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2009 National Space Forum

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2009 National Space Forum

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Program Overview

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, improving international cooperation with allies in Asia and Europe, a discussion of China's role in space, and 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, improve the chances that such a policy can be effectively implemented. Forum panels represented a variety of points of view from the security, civil, and commercial space sectors. Each panelist presented opening remarks to identify key issues and concepts that were discussed among the group of panelists.

Threat Assessments and the Space Domain

This session focused on risks in relation to the space domain, and the issue of how government resources should be applied to address risks. The point was made that the focus on threat assessments should be on looking for the most probable risks – since 9/11 the focus has been to identify all possible risks, and this is problematic as resources are inadequate for this approach. What is missing is a political context for threat assessments. It is the job of the military to consider all threats – to think of worst-case scenarios and to explore how to counter threats. But in this calculation, how much threat can you afford? Given resource constraints, trade-offs are needed. How you prioritize the threats and mitigation options are key issues to consider. The prioritization of risks, threats, and mitigation options is complicated by a number of factors and trends indentified and discussed in this session.

What is missing is a political context for threat assessments.

First, current assessments suggest that there are not imminent threats to space capabilities. Will this change? Will there be challenges from the rise of China as a space power or the resurgence of Russia as one?

Second, China is not as dependent on space as the United States (U.S.). For example, China carries 10% to 20% of telecommunications by satellite compared to more than 80% for the U.S. military. This creates a vulnerability gap for the U.S. The key question in this regard is the extent to which the gap will, or will not, narrow? The U.S. has no concept of how this vulnerability will be overcome. U.S. global reach has implications – this makes the U.S. dependent on space assets, and space assets are integrated into training, operational processes, and warfighting for the U.S. military. At the same time, as China further develops and integrates space assets for its own military use and security, China will emerge as more vulnerable and the vulnerability gap will likely narrow.

Third, space technology is dual-use. The U.S. Global Positioning System (GPS) is a good example of dual-use space technology. Dual-use is very often based on context; in other words, dual-use exists when there is demand for such use. A political context for dual-use is missing; where do you draw the line on dual-use? For example, are Chinese commercial telecommunication satellites (comsats) for military use, and is China's human spaceflight program linked to ballistic missile development?

Fourth, there is the tendency to exaggerate the capabilities of the other side in the dynamic of threat assessments. The dynamic is reinforced through insecurity, misperception, and miscommunication. In fact, these dynamics characterize current U.S.-China space relations. Dialogue is essential to offset these issues, similar to the dialogue that existed during the Cold War between the U.S. and the Soviet Union that developed common understandings between the two powers.

…global proliferation of space technology makes the threat assessment calculation not just about the U.S. and China.

Fifth, the global proliferation of space technology makes the threat assessment calculation not just about the U.S. and China. For example, there is Iran and the Middle East as well as South America and Brazil as emergent space powers. Many countries spend money for commercial and security purposes, and space plays an increasing role in those pursuits. In many ways, there is a global space race with regional rivalries. India, for example, is thinking of kinetic energy Anti-Satellite (KE-ASAT) tests as a result of the Chinese ASAT test. Such a development would, in turn, spawn Pakistan to challenge India. Each space power has a different strategic outlook and orientation that must be considered in threat assessments.

Sixth, in relation to the issue of space technology, the International Traffic in Arms Regulations (ITAR) regime of the U.S. Government is an internal threat to the U.S. This is a result of the dysfunctional nature of export control policies and laws. ITAR is an example of "fear-based" security. The approach with ITAR and export controls of space technologies demonstrates a lack of strategic thinking related to space.

…strategic thinking is essential to address U.S. vulnerability due to a dependence on space assets.

Seventh, strategic thinking is essential to address U.S. vulnerability due to a dependence on space assets. There is no good implementation plan for space policy in the U.S. Plausible solution sets for the U.S. include: respond to, replace (Operationally Responsive Space), and mitigate (space control, space deterrence, counterspace); cooperation (rules of the road, multilateral engagement) and diplomacy backed-up by capability; and leadership based on shaping the governance environment with rules of the road, codes of conduct, KE-ASAT test ban practices and no KE-ASAT first use policy and declaration. Also, the U.S. does not adequately look beyond building, designing, and funding space assets. Structurally and organizationally the U.S. deals with space in the wrong way for optimal outcomes. The U.S. cannot afford to be confident in the continued use of space assets as it currently exists, and the U.S. will likely be surprised by the space capabilities of other space powers.

Lastly, deterrence is critical to think of as one key mitigation option. Space deterrence is not an issue of hard versus soft power, but one of a spectrum of power elements. In other words, deterrence must be placed within the context of strategic thinking. Yet to deter is hard, as different agendas and different interests among states and space powers complicates the threat assessment landscape.

Space Deterrence and National Policy

The opening remarks for this session began with a review of the Space Deterrence Study recently completed (August 2009) by the Eisenhower Center for Space and Defense Studies and published in *Space and Defense* 3: 1 (2009). This review was followed by brief discussion of peer reviews and commentaries of the Deterrence Study, also published in *Space and Defense* 3: 1 (2009).

Discussion

The U.S. should make smarter strategic decisions since we have the kind of space capabilities that enables us to make military decisions on a board strategic level. For the U.S., more than any other space power, it is essential that a stable and predictable space environment is maintained for the continued use of space-based information services to support strategic and tactical decisions. A doctrine to encourage space deterrence is the best way forward in this regard. A stable deterrent environment is possible when capability exists, when there is political will and the credibility to leverage capability for deterrent ends, and when strategic communications are effective for fostering a shared understanding of deterrence.

Despite the importance of space deterrence, the concept has not had sufficient attention.

Despite the importance of space deterrence, the concept has not had sufficient attention. A conflict in space, or one that affects space assets, is more harmful to the U.S. than to others given U.S. dependence on space assets. It is encouraging, nonetheless, that the Obama Administration specifically identified space as a key enabler and enhanced space capabilities as critical to solving major practical challenges now facing U.S. security – global security issues and concerns; economic stimulus and industrial base; environment and climate; and workforce and employment. This recognition by the Obama Administration shows the importance of space and why stability in space ought to be of the highest national priority.

There were a number of questions raised and issues discussed in this session in relation to space deterrence. To begin with, how do we ensure the maintenance of the global commons of space? For this end, we need to find a way to meaningfully collaborate to create a stable and predictable space environment.[1] Deterrence by international norm or entanglement can be one strategy for this end. Can you create an approach to space deterrence that is inclusive of all spacefaring entities? Can norms based on rules of the road for space accomplish this approach to deterrence? Concomitantly, if you decide to collaborate and share, what new risks emerge? On the other hand, what are the implications for the global commons of space if we choose not to collaborate in the space domain? By definition, have we created conflict and competitors in the space domain? Does that domain become a contested one?

[1]Panelists agreed that shared space situational awareness is a good way forward for space deterrence and to demonstrate global leadership for the U.S.

It was noted that strategic communications are missing from the deterrence equation as there is no fundamental shared understanding of deterrence. The Schreiver Wargames demonstrated that even within the United States Government and among allies there is not a shared understanding of deterrence. This is more problematic with adversaries. For example, how will we develop shared understandings with the Chinese? There is the need for clarity and exactitude of language to reach a shared understanding. This can be accomplished by dialogue with the Chinese on space issues.

…strategic communications are missing from the deterrence equation as there is no fundamental shared understanding of deterrence.

Panelists remarked that very few space powers have the motive and capability to attack U.S. space assets. The focus tends to be on China. As such, has Russia been overlooked in the dialogue on space deterrence and threat assessment? Russia is a re-emergent space power that has reconstituted space capabilities. This needs to be watched by the U.S., but there is no real trigger or flash point with Russia, like the Taiwan issue with China. Also, Russia collaborates with the U.S. in space. Of note as well, are other potential threats and challenges to U.S. space assets. Today, any state can buy their way into space capability through commercial space assets.

International Cooperation in Asia and Europe

The Obama Administration put forward a new focus on international cooperation that is more multilateral, where the U.S. listens to friends and allies, but where friends and allies are expected to bear their fair share of the burden. Panelists in this session identified four factors important to foster space cooperation: (1) cooperation must be credible in that there is political will and the proposed cooperation offers something of value to each partner; (2) the collaborative arrangements should demonstrate a cost (burden to be accomplished) and benefit (value) to each partner; (3) cooperation should build national capacity; and (4) cooperation should be based on open communications between the partners.

The focus of this session was on the issue of international space cooperation regarding Japan and South East Asia, and on space security cooperation between Europe and the U.S. Also, India and Australia were identified as important space powers in regard to space cooperation in Asia, given Australia's cooperation with the U.S. on the Wide-Ban Global Satellite Communications System (WGS) and the evolving Indian-U.S. strategic relationship.

Japan

The Japanese perspective on international space cooperation is framed by new approaches to space diplomacy in Japan and by the reform of Japanese space organizations. First, in regard to space diplomacy, the new Japanese Basic Law for Space Activities was established in May 2008 and enforced in August of the same year. According to the Basic Law, a new Minister and a new Strategic Headquarters were established for space activities. And in June of 2009, the Strategic Headquarters announced the new Japanese Basic Plan for Space Activities.

Since launching sounding rockets to support the International Geophysical Year (IGY) of 1957-1958, Japan has promoted international space cooperation. Actually, Japan realized various kinds of international space programs with the United States, Europe, Canada, Russia, and Asian- Pacific countries. However, Japanese space activities have not been linked with diplomatic policies. This is the case because Japan has had no coordination between its space and diplomatic policies. The new Basic Plan stipulates that Japan should advance both "space activities for diplomacy" and "diplomacy for space activities."

…Japan can promote human security in developing countries.

Space activities for diplomacy imply the use of space to accomplish diplomatic purposes. For example, Japan could take better advantage for this end with the International Space Station program, with the Asia-Pacific Disaster Management Support System through the Asia-Pacific Regional Space Agency Forum, and with the Asia-Pacific Space Cooperation Organization.[1]

[1]The Asia-Pacific Regional Space Agency Forum, under the initiative of Japan, is an agency-level forum to promote regional space utilization. The Asia-Pacific Space Cooperation Organization, under the initiative of China, is an intergovernmental organization to promote collaborative space programs. Although the two organizations are different, it was noted during this panel that there is the need for Japan to dialogue with China about compatibility between regional cooperative space efforts in the near future.

In the area of diplomacy for space activities, Japan could make better use of Official Development Assistance to help develop countries through space cooperation. By offering assistances and services through its advanced space science and technology capabilities, Japan can promote human security in developing countries. Japan could also be more active in the United Nations Committee on the Peaceful Uses of Outer Space and in the United Nations Conference on Disarmament to promote diplomacy for space activities.

United States – European Space Security Cooperation

Space and security cooperation between Europe and the U.S. is limited given differences in priorities, capabilities, resources, and differences at the normative level. Nevertheless, a window of opportunity for transatlantic space cooperation between Europe and the U.S exists – there is a need to address the global context of space internationally, and there exist opportunities for building military space cooperation in areas of operational management, space debris, rules of road, and codes of conduct.

…security and defense are a re-affirmed priority at the European level.

Furthermore, security and defense are a re-affirmed priority at the European level. The limited use of space for security was part of the past trend in Europe due to the lack of integration across national-based security approaches. This is now changing with role of the European Union (EU) and the European Defense Agency (EDA) in space activities, and programs, such as Global Monitoring for Environment and Security (GMES) and Galileo. Also, the European Space Agency (ESA) is beginning to make contributions to the space component of common European defense and security, and recently adopted programs that deal with security, like SSA for example. In the SSA area, Europe is seeking to develop autonomous systems and to contribute with those systems to global SSA capability. U.S. military leaders are supportive of these European initiatives.

Military-Civil-Commercial Space Cooperation

This session addressed space cooperation across military, civil, and commercial space sectors by examining what is working, what are the obstacles, and what would you change. Following this, the discussion assessed the utility of national space strategy – do we need a national space strategy and strategy for what – to advance cooperation among the space sectors.

What is Working

Panelists stated that R&D at the project level is working well and that project budgets are focused on executing programs from acquisitions to development and operations. This allows for the transition of space technologies developed for strategic purposes to tactical use in the theater of operations, like intelligence, surveillance, reconnaissance, and communications satellites. An additional area that is working deals with cooperation among military, civil, and international space sectors with regard to meteorological data sharing.

…R&D at the project level is working well.

What are the Obstacles?

One obstacle discussed was the absence of common goals and objectives across the different space programs and projects of the U.S. This is a strategic planning issue that requires a focal point at a high-level of decision making, such as a national-level coordinating body for space in the Office of the President. Strategic planning can help to align agencies and missions with a common purpose, especially in light of constrained budgets. There is as well the need for realistic budget estimates followed by political will and leadership to execute programs.

One obstacle discussed was the absence of common goals and objectives…

A second obstacle concerned the erosion of the U.S. space industrial base as a result of three key factors: (1) reduced R&D investments; (2) export controls; and (3) worldwide proliferation of space technologies. One way to address the erosion is to set national goals for the industrial base and to implement the goals through the agencies and departments of the U.S. Government.

