequence of the above discussion, at least until as recently as two decades ago, the European organs were given very little room to address military, defense, and security issues, whether specifically in terms of space or more generally speaking. Although the EC, then Union, as indicated originated in a completely different context and for rather different purposes than ESA, essentially the same limitations to EC/EU action in the field of security followed from the established aims of its activities and institutional structure. As to the former, the aims of the EC were summed up exhaustively in the aforementioned Article 2 of the EC Treaty, which throughout history has been updated to take into account new developments requiring a European-level competence – and so far had always excluded a reference to military, defense, and security issues. The only conclusion can be that this domain as a generic area has not yet been included within the EU competence.[67] Only with the Treaty of Lisbon that has changed to some extent, as we shall see.

Even though the European Commission as a truly European organ has in principle the right to initiate policy and legislative developments, and the European Parliament as another truly European organ has considerable competence in both as well, at the end of the day this supranational competence only extends precisely to those domains falling within the EU sphere as determined, until very recently, by Article 2 of the EC Treaty. Extending the scope of that sphere in any formal sense requires the consent of the Council of Ministers representing the

Cooperation on military and security issues…does take place, but ultimately, Europe states still preferred to rely on themselves for national security.

[65]The earliest such document relevant for space activities was "Towards Europe-wide systems and services" – Green Paper on a common approach in the field of satellite communications in the European Community, Communication from the Commission, COM(90) 490 final, of 20 November 1990. For further discussion of the development of an EU-driven space policy, see Gunther Verheugen, "Europe's space plans and opportunities for cooperation," *Space Policy* 21 (2005), 93-95; Thomas Reuter, "The Framework Agreement between the European Space Agency and the European Community: A Significant Step Forward?," *Zeitschrift für Luft- und Weltraumrecht* 53 (2004), 56-65; Kevin Madders and Walter Thiebaut, "Carpe diem: Europe must make a genuine space policy now," *Space Policy* 23 (2007): 7-12; and Nicolas Peter, "The EU's emergent space diplomacy," *Space Policy* 23 (2007): 97-107.

[66]See Articles 293-294, Treaty on the Functioning of the European Union, providing the basis for the complicated decision-making processes formally applicable to the development of EC law.

[67]Note that the aforementioned subsidiarity principle specifically calls for either explicit or implicit (but then from a logical perspective irrefutable) transfer of competence to the EC/EU level, as argued on the basis of subsidiarity before such competence may be assumed.

member states, or in cases of fundamental enlargement of EU competence even new treaties.

From the perspective of security issues, the point of departure for European entities was the fundamental lack of reference to competencies in that area until fairly recently. Security being so closely related to questions of state sovereignty, the fact remains that in the last resort the sheer survival of the state as a relevant entity is at stake, and in spite of the long history of political, economic, social, and cultural integration since the Second World War European member states have not been willing to subject themselves in any fundamental sense to a supranational entity. Cooperation on military and security issues, and the conduct of joint military exercises does take place, but ultimately, Europe states still preferred to rely on themselves for national security.

Over the last two decades, however, partly as a consequence of the end of the Cold War, the demise of the Soviet Union, and the fundamental reshaping of the geopolitical landscape, the perspective on European security started to change. The undeniable success of the EU in economic terms –500 million inhabitants constituting the largest single economic block in the world – strengthened European self-consciousness about a major role for Europe also in the geopolitical arena. At the same time, the lack of political and security-related coherence has become painfully clear, in particular in the context of the demise of Yugoslavia and the ensuing civil wars, where only NATO and the U.S. turned out to be able to restore some measure of peace, and essentially by sheer military force.

The ambitions of the EC thus started to address the involvement of Europe in such security domains, and it started to move carefully into that direction, and as it turned out in some respects taking ESA along to the extent these ambitions involved, or were focusing on, outer space and space activities. Essentially, the EC took a three-pronged, staged approach: firstly, by transforming itself formally into a EU; secondly, by starting to address in earnest the issue of international trade in security-sensitive goods and technology; and thirdly, by undertaking space projects jointly with ESA that inevitably touched upon the security domain.

European Union Entrance into the Space Security Arena

The renaming of the Community as the Union in-and-of-itself was an expression of the ambition of the member states, and of the European institutions, most prominently the Commission, to broaden European integration beyond the more economically-oriented domains. More to the point, the Treaty on European Union effectively did extend the scope of European integration as it had arisen on the basis of the three treaties of the 1950s, re-christening the EEC Treaty as the EC Treaty, and by adding two more "pillars" of the EU to the three Communities that had been merged into one Community (those pillars of the Common Foreign and Security Policy (CFSP) and of Police and Judicial Cooperation in Criminal Matters (PJCCM) respectively).[68]

Of course, it is the CFSP pillar, which concerns us here, established by means of Articles 10A through 28 of the Treaty on

[68]The first pillar was now that of the European Community, based not only the EC Treaty (Title II, Treaty on European Union), but also on the ECSC and EAEC Treaties (Titles III, resp. IV, Treaty on European Union). For the second, CFSP pillar, see Title V, Treaty on European Union; for the third, PJCCM pillar (originally labeled Justice and Home Affairs (JHA)), see Title VI, Treaty on European Union.

European Union.[69] This is where, with the entry into force of the Treaty on European Union in 1993, for the first time as far as the EC/EU framework was concerned, issues of security – the use of the words "defense" and "military" were still judiciously avoided – could be addressed. At least the word "security" is prominently present in the text now.

The CFSP, however, is a straightforward intergovernmental construction and operates completely outside the established legal structure of the Union with its supranational features. There is at best a marginal role for the European Commission in its context as supposed guardian of the overarching European interest. For example, the Commission "may refer to the Council any question relating to the common foreign and security policy and may submit proposals to the Council" as well as request the convening of an extraordinary Council meeting.[70] As a consequence of the Treaty of Lisbon, the role of the Commission to "give its opinion particularly on whether the enhanced cooperation proposed [by EU member states] is consistent with Union policies"[71] may have been relocated to the Treaty on the Functioning of the European Union; it was not changed fundamentally.[72] Yet in principle, "Decisions under this Title shall be taken by the Council acting unanimously" and there is no formal entitlement for the Commission to anything other than being kept informed and allowed to offer its opinion.[73]

…gradually, the European institutions…as compared to the group of sovereign states making up EU membership, are involving themselves in issues of security…

As a result, there also was no role for the elaborate legislative, adjudicative, and enforcement jurisdiction of the European Parliament or the Court of Justice, which was developed in the context of the EC Treaty. The European Parliament, for instance, can make itself heard on similar terms as the Commission, but does not have any formal say in the outcome of whatever legally binding decisions would result from the deliberation process. Even post-Lisbon, the cooperation under the CFSP is essentially cooperation between the member states with the Commission in an unofficial mediating role except where the existing *acquis communautaire* (the total body of EU law accumulated thus far) is threatened. Those issues remain exclusively reserved for national governments to deal with as they see fit to the extent beyond having allowed for such concepts as the European Security and Defense Policy (ESDP), now Common Security and Defense Policy (CSDP), and EU Battle Groups to be developed.[74]

As referred to before, security at the European level has had distinct historical roots. To start, international cooperation in the areas of defense and security had always been dealt

[69]Note that the Treaty of Lisbon amended also the Treaty on European Union, so that in the consolidated version of the latter as per 1 December 2009, Title V now comprises Articles 21-46.

[70]Article 30(1), see also (2), Treaty on European Union as amended by the Treaty of Lisbon.

[71]Article 27c, Treaty on European Union, as inserted by the Treaty of Nice.

[72]See Article 329(2), Treaty on the Functioning of the European Union.

[73]Article 31(1), Treaty on European Union as Amended by the Treaty of Lisbon.

[74]See Articles 326-334, Treaty on the Functioning of the European Union. For example, the CSDP is the domain of the Council of the European Union, representing the member states under the Lisbon Treaty, not the European Commission.

with in the context of NATO or the WEU. As a consequence of the shifting paradigms, the WEU is now being integrated into the EU structures as part of the intergovernmental CFSP. That integration turns out to be a slow process. It started in 1999 with a first level of integration of WEU functions into the EU framework, and has meanwhile led to the handing over of the WEU satellite center at Torrejon, Spain to become the EU Satellite Center, jointly with a European Institute of Security Studies in 2002. Yet these transfers have not been finalized – and some doubt whether such integration will be ever complete.[75] The integration described here does not *ipso facto* subsume the WEU within the EU's institutional structures.

Prior to the Treaty of Lisbon, the Treaty on European Union referred to the role of the WEU in somewhat ambiguous terms. Security policies in the context of the CFSP pillar "shall not prevent the development of closer cooperation between two or more Member States on a bilateral level, in the framework of the Western European Union (WEU) and NATO, provided such cooperation does not run counter to or impede that provided for" through the CFSP.[76] The clauses that have replaced this one as per the Treaty of Lisbon do not mention the WEU in any specific terms and as a consequence of dealing with essentially the same subject matter might be argued to have effectively emptied the WEU of all meaning. Yet any implementation thereof still hinges crucially on member state agreement to any substantive implementation of the common and foreign security policy in the specific military domain, the erstwhile main focus of the WEU.[77]

In short, in this institutional domain of European involvement in space security, slowly but gradually, the European institutions properly speaking, as compared to the group of sovereign states making up EU membership, are involving themselves in issues of security in a broad sense. It seems inevitable that this process increasingly will also involve more clearly outlined military and defense issues.

The European Union and the Trade Aspects of Security

The second inroad the Union started to make into the realm of security concerns the risks inherent in today's voluminous global trade relations. These risks deal with proliferation of security-sensitive dual-use goods, technology, and know-how to states or non-state entities that would result in harming European interests.

In a sense, this was the most logical and obvious starting point for the Community/Union to get involved with the security domain, as international trade and the potentially trade-distorting impact thereof on the EC Internal Market had belonged to the EC's competencies for a considerable time. And indeed, already long before the establishment of the EU and the CFSP pillar, the Community had drafted a first legislative document on export controls, the 1969 Regulation 2603/69.[78]

[75]See Ralph Folsom, *Principles of European Union Law* (2005), 25. Formally, the WEU still is its own intergovernmental self, though now essentially dormant; the entry into force of the Treaty of Lisbon has not yet led to decisions to disband the WEU.

[76]Article 17, Treaty on European Union as Amended by the Treaty of Nice.

[77]See Articles 42 and forward, Treaty on European Union as Amended by the Treaty of Lisbon, *inter alia* also providing for an (in legal terms equally limited) role of the European Defense Agency.

[78]Regulation of the Council establishing common rules for exports, (EEC) No. 2603/69, of 20 December 1969.

These developments were given a considerable boost by several developments in the 1990s. First, there was the aforementioned creation of the Union and the CFSP – leading to such further EC law as Regulation 3381/94[79] and Decision 94/942/CFSP[80] drafted under the Treaty on European Union, even as these documents were far from comprehensive in scope. Second, the changing geopolitical landscape caused the aforementioned CoCom/MTCR-regime[81] to be widened in scope, most notably leading to the establishment of the Wassenaar Arrangement[82] encompassing all dual-use sensitive technologies and related products and know-how in the mid-1990s. Third, the limited progress, as compared to the ambitions of the then-Commission, of development of European security policy, including but not limited to space, in terms of a European Space Strategy on the basis of the CFSP made the European institutions more aware of the limited areas where progress could more easily and readily be expected, namely international security and international trade.

The result was of all this was Regulation 1334/2000[83] providing a baseline framework for implementing in a binding European context the international obligations resulting from the formally non-binding MTCR and Wassenaar regimes, while working towards a harmonization of the ways and means by which individual member states would implement and apply those international obligations and guidelines.[84] As the Regulation itself phrases it: its aims are to develop an "effective common system of export controls on dual-use items [which] is necessary to ensure... the international commitments and responsibilities of the Member States, especially regarding non-proliferation, and of the European Union," through "a common control system and harmonized policies for enforcement and monitoring" as "a prerequisite for establishing the free movement of dual-use items inside the Community" – the most fundamental justification for EU institutions to address the issue of international trade in dual-use goods.[85]

The Regulation itself has been amended on average almost once a year since by later instruments of EC law,[86] but still remains the

[79]Council Regulation setting up a Community regime for the control of exports of dual-use goods, No. 3381/94/EC, of 19 December 1994.

[80]Council Decision on the joint action adopted by the Council of the basis of Article J.3 of the Treaty on European Union concerning the control of exports of dual-use goods, 94/942/CFSP, of 19 December 1994.

[81]Currently, 19 out of the 27 EU member states – Cyprus, Estonia, Latvia, Lithuania, Malta, Romania, Slovakia and Slovenia are missing – are participating in the MTCR.