A third key obstacle mentioned is in regard to gaps between acquisition of space systems, development of those systems, and operations of the systems. Within the Department of Defense (DOD), one group builds things and one group buys things; there is no common purpose between the two groups. Each group has its own agenda and interests. The dysfunctional acquisition process of the National Polar- orbiting Operational Environmental Satellite System (NPOESS) program exemplifies what can go wrong as a result of these gaps.

At issue as well, is how to leverage commercial space assets, like the future placement of SSA sensors on commercial telecommunications satellites and making better use of secondary capacity on government space launches. The use of commercial space assets to acquire data for military and security purposes requires a

change in the way data is viewed from a product to be controlled to a commodity in the public domain similar to data on the internet, or even the GPS signal. The current policy for the use of secondary launch capacity is for once a year with the goal among those in the space community for every launch. One effective way to realize this is by congressional mandate.

What Would You Change

Following the discussion on obstacles, panelists were asked what they would change if they had to power to do so. One proposed change is to establish a high-level coordinating body, such as the National Space Council or a body at the level of the National Security Council Deputies, for national and interagency coordination of space policy. Also, it would be useful to have such top-level executive guidance – strategic direction – in the implementation of space activities.

…establish a higher level coordinating body…for national and interagency coordination of space policy.

A second proposed change would be to better balance security with commercial and civil uses of space to ensure a robust industrial base – revitalization of the science and technology base – which is essential for space power. In other words, focus on national goals for the industrial base. An essential change to make possible a robust industrial base is to reform export controls, namely ITAR.

The last two proposed changes include rethinking how we share information and establishing interface standards. With regard to information sharing, the example was given to utilize data that already exists among satellite operators for advancing SSA data sharing. And, interface standards, equivalent to the plug and play approach of USB ports for computers, for satellite buses and for the integration of satellite payloads onto space launch vehicles were viewed as important.

National Space Strategy

Strategy bridges policy goals with capabilities, and it provides a roadmap for ends and the ways and means to get there. A key challenge facing the U.S. is to formulate a national space strategy and execute that strategy with leadership, organization, and management.

There is hesitancy among experts to develop an overarching space strategy as consensus on such an approach within the fragmented environment of organizations and sectors of the different U.S. space programs is daunting. Rather, elements of a national space strategy need to be based on what is common among the space sectors. The approach to strategy should be issue-focused within this context.

…involvement of industry and international engagement are imperatives as part of national space strategy development.

Lastly, it was pointed out that the involvement of industry and international engagement are imperatives as part of national space strategy development. The commercial sector can play a role, if DOD will let them, in meeting national security space requirements, like protected telecommunications for example. Strategy development can also advance international cooperation in security space, particularly in the area of SSA data sharing.

New Approaches to Arms Control

Opening Remarks

There is a sparse record of accomplishment in arms control related to space. One, the Outer Space Treaty constrained the development of Weapons of Mass Destruction (WMD) activities in space. Two, the Anti-Ballistic Missile (ABM) Treaty prohibited space-based ballistic missile defense (BMD). Three, arms control treaties reaffirmed the ABM Treaty's valuable norm-setting provisions protective of satellites for intelligence ends. And four, there was one serious effort to negotiate constraints on military space capabilities concerning ASAT weapons between the U.S. and Soviet Union in the mid-1970s.

…conditions do not now appear to be in place for ambitious undertakings in space diplomacy for arms control because of the considerable mistrust between key spacefaring states…

There are a number of reasons for the sparse record of accomplishment in arms control related to space. The U.S. has preferred non-treaty approaches to arms control related to space and there are other negotiating priorities, usually nuclear related. Also, there exist long periods of disinterest and the United Nations Conference on Disarmament is blocked by consensus rule. Furthermore, conditions do not now appear to be in place for ambitious undertakings in space diplomacy for arms control because of: the considerable mistrust between key spacefaring states; the underlying conditions are not ready either for the development of arms control or for any potential agreements to transform relations between Russia, China, and the U.S.; the Obama Administration has higher priority negotiating objectives on nuclear related matters; verification and scope are at odds with one another – the more ambitious the negotiating agenda, the harder it will be to verify; and over-reaching is a possible factor, such as insisting on a treaty over informal approaches.

During opening remarks, several criteria for space diplomacy initiatives for the Obama Administration, which will help to shift relations between major space powers – and their behavior in space – for the better were indentified. These criteria are listed below.

- Agreements must advance U.S. national security.
- Agreements that work best set norms that advance responsible behavior in space. In doing so, norms help isolate irresponsible behavior in space and, if necessary, facilitate responses of our choosing to dangerous and irresponsible behavior. A code of conduct to extend the no harmful interference provision found in many earlier agreements to all satellites that serve peaceful and military support functions, and a KE-ASAT ban treaty are efforts worth pursuing to better ensure responsible behavior in space.[1]
- Agreements that have the best chance of success will focus on immediate problems that have the potential of growing far

[1]Some panelists thought that soft law, such as a code of conduct or rules of the road can capture the KE-ASAT issue, and thus the need for a formal treaty to ban ASATs may not be needed. All panelists agreed that to regulate behavior in space, capabilities must also be regulated and these regulations must be result-oriented aimed at building customary practices.

worse. The orbital debris problem and the space traffic management problem qualify.
- Agreements must be reached in a timely manner, and focus on space, not ballistic missile defense.

Discussion

During the discussion period, a number of issues were identified and discussed. The first issue concerned deterrence failure, and the right mix of strategies and policies to prevent failure. One reason for failure is that someone else might attack first if they think the benefits outweigh the costs. A second reason is inadvertent due to issues of insecurity and the security dilemma, and the dynamics of arms races. And a third reason, lies with an adherence to the view, among U.S. military leaders, of a contested space environment, which can become a "self fulfilling" prophecy.

Prevention of deterrence failure must be thought of in the context of several factors: there is no rivalry today akin to Cold War; cooperation is more an international norm today than before; and there are more pressing problems than space arms control, such as nuclear, missile, and high-technology proliferation. These factors suggest that there is a need for a strategy of reassurance, not dominance or control, with residual space deterrence to ensure responsible space behavior based on freedom of action and no harmful interference in the space dolman. In this way, the U.S. can reiterate norms and rules about space and make clear that it will discuss other possibilities, such as a ban on weapons in space.

The Outer Space Treaty… is essential as it sets the agenda for norms to be abided by in space.

The second key issue discussed concerned the critical role of law with regard to arms control. Law establishes the context for a stable and predictable environment. Even more so, law backed-up by political commitments can get you what you want. International law is ambiguous, but ambiguity can be strategic as law is based in getting agreement on valid interpretations of principles and interests.

The Outer Space Treaty (OST) is essential as it sets the agenda for norms to be abided by in space. It is based on ideas of reciprocity for freedom of action in space for all, and negative obligations to avoid harmful interference. Over the years, the OST has proven to be valid and enduring, although it does need clarification. The one weakness of the OST regime is that it is not optimally suited to respond to changing political and technical conditions. Examples of some of these changes identified in this session include: dual use technologies; rate of change in space technology; balance of capabilities (space is asymmetric); growth in the number of actors that complicates multilateral efforts and engagement; blurred intersections between military, commercial, and civil uses of space, and thus, the need for greater clarity between what is considered peaceful military use of space and what is not, e.g., what constitutes a space weapon; and different geopolitics than the Cold War. These factors make any new agreement directed at space related arms control – as well as revisions, updates, or amendments to OST – a very challenging prospect.

China's Role in Space: Cooperation, Competition, and Conflict

The panelists in this session were in agreement that China pursues cooperation, competition, and conflict in space. Space capabilities can be used to forge and improve relations with some states. These capabilities are also a means of displaying and projecting comprehensive national power. Finally, space capabilities apply to conflict.

Cooperation

In terms of cooperation, China emphasizes in its two Space White Papers that it is interested in engaging in cooperative space ventures. The success of the Double Star program on heliophysics is repeatedly mentioned in China as an example of cooperation. A second example is the Sino - Brazilian CBERS / Ziyuan satellite program that provides remote sensing of Earth resources. Data acquired from this program is made available through data sharing agreements with African states in particular. China is also cooperating with a number of states with the creation of the FengYunCast weather service uplink.

To create a climate for Sino-U.S. space cooperation, both states will need to engage in confidence building discussions.

Chinese pursuit of international cooperation is not just a matter of joint space missions. Through the Asia Pacific Space Cooperation Organization, China has made it clear that it views space as a diplomatic tool. Through this Organization, headquartered in Beijing, China is prepared to use space as one means of expanding influence and improving relations with neighboring states.

In the case of space cooperation between the U.S. and China, there is a presumption among U.S. leaders that the Chinese place a greater value on cooperation. This is insulting to the Chinese. The Chinese desire to be treated as equals by the U.S., rather than in the way the U.S. has tended to view space cooperation with China as a reward for good behavior internationally. Despite this, there is recent progress in space cooperation. There are indications of future space science cooperation between the U.S. and China. Panelists suggested as well that the U.S. should discuss with China measures for safety in spaceflight, like compatible air locks and compatible electrical busses for possible future cooperation with the Chinese on the ISS program.

In the past, the U.S. was able to achieve space cooperation with the Soviet Union despite deep suspicions, a nuclear arms stand-off, and the Cold War. Yet with the Soviet Union there was a long history of a number of strategic and conventional confidence building measures, such as strategic arms talks and agreements on not interfering with National Technical Means of Verification (NTMV). Today, there is no dynamic of cooperation and confidence building measures with the Chinese as there was with Russia during the Cold War. To create a climate for Sino-U.S. space cooperation, both states will need to engage in confidence building discussions.[1]

[1]One panelist mentioned that the Chinese military leadership was invited by USSTRATCOM Commander, General Kevin P. Chilton. On 28 October 2009, General Chilton hosted

Competition

China has made efforts to enter into the area of commercial launch services and the international satellite market. The recent Chinese sale of satellites to Nigeria and Venezuela are examples of these efforts, which included satellite manufacture and launch, and training of local personnel, all at competitive prices. An additional area that typifies the competitive nature of China's space efforts lies with the indigenous development of a satellite navigation system, Compass. This development makes China a potential competitor for the satellite navigation and positioning market regionally and worldwide. China has emphasized the importance of satellite navigation and positioning for future business and security development. China is also playing a greater role in the effort to develop international standards for space activities, including orbital data. Chinese participation in these efforts will improve their competitiveness, as they help shape industry standards and best practices.

Chinese competition in space is not simply a matter of technological capability as there is a "space race" among the major spacefaring Asian states. Japan and India have little desire to be left behind in space, while China advances its space activities. For all these Asian space powers –China, Japan, and India – space capability reflects comprehensive national power, and it is not surprising that these space powers want to use satellite launches, lunar probes, and human spaceflight missions for advertising their scientific and engineering prowess as well as the state of their economic, technological, and human resource capabilities.

Conflict

There is the potential of conflict involving China in space. This potential is supported by several key developments. One, the overall policy climate with regard to space and defense has not changed since the export controls issues and violations in relation to commercial space cooperation between the U.S. and China in the early 1990s. Two, there exist lexicon and language issues between the U.S. and China. For example, the concept of deterrence in China is different than it is in the U.S. Space deterrence for the Chinese refers to the idea of signaling an opponent of the likely actual use of space power and the attendant consequences in the hopes that this will persuade an opponent to undertake a cost-benefit analysis, affect their psychology, and compel them to abandon their original aims. Within this context, there is an emphasis on space deterrent capability and the need to demonstrate that capability. This accounts for the laser blinding and ASAT tests conducted by China.[2]

General Xu Caihou, one of two Vice Chairmen of China's Central Military Commission, today. General Xu's visit is a vital part of U.S. efforts to engage China on shared strategic issues, develop cooperative capacity and foster institutional understanding between the two militaries, http://www.stratcom.mil (accessed November 2009).

[2]China has stated that they reserve the right to continue ASAT testing. The panel debated the reasons for China's ASAT test and the chain of events that led to the test. One view was that the ASAT test was conducted not per say in response to any specific U.S. actions and not targeted at any specific adversary. The test was simply a logical technology development path since the 1960s and 1970s for the projection of Chinese space power. The political view is that test was a result of U.S. actions, primarily the 1999 U.S. bombing of the Chinese embassy in Belgrade. The decision for the test was made at the highest levels of government, including both the People's Liberation Army and Ministry of Foreign Affairs. Further, orbital debris experts in China briefed officials that the risk was minimal. One panelist further remarked that in hindsight the Chinese see the ASAT test as a poor political choice given the debris issue and negative international implications for China, in particular, as a norm-setter for space.

A third area of conflict lies with space surveillance. Surveillance is seen as hostile by China as there is no shared understanding of the importance of NTMV as there was with Russia. Chinese writings also suggest that space is not necessarily a global commons – suggesting an interest in extending sovereignty there – and that space is a possible contested battlefield, alongside land, sea, air, and cyberspace.