[82]*Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies* (hereafter Wassenaar Arrangement), effective 12 July 1996. Currently, 26 out of the 27 EU member states – only Cyprus is missing – as well as all 18 ESA member states are participating in the Arrangement.

[83]Council Regulation setting up a Community regime for the control of exports of dual-use items and technology, No. 1334/2000/EC, of 22 June 2000.

[84]An extended analysis of Regulation 1334/2000 and the framework built upon it can be found in Frans von der Dunk, "A European "Equivalent" to United States Export Controls: European Law on the Control of International Trade in Dual-Use Space Technologies," *Astropolitics* 7 (2009): 110-124.

[85]See Paragraphs (2), (3), Preamble, Regulation 1334/2000, and Article 1.

[86]This concerns Council Regulation amending Regulation (EC) No. 1334/2000 with regard to intra-Community transfers and exports of dual-use items and technology, No. 2889/2000/EC, of 22 December 2000; Council Regulation amending Regulation (EC) No. 1334/2000 with regard to the list of controlled dual-use items and technology when exported, No. 458/2001/EC, of 6 March 2001; Council Regulation amending and updating Regulation (EC) No. 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 2432/2001/EC, of 20 November 2001; Council Regulation amending Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 880/2002/EC, of 27 May 2002; Council Regulation amending and updating Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 149/2003/EC, of 27 January 2003; Council Regulation amending and updating Regulation (EC) No 1334/2000 setting up a

key document in the present context. Its main body provides for the basic regime whereas the Annexes, through their regular updates, take account of new developments regarding the subject matter itself as following *inter alia* from the Wassenaar Arrangement updates. In particular, Annex I entitled "List of Dual-Use Items and Technology," and thereby listing all items subject to the regime created by the Regulation, was amended time and again to keep track of ongoing technical, practical, and political developments.[87]

Dual-use items as covered by the Regulation's regime are broadly defined as all "items, including software and technology, which can be used for both civil and military purposes,"[88] whereas export comprises normal export of goods, but extends to "transmission of software or technology by electronic media, fax, or telephone to a destination outside the Community,"[89] and "exporter" is equally broadly defined.[90] Since such a definition of dual-use items clearly could encompass more or less all space technology, the broad sweep *ratione materiae* of the European regime in terms of space activities becomes clear immediately.

Technology itself is also defined in such broad terms, albeit not in the main body of the Regulation itself, but by Annex I: "specific information necessary for the 'development,' 'production,' or 'use' of goods" further elaborated in that "this information takes the form of 'technical data' or 'technical assistance,'" whereby the latter "may take forms, such as instructions, skills, training, working knowledge, and consulting services and may involve the transfer of 'technical data,'" and these may in turn "take forms, such as blueprints, plans, diagrams, models, formulae, tables, engineering designs and specifications, manuals and instructions written or recorded on other media, or devices, such as disk, tape, read-only memories."[91]

The core element of the regime developed on the basis of the Regulation concerns the authorization process and procedures, which remains a prerogative of the EU member states, but should conform to the parameters as provided by the Regulation's regime. The point of departure, in any event, still is national authorization.

Firstly, such an authorization is required for export of the dual-use items as defined and listed in Annex I.[92] Secondly, the obligations of a prospective exporter are not limited to screening an exhaustive list and then abiding by its terms, as there are scenarios under which an exporter would be obliged to comply with the control and authorization mechanisms provided by the Regulation, also where the items concerned as such are not listed in Annex I.[93]

Community regime for the control of exports of dual-use items and technology, No. 1504/2004/EC, of 19 July 2004; Council Regulation amending and updating Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 394/2006/EC, of 27 February 2006; Council Regulation amending and updating Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 1183/2007/EC, of 18 September 2007; and Council Regulation amending and updating Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 1167/2008/EC, of 24 October 2008.

[87]Annex I, Regulation 1167/2008; further see Article 3, Regulation 1334/2000.

[88]Article 2(a), Regulation 1334/2000.

[89]Ibid., Article 2(b), sub-paragraph (iii).

[90]See Ibid., Article 2(c).

[91]Annex I, Regulation 1167/2008.

[92]See Article 3(1), Regulation 1334/2000; and introductory paragraph, Annex I – List of Dual-Use Items and Technology, Regulation 1167/2008.

[93]The three scenarios concern: (1) potential involvement of the item concerned in the context of weapons of mass destruction; (2) export to a state subject to an arms embargo imposed by the European Union, the Organization for

As national sovereignty of member states is still the baseline, the Regulation does not take away the possibility for a prospective exporter to be confronted with requirements for authorizations imposed by member states under national laws and regulations outside of the system of the Regulation properly speaking.[94] In such cases, the Regulation only imposes upon the member state adopting or maintaining relevant legislation a duty to inform other member states as well as the Commission.[95]

With regard to these national authorization regimes, the Regulation only further imposes the requirement that they should allow for three types of authorizations: individual, global, or general, with the latter being valid throughout the Community.[96] While leaving the choice to the national member state authorities regarding which type of authorization to use in a certain case, a few specific limits are imposed by the Regulation in that regard.[97]

Next to that, as the cornerstone of actual harmonization, the Regulation introduces the concept of the Community General Export Authorization (CGEA).[98] The CGEA explicitly constitutes an exception to the sovereign discretion of member states as for all items not covered by it; any authorization shall be granted – or refused – by the member state where the exporter is located.[99]

The CGEA's scope is essentially limited in three ways. One, *ratione materiae* only items as defined by Annex II – with the exception moreover of those mentioned in Part 2 thereof – require a CGEA as opposed to a national authorization, which still covers the bulk of items listed in Annex I.[100] Two, however, *ratione personae* the CGEA covers such exports only to the extent the target destination is Australia, Canada, Japan, New Zealand, Norway, Switzerland, or the U.S.[101] Three, further exceptions to applicability of the CGEA occur in more limited scenarios.[102]

Thus, Regulation 1334/2000 in conjunction with follow-up Regulations created a complex interlocking system of European-wide and national authorizations. That system required European-wide authorizations instead of national ones in varying measures for the export of the items listed in a few interlocking Annexes to other EU member states, a limited set of close political allies of other states and destinations, otherwise leaving the individual sovereign discretion of the member states intact.

Nevertheless, presenting a kind of European equivalent to U.S. export controls, the Regulation and the regime built upon it

Security and Cooperation in Europe (OSCE) or the United Nations Security Council; and (3) export without national authorization or in violation of a national authorization; see Articles 3(2), 4(1), (2), (3), and (4), Regulation 1334/2000.

[94]Article 4(5), Regulation 1334/2000.

[95]See Ibid., Article 4(6).

[96]See Ibid., Article 6(2).

[97]See further Frans von der Dunk, "A European "Equivalent" to United States Export Controls: European Law on the Control of International Trade in Dual-Use Space Technologies," *Astropolitics* 7 (2009): 122-4.

[98]See Article 6(1), Regulation 1334/2000.

[99]Ibid., Article 6(2).

[100]See Annex II, Regulation 1167/2008; Part 1 of Annex II simply provides in full "This export authorization covers the following items: All dual-use specified in any entry in Annex I of the present Regulation except those listed in Part 2 below."

[101]See Ibid., Part 3.

[102]See Ibid., Articles 1, 2, and 3, Annex II. These three scenarios concern: (1) (once again): potential involvement of the item concerned in the context of weapons of mass destruction; (2) (once again) export to a state subject to an arms embargo imposed by the European Union, the OSCE, or the United National Security Council; and (3) where the relevant items are to be exported to a destination within a customs free zone or free warehouse.

represents a careful, detailed, and politically noteworthy foray of the EU into the security domain, including space security in view of the inherent dual-use of most space activities, hardware, and technology. The establishment of the European Defence Agency (EDA) in 2004[103] may also turn out to contribute to further fundamental EU inroads in legal and political terms in the European security domain, albeit that Agency falls under the competencies specifically of the Council of the European Union, not of the Commission.

As with the development of the CFSP pillar, this development took place without the involvement of ESA – although ESA's role in the European space endeavour under the Regulation's regime was recognized to the extent that export controls on launchers and launch-related items otherwise applicable would essentially be waived for items "that are transferred on the basis of orders pursuant to a contractual relationship placed by the European Space Agency (ESA) or that are transferred by ESA to accomplish its official tasks" or "that are transferred to a State-controlled space launching site in the territory of a Member State, unless that Member State controls such transfers within the terms of this Regulation" – noting here that European launches usually take place from Kourou, French Guyana, which is French territory.[104]

European Union - European Space Agency Cooperation

The most recent angle from which the EU, this time in close cooperation with ESA, was venturing into the space domain, was the development of two European "flagship projects," Galileo and GMES. Both concerned major programs aiming at launching and operating a system of satellites as the core part of an infrastructure to be used for practical downstream terrestrial applications. It may be added that perhaps soon a third project is to follow, i.e., the joint development of European SSA capabilities, which will also have a substantial, and probably even more profound impact on security issues in space for Europe.

Galileo, initiated by the European Commission, is the second-generation, European-owned and European-operated global satellite navigation system currently being developed to be operational by 2013.[105] Its key features, as compared with the currently operational satellite navigation systems, the U.S. Global Positioning System (GPS) and the Russian GLONASS (Global Navigation Satellite System), have been listed as being an internationally-operated system controlled by civilians and providing for 27, plus three spare, satellites in medium Earth orbits (MEO). The satellite signals should be augmented world-wide and should be

[103]See Council Joint Action 2004/551/CFSP of 12 July 2004 on the establishment of the European Defense Agency; also, see Article 42(3), Treaty on European Union as Amended by the Treaty of Lisbon.

[104]Part I, Annex IV, Regulation 1167/2008, sub-paragraph (1) resp. (4).

[105]Council Resolution on the European Contribution to the Development of a Global Navigation Satellite System (GNSS), of 19 December 1994; Communication from the Commission to the Council and the European Parliament – Towards a Trans-European Positioning and Navigation Network: including A European Strategy for Global Navigation Satellite Systems (GNSS), COM(1998) 29 final, of 21 January 1998; Galileo – Involving Europe in a New Generation of Satellite Navigation Services, of 10 February 1999, COM(1999) 54 final; Council Resolution on the involvement of Europe in a new generation of satellite navigation services – Galileo-Definition phase, of 19 July 1999; Commission Communication to the European Parliament and the Council – On GALILEO, of 22 November 2000, COM(2000) 750 final; Council Regulation setting up the Galileo Joint Undertaking, No. 876/2002/EC, of 21 May 2002; Council Regulation on the establishment of structures for the management of the European satellite radio-navigation programs, No. 1321/2004/EC, of 12 July 2004; and Regulation of the European Parliament and of the Council on the further implementation of the European satellite navigation programs (EGNOS and Galileo); No. 683/2008/EC, of 9 July 2008.

available in principle for usage by many transport as well as non-transport applications. These satellites should furthermore provide, apart from an Open Service similar to GPS and GLONASS Open Services, three types of enhanced services, for which users one way or another would have to pay, of which the Public Regulated Service (PRS) is of importance for the current discussion, plus search and rescue services additional to the existing COSPAS-SARSAT Program [International Satellite System for Search and Rescue].[106]

Galileo has undergone various delays and a number of changes of direction over the last years, most notably discarding for the time being the Public Private Partnership (PPP) approach in financing, building, and operating the system. The EU Council of Ministers by means of a Resolution of 8 June 2007 unequivocally concludes in this regard "that the current concession negotiations have failed and should be ended."[107] However, the Resolution, as well as ensuing political discussions within Europe at the highest level, left little doubt that the European stakeholders are determined to make Galileo happen and to replace the private investments that are now no longer expected with public investments one way or another; indeed, public investment has been achieved through the transfer of unused Common Agricultural Funds.[108] The most recent result of that determination so far has been Regulation 683/2008 on the further implementation of EGNOS (the regional forerunner to Galileo currently operational) and Galileo itself. By now, two test satellites are operational: the GIOVE-A, built by Surrey Satellite Technology, launched December 2005, and the GIOVE-B, built by Galileo Industries and launched April 2008.[109]

From several perspectives, including the geopolitical one, Galileo is a major success already prior to its proper deployment. Ever since the People's Republic of China (PRC) became the first non-European partner to join the project at the highest level,[110] many such states have expressed their interest in doing so and some concluded similar agreements.[111] Though, with the transition from the Galileo Joint Undertaking (GJU) to the European GNSS [Global Navigation Satellite System] Supervisory Authority, as well as the funding problems, these cooperative developments have largely stalled, in the case of the PRC even leading to a severe curtailing of the actual level of cooperation.[112]

Such involvement of non-EU, largely non-European, countries had for the first time raised major issues related to European security issues, which the Commission had to cope with. Notably, the Cooperation Agreement with the PRC specifically did not

[106]The COSPAS-SARSAT currently is a four-state satellite system available to aircraft, ships, other vehicles, and persons in distress for the purpose of sending emergency signals and alerting rescue services; see *International COSPAS-SARSAT Program Agreement*, entered into force on 30 August 1988.

[107]Item 2, Council Resolution on GALILEO, 2805th Transport, Telecommunications, and Energy Council Meeting, Luxembourg, 6-8 June 2007.

[108]Items 4-7, Council Resolution on GALILEO, 2805th Transport, Telecommunications and Energy Council Meeting, Luxembourg, 6-8 June 2007; respectively Council of the European Union, 2828th Council Meeting, Economic, and Financial Affairs, Brussels, 13 November 2007, 14534/07 (Presse 251), at 18.

[109]The first four in-orbit validation phase satellites for Galileo are planned for launch by November 2010.

[110]By becoming a member of the Galileo Joint Undertaking (GJU), the precursor to the European GNSS Supervisory Authority (GSA); see Cooperation Agreement on a Civil Global Navigation Satellite System (GNSS) – Galileo between the European Community and its Member States and the People's Republic of China, of 30 October 2003; Doc. Council of the European Union, 13324/03.

[111]For example; see Cooperation Agreement on a Civil Global Navigation Satellite System (GNSS) between the European Community and its Member States and the State of Israel, of 2 June 2005.

[112]*Space News* 12 June 2006.

include access by the PRC to the PRS.[113] The PRS is the Galileo-service most akin to the GPS Precise Positioning Signal. PRS will be encrypted and physically protected, and only accessible to a limited group of users – in principle all governmental organs, some hybrid service providers in areas key to modern society, and also in terms of security, such as energy and telecommunications networks.

Also, the Agreement with the PRC touched upon the issue of export control of security-sensitive space hardware and technology in the context of Galileo cooperation. It notably provided that "Exports by China to third countries of sensitive items related to the Galileo program will have to be submitted for prior authorization by the competent Galileo security authority, if the authority has recommended to the EU Member States that these items be subject to export authorization."[114] In any event, parties reserved the right to apply applicable laws and regulations in the context of EU-PRC cooperation on Galileo as a safety precaution in case key security issues would be perceived to be at stake.[115] Regulation 683/2008, the currently ruling legal document on Galileo, provides on this issue that any additional contributions by member states, third states, or intergovernmental organizations can only be arranged subject to dedicated agreements, allowing a similar degree of control over security matters.[116]

Being developed under EU leadership, with ESA as developer and procuring agency, the Regulation further outlines the envisaged approach to Galileo, including the system of governance that should apply to the operational phase. Important for our current topic is that the European GNSS Supervisory Authority, established by Regulation 1321/2004, is to fulfill the key role *inter alia* in security accreditation and operation of the Galileo security center.[117] In this respect, the Supervisory Authority will operate under the umbrella of the Commission, which takes it upon itself to "manage all questions relating to the security of the systems, duly taking into account the need for oversight and integration of security requirements in the overall programs."[118]

As already has become clear, and in spite of the civil governance structure to be developed for Galileo, security issues will have to be faced. Firstly, the possibility of potential adversary use of its signals would still have to be dealt with; someone has to take decisions, in the worst case, to effectively shut down parts of the system, when Galileo signals threaten to be used by states or non-state actors against the security interests of Europe and European states.[119]

Secondly, as referred to before, the envisaged PRS, while painstakingly avoiding any reference to military or defense, was modeled in many respects on the GPS Precise Positioning Signal. Whilst the PRS is officially to be made accessible to all

[113]On the other hand, see Article 4(2), *Cooperation Agreement on a Civil Global Navigation Satellite System (GNSS) – Galileo between the European Community and its Member States and the People's Republic of China.*

[114]Ibid., Article 8(4).

[115]Ibid., Article 5(1).

[116]See Articles 4(4), (5), and 6(3) and (4), Regulation 683/2008.

[117]See Article 16, Regulation 683/2008.

[118]Ibid., Article 13(1). See further Article 13(2)-(5), as well as Article 14 on the general governance of Galileo for security purposes.

[119]This was essentially taken care of by involving a "Galileo security center" in the overall governance scheme for the Galileo system, as well as specific security-related regulations; see 16th preamble paragraph, Articles 7, 13, 14, and 16, Regulation 683/2008; also see Council Joint Action on aspects of the operation of the European satellite radio-navigation system affecting the security of the European Union, 2004/552/CFSP, of 12 July 2004.

governmental services, debate has already arisen about whether such governmental uses should not also include the use by the military of respective member states. To those familiar with Western political history over the last half century, it will come as no surprise that France is most adamant in seeing no obstacle to such use, whereas the United Kingdom, at least until recently, was most adamant in emphasizing that such military uses were never contemplated, and should not be contemplated, or at least be vigorously pursued, now.

The other flagship project, GMES, is of more recent date, and consequently has not yet evolved to such an extent as Galileo, in particular, as relevant to the present discussion, in terms of an attendant legal and governance framework to handle to security aspects.[120] At the same time, it now seems certain, with the launch of the Sentinel 1 satellite for GMES scheduled for 2011 (the first Earth observation satellite for GMES) that it will actually precede an operational Galileo system to space. GMES is to become the pan-European contribution to the Global Earth Observation System of Systems (GEOSS), representing a global effort to enhance environmental protection with the help of satellite technology.

Nonetheless, GMES represents the next step for space security issues in Europe since this project for the first time did prominently refer to the concept of security – interestingly, in the process extending its scope, as GMES was originally meant to stand for Global Monitoring for Environmental Security, before the latter part was changed to Environment and Security. Security as understood here gradually came to be interpreted beyond the concept of "civil security" so as to encompass more "traditional" military and defense issues of security.[121]

GMES, being tasked to provide Europe with its own independent and comprehensive satellite Earth observation infrastructure for generation of data and information on a comprehensive range of subjects, will bring the inclusion of defense, security, and military matters into the broader civil European governance structures. Like Galileo, this impacts both the EU and ESA in terms of their traditional domain having explicitly excluded military, defense, and security issues. Establishment of a coherent SSA flagship project will no doubt move such developments one step further again.

The Treaty of Lisbon

The developments regarding the increasing involvement of the EU in the space security domain are converging with the latest European achievement, which is the entry into force of the Treaty of Lisbon as of 1 December 2009. The increasing growth of the Union – adding twelve new member states in the time span of a mere three years (2004-2007) – was calling for a further rationalization of the governance structure, where a Commission having at least one Commissioner of every member state and the possibilities for small numbers of member states to block legislative development in the Council were threatening to make further

[120]See further Council Resolution on the launch of the initial period of global monitoring for environment and security (GMES), of 13 November 2001; Communication from the Commission to the European Parliament and the Council – Global Monitoring for Environment and Security (GMES): Establishing a GMES capacity by 2008, COM(2004) 65 final, of 3 February 2004.

[121]See further on this Frans von der Dunk, "A European "Equivalent" to United States Export Controls: European Law on the Control of International Trade in Dual-Use Space Technologies," *Astropolitics* 7 (2009).

progress of the Union as a whole increasingly difficult. Also, the calls for more involvement at a European level in global issues of sustainable development, poverty, climate change, and last, but not least, the new security issues and a consequent revival of ideas to extend the scope of supranational policy-making and law-making did not go unheard.

As mentioned, the first effort after the Treaty of Nice of 2001 to take a step forward in European integration was the Treaty establishing a Constitution for Europe agreed upon in Rome in 2004 – but this effort failed. This was not in the least because the inclusion of the word "Constitution," and its presumed corollaries of a "European anthem" and an official "European flag" as symbols of the perceived ambition to create a European "super-state" with certain democratic *lacunae*, triggered nationalist sentiments sufficiently to make the treaty fail in the referenda held in France and the Netherlands. An additional factor blocking the required EU-wide acceptance was the rather unwieldy and "juridical-technical" nature of the document that the combination of the various updating treaties with particular the original EC Treaty had become.

While the Treaty of Lisbon, to many a scaled-down and more realistic version of the Treaty establishing a Constitution for Europe, took close to two years between acceptance of the final text and entry into force,[122] in the end it did succeed in becoming the key document underlying the European Union. Among many other things, it also tried to further enhance the position of Europe as an entity in its own right in space and security, and consequently the space security domain.

The Treaty of Lisbon and Security

As far as the security-side to the equation is concerned, at least the principle of "security" was partially transferred from the Treaty on European Union to the Treaty on the Functioning of the European Union, and included a reference to "defense" at the same time. The first treaty was the one document part of the Treaty of Lisbon where the EC legal order and the key roles of Commission, Parliament, and Court were not engaged; the other, effectively the old EC Treaty as amended by the Treaty of Lisbon, was the second such document where EC law and Commission, Parliament, and Court competencies did apply.

So, in matters of security, now "The Union shall have competence, in accordance with the provisions of the Treaty on European Union, to define and implement a common foreign and security policy, including the progressive framing of a common defense policy."[123] However, the actual implementation of such policies refers back to the Treaty on European Union, to wit its second pillar where the intergovernmental structures reside. Also, Article 4 of the Treaty on the Functioning of the European Union makes reference to shared competence between the Union and EU member states in the "area of freedom, security, and justice."[124] Note, that "security" is inserted in the text between "freedom" and "justice," whereby the term "security" may

[122]The Treaty of Lisbon was voted down in Ireland by a referendum the first time around, and managed a favorable vote the second time only after considerable wheeling and dealing and a number of cosmetic changes; and even after the Treaty had passed that hurdle, in particular Poland and the Czech Republic were serious candidates to block the entry into force of the Treaty – acceptance of the Treaty of Lisbon, as of any other fundamental treaty in the EC and EU context, had to be unanimous as between the twenty-seven member states in order to lead to entry into force.

[123]Article 2(4), Treaty on the Functioning of the European Union.

[124]Ibid., Article 4(2.j).

arguably be somewhat confined to civil security.

What the actual effect will be of this partial "transfer" of the security domain into the Treaty on the Functioning of the European Union, will depend on the future usage that the Union's institutions may seek to make of these clauses. On one hand, the shared competence of Article 4(2) essentially means that "the member states can in principle only exercise their competences to the extent that the Union has not exercised its competence,[125] which in turn means the Union's institutions can, following Article 288 of the Treaty on the Functioning of the European Union, adopt Regulations, Directives, and Decisions.

On the other hand, Article 2(4) ensures that any action of the Union in this domain will have to follow the rules of the Treaty on European Union in its version as consolidated by the Treaty of Lisbon. Here, the Union may now "define and pursue common policies and actions" among others to "safeguard its values, fundamental interests, security, independence and integrity; … preserve peace, prevent conflicts, and strengthen international security in accordance with the purposes and principles of the United Nations Charter, with the principles of the Helsinki Final Act, and with the aims of the Charter of Paris, including those relating to external borders," objects clearly at least potentially involving security, including military decisions.[126] To what extent such policies and actions may comprise juridical or legislative action, and also to what extent such policies would essentially remain an empty shell without actual follow-on juridical or legislative action, may be disputed, but in principle these would not be subject to the democratic controls of the European Parliament, and therefore remain within the exclusive domain of democratic controls of relevant national parliaments, and by the same token would fall outside the jurisdiction of the Court of Justice.

Furthermore, it is the European Council, a special version of the Council of Ministers comprising the Heads of State of the member states, hence still first and foremost representing their individual member states' interests,[127] which shall now, further to Article 21 of the consolidated Treaty on European Union, identify the strategic interests and objectives of the Union and take relevant decisions by unanimity, *inter alia* in the area of common foreign and security policy.[128] The role of the Commission is limited to the right to propose external actions other than those for the area of common foreign and security policy, which is the domain of the occupant of the newly created High Representative for Foreign Affairs and Security Policy, a special official which is, although Vice-President of the Commission, directly appointed by the European Council.[129]

…at least the principle of "security" was partially transferred from the Treaty on European Union to the Treaty on the Functioning of the European Union…

[125]Stephen Hobe, *et al*, A New Chapter for Europe in Space," *Zeitschrift für Luft- und Weltraumrecht* I: 54 (2005), 347.

[126]Article 21(2), Treaty on European Union as amended by the Treaty of Lisbon amending the Treaty on European Union and the Treaty Establishing the European Community (hereafter Consolidated Version of the Treaty on European Union), Lisbon, entered into force 1 December 2009.

[127]See further Articles 235-236, Treaty on the Functioning of the European Union.

[128]See Article 22(1), Consolidated Version of the Treaty on European Union.

[129]See Ibid., Articles 18(1) and (2), and 22(2); further Article 30.