As with cooperation and competition, conflict, including deterrence, is not solely aimed at the U.S. Chinese leaders have concerns about Japan, especially in light of Japan's new Basic Space Law, which allows Japan to use space for national security purposes. In addition, China is concerned about the 2008 "Joint Declaration on Security Cooperation" between Japan and India.

Implementing Security Space Policy in the New Administration

The Obama Administration has started out strong in the area of space policy formulation and implementation with calls for re-establishing the National Space Council, although this has not happened yet, and by undertaking a number of space policy reviews, including the Augustine Commission on human spaceflight, National Security Council (NSC) and Office of Science and Technology Policy (OSTP) reviews of national space policy under Presidential Directive, the Quadrennial Defense Review (QDR), and the DOD Space Posture Review. Further, the Office of Management and Budget (OMB) and OSTP list space as a science and technology priority because it addresses several priorities, including: climate, employment, and economic stimulus. There are as well recent increases in funding for SSA, and reviews regarding future imagery architecture issues and National Reconnaissance Office (NRO) organization and management.

…there is a gap between… policy formulation and implementation.

At the same time, there is a gap between space policy formulation and implementation. There are a number of things that can go wrong with implementation that were discussed in this session. First, there can be failure to formulate policy or update it, and also failure to implement policy. Second, there can be failure to fund policy due to poor communication, such as between the executive and congressional parts of government. Third, there can be failure in the implementation process due to poor management and organization, poor execution, poor top-level guidance, and poor delegation to agencies and departments; in other words, there is no management structure that incentivizes cooperation and collaboration across the space sectors. Fourth, there can be failure to reach consensus on policy, i.e., failure to resolve disputes and conflicts, and to reconcile differences among agencies and departments that will inevitably exist. Lastly, there can be failure to get public support. This is where presidential leadership comes into play.

Panelists suggested a number of ways to address these shortcomings with implementation. One way is to institute a workable coordination mechanism for effective balance of department and agency equities. The NSC can play a role in this regard, and it does do this along with the OSTP in regard to national space policy formulation. But the NSC and OSTP are flat organizations, however, and execution of policy is an issue. Effective execution can take place with energized attention and oversight at the level of the U.S. President as well as guidance on a clear role for departments and agencies, including budgets and jurisdictions. Further, it was stated in this session that the development of a national space strategy can provide effective guidance on the implementation of space policy.[1]

[1]Panelists mentioned one report on civil space policy of the National Research Council of the National Academies, *America's Future in Space: Aligning the Civil Space Program with National Needs*, which called for organization and processes to implement space policy across all departments and agencies, essentially a strategy for civil space. Also, mentioned was a non-affiliated group of space professionals, "Committee for U.S. Space Leadership," that called for a National Space Strategy to implement space policy.

Concluding Assessments

Opening Remarks

We are at a critical juncture in the evolution of space – we need an intellectual foundation to guide policy and actions. Space was a major instrument and force in shaping the 20th century and the nation's strategy – Apollo, nuclear deterrence, international cooperation, technology advances, and international conduct exemplify this. A central question is: will space be a similar force in 21st century – will it be determinant of great power status, a key instrument of national power? Today, there is the recognition among leaders that space is not a discretionary activity, but essential to the well-being of the U.S. and the world community.

We are facing challenges in space in all directions – problems in development and acquisition, gaps in critical on-orbit capabilities, systemic program and budget over-reach, workforce and industry base issues, foreign competition, space as a contested domain, and increasing interconnection and interdependence across all space sectors. The Obama Administration is interested in space and is taking some important steps, such as: a review of the way ahead for imagery, including Future Imagery Architecture and NRO organization and management; the Augustine panel review of options for NASA's human spaceflight programs; DOD Space Posture review; the OSTP and OMB FY2011 budget guidance; and the reviews of National Space Policy and export control policy. There is reason for optimism and hope, but also for realism.

…we need an intellectual foundation to guide policy and actions.

One essential ingredient that must be included is the development of national space strategy and a governance mechanism to coordinate decisions and actions at the national level. National Space Policy is relatively consistent, but it does not guide and drive decisions and actions. There is the fundamental need for strategic "ways and means" to achieve policy "ends." The development of space strategy should consider the full range of tools – programs, investments, human capital, infrastructure, regulatory, and incentives and buying practices – that the U.S. Government can employ. Also, there is need for governance structures where agencies can execute and where the U.S. President can coordinate decisions and actions, such as through the NSC Deputies structure.

Ultimately, space is critical to continued U.S. world leadership. Space is a strategically important enterprise for the nation – it contributes to the nation's instruments of power and influence in areas of commerce, security, politics, and international relations in unique and asymmetric ways – with far more value than simply the dollars and people devoted to it. The real question today is: does the Obama Administration see it so – that space is an essential enabler of national goals for climate change, security, international cooperation, and domestic competitiveness in education and technology.

Discussion

The concluding session identified that there needs to be a "center-of-gravity" at the level

of the United States President with regard to space. Further, the absence of a true strategy for space is an issue. A strategy can provide guidance for how to apply the full range of tools to achieve ends. What is needed is for a formulated strategy to be implemented through effective governance mechanisms and through persistent leadership. All this is essential as space is critical – a strategic enterprise and one with asymmetric advantages.

Three key elements to implement national policy and a strategy for space were discussed: (1) presidential leadership to set and establish the agenda for space; (2) presidential persistence to see the agenda through formulation and implementation; and (3) a responsive bureaucracy. Effective implementation is essential as U.S. space programs are at a critical juncture. Space is a dominant force and tool for national power and national security, and there exists a mature industry that plays a fundamental role in space activities. Success for policy and strategy development will be determined by whether space can be linked to national goals and priorities.

There are number of specific challenges facing the space community. One challenge is the need to establish the intellectual foundations for thinking about space at the strategic level. Most fundamentally, what is the strategic concept with regard to space – is it part and parcel of global commons management? Should we worry more about ensuring our access versus denial of others – is this is a better way to ensure our asymmetric advantage?[1]

A second challenge lies with the reality of constrained budgets. This leads to problems of over-reach in system development and in excessive program demands relative to resources and budgets. For example, NASA cannot execute current plans for human spaceflight within current and projected budgets, and the QDR effort points to trade-offs on space programs and projects. This all leads to the conclusion that program demands, in an environment of constrained budgets, can only be met through partnering with the space commercial sector, cooperating internationally, and shaping the governance environment regarding space.[2]

…space is critical to continued U.S. world leadership.

A third set of challenges discussed concern acquisitions and industrial base issues, including export controls. Of concern with acquisitions, is how to address gaps in new system development, especially for the military and intelligence space sectors. Export controls and cuts in research and development (R&D) funding erode the U.S. space industrial base. This erosion is further exacerbated by the fact that unmanned access to space is reliant to a large extent on Russian rocket engines. There are also cross-cutting industrial base issues; if NASA gives up solid rocket motors, for example, will the U.S. military have to pay large fixed cost to maintain a solids rocket industry?

[1]One panelist remarked that if you have to prioritize, prioritize our access over denying others' access.

[2]It was discussed in this session that shaping the governance environment regarding space can mitigate the negative consequences of challenges posited by foreign competition and space as a contested domain. In general, shaping the environment to one more favorable to the U.S. can be accomplished by asserting U.S. leadership in the area of collective action for security, commercial, and civil space activities.

Articles

Viewpoint: Outer Space Treaty and Enhancing Space Security
Joanne Irene Gabrynowicz

Viewpoint: Space Law and the Advancement of Spacepower
Peter L. Hays

Role and Identity for Europe in Space Security
Wolfgang Rathgeber and Nina-Louisa Remuss

Viewpoint: Outer Space Treaty and Enhancing Space Security

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The specific question addressed here is: what progress could be made at a possible Outer Space Treaty (OST) Revision Conference and how should a possible Revision Conference unfold?"[1] The answer to the question as framed is, with serious trepidation and extreme caution. However, the question contains the assumption that a revision conference for the 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) ought to occur. The response to that assumption is, at this point in time, to leave the Outer Space Treaty alone. Regardless of how compelling or meritorious the reason for revising the Outer Space Treaty may appear to be, the fact is there is much more to lose than there is to gain. This article begins with an overview of the Outer Space Treaty, a brief discussion of its provisions and its likely status during a revision conference. It then raises the hard questions that must be addressed in a discussion about potentially revising the treaty. A conclusion follows.

The Outer Space Treaty is, beyond any question, one of the most successful multilateral, international treaties ever promulgated.[2] It has been accepted by a large majority of the world's nation-states, including all of the world's space-capable states.[3] Nearly 40 years after it entered into force in 1967, the Outer Space Treaty still continues to garner signatories. As newly active and recently advancing space nations continue to emerge, they are also choosing to become treaty signatories.[4] "It is also generally agreed by legal scholars and governments that the earlier Declaration of Legal Principles, which was incorporated into the Outer Space Treaty, expresses general customary law, binding on all states."[5] Moreover, treaties that "provide for neutralization or demilitarization of a territory or area, such as... outer space" "have been held to create a status or regime valid *erga omnes* (for the entire world)."[6]

The Outer Space Treaty is quasi-constitutional, which means it functions like a

[1]See "Building the Architecture for Sustainable Space Security," Conference Report, 30-31 March 2006, United Nations Institute for Disarmament Research.

[2]Sergio Marchisio, "The Evolutionary Stages of the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)," *Journal of Space Law* 31 (2005): 219–226.

[3]As of 1 January 2008, 125 have accepted the Outer Space Treaty (98 ratifications and 27 signatories), www.unoosa.org/oosa/en/SpaceLaw/treatystatus/index.html (accessed November 2009).

[4]For example, Nigeria ratified the Outer Space Treaty due to the successful launch of its first satellite, NigeriaSat 1, on 27 September 2003.

[5]Lori F. Damrosch et al., *International Law Cases and Materials* (American Casebook Series, Fourth Edition, Thomson West, 2001). See Rule 15.1 and 15.4.

[6]Antony Aust, *Modern Treaty Law and Practice*, Cambridge (Cambridge University Press, 2000), 208-209, citing M. Raggazzi, *The Concept of International Obligations Erga Omnes*, 1997, 24–27.

constitution for space. "It is a quasi constitution, not only a culmination, but also an initiation."[7] The principles it contains are the foundation of the Convention on International Liability for Damage Caused by Space Objects (Liability Convention), the Convention on Registration of Objects Launched into Outer Space (Registration Convention) and the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Astronaut Rescue Agreement). Because the Outer Space Treaty functions like a constitution, opening it for revision means that all of its provisions will be vulnerable to change. These provisions include some of the most important and fundamental principles in international space law. They include: that the exploration and use of space is to be for the benefit and interests of all countries;[8] space is the "province of all mankind";[9] all states are free to explore, use and scientifically investigate space;[10] state appropriation of space is prohibited;[11] nuclear weapons and weapons of mass destruction are prohibited;[12] military bases, installations, fortifications, weapons testing, and military maneuvers are forbidden on the Moon and other celestial bodies;[13] states are responsible for all space activities undertaken by national and non-governmental entities;[14] and states can be held liable for damage caused by their space objects.[15] All of these would be at risk in a revision conference.

It has been argued that revision is a narrow approach that can be contained and controlled, and that it is unnecessary to assume revision can or will lead to an amendment process, which, according to this view, is a broader approach that can be avoided. This view fails to take into account that the Outer Space Treaty, unlike the Liability Convention and the Registration Convention, which do provide for revision,[16] provides only for amendment.[17] More importantly, to speak of "revision" rather than "amendment" is increasingly a distinction without a difference in international law. The International Law Commission, when considering the question of whether or not there is a difference between the two, "saw no essential legal difference in the processes of amendment and review, regarding amendment as including review."[18] Without a clear legal demarcation between "amendment" and "review," the true force that will be at play in an Outer Space Treaty revision conference is politics. A politically motivated revision process will guarantee "no guarantees." All treaty provisions will be susceptible to change or elimination.

The Outer Space Treaty… functions like a constitution for space.

Interest groups are another force that will be activated in a treaty revision process. Some interest groups are seeking to change the Outer Space Treaty for their own reasons, including clarifying and establishing property rights in space.[19] If the Outer Space Treaty

[7]George S. Robinson and Harold M. White, Jr., *Envoys of Mankind: a Declaration of First Principles for the Governance of Space Societies* (Washington, DC, Smithsonian Institution Press, 1986), 181.
[8]Outer Space Treaty, Article I.
[9]Ibid.
[10]Ibid.
[11]Ibid., Article II.
[12]Ibid., Article IV.
[13]Ibid.
[14]Ibid., Article VI.
[15]Ibid., Article VII.

[16]Liability Convention, Article XXVI; and Registration Convention, Article X.
[17]Outer Space Treaty, Article XV.
[18]Antony Aust, *Modern Treaty Law and Practice*, Cambridge (Cambridge University Press, 2000), 220.
[19]Robert A. Fabian, Space Economic Development in the Province of All Mankind: If No One Goes, We All Lose, *Astropolitics* 1: 1 (2003): 89-98. Here, the Outer Space Treaty

were opened for any reason, these groups would welcome the opportunity to introduce their own purposes into the process and would bring political pressure to open it up. Another force that will work to expand a revision conference is those nation-states in the current geopolitical environment that advocate eliminating all of the space treaties and beginning anew with one, single, comprehensive agreement.[20]

In addition to interest groups and nations that advocate a new, single space agreement, another indicator that an Outer Space Treaty revision process will inevitably expand to the entire space treaty regime is the treaty drafters' intention that the space treaties be interrelated.[21] "The Outer Space Treaty... provides a framework for a number of limited accords between individual countries and intergovernmental organizations as well as [the] subsequent [space] treaties."[22] The Astronaut Rescue Agreement is specifically based on Article V[23] of the Outer Space Treaty, the Liability Convention is based on Article VII,[24] and the Registration Convention is based on Article VIII.[25] Together, these treaties create an interrelated legal framework that creates a legal whole that is greater than the sum of its parts – a rare condition in international law. Opening the underlying provisions of the Outer Space Treaty upon which the latter treaties are based will, of necessity, bring their status into question as well.

> The type of interrelation that exists among these treaties is unusual in international law, except in the case of the United Nations Charter and the Statute of the International Court of Justice, both of which are incorporated by reference into the Outer Space Treaty.[26]

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is characterized as "the current legal obstacle to any effort to develop space resources like asteroids or solar power."

[20]Joanne Irene Gabrynowicz, "Space Law: Its Cold War Origins and Challenges in the Era of Globalization," *Suffolk University Law Review* 37 (2004): 1041–1053.

[21]Walter A. McDougall, *…the Heavens and the Earth, a Political History of the Space Age* (Basic Books, 1985), 431.

[22]George S. Robinson and Harold M. White, Jr., *Envoys of Mankind: a Declaration of First Principles for the Governance of Space Societies* (Washington, DC, Smithsonian Institution Press, 1986), 181–182. The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement) also relates back to the Outer Space Treaty. However, the Moon Agreement relates back to the Outer Space Treaty as a whole, without reference to a specific article.

[23]Outer Space Treaty, Article V: States' Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas. When astronauts make such a landing, they shall be safely and promptly returned to the State of registry of their space vehicle. In carrying on activities in outer space and on celestial bodies, the astronauts of one State Party shall render all possible assistance to the astronauts of other States' Parties. States Parties' to the Treaty shall immediately inform the other States' Parties to the Treaty or the Secretary-General of the United Nations of any phenomena they discover in outer space, including the Moon and other celestial bodies, which could constitute a danger to the life or health of astronauts.

[24]Outer Space Treaty, Article VII: Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies.

[25]Outer Space Treaty, Article VIII: A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return.

[26]George S. Robinson and Harold M. White, Jr., *Envoys of Mankind: a Declaration of First Principles for the*

A critical aspect of the Outer Space Treaty that must to be raised in any discussion about its potential revision is the treaty's status in international law in the event of the outbreak of hostilities or armed conflict.[27] Today the status of the Outer Space Treaty during hostilities is crystal clear: it remains in force and its provisions are available during conflict. However, if hostilities were to begin while a review process was in progress, the treaty's status would be unclear.

The Outer Space Treaty is a law-making treaty[28] and is, therefore, a member of a very special category of treaties that remain in force and which do not terminate with the outbreak of hostilities.[29] It is a treaty "among a multitude of states that establish[es] a rule or system of rules that govern the conduct of states in a particular area of international law."[30] Moreover, it is "one of the outstanding lawmaking treaties of contemporary international law as a whole."[31] Nor will the Outer Space Treaty suspend during conflict. The twentieth century trend – which is continuing into the twenty-first century – is the growing presumption that treaties do not suspend with the commencement of hostilities. "The outbreak of armed conflict does not *ipso facto* terminate or suspend the operations of treaties in force."[32]

Furthermore, in the case of the Outer Space Treaty, practice is consistent with jurisprudence. The Outer Space Treaty remained in force during both the 1991 Gulf War and the 2003 Gulf War. The former is widely recognized as the "first space war" and the latter as the "second space war" having used various space-based assets for the first and second time in a conflict. However, if hostilities were to begin while a review process was in progress, the treaty's law-making status and the availability of its provisions specifically relevant to hostilities, including limiting military activity to scientific and peaceful purposes, the ban on nuclear weapons and weapons of mass destruction, and the right to remain free from interference while using space would be unclear.

The non-interference principle in international space law and the neutrality principle in the law of war are, in essence, the same. Both of the principles are concerned with protecting peaceful activities in an area or region used by non-belligerents. In the Outer Space Treaty, states are afforded non-discriminatory access to, and non-interference with, their use of

Governance of Space Societies (Washington, DC, Smithsonian Institution Press, 1986), 182.

[27]Much of the research for this particular topic was done by LaToya Tate, a third year law student at the University of Mississippi School of Law and a researcher at the National Remote Sensing and Space Law Center. The subject is examined in depth in her paper, see LaToya Tate, "The Status of the Outer Space Treaty at International Law During "War" and "Those Measures Short of War," *Journal of Space Law* 32 (2006).

[28]Sergio Marchisio, "The Evolutionary Stages of the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)," *Journal of Space Law* 31 (2005): 226.

[29]Lord McNair, *The Law of Treaties* (Oxford, Clarendon Press, 1961), 723. See also L. Oppenheim and H. Lauterpacht, *International Law a Treatise* (Seventh Edition, London, Longmans, Green and Company, 1952, 304; J. Delbruck, "War, Effect on Treaties," in: R. Bernhardt, ed., *Encyclopedia of Public International Law* (Max Planck Institute for Comparative Public Law and International Law, 1982), 310-312; U.S. Supreme Court, *Society for the Propagation of the Gospel in Foreign Parts v. New Haven*, 21 U.S. 464, 8 Wheat. 464 (1823), Washington, DC.

[30]Lord McNair, *The Law of Treaties* (Oxford, Clarendon Press, 1961), 723.

[31]Sergio Marchisio, "The Evolutionary Stages of the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS)," *Journal of Space Law* 31 (2005): 226.

[32]Institut de Droit International, *The Effects of Armed Conflicts on Treaties*, Articles 2 and 5, 28 August 1985, http://www.idi-iil.org/idiE/navig_chon1983.html (accessed November 2009).

space.[33] Under the neutrality principle, states that are not part of a conflict can assert their right to remain neutral and not to be interfered with by the belligerents.[34] If hostilities were to start during a review process the treaty's guarantee against non-interference with the use of space would be placed in doubt.

This article also addresses the question of how to best leverage the Outer Space Treaty to enhance space security. The response to that question is to not just focus on what the treaty does not provide, but also to appreciate how much it does provide. A discussion on how to best leverage the Outer Space Treaty to enhance space security must include asking hard questions. They begin with: would the provisions that the Outer Space Treaty contains be achievable today?

Specifically, would there be agreement on banning nuclear weapons and weapons of mass destruction? Current events include rapidly developing situations in the constantly shifting geopolitical landscape that provide evidence that the nuclear regime is under stress. Developed and developing nations are realigning regarding what are considered permissible nuclear activities. Ostensibly controlled nuclear access is now emerging in tandem with non-proliferation. The long-standing dichotomy between nuclear capable and developed nations and the non-nuclear capable and developing nations is shifting, as is the dichotomy between developed nation and spacefarer, and developing nation and non-spacefarer.[35] Nuclear and space activities are being rearranged. In light of the changes in the terrestrial nuclear regime, it is not at all clear that the Outer Space Treaty's nuclear weapons ban in space would survive a revision conference.

The Outer Space Treaty… remains in force… with the outbreak of hostilities.

Would there be agreement today on limiting military activity in space to peaceful or scientific purposes? The nature and role of military entities since the end of the Cold War have been undergoing questioning and changes all around the world. Recognizing and defining what constitutes "peaceful" or "scientific" activities will continue to test the limits of the Outer Space Treaty, but it will not expand the categories of permitted military actions. Revising the treaty can.

Is there a clear, present, and credible threat that justifies the disruption that will inevitably occur by attempting to revise the Outer Space Treaty? In the 1960s, the nations of the world were brought to the negotiating table because both the former Soviet Union and the United States had successfully and pragmatically proven that they had existing and substantial launch and weapons capabilities. Existing rockets could have been either transportation vehicles for scientific experiments or for weapons. Does the current geopolitical landscape provide an analogous situation today? Are there any nations that now have both an independent, robust, long-term launch capability, and proven advanced space weaponry that create a situation dire enough to

[33]Outer Space Treaty, Articles I, IX, and XII.

[34]Leslie C. Green, *The Contemporary Law of Armed Conflict* (Manchester University Press, 1993), 259.

[35]Joanne Irene Gabrynowicz, *Comments on the Discussion Paper, Space Law and Remote Sensing Activities*, Workshop on Space Law Disseminating and Developing International and National Space Law: The Latin America and Caribbean Perspective, United Nations Office of Outer Space Affairs, Rio de Janeiro, Brazil, 22-25 November 2004, http://www.unoosa.org/oosa/en/SpaceLaw/workshops/index.html (accessed November 2009).

risk the stability that the Outer Space Treaty provides?

Assuming, only for the sake of argument, that there is an existing space threat analogous to the former Soviet Union-United States Cold War capabilities: will it last as long as the time required to negotiate revised or amended treaty terms? The United Nations was first asked to consider the legal issues associated with space activities in 1958.[36] The Outer Space Treaty entered into force in 1967.[37] Even with the extreme pressures of the Cold War, it took nearly a decade to complete and activate the Outer Space Treaty. Nine years is definitely fast in terms of international treaty negotiations, however, the more significant fact is that at that time, space technology development was still in its early stages and less likely to outpace the speed of negotiations. Today, the intense, focused, urgent pressures of the Cold War have given way to a diverse, multipolar array of forces, and space technology has advanced. And today, the likelihood is that discussions would be less focused and more wide ranging; once opened, attempted revisions could lead to decades of debate and negotiations. At the same time, the ability to implement already developing technologies could outpace negotiations.

Also to be considered is that the original perceived threat that catalyzes a revision conference could be readily overcome by more dynamic economic and political events, including cyclical elections, changes of administration, changing foreign policies, and national fiscal and budgetary constraints. Moreover, the original threat could be supplanted by a new, unforeseen one that might not have been activated but for the opportunity presented by the ongoing negotiations and the uncertain status of the treaty during that time. This leads to the next hard question.

What behavior, practice, or custom will develop to fill the legal ambiguity created during the revision process? Once revision begins and various political forces enter the process, the status of the Outer Space Treaty and specific provisions will be unclear for the duration of the process. Ambiguity regarding signatories' obligations will increase and some will be emboldened to take action to resolve the increased ambiguity in their favor. This is exactly what happened at the dawn of the space age. The legality of satellite overflight was not established at the time that the former Soviet Union and the United States embarked on their race to space.[38] With the successful launch of Sputnik 1 and lack of objection by the United States, the precedent for satellite overflight without seeking sovereign consent was quickly set in a matter of days.[39] A variation on the theme of the role of ambiguity during a revision process is that there will be some nations that will have no incentive to resolve new ambiguities that, in their view, replace settled, but inconvenient treaty obligations.

Finally, no treaty revision occurs in a legal vacuum. It must occur within the framework of the entire prevailing legal system, related agreements, and general principles of law. This presents an infinite number of paths that a treaty revision conference can be made to take, increasing the likelihood of delay and uncertainty to an unquantifiable degree.

[36]Walter A. McDougall, *…the Heavens and the Earth, a Political History of the Space Age* (Basic Books, 1985), 184.

[37]The Outer Space Treaty opened for signature on 27 January 1967 and entered into force on 10 October 1967. See United Nations Office of Outer Space Affairs, *United Nations Treaties and Principles on Space Law*.

[38]Walter A. McDougall, *…the Heavens and the Earth, a Political History of the Space Age* (Basic Books, 1985), 119–120.

[39]Ibid., 134, 187.

Unquantifiable uncertainty ought to be risked only for the most menacing and most immediate of threats.

Taking a long look backward at the history of humanity, it becomes quickly evident that it is folly to say that anything should never change, even the Outer Space Treaty. However, for the foreseeable future, the Outer Space Treaty should be left alone. Opening it for revision now is a case of "be careful what you wish for."

Viewpoint: Space Law and the Advancement of Spacepower

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Space law has and should continue to play an essential role in the evolution of spacepower. Testing the principle of "freedom of space" and helping establish the legality of satellite overflight were primary objectives of NSC-5520, the first U.S. space policy, approved by President Eisenhower in May 1955;[1] during the 1960s, the superpowers and other emerging spacefaring states negotiated a far-reaching and forward-thinking Outer Space Treaty (OST);[2] and today a variety of transparency- and confidence-building measures (TCBMs) for space are being discussed and debated in a number of fora.[3] Law can be perhaps the single most important means of providing structure and predictability to humanity's interactions with the cosmos. Justice, reason, and law are nowhere more needed than in the boundless, anarchic, and self-help environment of the final frontier. The topics space law is designed to address, the precedents from which it is drawn, and the pathways ahead it illuminates will be critical determinants of the future development of spacepower.