Article 24(1) of the consolidated version of the Treaty on European Union echoes the aforementioned provision of Article 2(4) of the Treaty on the Functioning of the European Union, in allotting to the Union "all areas of foreign policy and all questions relating to the Union's security, including the progressive framing of a common defense policy." This common foreign security policy, however, is subject to specific rules and procedures, requiring unanimous agreement by the European Council and alternatively the Council of Ministers, but "the adoption of legislative acts shall be excluded" and (with one exception not relevant here) "the Court of Justice of the European Union shall not have jurisdiction with respect to these provisions."[130]

In sum, in all of Title V of the consolidated version of the Treaty on European Union, entitled "General Provisions on the Union's External Action and Specific Provisions on the Common Foreign and Security Policy" and comprising Articles 21 through 46, the Commission is referred to no more than eight times, in a manner that can be described as being on the fringe of the actual decision-making processes. From the same perspective, the European Parliament is referred to a mere seven times, the Court of Justice of the European Union exactly once. By contrast, the European Council has been mentioned 19 times, the Council of Ministers as such no less than 74 times, and the term "Member States" occurs 58 times in this Title. There is no better way to directly visualize the different roles of the first three, the "truly European institutions," as compared with the latter two institutions where the individual member states' interests are most prominently defended, in the context of security under the Common Foreign and Security Policy.

[130]Ibid., Article 24(1). See further Articles 28 and 31.

It remains to be seen how the political landscape, both within the European Union itself and from a more geopolitical perspective, will evolve and whether this might, under certain circumstances, allow for an increasingly larger role for the EU institutions in security issues.

The Treaty of Lisbon and Space

In regard to outer space, the Treaty of Lisbon was hoped for to present at least a courageous step forward. When its failed predecessor, the Treaty Establishing a Constitution for Europe, was being negotiated and drafted, it had included two novel provisions offering a key to considerably enlarging Europe's role in space.

Firstly, that Treaty provided in Article I-14 that "In the areas of research, technological development, and space, the Union shall have competence to carry out activities, in particular to define and implement programs; however, the exercise of that competence shall not result in Member States being prevented from exercising theirs."[131] This clause was part of the Article providing for the scope of shared competence between the Union and its member states, but the last part has led commentators to conclude that this was not so much a normal shared competence, but rather a "parallel competence."[132] In other words, individual member states would retain sovereign discretion to draft and implement their own national policies and legislation in this area.

[131]Article I-14(3), Treaty Establishing a Constitution for Europe.

[132]Stephen Hobe, *et al*, "A New Chapter for Europe in Space," *Zeitschrift für Luft- und Weltraumrecht* I: 54 (2005), 346-347.

Secondly, specifically on space it was provided:

> 1. To promote scientific and technical progress, industrial competitiveness, and the implementation of its policies, the Union shall draw up a European space policy. To this end, it may promote joint initiatives, support research and technological development, and coordinate the efforts needed for the exploration and exploitation of space.
> 2. To contribute to attaining the objectives referred to in paragraph 1, European laws or framework laws shall establish the necessary measures, which may take the form of a European space program.
> 3. The Union shall establish any appropriate relations with the European Space Agency.[133]

By many, this was considered to represent the first true acceptance of a competence in space for the Union, even if only shared or parallel. This, however, overlooked the fact that already since 1994, with the adoption of the Satellite Directive,[134] the Union had exercised a fundamental competence to regulate satellite communications as part of the broader telecommunications sector in the context of the European Internal Market. From that moment on, for example, the Commission had adopted more Regulations, Directives, and Decisions to deal with specific aspects of commercial satellite communications[135] and had handed down Decisions enforcing the general competition regime in the sector.[136] It also overlooked a similar regulatory involvement in the satellite navigation area, beginning with the Regulation setting up the Galileo Joint Undertaking in 2002.[137]

More precisely, therefore, entry into force of the Treaty Establishing a Constitution for Europe would have meant a first comprehensive competence in terms of scope, not being indirectly deduced from competencies in telecommunication and transport fields (e.g., note that Galileo was presented first and foremost as a tool for trans-European transport networks, and still essentially resides with the Commission's Directorate on Transport and Energy). This

[133]Article III-254, Treaty establishing a Constitution for Europe.

[134]Commission Directive amending Directive 88/301/EEC and Directive 90/388/EEC, in particular with regard to satellite communications, 94/46/EC, of 13 October 1994.

[135]For example: Commission Directive amending Directive 90/387/EEC with regard to personal and mobile communications, 96/2/EC, of 16 January 1996; Commission Directive amending Directive 90/388/EEC with regard to the implementation of full competition in telecommunications markets, 96/19/EC, of 13 March 1996; Decision of the European Parliament and of the Council on a coordinated authorization approach in the field of satellite personal communications systems in the Community, No. 710/97/EC, of 24 March 1997; Directive of the European Parliament and of the Council on a common framework for general authorizations and individual licenses in the field of telecommunications services, 97/13/EC, of 10 April 1997; Decision of the European Parliament and of the Council on the selection and authorization of systems providing mobile satellite services (MSS); No. 626/2008/EC, of 30 June 2008.

[136]For example: Commission Decision relating to a proceeding pursuant to Article 85 of the EC Treaty and Article 53 of the EEA Agreement (IV/34.768 – International Private Satellite Partners), No. 94/895/EC, of 15 December 1994; Commission Decision declaring a concentration to be incompatible with the common market and the functioning of the EEA Agreement (IV/M.490 – Nordic Satellite Distribution), No. 96/177/EC, of 19 July 1995; Commission Decision relating to a proceeding under Article 85 of the EC Treaty and Article 53 of the EEA Agreement (IV/35.518 – Iridium), No. 97/39/EC, of 18 December 1996; Commission Decision declaring a concentration to be compatible with the common market according to Council Regulation (EEC) No 4064/89 (IV/M.1564 – Astrolink), of 25 June 1999; Commission Decision declaring a concentration to be compatible with the common market according to Council Regulation (EEC) No 4064/89 (IV/M.4465 - Thrane and Thrane/Nera), of 21 March 2007; Commission Decision declaring a concentration to be compatible with the common market and the EEA Agreement (COMP/M.4403 – Thales/Finmeccanica/Alcatel Alenia Space & Telespazio), of 4 April 2007; Commission Decision declaring a concentration to be compatible with the common market according to Council Regulation (EEC) No 4064/89 (IV/M.4709 – Apax Partners/Telenor Satellite Services), of 20 August 2007,

[137]Council Regulation setting up the Galileo Joint Undertaking, No. 876/2002/EC, of 21 May 2002.

was not generally considered to be subject to dispute, and even as the Treaty Establishing a Constitution for Europe was running into trouble, this clause was expected to survive.[138]

As it turned out, by way of an unpleasant surprise for the supporters of European space cooperation, the Treaty of Lisbon did take one fundamental step backwards here. The Treaty on the Functioning of the European Union as per the Treaty of Lisbon in relevant part firstly faithfully copies Article I-14 of the Treaty Establishing a Constitution for Europe that was stated above.[139]

Secondly, however, the Treaty now provides:

> 1. To promote scientific and technical progress, industrial competitiveness, and the implementation of its policies, the Union shall draw up a European space policy. To this end, it may promote joint initiatives, support research and technological development, and coordinate the efforts needed for the exploration and exploitation of space.
> 2. To contribute to attaining the objectives referred to in paragraph 1, the European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall establish the necessary measures, which may take the form of a European space program, excluding any harmonization of the laws and regulations of the Member States.
> 3. The Union shall establish any appropriate relations with the European Space Agency.
> 4. This Article shall be without prejudice to the other provisions of this Title. [140]

Note that paragraphs 1 and 3 are identical to paragraphs 1 and 3 of Article III-254 of the Treaty Establishing a Constitution for Europe, and that paragraph 4, though not present in the latter, does only confirm the default relationship. Thus, paragraph 2 is the key difference here.

First, it replaces the reference to European laws and framework laws (the new names proposed by the Treaty Establishing a Constitution for Europe for Regulations and Directives) with a more complicated formula, which in essence still refers to EC secondary law.[141] Second, a clause is now added excluding from any such EU competence the possibility to use Regulations, Directives, or Decisions for the purpose of harmonizing laws and regulations of EU member states. Consequently, the EU competence on space is now limited to adopting secondary EU law that either (1) establishes a space project or space program and presumably takes care of its financing through EU budgets, or (2) applies the freedoms of movement of goods, services, persons and capital as well as the competition regime to the space sector, as the remaining key pillars of the Internal Market not covered by the last clause of paragraph 2.

With regard to the latter, moreover, with the exception of areas of satellite telecommunications and satellite navigation where the leadership role of the Commission and also in the legislative domain is generally accepted and already has led to secondary EU law being adopted, actual adoption of Regulations, Directives, or Decisions may run into problems. Any existence of member state regulation on any such topic – as part of the exercise of member state competence, left

[138]Stephen Hobe, *et al*, "A New Chapter for Europe in Space," *Zeitschrift für Luft- und Weltraumrecht* I: 54 (2005), 346.
[139]Article 4(3), Treaty on the Functioning of the European Union.
[140]Ibid., Article 189.
[141]The "ordinary legislative procedure" referred to here is described as "the joint adoption by the European Parliament and the Council of a regulation, directive or decision on a proposal from the Commission." See Ibid., Article 289(1) and Article 294.

unhampered under Article 4(3) of the Treaty on the Functioning of the European Union – might be expected either to exclude *ipso facto* a right for the EU institutions to adopt secondary EU law, or lead to sufficient opposition in the Council to preclude such adoption in practice.

Still, the combined force of existing competencies in the satellite communication and satellite navigation fields, the clauses of the Treaty on the Functioning of the European Union, and the subsidiarity principle vis-à-vis the inherently global domain of outer space may well lead to increasing activity of the EU institutions in the space domain. Once the Council would be convinced that it is in the overarching interest to do so, the framework briefly outlined above certainly would allow this to happen.

Conclusions

From the above analyses of the often painstaking and complicated processes of European integration, it may be concluded that the involvement of key intergovernmental entities in Europe, including the European Union and ESA, in space security is rapidly evolving at least on a political and visibility level, even as such involvement is crucially shaped by the institutional structures and the roles of the member states in delineating relevant competencies. The outside reality that space activities are almost always inherently security-sensitive or even simply developed from security needs has caught up with the principled prohibition in the relevant documents (for the European Union at least until the Treaty on European Union) to become fundamentally involved in security issues. The European flagship projects, Galileo and GMES, may be seen as clear indicators that indeed a gradual acceptance of the inevitability of involvement of the Union and the Agency into the field of space security has started to occur.

This process so far has been largely an indirect one, bringing many factors together – the increasing entanglement, even convergence, of ESA and the EU, the gradual swallowing of the WEU by the latter (where perhaps that process is most advanced with respect to the space part of the WEU), the double perspective of security and space from which the Union is addressing space security, the joint development of the flagship projects, the specific focus on international trade in and exports of security-sensitive technology, and trying to cope with potential Internal Market-distorting consequences of national licensing regimes on export control. The process is further driven by the political will of the Union to be in Europe's driver's seat with regard to global developments, such as concerning the Wassenaar Arrangement and the MTCR, but also Space Situational Awareness and other space security-related issues.

The failed Treaty Establishing a Constitution for Europe and the successful Treaty of Lisbon from that perspective together represented the extent to which the EU and its leading institutions, first of all the Commission, were able to move along that path so far, and establish a first measure of legislative and regulatory coherence on the European front. The results, as analyzed, are rather mixed and certainly do not overcome many of the complications, sometimes perhaps even inconsistencies, arising as a result from the manifold angles from which issues of space security are addressed in Europe.

For example, in spite of the increasing cooperation of the Union and ESA in matters of space policy, and now even projects, a full-fledged integration of ESA into the Union

does not seem to be plausible for now. Issues, such as the conflicting approach to the financing of space industry in the context of European space projects, with ESA largely still forced to adhere to the "fair return" concept and the Union insisting on open and competitive procurement, will therefore continue to require ad-hoc solutions, as was achieved for example for Galileo. In that sense, institutionally speaking, Europe has not yet moved fundamentally beyond the Framework Agreement. This is not to diminish the value and importance of what has been achieved.

To paraphrase the most famous quote in space history, it may not be the giant leap hoped for, but it is a small step forward opening up the prospect of more steps in the same direction. Security is also high on the agenda in Europe, space is increasingly playing an indispensable role in that context, and the flagship projects may well turn out to prove that the best way to deal with these issues would be by allowing more space for integrated decision-making at a European level, in which case both the European Union and ESA will be indispensable players – or at the very least indispensable vehicles for the sovereign member states to ensure their individual interests would not unduly obstruct the overarching European interests in security, space, and in space security.