Although there is some substance to arguments that the OST only precludes those military activities that were of little interest to the superpowers and does not bring much clarity or direction to many of the most important potential space activities, the treaty, nonetheless, provides a solid and comprehensive foundation upon which to build additional legal structures needed to advance spacepower. Spacefaring actors can most effectively improve on this foundation through a number of actions, including further developing and refining the OST regime, adapting the most useful parts of analogous regimes such as the Law of the Sea and Seabed Authority mechanisms, and rejecting standards that stifle innovation, inadequately address threats to humanity's survival, or do not provide opportunities for rewards commensurate with risks undertaken. In the

[1]The best and most comprehensive analysis of the complex maneuvering by the superpowers at the opening of the space age remains Walter A. McDougall's *…the Heavens and the Earth: A Political History of the Space Age* (Basic Books, 1985). NSC-5520 is reprinted in John M. Logsdon, ed. *Exploring the Unknown: Selected Documents in the History of the U.S. Civil Space Program, Volume I, Organizing for Exploration* (Washington, D.C.: NASA History Office, 1995), 308-313. McDougall in *Heavens and Earth* and R. Cargill Hall's introductory essay, "Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space," in *Exploring the Unknown, Volume I* masterfully develop the context and purposes of NSC-5520. Hall uses the term "stalking horse" to describe the purpose of the IGY satellite in relation to the WS-117L (America's first reconnaissance satellite program). "Peaceful purposes" for space activity are often referenced and cited, but never authoritatively defined.

[2]Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (General Assembly resolution 2222 (XXI), annex), adopted 19 December 1966, opened for signature on 27 January 1967, and entered into force on 10 October 1967.

[3]The term "transparency" apparently connotes espionage when translated into Chinese, and since the Chinese are a key party that spacefaring actors wish to engage, consideration should be given to finding an alternative term, perhaps "clarity-of-intensions."

three sections below, this article explores other specific ways improvements in space law may contribute to: furthering the quest for sustainable space security; enabling more direct creation of wealth in and from space; and ultimately improving the odds for humanity's survival by helping to protect the Earth and space environments. Without clearer and better developed space law, humanity may squander opportunities and investments, making it more difficult for spacepower to enable these and other critical contributions to our future.

While desires for better refined space law to advance spacepower may be clear, progress towards developing and implementing improvements is not likely to be fast or easy. Terrestrial law evolved fairly steadily and has operated over millennia. Space law, by contrast, is a relatively novel concept that rapidly emerged within a few years of the opening of the space age and thereafter greatly slowed. The objectives of space law must include not just aspirational goals, such as structuring competition between humans and helping define and refine fundamental interactions between humanity and the cosmos, but also more mundane issues, like property rights and commercial interests. It is likely there will be growing pressure for space law to provide greater predictability and structure in many areas despite the fact that it can be very difficult to establish foundational legal elements for the cosmic realm, such as evidence, causality, attribution, and precedence. Moreover, any movement towards improving space law is likely to be slowed by discouraging attributes associated with spacepower that include very long timelines and prospects for only potential or intangible benefits. These factors can erode acceptance of and support for improving space law at both the personal and political levels, but also point to the need for an incremental approach and reinforce the long-term value of law in providing stability and predictability.

Space law has and should continue to play an essential role in the evolution of spacepower.

Other impediments to further developing space law are exacerbated by a lack of acceptance in some quarters that sustained, cooperative efforts are often the best and sometimes the only way in which humanity can address our most pressing survival challenges. Cosmic threats to humanity's survival exist and include the depletion of resources and fouling of our only current habitat, threats in the space environment, such as large objects that could strike Earth causing cataclysmic damage, and the eventual exhaustion and destruction of the Sun. The message is clear: environmental degradation and space phenomena can threaten our existence, but humanity can improve our odds for survival if we can cooperate in grasping and exploiting survival opportunities. Law can provide one of the most effective ways to structure and use these opportunities. Sustained dialogue can help raise awareness, generate support for better space law, and ultimately nurture the spacepower needed to improve our odds for survival.

The Quest for Sustainable Security

In examining space law, spacepower, and humanity's quest for sustainable security, it is prudent for spacefaring actors to transcend traditional categories and approaches by considering resources in novel, broad, and multidimensional ways. This article attempts to employ the spirit of this unrestrained approach, but is not suggesting that everything discussed would necessarily turn out to be useful or implementable in the real world. In

addition, it is often not practical or even possible to examine space law developments in discrete ways by delineating between legal, technical, and policy considerations, or between terrestrial and space security concerns. Over the long run, however, an expansive approach will undoubtedly reveal and help create the most opportunities to advance space law and spacepower in the most significant and lasting ways. Nonetheless, when beginning the journey, small, incremental steps are the most pragmatic way to develop and implement more effective space law, and the process should first focus on improving and refining the foundation provided by the OST regime.

Most spacefaring actors understand the merits and overall value of the OST regime; they are much more interested in building upon this foundation than in creating a new structure. As the most important first steps towards further developing space law, the international community needs to find better ways to achieve more universal adherence to the regime's foundational norms and embed all important spacefaring actors more completely within the regime. Beginning work to include major non-state actors in more explicit ways could prove to be a difficult undertaking that would require substantial expansion of the regime and probably should be approached on an incremental basis. Fortunately, the security dimensions of the regime have opened widows of opportunity and important precedents have been set by expanding participation in the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and World Radio Communication Conferences of the International Telecommunications Union (ITU) to include non-state actors as observers or associate members. Some form of a two-tiered participation structure within the OST regime might be appropriate as it may prove impractical to include non-state actors in a formal treaty; steps towards expanded participation should begin now, both to capture the growing spacepower of non-state actors and to harness their energy in helping achieve more universal adherence to the OST regime. Perhaps most importantly, these initial steps should help promote a sense of stewardship for space among more actors and increase attention on those parties that fail to join or comply with these norms. Of course, these first steps alone would be insufficient to make large improvements or assure compliance with the regime, yet they might be among the most easily undertaken and significant ways to advance space law in the near term. Other specific areas within the OST regime that should be better developed, perhaps through creation of a standing body with implementation responsibilities, include the Article VI obligations for signatories to authorize and exercise continuing supervision over space activities and the Article IX responsibilities for signatories to undertake or request appropriate international consultations before proceeding with any activity or experiment that would cause potentially harmful interference.

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One key way the United States (U.S.) could help better define OST obligations and

demonstrate leadership in fostering cooperative spacepower would be to share space situational awareness (SSA) data globally in more effective ways through the Commercial and Foreign Entities (CFE) program or some other approach. Congress has extended the CFE Pilot Program through September 2010, and following the February 2009 collision between Iridium and Cosmos satellites, there is more worldwide attention focused on space debris and spaceflight safety as well as considerable motivation for the U.S. to improve the CFE program by providing SSA data to more users in more timely and consistent ways.

A most useful specific goal for the CFE Program would be development of a U.S. Government operated data center for ephemeris, propagation data, and pre-maneuver notifications for all active satellites; consideration should also be given to the utility and modalities of creating or transitioning such a data center to international auspices.[4] Users would voluntarily contribute data to the center, perhaps through a Global Positioning System (GPS) transponder on each satellite, and the data would be constantly updated, freely available, and readily accessible so that it could be used by satellite operators to plan for and avoid conjunctions.[5] Difficult legal, technical, and policy issues that inhibit progress on sharing SSA data, include: bureaucratic inertia, and liability and proprietary concerns; non-uniform data formatting standards and incompatibility between propagators and other cataloguing tools; and security concerns over exclusion of certain satellites from any public domain data. Some of these legal concerns could be addressed by working towards better cradle-to-grave tracking of all catalogued objects to help establish the launching state and liability; using opaque processes to exclude proprietary information from public databases to the maximum extent feasible; and indemnifying program operators, even if they provide faulty data that results in a collision, so long as they operate in good faith, exercise reasonable care, and follow established procedures.

History suggests there is a very important role for militaries both in setting the stage for the emergence of international legal regimes and in enforcing the norms of those regimes once they emerge. Development of TCBMs for space, such as rules of the road or codes of conduct, should draw closely from the development and operation of such measures in other domains, like sea or air. The international community should consider the most appropriate means of separating military

[4]For an outstanding and detailed analysis of the benefits and challenges associated with creation of an international data center, see Colonel Lee-Volker Cox, "Avoiding Collisions in Space: Is it Time for an International Space Integration Center?" U.S. Army War College, 30 March 2007.

[5]SSA issues are framed by specialized concepts and jargon. Conjunctions are close approaches, or potential collisions, between objects in orbit. Propagators are complex modeling tools used to predict the future location of orbital objects. Satellite operators currently use a number of different propagators and have different standards for evaluating and potentially maneuvering away from conjunctions. Maneuvering requires fuel and shortens the operational life of satellites. Orbital paths are described by a set of variables known as ephemeris data; two-line element sets (TLEs) are the most commonly used ephemeris data. Much of this data is contained in the form of a satellite catalog. The United States maintains a public catalog at www.space-track.org. Other entities maintain their own catalogs. Orbital paths constantly change, or are perturbed, by a number a factors including Earth's inconsistent gravity gradient, solar activity, and the gravitational pull of other orbital objects. Perturbations cause propagation of orbital paths to become increasingly inaccurate over time; beyond approximately four days into the future predictions about the location of orbital objects can be significantly inaccurate. For more about SSA concepts, see Brain Weeden, "The Numbers Game," *The Space Review*, 13 July 2009. For discussion about ways to share SSA data and other space security ideas fostered by meetings between the Department of Defense Executive Agent for Space and the Chief Executive Officers of commercial satellite operators, see David McGlade, "Commentary: Preserving the Orbital Environment," *Space News*, 19 February 2007.

activities from civil and commercial activities in the building of these measures because advocating a single standard for how all space activities ought to be regulated is ambitious and not likely to be helpful. The U.S. Department of Defense (DOD) requires safe and responsible operations by warships and military aircraft, but they are not legally required to follow all the same rules as commercial traffic and sometimes operate within specially protected zones that separate them from other traffic. Full and open dialogue about these ideas along with others will help develop space rules that draw from years of experience in operating in these other domains and make the most sense for the unique operational characteristics of space. Other concerns surround the implications of various organizational structures and rules of engagement for potential military operations in space. Should such forces operate under national or only international authority, who should decide when certain activities constitute a threat, and how should such forces be authorized to engage threats, especially if such engagements might create other threats, or potentially cause harm to humans or space systems? Clearly, these and a number of other questions are very difficult to address and require careful international vetting well before actual operation of such forces in space. Finally, consider the historic role of the British Royal and U.S. Navies in fighting piracy, promoting free trade, and enforcing global norms against slave trading. Should there be analogous roles in space for the U.S. military and other military forces today and in the future? What would be the space component of the Proliferation Security Initiative and how might the United States and others encourage like-minded actors to cooperate on such an initiative? Attempts to create legal regimes or enforcement norms that do not specifically include and build upon military capabilities are likely to be divorced from pragmatic realities, and ultimately frustrate efforts.[6]

History suggests there is a very important role for militaries both in setting the stage for the emergence of international legal regimes and in enforcing the norms of those regimes once they emerge.

Seemingly new United States focus and direction on space TCBMs initially was provided by a statement on the Obama Administration White House website that appeared on 20 January 2009: **"**Ensure Freedom of Space: The Obama-Biden Administration will restore American leadership on space issues, seeking a worldwide ban on weapons that interfere with military and commercial satellites."[7] The language about seeking a worldwide ban on space weapons was similar to position papers issued during the Obama-Biden campaign but much less detailed and nuanced; it drew considerable attention and some criticism.[8] By May 2009, the space part of the Defense Issues section on the White House website had been changed to read: "Space: The full spectrum of U.S. military capabilities depends on our space systems. To maintain our technological edge and protect assets in this domain, we will continue to invest in next-generation capabilities, such as operationally responsive space and global positioning systems. We will cooperate with our allies and

[6]On the role of militaries in enforcing legal norms and analogies between the law of the sea and space law, see R. Joseph DeSutter, "Space Control, Diplomacy, and Strategic Integration," *Space and Defense* 1: 1 (2006): 29-51.

[7]The statement appeared on the Defense Agenda section of the White House website.

[8]See, in particular, the *Space News* editorial for 2 February 2009, "Banning Space Weapons—and Reality."

the private sector to identify and protect against intentional and unintentional threats to U.S. and allied space capabilities." Ongoing space policy reviews, including a congressionally-directed Space Posture Review and Presidential Study Directives on National Space Policy are likely to encourage policies that are more supportive of pursuing TCBMs as well as greater reliance on commercial and international partners.[9] Consideration is also being given to the best ways to reconcile any new approaches with the 2006 U.S. National Space Policy language about opposing "development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access to or use of space," while encouraging "international cooperation with foreign nations and/or consortia on space activities that are of mutual benefit."[10] Spacepower actors can expect to continue making progress in developing effective, sustainable, and cooperative approaches to space security by building on the ongoing thoughtful dialogue between all major space actors in several venues that emphasize a number of primarily incremental, pragmatic, technical, and bottom-up steps. Prime examples of this approach, include the February 2008 adoption by the United Nations General Assembly of the Inter-Agency Debris Coordination Committee (IADC) voluntary guidelines for mitigating space debris and the December 2008 release from the Council of the European Union (EU) of a draft Code of Conduct for outer space activities.[11]

Beyond the OST, efforts to craft comprehensive, formal, top-down space arms control or regulation continue to face the same significant problems that have overwhelmed attempts to develop such mechanisms in the past. The most serious of these problems, include: disagreements over the proper forum, scope, and object for negotiations; basic definitional issues about what is a "space weapon" and how they might be categorized as offensive or defensive, and stabilizing or destabilizing; and daunting concerns about whether adequate monitoring and verification mechanisms can be found for any comprehensive and formalized TCBMs. These problems relate to a number of very thorny, specific issues, such as whether the negotiations should be primarily among only major spacefaring actors or more multilateral, what satellites and other terrestrial systems should be covered, and whether the object should be control of space weapons or TCBMs for space; the types of TCBMs which might be most useful (e.g., rules of the road or keep-out zones) and how these approaches might be reconciled with the existing space law regime; and verification problems, such as how to address the latent or residual anti-satellite (ASAT) capabilities possessed by many dual-use and military systems, or how to deal with the significant military potential of even a small number of covert ASAT systems.

New space system technologies, continuing growth of the commercial space sector, and new verification and monitoring methods interact with these existing problems in

[9]Section 913 of the Fiscal Year 2009 National Defense Authorization Act (P.L. 110-417) directs the Secretary of Defense and Director of National Intelligence to submit a Space Posture Review to Congress by 1 December 2009. In addition, the Obama Administration has ongoing Presidential Study Directives that are examining the need for changes to current National Space Policy. See Amy Klamper, "White House Orders Sweeping U.S. Space Policy Review," *Space News*, 15 July 2009.

[10]The unclassified version of current National Space Policy was posted on the Office of Science and Technology Policy website on 14 October 2006.

[11]United Nations General Assembly Resolution 62/217, "International cooperation in the peaceful uses of outer space," 1 February 2008, and Council of the European Union, "Council conclusions and draft Code of Conduct for Outer Space Activity, (Brussels: Council of the European Union, 3 December 2008).

complex ways. Some of the changes would seem to favor TCBMs, such as better radars and optical systems for improved SSA, attribution, and verification capabilities; technologies for better space system diagnostics; and the stabilizing potential of redundant and distributed space architectures that create many nodes by employing larger numbers of smaller and less expensive satellites. Many other trends, however, would seem to make space arms control and regulation even more difficult. For example: micro- or nano- satellites might be used as virtually undetectable active ASATs or passive space mines; proliferation of space technology has radically increased the number of significant space actors to include a number of non-state actors that have developed or are developing advanced dual-use technologies, such as autonomous rendezvous and docking capabilities; satellite-enabled communications technology can easily be used to jam rather than communicate; and growth in the commercial space sector raises issues, such as how quasi-military systems could be protected or negated, and the unclear security implications of global markets for dual-use space capabilities and products.

There is disagreement about the relative utility of top-down versus bottom-up approaches to developing space TCBMs and formal arms control, but, following creation of the OST regime, the United States and many other major spacefaring actors have tended to favor bottom-up approaches, a point strongly emphasized by U.S. Ambassador Donald Mahley in February 2008:

> Since the 1970s, five consecutive U.S. administrations have concluded it is impossible to achieve an effectively verifiable and militarily meaningful space arms control agreement.[12]

Yet this assessment may be somewhat myopic, since strategists need to consider not only the well-known difficulties with top-down approaches, but also the potential opportunity costs of inaction, and recognize when they may need to trade some loss of sovereignty and flexibility for stability and restraints on others. Since the United States has not tested a kinetic energy ASAT since September 1985 and has no program to develop such capabilities, would it have been better to foreclose this option to pursue a global ban on testing kinetic energy ASATs, and would such an effort have produced a restraining effect on Chinese development and testing of ASAT capabilities? This may have been a lost opportunity to pursue legal approaches, but is a complex, multidimensional, and interdependent issue shaped by a variety of other factors, like inabilities to distinguish between ballistic missile defense and ASAT technologies, reluctance to limit technical options after the end of the Cold War, emergence of new and less easily deterred threats, and the demise of the Anti-Ballistic Missile (ABM) Treaty.

Moreover, the Chinese, in particular, apparently disagree with pursuing only bottom-up approaches, and, in ways that seem both shrewd and hypocritical, are currently developing significant counterspace capabilities, while simultaneously advancing various top-down proposals in support of prevention of an arms race in outer space (PAROS) initiatives and moving ahead with the joint Chinese-Russian draft treaty on "Prevention of Placement of Weapons in

[12]Ambassador Donald A. Mahley, "Remarks on the State of Space Security," *The State of Space Security Workshop*, Space Policy Institute, George Washington University, Washington, 1 February 2008.

Outer Space, the Threat or Use of Force against Outer Space Objects" (PPWT) introduced at the United Nations Conference on Disarmament in February 2008. If the Chinese are attempting to pursue a two-track approach to space arms control, they need to present that argument to the international community much more explicitly. The current draft PPWT goes to considerable lengths in attempting to define space, space objects, weapons in space, placement in space, and the use or threat of force, but there are still very considerable definitional issues with respect to how specific capabilities would be classified. An even more significant problem relates to all the terrestrial capabilities that are able to eliminate, damage, or disrupt the normal function of objects in outer space, such as the Chinese direct ascent ASAT. One must question the utility of a proposed agreement that does not address the significant security implications of current space system support for network-enabled terrestrial warfare, does not deal with dual-use space capabilities, seems to be focused on a class of weapons that does not exist, or at least is not deployed in space, is silent about all the terrestrial capabilities that are able to produce weapons effects in space, and would not even ban development and testing of space weapons, only their use.[13] Given these weaknesses in the PPWT, it seems plausible that it is designed as much to place political pressure on the United States and derail U.S. missile defense efforts as it is to promote sustainable space security.

Since Sino-American relations and space relations, in particular, are likely to play a dominant role in shaping the quest for spacepower and sustainable security during this century, other proposed Sino-American cooperative space ventures or TCBMs are worthy of further consideration, including inviting a Chinese astronaut to fly on one of the remaining Space Shuttle missions, and making very specific, repeated, and public invitations for the Chinese to join the ISS program and other major cooperative space efforts. The United States and China could also work towards developing non-offensive defenses of the type advocated by Philip Baines.[14] Kevin Pollpeter explains how China and the United States could cooperate in promoting the safety of human spaceflight and "coordinate space science missions to derive scientific benefits and to share costs. Coordinating space science missions with separately developed, but complementary space assets, removes the chance of sensitive technology transfer and allows the two countries to combine their resources to achieve the same effects as jointly developed

Sino-American relations… are likely to play a dominant role in shaping the quest for spacepower and sustainable security during this century…

[13]For an outstanding analysis of trigger events for space weaponization and why space-basing is not necessarily the most important consideration, see Barry D. Watts, *The Military Use of Space: A Diagnostic Assessment* (Washington, D.C.: Center for Strategic and Budgetary Assessments, February 2001), 97-106. Watts argues that: "There are at least two paths by which orbital space might become a battleground for human conflict. One consists of dramatic, hard-to-miss trigger events, such as the use of nuclear weapons to attack orbital assets. The other class involves more gradual changes, such as a series of small, seemingly innocuous steps over a period of years that would, only in hindsight, be recognized as having crossed the boundary from force enhancement to force application." Watts discusses high-altitude nuclear detonations, failure of nuclear deterrence, and threats to use nuclear ballistic missiles during a crisis as the most likely of the dramatic trigger events.

[14]See Philip J. Baines, "The Prospects for 'Non-Offensive' Defenses in Space," in James Clay Moltz, ed., *New Challenges in Missile Proliferation, Missile Defense, and Space Security* (Monterey: Center for Nonproliferation Studies, Occasional Paper 12, Monterey Institute of International Studies, July 2003), 31-48.

missions."[15] Michael Pillsbury outlined six other areas where U.S. experts could profitably exchange views with Chinese specialists in a dialogue about space weapon issues: "reducing Chinese misperceptions of U.S. Space Policy, increasing Chinese transparency on space weapons, probing Chinese interest in verifiable agreements, multilateral versus bilateral approaches, economic consequences of use of space weapons, and reconsideration of U.S. high-technology exports to China."[16]

Finally, Bruce MacDonald's report on *China, Space Weapons, and U.S. Security* for the Council on Foreign Relations offers a number of specific recommendations for both the United States and China. For the U.S., MacDonald recommends the following measures: assessing the impact of different U.S. and Chinese offensive space postures and policies through intensified analysis and "crisis games," in addition to wargames; evaluating the desirability of a "no first use" pledge for offensive counter-space weapons that have irreversible effects; pursuing selected offensive capabilities meeting important criteria – including effectiveness, reversible effects, and survivability – in a deterrence context to be able to negate adversary space capabilities on a temporary and reversible basis; refraining from further direct ascent ASAT tests and demonstrations as long as China does, unless there is a substantial risk to human health and safety from uncontrolled space object re-entry; and entering negotiations on a kinetic energy ASAT testing ban. MacDonald's recommendations for China include: providing more transparency into its military space programs; refraining from further direct ascent ASAT tests as long as the United States does; establishing a senior national security coordinating body, equivalent to a Chinese National Security Council; strengthening its leadership's foreign policy understanding by increasing the international affairs training of senior officer candidates and establishing an international security affairs office within the People's Liberation Army (PLA); providing a clear and credible policy and doctrinal context for the 2007 ASAT test and counterspace programs, more generally, and addressing foreign concerns over China's ASAT test; and offering to engage in dialogue with the United States on mutual space concerns, and become actively involved in discussions on establishing international space codes of conduct and confidence-building measures.[17]

Spacefaring actors should consider revising and further developing the OST regime as a key first step when seeking better ways to harvest energy and create wealth in and from space.

Harvesting Energy and Creating Wealth In and From Space

Spacefaring actors should consider revising and further developing the OST regime as a key first step when seeking better ways to harvest energy and create wealth in, and from, space. Expanding participation in the OST as

[15]Kevin Pollpeter, "Building for the Future: China's Progress in Space Technology during the Tenth 5-Year Plan and the U.S. Response," (Strategic Studies Institute: U.S. Army War College, 21 March 2008), 48-50.

[16]Michael P. Pillsbury, "An Assessment of China's Anti-Satellite and Space Warfare Programs, Policies, and Doctrines," Report prepared for the U.S.-China Economic and Security Review Commission, 19 January 2007, 48.

[17]Bruce W. MacDonald, *China, Space Weapons, and U.S. Security* (Council on Foreign Relations, September 2008), 34-38.

recommended above would also be helpful, but other steps, such as reducing liability concerns, and clarifying legal issues with respect to harvesting energy and generating wealth, are likely to be more effective in furthering commercial development of space. Of course, as with security, a range of objectives and values are in tension and require considerable effort to change or keep properly balanced. The OST has been extremely successful thus far with respect to its primary objective of precluding replication of the colonial exploitation that plagued much of Earth's history. The international community should now consider whether the dangers posed by potential cosmic land grabs continue to warrant OST interpretations that may be stifling development of spacepower, and, if these values are found to have become imbalanced, how impediments might best be reduced. Spacefaring actors should again use an expansive approach to consider how perceived OST restrictions and the commercial space sector have evolved and might be further advanced in a variety of ways, including reinterpreting the OST regime itself, becoming more intentional about developing spacepower, creating space-based solar power capabilities, and improving export controls.

While the OST has thus far been unambiguous and successful in foreclosing sovereignty claims and the ills of colonization, it has been less clear and effective with respect to de facto property rights and other liability and commercialization issues. OST language, negotiating history, and subsequent practice do not preclude some level of commercial activity in space and on celestial bodies, but various articles of the OST support different interpretations about the potential scope and limitations on this activity. The treaty most clearly allows those commercial activities that would be performed to support exploration or scientific efforts. It is far more problematic with respect to commercial space activity that would result in private gain or not somehow equitably distribute gains among all states. Even if it were found that commercial activities would not "appropriate" space resources, however that might be defined, it would be difficult to reconcile such activity with the spirit of the OST regime, especially since the regime provides no guidance on how private or unequal gains might be distributed. In addition to clarifying potential property rights and wealth distribution mechanisms, consideration should be given to re-evaluating liability standards. The 1972 Liability Convention establish two distinct liability structures: launching states are absolutely liable to pay compensation for any damages caused by space objects on Earth or to aircraft in flight, but are only liable for damages caused in space by space objects if found to be at fault or negligent. A challenge for the international community is how best to evolve the existing space law regime based on either absolute liability or fault/negligence, depending upon the location of the incident, into a structure that might provide enough clarity to help establish liability for damages in space, and perhaps provide better incentives for commercial development.[18]

[18]Although Article VII of the OST discusses liability, that article was further implemented in the Convention on International Liability for Damage Caused by Space Objects, commonly referred to as the Liability Convention. Under the Liability Convention, Article II, a launching state is absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight. However, under Articles III and IV, in the event of damage being caused elsewhere than on the surface of the Earth by a space object, the launching state is liable only if the damage is due to its fault or the fault of persons for whom it is responsible, including commercial companies, under a negligence standard. See Convention on International Liability for Damage Caused by Space Objects (resolution 2777 (XXVI) annex), adopted on 29 November 1971, opened for signature on 29 March 1972, and entered into force on 1 September 1972.