Chinese Intentions in Space: A Historical Perspective for Future Cooperation

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The United States (U.S.) is opening a new dialogue with China on cooperation in space that includes human space flight. The announcement appeared in the Joint Statement issued by U.S. President Obama and Chinese President Hu in Beijing, China on 17 November 2009. The two leaders also agreed "the two countries have common interests in promoting the peaceful use of outer space and agree to take steps to enhance security in outer space."[1] These are significant shifts in U.S. civilian and military space policy. The U.S. ended cooperation in space with China more than a decade ago[2] and consistently refused to discuss Chinese concerns about security in outer space.

In January 1999, a Select Committee of the U.S. House of Representatives chaired by Representative Christopher Cox issued its Report on U.S. National Security and Military/Commercial Concerns with the People's Republic of China (PRC). The report claimed "The PRC (China) has stolen or otherwise illegally obtained U.S. missile and space technology that improves the PRC's military and intelligence capabilities."[3] The Cox Commission concluded many of the alleged illegal transfers of American space technology occurred in the wake of "the Reagan administration's decision to permit satellite launches in the PRC" and that the factors that led to the Reagan decision, which was left unaltered by subsequent administrations, were "no longer applicable."[4] The U.S. Congress and the Executive branch responded by enacting highly restrictive export control laws and regulations that ended U.S. - China cooperation in commercial satellite launches and prevented cooperation in civilian space exploration.[5]

Just a few months later, in March 1999, the Chinese government refused to support a program of work at the United Nations (UN) Conference on Disarmament (CD) because it did not include negotiations on the Prevention of an Arms Race in Outer Space (PAROS).[6] The United States repeatedly opposed opening such a discussion, insisting on many occasions during the last ten years "there is no arms race in outer space" and therefore no need to

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[1]The White House Office of the Press Secretary, "U.S.-China Joint Statement," 17 November 2009, Beijing, China, http://www.whitehouse.gov/the-press-office/us-china-joint-statement (accessed November2009).

[2]Primarily consisting of U.S. government permission to allow commercial space activities, such as satellite launch services, consulting and satellite and component purchases.

[3]Select Committee of the U.S. House of Representatives, *Report on U.S. National Security and Military/Commercial Concerns with the People's Republic of China Volume III*, U.S. Government Printing Office, Washington, D.C., 1999. p. xii, http://www.access.gpo.gov/congress/house/hr105851 (accessed January 2010).

[4]Ibid. p. xxiv.

[5]Joan Johnson-Freese, "Becoming Chinese: Or, How U.S. Satellite Export Policy Threatens National Security," *Space Times*, January/February 2001. Also, see Joan Johnson-Freese, "Alice in Licenseland: U.S. Satellite Export Controls Since 1990," *Space Policy* 16: 3 (2000).

[6]Statement by H. E. Mr. Li Changhe, Ambassador for Disarmament Affairs of the People's Republic of China, Plenary Meeting of the Conference on Disarmament, 27 May 1999, Geneva, Switzerland, http://www.nti.org/db/china/engdocs/lichangh_0599.htm (accessed December 2009).

discuss space security issues in the CD.[7] In June 2009, the U.S. and China agreed to form an ad-hoc committee in the CD to discuss PAROS. The change in the U.S. position on space in the CD is consistent with the agreement in the U.S. - China Joint Statement to "take steps" on space security.

These shifts in U.S. civilian and military space policy towards China are supported by the head of the U.S. Strategic Command, General Kevin Chilton. Just before President Obama's trip to China, the general told reporters that China was "on a fast track to improving capabilities," that space was "a competitive domain" and that the United States needed "a forum that provides an open dialogue between our nations."[8] General Chilton hopes the new dialogue with China will help the United States "understand exactly what China's intentions are."[9] The chief coordinator of U.S. military activities in space admitted "where they are heading is one of the things that a lot of people would like to understand better."[10]

General Chilton's open-minded approach to Chinese intentions is at odds with many U.S. analysts of China's space programs, who claim to know that Chinese investments in space, including the large sums spent on their human space flight program, are guided by military objectives. The head of U.S. Strategic Command is likely aware of the limited value of many existing U.S. assessments of Chinese intentions in space, which often lack credibility because they are based on questionable information from a small set of poorly evaluated Chinese sources.[11] The unwarranted concern generated by U.S. analysts over the comments of Chinese General Xu Qiliang on 1 November 2009 is a good example. Xu was discussing general trends in the development of military space technology in the context of comments on the 60th anniversary of the People's Liberation Army Air Force (PLAF). American press accounts, took highly edited fragments of Xu's full remarks out of context, making it appear the head of the Chinese Air Force said war in space was inevitable, which he did not.[12]

The new willingness to talk about cooperation in space is a welcome sign that both the U.S. and China recognize the undesirable consequences of maintaining the post-Cox Commission status-quo. If the bilateral dialogue on space is to succeed, both sides need to be prepared to manage the inevitable

[7]The most notable among these was the statement of the Delegation of the United States of America to the Conference on Disarmament on 13 June 2006, which states: "The Cold War is over, Mr. President, and there is no arms race in outer space. Thus there is no – repeat, no – problem in outer space for arms control to solve." The statement was delivered by John Mohanco, then the Deputy Director of the U.S. State Department's Office of Multilateral Nuclear and Security Affairs, http://www.reachingcriticalwill.org/political/cd/speeches06/13JuneUS.pdf (accessed December 2009).

[8]Phil Stewart, "U.S. Eyes Intent of China's Space Programs," *Reuters* 3 November 2009, http://www.reuters.com/article/scienceNews/idUSTRE5A25XG20091103 (accessed December 2009).

[9]Ibid.

[10]Ibid.

[11]Gregory Kulacki, "Anti-Satellite (ASAT) Technology in Chinese Open-Source Publications," Union of Concerned Scientists, Cambridge, Massachusetts, 9 June 2009, http://www.ucsusa.org/nuclear_weapons_and_global_security/international_information/us_china_relations/anti-satellite-asat.html (accessed December 2009).

[12]Analysts are made to appear to sanction the inaccurate interpretation that Xu's remarks exposed hitherto unpublicized Chinese plans for space warfare. See Colin Clark, "China Declares Space War Inevitable," http://www.dodbuzz.com/2009 /11/04/china -declares-space-war-inevitable (accessed December 2009). The original story clearly indicates Xu was referring to longstanding public Chinese discussions of trends in the militarization of outer space, not plans for space war or space weaponization. See "China's PLA Eyes Future in Space, Air: Air Force Commander," *Xinhua General News Service*, Beijing, China, 1 November 2009, http://eng.mod.gov.cn/TopNews/2009-11/02/content_4099975.htm (accessed December 2009). An extended Chinese language account of the full press conference from which the quotes in the prior source are derived is available at http://news.mod.gov.cn/headlines/2009-11/01/content_4099571.htm.

difficulties and frustrations of continued miscommunication and misunderstanding. For example, the United States and China began a similar dialogue on nuclear weapons nearly twenty years ago, but the participants still argue over the meaning of basic concepts, like deterrence.[13] China's nuclear weapons experts have an institutionalized aversion to the use of the Chinese word for deterrence *"weishe."* Elder Chinese leaders do not want them to use deterrence to describe the purpose of Chinese nuclear weapons because they associate the concept with the "nuclear blackmail" they believe China experienced at the hands of the Americans in the 1950s.[14] Today, younger Chinese analysts are beginning to use the word "deterrence" the same way their American counterparts do. Ironically, this accommodation to the American nuclear vernacular is producing more confusion. Some American analysts, mistakenly according to the Chinese, are interpreting changes in their use of terminology as a sign China is changing its nuclear posture.[15]

The American side should prepare for the upcoming dialogue with China on space by learning more about the history of the Chinese space program. Familiarity with the choices China made in the past, as well as how and why those choices were made, should help the American participants be more effective in meeting whatever objectives they set for the talks. The best way to determine where China might be heading is to understand more about where they have been.

The 1980s: The Formative Decade for Contemporary Chinese Space Policy

China's contemporary space capabilities, including the anti-satellite (ASAT) interceptor tested in January 2007 and their human space flight program, were made possible by a 1986 leadership decision to make an initial 10 billion Chinese Yuan (or Renminbi, RMB) investment in seven key areas of advanced technology, including aerospace.[16] This

[13]The Committee on the U.S. - Chinese Glossary of Nuclear Security Terms, composed of members of the U.S. National Academy of Science Committee on International Security and Arms Control (CISAC) Policy and the Chinese Scientists Group on Arms Control (CSGAC) negotiated for months over the inclusion of the term "limited deterrence" in their English-Chinese, Chinese-English Nuclear Security Glossary. The aim of the glossary is to "reduce the likelihood of misunderstanding, and to remove barriers to progress in exchanges and diplomatic, cooperative and other activities where unambiguous understanding is essential." CISAC and CSGAC have been meeting for almost twenty years. In the end, the two sides agreed to disagree, saying it was "a term used by some scholars to describe a form of deterrence. However, there is no consensus on the definition." This may seem a small matter, but some of the scholars they refer to in the definition argue that China is in the process of changing its nuclear posture from a "minimal" to a "limited" deterrent. This change could have grave implications for U.S. perceptions of Chinese intentions regarding the alert status and possible use of their nuclear weapons. Committee on the U.S. - Chinese Glossary of Nuclear Security Terms, National Research Council, "English-Chinese, Chinese-English Nuclear Security Glossary," The National Academies Press, Washington, D.C., 2008, http://books.nap.edu/catalog.php?record_id=12186 (accessed January 2010).

[14]This was the unanimous response from a panel of eight leading Chinese experts on nuclear strategy: Duan Zhanyuan, Second Artillery of the People's Liberation Army; Fan Jishe, China Academy of Social Sciences; Guo Xiaobing, China Institute of Contemporary International Relations; Hu Yumin, China Institute of International and Strategic Studies; Li Bin, Tsinghua University; Sun Xiangli, China Academy of Engineering Physics; Teng Jianqun, China Institute of Intemational Studies; and Yang Mingjie, China Institute of Contemporary International Relations. These experts were responding to a question on the Chinese aversion to the term "deterrence" from James Acton at a workshop sponsored by the Carnegie Endowment for International Peace and Tsinghua University held at Tsinghua University.

[15]A description of the ongoing debate among scholars can be found in Stephanie Legge, "Going Beyond the Stir: The Strategic Realities of China's No-First-Use Policy," *NTI Issue Brief*, December, 2005, http://www.nti.org/e_research/e3_70.html (accessed December 2009). Legge notes the origins of the linguistic roots of the suspected Chinese posture change in Alastair Iain Johnson, "China's New Old Thinking: The Concept of Limited Deterrence," *International Security* 20: 3 (1995-1996).

[16]Gregory Kulacki and Jeffrey Lewis, "A Place for One's Mat," American Academy of Arts and Sciences, Cambridge,

decision was a direct result of a personal appeal to Deng Xiaoping by Chinese scientists who were closely associated with China's nuclear weapons and ballistic missile programs.[17] That appeal was contained in a letter written in response to U.S. President Ronald Reagan's 23 March 1983 speech announcing the Strategic Defense Initiative (SDI).[18]

Influential Chinese defense community scientists were not writing to Deng because of a concern about the possibility of a future military conflict with the United States. The contents of their letter and the state of U.S. - China relations at the time it was written make this clear. The United States and China were cooperating in efforts to contain the Soviet Union, and the United States was providing intelligence, technology and training to the Chinese military. President Reagan received a warm welcome in what he described as the "so-called Communist China" during his visit in April 1984. Reagan proclaimed, "My visit to China has convinced me that our future is bright," and "America is on the edge of a new era of peace, prosperity and commerce."[19] While the two nations were not allies, U.S. and Chinese mutual threat perceptions were low. The year the letter was sent to Deng Xiaoping *Time* magazine made him their "Man of the Year." *Time* noted "his continuing reform of China and Marxism holds more promise for changing the course of history than anything else that occurred during 1985."[20]

The Chinese scientists who persuaded Deng Xiaoping to commit a large block of the nation's limited technical and fiscal resources to an ambitious space program believed that SDI was "not just a military program, but a far-reaching political striving to preserve American superiority."[21] The military implications of SDI were not the "real objective" behind a program they saw as an effort to "push forward new advanced technologies and national economic development."[22] The Chinese leadership, attentive to the concerns of their scientific advisers, wanted to ensure China kept pace in the international competition for technological and economic power. Military space capability was a secondary concern. This was reflected in the "Outline for National High Technology Planning" that codified the scientists concerns into national policy.[23] The

Massachusetts, 2009, pp.23-24, http://www.amacad.org/publications/spaceChina.aspx (accessed December 2009).

[17]The scientists were Wang Daheng, Chen Fangyun, Wang Ganchang and Yang Jiachi. An excellent English language summary of their contributions to China's nuclear and ballistic missile programs is contained in Evan A. Feigenbaum, *China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age* (Stanford University Press, 2003): 154–157.

[18]Xiaohua Fan, *The Inside Story of Chinese Space Policy-Making* (China Literature and History Publishing House, 2005): 262 - 269.

[19]Robert A. Jemian, Laurence I. Barrett and Evan Thomas,"An Opening to the Middile Kingdon," *Time* 14 May 1984, http://www.time.com/time/magazine/article/0,9171,955255, 00.html (accessed November 2009).

[20]George J. Church, "Deng Xiaoping," *Time* 6 January 1986, http://www.time.com/time/subscriber/personoftheyear/archive/stories/1985.html (accessed November 2009). It was the second time Deng received high praise from *Time*, which named him "Man-of-the-Year" in 1978 for "leading one-quarter of mankind quickstep out of dogmatic isolation into the late 20th Century and the life of the rest of the planet." From the *Time* archive, "Person of the Year," *Time* 1 January1979, http://www.time.com/time/subscriber/personoftheyear /archive/stories/1978.html (accessed December 2009).

[21]Xiaohua Fan, *The Inside Story of Chinese Space Policy-Making* (China Literature and History Publishing House, 2005): 262-269. Two of the four authors of the letter detail their political, economic and technological motivations for investments in space in an article entitled: "The Science of Technology and Our National Aerospace Technology Development," *Journal of the Chinese Academy of Science* 4 (1986), shortly after they transmitted their letter to Deng Xiaoping. The article can be found in Yang Jiachi, *The Selected Works of Yang Jiachi* (China Astronautic Publishing House, 2006): 102-109.

[22]Ibid.

[23]Ibid.

Outline placed a priority on civilian and dual-use applications: a priority that continues to guide Chinese high technology investments, including aerospace investments, according to language in the current Chinese national plan.[24]

During Reagan's visit, Deng expressed frustration that the U.S. was unwilling to provide China with access to space technology.[25] Six year's earlier, U.S. President Carter's National Security Advisor, Zbigniew Brzezinski, brought what he described as "the most high powered science/technology delegation ever sent by the United States to a foreign country" when he visited China in 1978 for negotiations leading to the establishment of diplomatic relations.[26] NASA Administrator at that time, Robert Frosch, was a member of that delegation. Deng Xiaoping took the occasion to ask the United States for help developing China's first communication satellite. Their own effort had stalled and Deng wanted to jump start a long distance education effort designed to address the catastrophic damage to Chinese secondary and higher education caused by the Cultural Revolution of 1966-1976.[27]

The Carter administration was willing to sell China a satellite, but China wanted help overcoming the specific technical difficulties inhibiting progress on their existing communications satellite program. It had been a top Chinese national technology policy priority since September of 1977.[28] The willingness of the Carter administration to provide technological assistance to China was encouraging and the immediate need pressing, so Deng took the extraordinary step of making a direct personal appeal to the United States against the wishes of his scientific advisers. They wanted to do it on their own. Fortunately for them, the negotiations broke down. Afterward, Deng and China's aerospace leaders came to believe that China could not rely on the U.S. for meaningful assistance in developing their own space technology. They went ahead with the communication satellite on their own. There were repeated setbacks and delays, but these proved to be invaluable learning experiences.[29] China eventually succeeded in placing their first communications satellite into space on 16 April 1984, ten days before Reagan arrived in China.[30] Deng may have been expressing frustration when he chided Reagan for not providing more access to American space technology, but he may also have been trying to let him know China could succeed without it.

China's disappointment in American reluctance to share advanced space technology has a historical precedent in the Soviet Union's hesitant assistance to China's nuclear

[24]An English Language copy of the complete document is available on-line at http://www.cstec.org/uploads/files/National%20Outline%20for%20Medium%20and%20Long%20Term%20S&T%20Development.doc (accessed December 2009).

[25]Jeff Gerth and Eric Schmidt, "The Technology Trade: A Special Report; Chinese Said to Reap Gains In U.S. Export Policy Shift," *New York Times* 19 October 1998.

[26]Richard Masden, *China and the American Dream: A Moral Inquiry* (University of California Press, 1995): 134.

[27]Xiaohua Fan,. *The Inside Story of Chinese Space Policy-Making* (China Literature and History Publishing House, 2005): 199-201.

[28]Chinese General Zhang Aiping, the Director of the Committee on Science, Technology for National Defense (CSTND) first expressed his intention to make it a priority during a meeting of the Chinese Academy of Space Technology (CAST) in June 1975. Jisheng Li, *Far Road to Heaven: Record of Rocket and Satellite Launches* (Central Party School of the Chinese Communist Party Publishing House, 2005): 151.

[29]Carter's NASA Administrator Robert Frosch felt that the lesser risk was in helping China with their own communications satellite, since that would probably mean they learned less than if they did it themselves. Moreover, in his view there were no great secrets in the comsat (commercial satellite) business that cooperation would risk compromising. Personal communication with the author.

[30]Xiaohua Fan,. *The Inside Story of Chinese Space Policy-Making* (China Literature and History Publishing House, 2005): 224-232.

and ballistic missile programs– assistance abruptly canceled shortly after it began. Chinese leaders call attention to this precedent when they compare the human spaceflight program to their earlier effort to develop nuclear weapons and ballistic missiles.[31] Although in practice human spaceflight has shown little military value, the common denominator between the two programs (nuclear weapons/ballistic missiles and spaceflight) is that in both instances the Chinese were forced to master the technologies on their own, or at least without substantial foreign assistance. The comparison is meant to be an object lesson for the Chinese in the continuing importance of indigenous technological development, even in this era of globalization and interdependence. This understanding of the importance the current leadership attaches to their space program is consistent with the concerns expressed in the past by the letter-writing Chinese scientists who got it started. Those scientists understood how technologically deficient China was in comparison to the world's most technologically advanced nation, the United States., which they imagined was about to invest hundreds of billions of dollars in a new generation of space-related technologies.

At the same time, China made a diplomatic push for international restrictions on the military use of space technology. In March 1985, Chinese Ambassador Hu Xiaodi delivered China's first official position paper on the peaceful use of outer space to the CD. It stated "China fully subscribes to the objective of the non-militarization of outer space and the exclusive use of outer space for peaceful purposes." Non-militarization was understood to mean "both space weapons with actual lethal or destructive power and military satellites of all types from limited and prohibited." China was willing to postpone discussions on a ban on all military uses in lieu of an immediate effort to ban the "development, testing, production, deployment and use of any space weapons" including "all devices or installations either space, land, sea, or atmosphere-based, which are designed to attack or damage spacecraft in outer space, or disrupt their normal functioning or change their orbits."[32]

Had the United States, China and the other members of the CD negotiated such a prohibition, the research and development (R&D) effort that produced the ASAT interceptor China tested in January of 2007, and other suspected Chinese counter space technologies, would have been legally proscribed. In the absence of an agreement, Chinese concerns about ASAT weapons gradually evolved from observations and analysis of foreign ASAT systems to

[31]Many American observers see the connection in military terms and describe the Chinese human spaceflight program as a "military run" program. One example, among scores of others, was an editorial published in The *Dallas Morning News* shortly after China put their first person in space. The editorial was accompanied by a picture of military officers surrounding the Shenzhou V space capsule. Standing at the front of the capsule were Chinese astronaut Colonel Yang Liwei and Chinese President Jiang Zemin, both dressed in their military uniforms. The editorial notes: "It is important to observe that Beijing's space program is not run by the Chinese equivalent of the National Aeronautics and Space Administration, but by the People's Liberation Army. Following the taikonaut's return to Earth, the countr's science and technology minister called the event a "glorious achievement" as significant as China's explosion of its first atomic and hydrogen bombs. The comparison is telling." See "Red Star Rising: Space Venture Makes China a True Competitor," *Dallas Morning News* 17 October 2003. A similar assessment of the military character of China's human spaceflight program appeared on the eve of U.S. President Obama's visit to China: See Gordon Chang, "The Space Race Begins. Should the U.S. and China Cooperate," Forbes.com, http://www.forbes.com/2009 /11/05/space-arms-race-china-united-states-opinions-columnists-gordon-g-chang.html (accessed December 2009).

[32]See China's Basic Position on the Prevention of an Arms Race in Outer Space Conference on Disarmament, CD/579, 19 March 1985 in Jeffrey Lewis, *The Minimum Means of Reprisal: China's search for Security in a Nuclear Age* (The MIT Press, 2007): 209-210.

diplomatic efforts to restrain them, and eventually to R&D programs of their own.

China had been watching the development of U.S. and Soviet ASAT systems since the early 1970s.[33] By the end of the decade, they noted then that while the Soviet Union seemed to be farther ahead in ASAT technology, U.S. R&D on missile defense had also produced capabilities that could be used to "track, approach, discriminate and destroy" satellites.[34] These early observations led China's defense aerospace experts to anticipate, several years before Reagan's SDI speech, "technological breakthroughs… in infrared sensing, adaptive optics, lasers, precision guidance, micro-computing, aerospace, particle beam and other weapons that will lead to a fundamental change in strategic defenses."[35] China's scientists also predicted these technological changes would "undermine arms control efforts between the United States and Soviet Union that restrict the development of missile defense and ASAT systems."[36] This early connection between missile defense and ASAT technology is a persistent theme in Chinese discussions about the two technologies that continues today. The ASAT interceptor China tested in 2007 uses the same basic technologies as those used in U.S. missile defense interceptors. China appears to have begun the R&D program that produced their ASAT interceptor in the mid-1980s.[37]

By the end of the1980s, China had committed to a long-term R&D effort that would eventually lead to the acquisition of the civilian and military space capabilities they are bringing on-line today. China expressed "strong interest" in international negotiations to control the military use of space technology, including all types of ASAT weapons, but also set about developing the same military space capabilities they sought to have controlled.[38] When China made these commitments, neither the technologies nor the negotiations to control them appear to have been specifically intended to resolve concerns about a possible military conflict with United States. For understandable reasons, many Americans do not see it that way today.

Historical Perspective on American Perceptions of Chinese Intentions in Space

American perceptions of Chinese intentions in space have a history of their own that is disconnected from the history of China's space programs. When Ronald Reagan agreed to allow China to launch U.S. commercial communications satellites in September of 1988, U.S. threat perceptions of China were even lower than they had been when he visited China four years earlier. *Time* magazine made fun of a Chinese military "whose power and prestige have been diminished by Chinese leaders determined to de-emphasize military

[33]Gregory Kulacki, "Anti-Satellite (ASAT) Technology in Chinese Open-Source Publications," Union of Concerned Scientists, 9 June 2009, http://www.ucsusa.org/nuclear_weapons_and_global_security/international_information/us_china_relations/anti-satellite-asat.html (accessed December 2009).

[34]Ji Shipan and Li Minghu, "Kongjian Zhanzheng yu Jiguang Wuqi: Dandao Daodan Fangyu de Fazhan Qushi" (Space Warfare and Laser Weapons: Trends in the Development of Missile Defense)," *Xiandai Fangyu Jishu* (Modern Defense Technology) 3 (1979): 1-31.

[35]Ibid.

[36]Ibid.

[37]Gregory Kulacki and Jeffrey G. Lewis, "Understanding China's Antisatellite Test," *The Nonproliferation Review* 15: 2 (2008).

[38]The Chinese wanted to ban all military uses of space. This was a much stronger arms control measure than what China and Russia are currently proposing. Links to the UN documents on the current Chinese-Russian proposal can be found on-line at http://www.reachingcriticalwill.org/legal/paros/osdocuments.html.

might in favor of agricultural and industrial reform."[39] The U.S. security concern at the time was Chinese missile sales. Reagan administration officials, including Defense Secretary Frank Carlucci, were "fully satisfied" their discussions with Deng Xiaoping had resolved those concerns. Sanctions imposed in the wake of missile sales to Iran were lifted, and the U.S. continued to provide assistance and equipment to the Chinese military.[40]

Less than a year later American threat perceptions changed dramatically after the Chinese military used lethal force to repress anti-government demonstrations throughout China in June of 1989. What is known in the United States as the "Tiananmen Massacre" was a massive nationwide military campaign to put down protests in major cities throughout China. Televised images of the violence in Beijing on the evening of June 3 and the early morning of June 4 horrified the American public. CNN reporter Mike Chinoy, who was responsible for getting those images out of China, later called it the defining moment in American perceptions of China.[41]

The best way to determine where China may be heading is to understand more about where they have been.