Additional interpretation issues stem from the fact that OST is embedded within a larger body of international law and that broad regime is evolving, sometimes in ambiguous and contradictory ways. Elements within this larger regime are of unclear and unequal weight; for example, the Moon Agreement with its Common Heritage of Mankind (CHM) approach to communal property rights and equally shared rewards undoubtedly has some effect in advancing the CHM principle in both formal and customary international law. At the level of formal international law, however, the Moon Agreement falls well short of the OST regime due to its lack parties, especially among major spacefaring states.

Most fundamentally, the current lack of clarity within space law about property rights and commercial interests is the result of both space law and space technology being underdeveloped and immature. Of course, there is also a "chicken-and-egg" factor at work since actors are discouraged from undertaking the test cases needed to develop and mature the regime because of the immaturity of the regime and their unwillingness to develop and employ improved technologies and processes as test cases in whatever legal processes would be used to resolve property rights and reward structures. The most effective way to move past this significant hurdle would be to create more clear mechanisms for establishing property rights and processes by which all actors, especially commercial actors, could receive rewards commensurate with the risks they undertake. In addition, any comprehensive re-evaluation of space property rights and liability concerns should also consider how these factors are addressed in analogous regimes, such as the Seabed Authority in the Law of the Sea Treaty. Unfortunately, however, there are also several problems with attempting to draw from these precedents. First, several of the analogous regimes like the Law of the Sea build from CHM premises in several ways and it is not clear this approach is entirely applicable or helpful when attempting to sort through how the OST should apply to issues like property rights and reward structures. Second, while these analogous regimes are undoubtedly better developed than the OST and have a significant potential role in providing precedents, today they are still somewhat underdeveloped and immature with respect to their application in difficult areas, such as property rights and reward structures, again limiting the current utility of attempting to draw from these precedents.

Provisions of the OST regime are probably the most important factors in shaping commercial space activity, but they are clearly not the only noteworthy legal and policy factors at work influencing developments within this sector. Legacy legal and policy structures developed during the Cold War were probably adequate for the amount of commercial space activity during that period, but it is far from clear they will be sufficient to address the significant and sustained increase in commercial space activity since that time. In the 1960s, the United States was the first to begin developing space services, such as communications, remote sensing, and launch capabilities, but did so within the government sector. This approach began to change in the 1980s, first with the November 1984 Presidential Determination to allow some commercial communication services to compete with Intelsat, and continued with subsequent policies designed to foster development of a commercial space sector. By the late 1990s, commercial space activity worldwide had outpaced government activity, and although government space investments remain very important, they are likely to become increasingly overshadowed by commercial activity. It would be helpful if governments, and the U.S. Government in particular, could

more explicitly develop and consistently implement legal structures and long-term policies that would better define and delineate between those space activities that ought to be pursued by the private and public sectors, as well as more intentionally and consistently develop the desired degree of international cooperation in pursuing these objectives.

Other clear commercial and economic distinctions of the Cold War era have even more significant implications for the future of spacepower; whereas the Soviet Union was only a military superpower, China is a major U.S. trading partner and an economic superpower that recently passed Germany to became the world's third largest economy, is poised to pass Japan soon, and is on a path to become larger than the U.S. economy, perhaps within only about ten years. Because of its economic muscle, China can afford to devote commensurately more resources to its military capabilities, and will play a more significant role in structuring the global economic system. For example, China holds an estimated $1.4 trillion in foreign assets, mainly U.S. treasury notes, an amount that gives it great leverage in the structure of the system.[19]

The United States and other major spacefaring actors lack, but undoubtedly need, much more open and comprehensive visions for how to develop spacepower. The process should continue, become more intentional and formalized, and be supported by an enduring organizational structure that includes the most important stakeholders in the future of spacepower. Legal structures should be a foundational part of creating and implementing the vision to develop spacepower, but the approach should be broader, "focused on opening space as a medium for the full spectrum of human activity and commercial enterprise, and those actions, which government can take to promote and enable it, through surveys, infrastructure development, pre-competitive technology, and encouraging incentive structures (prizes, anchor-customer contracts, and property/exclusivity rights), regulatory regimes (port authorities, spacecraft licensing, public-private partnerships), and supporting services (open interface standards, RDT&E [research, development, test, and evaluation] facilities, rescue, etc.)."[20] In addition, consideration should be given to using other innovative mechanisms and nontraditional routes to space development, including a much wider range of federal government organizations, and the growing number of state spaceport authorities and other organizations developing needed infrastructure. Finally, the United States should make comprehensive and careful exploration of the potential of space-based solar power its leading pathfinder in creating a vision for developing spacepower. Working towards harvesting this unlimited power source in economically viable ways will require development of appropriate supporting legal structures, particularly with respect to indemnification and potential public private partnerships.

Global licensing and export controls for space technology have often been developed and implemented in inconsistent and counterproductive ways. It is understandable that many states view space technology as a key strategic resource and are very concerned about developing, protecting, and preventing the proliferation of this technology, but the international community, and the United States, in particular, needs to find better legal mechanisms to balance and advance

[19]See James Fallows, "The $1.4 Trillion Question," *The Atlantic*, January/February 2008.

[20]Peter Garretson, "Elements of a 21st century space policy," *The Space Review*, 3 August 2009.

objectives in this area. Many current problems with U.S. export controls began after Hughes and Loral worked with insurance companies to analyze Chinese launch failures in January 1995 and February 1996. A congressional review completed in 1998, known as the "Cox Report," determined these analyses violated the International Traffic in Arms Regulations (ITAR) by communicating technical information to the Chinese. The 1999 National Defense Authorization Act transferred export controls for all satellites and related items from the Commerce Department to the Munitions List administered by the State Department.[21] The stringent Munitions List controls contributed to a severe downturn in U.S. satellite exports.[22] To avoid these restrictions, foreign satellite manufacturers, beginning in 2002 with Alcatel Space, now Thales Alenia Space, and followed by European Aeronautic Defense and Space (EADS), Surrey Satellite Company, and others replaced all U.S.-built components on their satellites to make them "ITAR-free."[23]

There are two key reasons why the United States should move away from the priorities in its current export control regime. First, an overly broad approach that tries to guard too many things dilutes monitoring resources and actually results in less protection for "crown jewels" than does a focused approach. Second, a more open approach is more likely to foster innovation, spur development of sectors of comparative advantage, and improve efficiency and overall economic growth. Congress and the Obama Administration should make it a priority to re-evaluate current U.S. export controls and adjust laws and policies accordingly. Excellent starting points are the recently released recommendations for re-balancing overall U.S. export control priorities in the congressionally mandated National Academies of Science (NAS) study.[24] In addition, the United States should implement key recommendations from the Center for Strategic and International Studies (CSIS) study on the space industrial base, such as removing from the Munitions List commercial communications satellite systems, dedicated subsystems, and components specifically designed for commercial use.[25]

[21]The January 1995 failure was a Long March 2E rocket carrying Hughes-built Apstar 2 spacecraft and the February 1996 failure was a Long March 3B rocket carrying Space Systems Loral-built Intelsat 708 spacecraft. Representative Christopher Cox led a six-month long House Select Committee investigation that produced the "U.S. National Security and Military/Commercial Concerns with the People's Republic of China" report released on 25 May 1999, http://www.house.gov/coxreport (accessed November 2009). In January of 2002, Loral agreed to pay the U.S. government $20 million to settle the charges of the illegal technology transfer, and in March of 2003, Boeing agreed to pay $32 million for the role of Hughes, which Boeing acquired in 2000. Requirements for transferring controls back to the Department of State are in Sections 1513 and 1516 of the Fiscal Year 1999 National Defense Authorization Act. Related items are defined as "satellite fuel, ground support equipment, test equipment, payload adapter or interface hardware, replacement parts, and non-embedded solid propellant orbit transfer engines."

[22]Satellite builders claim that their exports dropped 59 percent in 2000, and that since March 1999 their share of the global market declined sharply, from 75 percent to 45 percent. See Evelyn Iritani and Peter Pae, "U.S. Satellite Industry Reeling Under New Export Controls," *Los Angeles Times*, 11 December 2000. According to *Space News*, 2000 marked the first time that U.S. firms were awarded fewer contracts for GEO communications satellites than their European competitors; the Europeans were ahead 15 to 13. See Peter B. de Selding and Sam Silverstein, "Europe Bests U.S. in Satellite Contracts in 2000," *Space News*, 15 January 2001.

[23]See Peter B. de Selding, "European Satellite Component Maker Says it is Dropping U.S. Components Because of ITAR," *Space News*, 13 June 2005; and Douglas Barrie and Michael A. Taverna, "Specious Relationship," *Aviation Week & Space Technology*, 17 July 2006, 93-96.

[24]See National Research Council, *Beyond "Fortress America:" National Security Controls on Science and Technology in a Globalized World* (Washington, DC: National Academies Press, 2009). With the Obama Administration and the new congress, as well as former Congresswoman Ellen Tauscher now confirmed in the key position of Under Secretary of State for Arms Control and International Security, conditions for changing the space export control laws are the most favorable they have been for the last decade.

[25]"Briefing of the Working Group on the Health of the U.S. Space Industrial Base and the Impact of Export Controls,"

Environmental Sustainability and Survival

Work towards developing space law to advance spacepower and improve environmental sustainability and humanity's odds for survival faces a number of daunting challenges, including a high "giggle factor," very long timelines that can be beyond our political and personal awareness, and potential returns that are uncertain and intangible. While difficult, work in this area is absolutely critical since it may hold the key to humanity's very survival, and it must be pursued with all the resources, consistency, and seriousness it deserves. The quest to improve space law to support environmental and survival objectives should focus in three areas: space debris, environmental monitoring, and planetary defense.

Human space activity produces many orbital objects; when these objects no longer serve a useful function, they are classified as space debris. Over time, human activity has generated an increasing amount of debris from a variety of causes; the number of catalogued debris objects has gone from about 8,000 to over 18,000 during the past 20 years.[26] The most serious cause of debris is deliberate hypervelocity impacts between large objects at high orbital altitudes, such as the Chinese direct ascent kinetic energy ASAT weapon test of January 2007. This test was dangerously irresponsible and now accounts for more than 25 percent of all catalogued objects in low Earth orbit (LEO).[27] If current trends continue, there is growing risk that space, and LEO in particular, will become increasingly unusable. Fortunately, there is also growing awareness and earnestness across the international community in addressing this threat. Overall goals for spacefaring actors with respect to space debris include minimizing its creation, while mitigating and remediating its effects – space law can play an important role in all these areas. Key approaches to minimizing creation of debris are commercial best practices and evolving regimes, like the IADC voluntary guidelines adopted by the United Nations General Assembly in February 2008. Spacefaring actors also need to consider mechanisms to transition these voluntary guidelines into more binding standards and ways to impose specific costs, such as sanctions or fines on actors that negligently or deliberately create long-lived debris. Fines could be applied towards efforts to further develop and educate spacefaring actors about the debris mitigation regime, as well as to create and implement remediation techniques. An additional potential source of funding for mitigation and remediation would be

(Washington: Center for Strategic and International Studies, February 2008).

[26]Comprehensive and current information about orbital debris is provided by NASA and the European Space Agency, http://orbitaldebris.jsc.nasa.gov and http://www.esa.int/esaCP/SEMHDJXJD1E_FeatureWeek_0.html (both accessed November 2009).

[27]See "Fengyun 1-C Debris: Two Years Later," *Orbital Debris Quarterly News* 13: 1 (2009): 2. The *Orbital Debris Quarterly* is published by NASA Orbital Debris Program Office. As a result of the 11 January 2007 Chinese ASAT test, the U.S. Space Surveillance Network has catalogued 2,378 pieces of debris with diameters greater than five centimeters, is tracking 400 additional debris objects that are not yet catalogued, and estimates the test created more than 150,000 pieces of debris larger than one square centimeter. Unfortunately, less than two percent of this debris has re-entered the atmosphere so far, and it is estimated that many pieces will remain in orbit for decades and some for more than a century. By contrast, destruction of the inoperative USA-193 satellite by the U.S. on 21 February 2008 occurred at a much lower altitude and did not produce long lived debris; the last piece of catalogued debris from this intercept re-entered on 9 October 2008. On the engagement of USA-193, see, in particular, James Oberg, "OPERATION BURNT FROST: Five Myths About the Satellite Smashup," NBC News Analysis, 27 February 2008, and James E. Oberg, "Down in Flames: Media "Space Experts" Flub the Shoot-Down Story," *The New Atlantis* 24 (Spring 2009): 120-129.

establishing auctions for the radio frequency spectrum controlled by the ITU that would be analogous to the spectrum auctions conducted at the national level by organizations like the U.S. Federal Communications Commission. Finally, it must be emphasized that techniques for remediating debris using lasers or other methods are likely to have significant potential as ASAT weapons, and very careful international consideration should be given to how and by whom such systems are operated.