Chinese leader Deng Xiaoping was instantly transformed from *Time* magazine's reform-minded "Man-of-the-Year" into the "Butcher of Beijing." In the next few years, the fall of the Berlin Wall and the collapse of the Soviet Union left China as the only major nation ruled by a communist party. Over the next decade, Americans developed "a picture of China solely as a country of brutal dictators, beleaguered dissidents and corrupt deal-makers intent on using its economic clout and its military might to dominate its neighbors and challenge the United States for regional supremacy."[42]

Changing American perceptions of China did not bring a halt to U.S. commercial satellite launches from China until 1998. Initially this may have been due to the temporary shortage of U.S. launch capacity created by the loss of the Space Shuttle Challenger in 1986. Later in the next decade, the Clinton administration continued to permit the launches because it believed the policy encouraged China to keep the promise not to sell missile technology it made just before President Reagan authorized them.[43] Republican opponents on Congress, however, began to define Chinese space programs as a grave threat to U.S. national security and charged President Clinton "sold to a Chinese Military Intelligence front the technology that defense experts argued would give Beijing the capacity to blind our spy satellites and launch a sneak attack."[44]

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[39]Michael S. Serrill, Sandra Burton and Jaime A. FlorCruz, "China Sprucing Up the Troops." *Time* 11 July 1988, http://www.time.com/time/magazine/article/0,9171,967873,00.html (accessed 29 November 2009).

[40]See Don Oberdorfer, "U.S. and China Mark 10 Years of Ties," *New York Times* 16 December 1988; "China Assures Carlucci On Mideast Arms Sales; Peking Seen Curbing Missile Supply Role," *New York Times* 8 September 1988; and "U.S. to Lift Sanctions Against Beijing; Chinese Agree to Accept Peace Corps," *New York Times*, 10 March 1988.

[41]Mike Chinoy, "Speech Before the Los Angeles World Affairs Council," 18 April 1997, http://www.lawac.org/speech/pre%20sept%2004%20speeches/chinoy.html (accessed November 2009).

[42]Ibid.

[43]Jeff Gerth and David Sanger, "How Chinese Won Rights to Launch Satellites for U.S," *New York Times* 17 May 1998, http://www.nytimes.com/1998/05/17/us/how-chinese-won-rights-to-launch-satellites-for-us.html?scp=2&sq=Rubin&st=nyt&pagewanted=all (accessed November 2009).

[44]William Safire, "Essay; U.S. Security for Sale," *New York Times* 18 May 1998, http://www.nytimes.com/1998/05/18/opinion/essay-us-security-for-sale.html?scp=5&sq=China&st=nyt (accessed November 2009).

This claim was made in May 1998, when China had 14 satellites in orbit including ten communication satellites, mostly of foreign manufacture, that were used primarily for television, phone and fax services. China also had one weather satellite and one scientific satellite.[45] Also, China's space investments, and the Chinese military's space work force, were developing the human spaceflight program, which had yet to launch the first experimental capsule and would not put an astronaut into space for another five years. Even though China had mastered the use of recoverable reconnaissance satellites and was developing experimental positioning satellites,[46] they had no demonstrated counter space capabilities. Yet the "Space Pearl Harbor" narrative quickly emerged as the consensus interpretation of Chinese intentions among U.S. analysts. In January 2001, the supposed Chinese threat was highlighted in the Report of the Commission to Assess U.S. National Security Space Management and Organization– a Congressional commission chaired by Donald Rumsfeld until President-elect George W. Bush nominated him to serve as Secretary of Defense. The Space Commission report claimed: "China's military is developing methods and strategies for defeating the U.S. military in a high-tech and space-based future war."[47]

Prominent American analysts of China's military modernization program believed these methods and strategies were inspired by concerns within the Chinese military about the American use of space technology in the 1991 Gulf War.[48] One of the most frequently was Mark Stokes, whose 1999 U.S. Army War College publication on Chinese strategic modernization was cited frequently by American analysts. Stokes called the supposed Chinese preoccupation with military space technology "China's Gulf War Syndrome." He described it "a rude awakening for the

[45]The communications satellites were: Apstar 1, 3 and 4 (APT Satellite); Asiasat 1, 2, 3S, and Asiasat G (Asia Satellite Telecom); Dongfanghong 3R (China Telecom Satellite Broadcasting); Sinosat-1 (Sino Satellite Communications); and the Chinastar-1 (Zhongwei 1) built by Lockheed, owned and operated by China Satellite Communications. The weather satellite was the Feng Yun 2B (China National Space Administration), and the scientific sateliite was the Shijian 4 (CAST). See *Aviation Week & Space Technology* 148: 2 (1998): 141-147; and *Aviation Week & Space Technology* 154: 3 (2001): 167-176. Also, see the Union of Concerned Scientist Satellite Database, which is available at http://www.ucsusa.org/nuclear_weapons_and_global_security/space_weapons/technical_issues/ucs-satellite-database.html (accessed January 2010).

[46]This includes the FSW recoverable satellite program which was used for a variety of experiments as well as photo reconnaissance, the Ziyuan imaging satellites developed in cooperation with Brazil and the Beidou positioning satellites.

[47]*Report of the Commission to Assess U.S. National Security Space Management and Organization*, 11 January 2001, p. xiv and p. 22, http://www.fas.org/spp/military/commission/report.htm (accessed January 2010).

[48]The claim appears in many American analyses. Some of the more prominent are James A. Lewis, *China as a Military Space Competitor*, Center for Strategic and International Studies, August 2004, http://www.csis.org/media/csis/pubs/040801_china_space_competitor.pdf (accessed January2010); Phillip Saunders, Jing-dong Yuan, Stephanie Lieggi and Angela Deters, *China's Space Capabilities and the Strategic Logic of Anti-Satellite Weapons*, Center for Non-proliferation Studies, July 2002, http://cns.miis.edu/stories/020722.htm (accessed January 2010); David O. Meteyer, *The Art of Peace: Dissuading China from Developing Counter-Space Weapons*, INSS Occasional Paper 60, USAF Institute for National Security Studies, USAF Academy, Colorado, August 2005; Mark A. Stokes, "Space, Theater Missiles, and Electronic Warfare: Emerging Force Multiplier for the PLA Aerospace Campaign, "presented at Chinese Military Affairs: A Conference on the State of the Field, 26-27 October 2000, Fort McNair, Washington DC, Aerospace I Panel; and Mary C. FitzGerald, "China's Evolving Military Juggernaut," in *China's New Great Leap Forward: High Technology and Military Power in the Next Half-Century*, Hudson Institute, 2005. The assertion was also a focal point of a review of China's space program presented by Dean Cheng of the Center for Naval Analysis (CNA) at the Henry L. Stimson Center on 3 March 2005. A somewhat less definitive agreement with this consensus appears in Joan Johnson-Freese, "Strategic Communication with China: What Message about Space?" *China Security* 2 (2006): 51, http://www.wsichina.org/attach/china_security2.pdf#search='Strategic%20Communication%20with%20China:%20Space (accessed January 2010).

CMC [China's Central Military Commission] and the military-industrial complex."[49]

However, the history of China's space program reviewed earlier in this paper demonstrates that Stokes was mistaken. There is ample documentary evidence that the defense scientists who ran China's "military industrial complex" anticipated the military applications of space technology the U.S. demonstrated in the Gulf War more than a decade before that war started.[50] They petitioned the Chinese government for the funding to develop their own military space capabilities five years before it started. And at the time these senior figures in China's "military industrial complex" wrote their petition to the most influential military decision-maker in the CMC, Deng Xiaoping, the U.S. was assisting the development of Chinese military capabilities. Mutual threat perceptions were low and the probability of a U.S. - China military conflict was remote.

The mistake Stokes makes in interpreting Chinese thinking about space is revealing, and it is one that is repeated by American analysts who cite Chinese publications without considering their historical, institutional and social context. The claim that China was acquiring the capability to launch a "Space Pearl Harbor" is based on American interpretations of the selected quotations of Chinese military personalities culled from Chinese military publications and press interviews. The quotations used to demonstrate Chinese intent that appear in the Space Commission Report, in the Stokes' study and in many other U.S. analyses of China's space programs are not from the scientists who work in the aerospace community and advise the senior leadership of the Chinese "military-industrial complex." The quotations are from a very different set of Chinese authors writing for publications with a different purpose and a different audience.

The Gulf War was a global media phenomenon that carried the now iconic televised images of "smart bombs" to hundreds of million of Chinese viewers for whom television itself was advanced technology. In the wake of this media event, a new and very different group of Chinese authors began writing about military space technology for a new audience. The authors were not aerospace experts or strategists writing for Chinese leaders, but non-experts writing for average Chinese readers who were, like many others all over the world, rudely awakened by the images of modern warfare they saw on television. Their articles were part of a political campaign meant to reassure both soldiers and officers that the Chinese leadership was aware of the changing nature of modern military technology and would take steps to prepare the PLA to respond to these developments, but without saying in a detailed or authoritative way how it would respond.[51] American analysts were confusing Chinese military space policy with Chinese military propaganda. This confusion is still a problem today.

…China made a diplomatic push for international restrictions on the military use of space technology.

[49]Mark A. Stokes, *China's Strategic Modernization: Implications for the United States*, Strategic Studies Institute, U.S. Army War College, September 1999, p. 12.

[50]Gregory Kulacki, "Anti-Satellite (ASAT) Technology in Chinese Open-Source Publications," Union of Concerned Scientists, 9 June 2009, http://www.ucsusa.org/nuclear_weapons_and_global_security/international_information/us_china_relations/anti-satellite-asat.html (accessed December 2009). This study is based on over 1,500 source articles over a four-decade period.

[51]Ibid.

Lesson for Policy Makers: Let the Scientists Do the Talking

The dialogue on cooperation and the peaceful use of outer space President Obama and President Hu agreed to begin in their Joint Statement of November 17, 2009 will not last for long if both sides continue to be suspicious of the other's intentions. Before the dialogue begins in earnest, and before any agreement on cooperation is signed, both sides should take steps to correct past mistakes.

China had been watching the development of the U.S. and Soviet ASAT system since the early 1970s.

Chinese military propaganda on space may not be an indication of the intentions driving Chinese space policy, but it is a cause for concern. Repeated unsettling statements from military officers published in Chinese newspapers, magazines and journals have the same effect on U.S. policy-makers as the rhetoric from the U.S. Air Force about "space dominance" has on Chinese policymakers. Because Chinese leaders are unwilling to censure their military propagandists and American leaders cannot prevent U.S. space hawks from advocating visions of space dominance to Congress, policy-makers in both nations find it difficult to navigate the maze of heated rhetoric that drives their respective domestic debates over the merits of cooperation and negotiation.

Mutual reassurances of peaceful intentions issued regularly by the Chinese Foreign Ministry and the U.S. Department of State are routinely dismissed by both governments as the wishful thinking or disingenuous decorum of diplomats. In the United States, this perception was strongly reinforced by the Foreign Ministry's apparent lack of knowledge about the Chinese ASAT test in 2007, which some ministry functionaries originally dismissed as U.S. government slander.[52] The U.S. State Department enforcement of discriminatory U.S. legal restrictions on space cooperation with China is interpreted by many Chinese space scientists and engineers as a sign of persistent U.S. hostility towards China's efforts to join the international community of spacefaring nations.[53] This explains, in their view, why China is not treated on an equal basis with other less-developed Asian space programs, specifically those of Japan, India, Malaysia and South Korea, which all have cooperative relationships with NASA.

A look back at the record of Chinese decisions about space suggests that neither the PLA nor the Foreign Ministry has played a decisive role in the formation and direction of Chinese space policy. The limited historical materials available on Chinese space policy, from the decision to launch China's first satellite in the early days of the People's Republic to current Chinese plans to build their own space station, suggest that China's scientists guided Chinese space policy and convinced the Chinese political leadership to make the investments necessary to carry it out. Since this is the audience most likely to influence Chinese policymakers, a dialogue on cooperation and negotiations on space between U.S. and Chinese scientists is more likely to produce credible, productive and sustainable outcomes than a dialogue between military officers or diplomats. This is also what we have observed in the bilateral dialogue on nuclear weapons policy.

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[52]David E. Sanger and Joseph Kahn, "U.S. Tries to Interpret China's Silence Over Test," *New York Times* 22 January 2007.

[53]Interviews with Chinese space scientists and engineers conducted by author in China during the course of managing the China Project of the Union of Concerned Scientists between 2002 and 2009.

The publications of both militaries suggest they will have difficulty discussing space with the nation they believe to be their most likely adversary in a future military conflict. This is especially true of Chinese military publications because of their propaganda function. Military to military exchanges should begin with less controversial and less technologically complex problems. Adding space to that agenda is more likely than not to derail it. Diplomats will be inclined to see discussions on space as a vehicle for addressing other problems in the bilateral relationship, or to hold the discussions hostage to those problems if they become worse. The Clinton Administration's use of licensing procedures for sensitive space technology as a bargaining chip in a diplomatic effort to constrain Chinese missile sales is an instructive example of how this common diplomatic practice can go awry.

Conclusions

The history of American perceptions of China suggests that U.S. Congressional concerns about technology transfer will continue to be the most volatile and disruptive factor in U.S. - Chinese relations in space. The new dialogue on cooperation will be more likely to produce sustainable programs if it is conducted by individuals who can apply their scientific competencies to the problem of preventing the exchange of technologies the United States wants to protect and the Chinese want to acquire. Given the substantial gap in their respective national capabilities, many cooperative space endeavors, including human spaceflight, are likely to result in transfers of technology and expertise from the United States to China. Having scientists organize and conduct the discussions could help both parties identify and assess the relative costs and benefits of specific technology transfers early in the process. This could help avoid inappropriate expectations that could provoke Congressional opposition and undermine progress.

The history of China's space programs suggests that a U.S. - China dialogue on the peaceful uses of outer space is more likely to diminish mutual threat perceptions if scientists are at the table. Contemporary Chinese space policy is the product of a reaction to a U.S. plan for national missile defenses that Chinese scientists misread as a new Apollo program. The objective of their subsequent investments in space was to keep China from falling too far behind the pace of the global space technology leader, primarily because of the imagined economic consequences. If the science delegation Zbigniew Brezinski brought to China in 1978 had been charged with beginning a long-term scientific dialogue about space technology with their Chinese counterparts, it is possible the four anxious scientists who wrote to Deng Xiaoping would have been better informed about the politics of missile defense in the United States. They might have been able to see that SDI was more science fiction than science. They might have been able to predict that it would be immediately scaled back and eventually terminated.

Contemporary Chinese space policy is the product of a reaction to a U.S. plan for national missile defenses that Chinese scientists misread as a new Apollo program.

Had there been an on-going relationship between Chinese and American scientists in 1983, the history of China's space program, as well American perceptions of Chinese intentions in space, might have taken a radically different course in a healthier direction. In planning a new relationship with

China in space, this historical perspective suggests it would be in the best interest of the United States to consider the long term. The U.S. Congress and Executive should avoid making the dialogue on space a hostage of unrelated troublesome contentions in the bilateral relationship. They should use cooperation to build relationships between Chinese and American scientists and engineers who share an interest in the peaceful exploration and utilization of outer space. Once established, this cross-cultural community of space scientists and engineers could help reduce miscommunication and misunderstanding, especially during moments of crisis. Dialogue and cooperation may not produce a bilateral consensus on space security or space policy, but it can establish the reliable channels of communication to the Chinese aerospace community that General Chilton said the United States Government needs to better assess Chinese intentions in space.

Eisenhower Center Program Summaries

Space Situational Awareness Workshop

Summer Space Seminar

Asia, Space, and Strategy Workshop

National Space Forum

Transatlantic Space Cooperation Workshop

Eisenhower Center Program Summaries

Compiled by Eligar Sadeh

Space Situational Awareness Workshop

The goal of the Space Situational Awareness (SSA) Workshop is to bring together stakeholders interested in space situational awareness. This includes practitioners, users of data, representatives of industry and the military, the scientific community, international organizations, and the satellite-tracking community. These stakeholders discuss how needs are changing with SSA, what improvements in SSA capabilities can be achieved in the near-term to medium-term, and how various stakeholder communities might better interact to draw on each other's strengths.

The first workshop was held in 2006. It was co-sponsored by the World Security Institute's Center for Defense Information. A workshop report can be found at: http://www.cdi.org/PDFs/SSAConference_screen.pdf.

The second workshop was hosted by Inmarsat in 2007 and was co-sponsored by the World Security Institute's Center for Defense Information and the Secure World Foundation. A summary of the discussions that took place at the workshop held in 2007 was published in *Space and Defense* 2: 1 (2008).

The third workshop was held in 2009. This workshop was hosted by Intelsat and was co-sponsored by the World Security Institute's Center for Defense Information, the Secure World Foundation, and the George C. Marshall Institute. A summary of the 2009 workshop was published in *Space and Defense* 3: 2 (Winter 2009).

Areas of focus at the 2009 workshop included:

- National and international perspectives on SSA.
- Challenges of the space environment.
- Governance issues related to safe and responsible behavior in the space environment.
- State of SSA data sharing and the U.S. Commercial and Foreign Entities (CFE) Program.
- Concepts and capabilities for improved SSA data sharing.
- New opportunities in SSA.

Summer Space Seminar

The Eisenhower Center for Space and Defense Studies organizes the Summer Space Seminar to advance two principal goals: (1) to foster an education and interest in the interdisciplinary areas of space with the intent to develop space professionals; and (2) to develop a network of relations across civil, commercial, and military space professionals that will likely emerge from the participants. The first Summer Space Seminar was held in 2007.

This seminar exposes participants to the breadth and depth of space activities in the civil, commercial, and military areas. The relationships among these areas are explored across a number of perspectives – participants are exposed to the technology and science of space activities, followed by discussions on the political, legal, economic, and social aspects that influence the development and application of the various civil, commercial, and military space activities. The emphasis is on exchanges among the participants.

The Summer Space Seminar is directed toward bringing together a broad group of future space professionals to lay a foundation for a future space policy community in the military, civilian government, and private sectors. Participants in the program include students from the U.S. Air Force Academy, U.S. Naval Academy, U.S. Military Academy, George Washington University, and the Massachusetts Institute of Technology.

The seminar serves as a useful forum for further professional development given that several of the participants worked, or are currently employed, as space professionals. During the seminar, a great deal of learning and socialization takes place among the participants to meet the goal to inform and to build connections between future space professionals.

Asia, Space, and Strategy Workshop

In 2006, the Eisenhower Center for Space and Defense Studies held its first Asia, Space, and Strategy Workshop. This effort brought together U.S., Canadian, and European experts and policy makers from the military, civilian government, universities, think-tanks, and private sectors to discuss the implications of current and future Chinese space policy and to investigate areas of possible Sino-U.S. cooperation in space. Beginning in 2007, an invitation was extended to include Chinese academics in the discussions. Chinese participation has increased each year since then, with four attendees from China at the 2009 workshop in Vancouver, Canada.

The fourth workshop of 2009 was broadened to include other space powers in the Asia-Pacific region. For the first time in the workshop series, representatives from Australia and Japan took part. The workshop focused on common interests that spacefaring countries of the Pacific Basin have in the creation of a stable, predictable, and mutually beneficial environment in space. Workshop topics in 2009 ranged from: economic and political goals for the use of space; improving the safety and stability of the space environment; deterrence and defense concepts; and arms control and verification. A summary of the 2009 workshop was published in *Space and Defense* 3: 2 (Winter 2009).

National Space Forum

The Eisenhower Center for Space and Defense Studies organized and held its fourth annual National Space Forum from 1-2 September 2009 in Washington, DC. Panels at the Forum discussed security issues and space.

Specific topics of discussion included:

- An assessment of security challenges and threats in the space domain.
- The role of space deterrence in national policy.
- The potential for new approaches to arms control and verification.
- The improvement of international cooperation with allies in Asia and Europe.
- The role that China plays in space.
- The implementation of national space policy in the Obama Administration.

The Forum concluded with discussions on how to integrate often competing interests into a more cohesive policy and, more importantly, to improve the chances that such a policy can be effectively implemented. Forum panels represented a number of points of view from security, civil, and commercial space. Proceedings of the National Space Forum 2009 were published in *Space and Defense* 3: 2 (Winter 2009).

Transatlantic Space Cooperation Workshop

In 2008, the Eisenhower Center for Space and Defense Studies established the Transatlantic Space Cooperation Workshop. This workshop series brings together a community of scholars and experts from the United States and Europe, including the European Union (EU), European Space Agency (ESA), and NATO, to share lessons learned, debate, and network on joint priorities in civil, security, and commercial space.

The first workshop was held in Brussels, Belgium in June 2008. Participants in this workshop examined U.S., European, and EU security space priorities and considered NATO's space role. Discussions began with an opening panel where senior U.S., EU, and NATO officials briefed participants on current security space priorities before participants explored issues more in-depth. The goal of the workshop was to educate senior leadership from the U.S., EU, and NATO on philosophies and strategies for collective space security and deterrence in the 21st Century. The workshop was successful in initiating dialogue on harmonizing transatlantic security space strategies.

The second workshop was held in Berlin, Germany during September 2009. The 2009 workshop fostered dialogue regarding the potential for greater cooperation across the Atlantic to make the most efficient use of capabilities where possible across civil, security, and commercial space. A summary of the 2009 workshop was published in *Space and Defense* 3: 2 (Winter 2009).

Issues discussed at the 2009 workshop included:

- Developments over the past year in transatlantic space cooperation.
- Joint priorities in protection of critical space infrastructure.
- Transatlantic cooperation on Earth observations for security and stability.
- Future avenues for advancing transatlantic cooperation.

Notes for Contributors to *Space and Defense*

Space and Defense seeks contributions that further inquiry and intelligently inform space policy issues. Contributions are welcome from: academic scholars and policy analysts at think tanks and research institutes; senior management and policy officials from international and governmental agencies and departments relevant to space issues; military officers and operators in relevant units, commands, and in staff colleges and service academies; senior management and policy officials from major aerospace corporations relevant to space issues; and scientists and engineers interested or involved in space policy issues.

The journal welcomes submissions of scholarly, independent research articles and viewpoint essays. There is no standard length for articles, but 7,500 to 10,000 words, including notes and references, is a useful target for research articles, and viewpoint essays should be in the range of 2,500 to 5,000 words. The opinions, conclusions, and recommendations expressed or implied within *Space and Defense* are those of the contributors and do not reflect those of the Eisenhower Center for Space and Defense Studies, the Air Force Academy, the Air Force, the Department of Defense, or any other agency of the U.S. Government.

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Contributors are required to submit all articles electronically by e-mail attachment as a Microsoft word file (.doc or .docx format). Contributors should not submit PDF files. All manuscripts submitted to *Space and Defense* need to be double-spaced with margins of 1inch or 2.5 cm, and all pages, including those containing only diagrams and tables, should be numbered consecutively. It is the author's responsibility to ensure when copyrighted materials are included in a manuscript that the appropriate copyright permission is received by the copyright holder.

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Providing the manuscript meets editorial standards, i.e., relevant to aims and scope, analytical rigor, spelling, grammar, properly referenced, and suitable length, the academic editors will first undertake a review of the submission. If required, the author(s) will be invited to make any changes and corrections as a result of the review by the academic editors. For viewpoint essays, the process stops here and a publication decision is made. On the basis of the peer reviews for research articles, the academic editors will make a final decision for publication. If required, the author(s) will be required to make additional changes and corrections as a result of the external peer review.

Tables and Figures

All maps, diagrams, charts, and graphs should be referred to as figures and consecutively numbered and given appropriate captions. Captions for each figure should be submitted on the same page as the figure to avoid confusion. Tables should be kept to a minimum and contain only essential data. Each figure and table must be given an Arabic numeral, followed by a heading, and be referred to in the text. Figures and tables are not to be embedded in the text. Each table and figure should be clearly labeled. In the text, make sure and clearly explain all aspects of any figures or tables used.

Style

Authors are responsible for ensuring that their manuscripts conform to the style of *Space and Defense*. The editors will not undertake retyping of manuscripts before publication. Please follow the Chicago Manual of Style.

Listed below are some additional style and writing guides:

- Dates in the form: 1 January 2009.
- Headings (bold title case and centered).
- Subheadings (italic title case and centered).
- Acronyms/abbreviations should always be spelled out in full on first use in the text.
- The 24-hour clock is used for time, e.g., 0800, 1300, 1800.
- Use percent rather than % except in figures and tables.
- For numbers, spell out numbers less than 10.
- Make use of 21st style where appropriate.
- Keep capitalization to a minimum.
- Concise paragraphs and sentences are desirable.
- Avoid a paper that is just descriptive; rather engage in analytical rigor and assessment.
- Avoid policy recommendations in the analysis part of paper; leave this, if applicable, for a separate section at the end of the paper.
- Define all new terms used in paper.
- Avoid hyphenated words when possible.
- Avoid the use of passive voice when possible.

Footnotes

Footnotes need to be numbered consecutively with a raised numeral in the text. Please make use of the Insert-Preference-Footnote function of Word. Please do not use endnote style or scientific notation. Footnotes should be in full bibliographic style with first name, last name format for authors.