Space provides a unique location to monitor, and potentially remediate, Earth's climate. It is the only location from which simultaneous in-situ observations of Earth's climate activity can be conducted, and such observations are essential to developing a long-term understanding of potential changes in our biosphere. Because so much is riding on our understanding of the global climate and our potential responses to perceived changes, it is particularly important to apply apolitical standards in getting the science right and controlling for known space effects, like solar cycles, when making these observations. If fears about global warming are correct, and the global community wishes to take active measures to remediate these effects, space also provides a unique location to operate remediation options, such as orbital solar shades.

It is also important that the United States and all spacefaring actors think more creatively about using spacepower to transcend traditional and emerging threats to our survival. Parts of space law can help to illuminate paths towards, and develop incentives, to create a better future. Space, perhaps more than any other medium, is inherently linked to humanity's future and very survival. We need to link these ideas together and better articulate ways spacepower can light a path towards genuinely cooperative approaches for protecting the Earth and space environments from cataclysmic events, such as large objects that may collide with Earth or gamma ray bursts that may have the potential to render huge swaths of space uninhabitable. Better knowledge about known threats, such as Near Earth Objects (NEOs), is being developed, but more urgency is required. All predicted near approaches and possible NEO impacts, such as the asteroid Apophis on 13 April 2029, ought to be seen as opportunities since they provide critical real-world tests for our ability to be proactive in developing effective precision tracking and NEO mitigation capabilities. In the near term, it is most important for national and international organizations to be specifically charged with and resourced to develop better understanding of NEO threats and mitigation techniques that can be effectively applied against likely impacts. Ultimately, however, we cannot know of, or effectively plan for, all potential threats to Earth, but should pursue a multidimensional approach to develop capabilities to improve our odds for survival and one day become a multi-planetary species.

Space provides a unique location to monitor, and potentially remediate, Earth's climate.

Conclusion

There will be inevitable missteps, setbacks, and unintended consequences as we refine space law to improve our quest for sustainable space security, generate wealth in and from space, and protect the Earth and space environments. The inexorable laws of physics and of human interaction indicate that we will create the best opportunities for success in improving space law by beginning long-term, patient work now, rather than crash programs

later. This long-term, patient approach will allow the best prospects for space law to provide a solid foundation for the peaceful advancement of spacepower.

Role and Identity for Europe in Space Security

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This article is reprinted here with permission from the authors. See "Executive Summary" in Wolfgang Rathgeber and Nina-Louisa Remuss, *Space Security: A Formative Role and Principled Identity for Europe* (European Space Policy Institute Report 16, January 2009).

Modern societies have become heavily dependent on space and its applications. As a consequence, the issue of security in space is increasingly being recognized as critical for humankind. This development is reinforced by events like the Chinese anti-satellite (ASAT) test in January 2007. Various alternatives to support the peaceful uses of space, to promote international cooperation, and to prevent an arms race in outer space are under discussion. These attempts occasionally lack support by space actors that emphasize the right to act freely when national security concerns are at stake. Possible routes forward include legally binding treaties, confidence building measures, and soft law, such as codes of conduct or rules of the road.

The respective efforts cannot be seen isolated from the political boundary conditions, like existing national space security doctrines. To devise recommendations for action, this background needs to be taken into account. Europe will have to decide upon its own position, to come up with a distinct strategy, and to find suitable ways of implementing its approach to space security. While identifying distinct elements of a possible European doctrine, this article puts Europe in the context of the existing doctrines of other spacefaring countries. In doing so, it goes beyond the mere provision of an internal view, providing a detailed analysis of the legal framework and current proposals under negotiations. Taking, on the one hand, a political sciences approach by using international relations theories to explain differences in doctrines, the paper, on the other hand, offers concrete recommendations addressed to policy makers. It aims at showing how Europe should position itself on the international scene.

Existing National Security Space Doctrines

Doctrines, be they implicit or explicit, demonstrate national goals and security objectives. Different strategies can be chosen to achieve these aims. To prevent an arms race, the possible reasons for the development of an arms race have to be analyzed. Theories offering explanations can be subdivided into theories focusing on external or on internal factors, i.e., factors that lie outside or inside the states participating in an arms race.

The U.S. is the only spacefaring country with an explicit space policy. Its plans are evidenced by the national space policies, the latest formal one from 2006, as well as by other documents, such as the Air Force Space Command's *Vision 2020* or the *National Security Strategy*. In the Cold War era, the U.S. saw space as a sanctuary, i.e., as a surveillance medium and strived for space control – not on a permanent basis, but in case of conflict. In the Reagan Administration, there was a move towards considering space as another area for military operations. After 9/11, security aspects of space were emphasized over civil and scientific ones.

While still pursuing the concept of space control, which may well go beyond the right of self-defense, and asserting a "specific right" for itself, the U.S. also stresses the importance of compliance to the existing international legal framework. However, the fact that the U.S. opposes legal regimes that might infringe on its right of using and accessing outer space has impacts on the process of preventing an arms race in space. It remains to be seen, which approach the Obama Administration will take.

Russia does not have an explicit space doctrine. One of the main rationales for Russian space activities is national security. In the early 1970s, the former Soviet Union had refrained from multilateral efforts to prohibit the development or deployment of space weapons. In that period, it had developed space weapons, such as ASATs. At the beginning of the 1980s, the Soviet Union shifted its policy and proposed a multilateral treaty banning space weapons in the framework of the United Nations. It also called for a total demilitarization of outer space. Russia continues this trend, calling for unhindered space exploration and preservation of space as a sanctuary. At the same time, it has expressed concerns that attacks on its early warning systems would represent a direct threat to its security.

Europe… has only recently regarded space as a strategic asset.

While China's space objectives are stated openly, its military space doctrine is not published. Thus, there is no explicit space policy doctrine. The Standing Committee of the National People's Congress and the Central Military Commission define national and strategic objectives, and policies and doctrines are clarified by the relevant bureaucratic actors through speeches, white papers, and other instruments. The 2006 White Paper on Space Activities states national security as a main objective, besides the utilization of space for peaceful purposes. The principle of independence is also declared a fundamental policy. Further indications on its space doctrine can be found in China's White Papers on National Defense. China emphasizes the importance of securing information dominance. To avoid vulnerability, it refrains from increasing military reliance on space assets. Concerns about China's real space intentions were raised by its ASAT activity in 2007. At the international stage, the official Chinese position it that space security will be undermined by the weaponization of space. Consequently, China is one of the key proponents of negotiating a multilateral arms control treaty within the Prevention of an Arms Race in Outer Space (PAROS) talks at the United Nations Conference on Disarmament (UNCD). In this context, it lines up with Russia. There are different political theories to explain this alliance.

Towards a European Space Security Identity

Europe as a whole has only recently regarded space as a strategic asset. Looking at existing space policy documents, it is only possible to distinguish elements of a European space security identity. Space activities in Europe are carried out by multiple actors at different levels: (1) the overall European level with the European Union (EU); (2) the intergovernmental organizations, e.g., European Space Agency (ESA) and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT); and (3) the Member State level with the national space actors.

The EU as the central political authority at the European level has begun to get involved. ESA is the Space Agency of Europe. EUMETSAT provides its members and cooperating states with Earth observation data and weather information. A major part of its data goes to defense-related institutions. Other European organizations and bodies relevant for space and security exist as well. All these institutions are complemented by national projects that are sometimes carried out in bilateral or multilateral cooperation outside the official European structures. A key role is played by the Member States and their space policies.

A number of documents show the ongoing process of developing a European approach to space security. In this regard, the *Three Wise Men Report* of 2000 stated that the European Security and Defense Policy (ESDP) are incomplete without a space component. The EU-ESA Framework agreement in 2004 called on both sides to take into account the security dimension of space technologies and infrastructures. The Council of the EU in 2004 and 2005 called for a roadmap for the development of effective and coherent space capabilities necessary for ESDP and specified the steps needed therefore. The European Space Policy of 2007 contained a distinct chapter on security and defense and called for protection of space infrastructure. The 2008 *von Wogau Report* adopted by the European Parliament insists that European space policy must not contribute to militarization or weaponization of space. The EU is also involved in setting up a Code of Conduct for sustainable space activities. In the long run, Europe will have to come up with a Europeans Space Security Strategy (E3S). Such a strategy can contribute to shaping a European identity in space security, which should comprise a corresponding doctrine as well.

…the role that Europe takes will need to be formative… it will have to actively influence the situation of space security by normative action…

Current Negotiations

Several proposals have been made to negotiate a space weapons ban with Canada, China, and Russia taking the lead, and the U.S. as a major spacefaring nation being involved in the debate. These main players link their position in this domain to their larger strategic positions, relationships and their national space security doctrine. Current proposals can broadly be divided into three categories: (1) the treaty approach; (2) the code of conduct approach; and (3) alternative ideas, including transparency and confidence building measures and the proposal for comprehensive space traffic management.

China and Russia have been strong advocates of a treaty on the peaceful use of outer space in the past. Apart from negotiating a legally binding treaty there is the option of adopting a code of conduct, which can be regarded as a single instrument or an interim solution, i.e., elemental to a future treaty. Alternatively, one of the often referred to all-encompassing solutions is the proposal of a comprehensive space traffic management regime with the most prominent proponent being the International Academy of Astronautics. Thereafter, space traffic management is "a set of technical and regulatory provisions for guaranteeing safe access to outer space, operation in outer space and return from outer space to Earth free from physical or radio frequency interference." Space traffic management is not tackling single issues, but concerns the regulation of space activities as a comprehensive concept. Space traffic

management could be complimentary to existing or future legal regulations, solving the existing deadlock in the UNCD.

Assessing a Role for Europe on the International Scene

The situation described above leaves room for several options to move forward. Accordingly, one could simply neglect the threat of an arms race and avoid any action. Another option would be to amend the existing legal structure.

A third possibility is to introduce confidence building measures and a code of conduct. A fourth way is the negotiation of a legally binding treaty. Given these options, the question arises in more specific terms, which road the EU should take. Conceptualizing Europe's international role does not mean outlining a single role or route Europe does adopt or might follow. Considerations can be broken down into three possible scenarios for Europe shown in Figure 1.

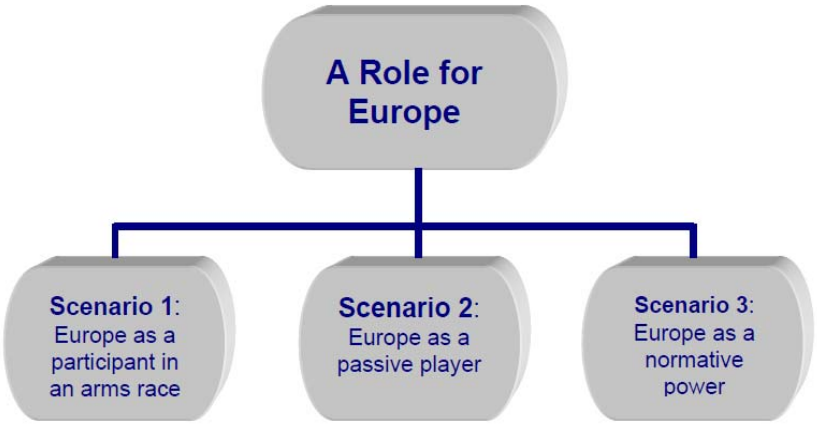

Figure 1. Scenarios for Europe's International Role.

The discussion above showed the future possibilities and roads for the EU to take. The introduction of the code of conduct by the EU might already indicate a certain future direction. It increases the EU's position in the space debate by indicating its willingness and ability to deal with sensitive questions even in the face of opposition from key partners. needs to shape its identity in space security. This identity has to correspond to the values, goals, and policies of the EU.

All in all, the role that Europe takes will need to be formative, i.e., it will have to actively influence the situation of space security by normative action instead of just handling or administrating the given status quo that has been set by others. Europe should pursue certain goals in this regard. Such goals follow from values that have been laid down in various documents, like the European Security Strategy. They include: multilateralism, emphasizing international cooperation and diplomacy; combining civilian and military means; and promoting the rule of law. An identity formed by these underlying values is a principled one.

Based on such an approach, Europe should take into consideration the following policy recommendations: formulate a strategy and develop a space identity in line with the European Security Strategy, corresponding to the values, goals and policies of the EU; decide on the policy making and decision making processes and introduce key mechanisms to oversee the European Space Policy; clarify the organizational and institutional questions relating to space and Common Foreign and Security Policy / ESDP, e.g., in regard to ESA and EDA; establish a European Space Situational Awareness System; increase investments for space programs, research and development; move away from a purely State focused actor perception; and establish a coordinated space dialogue with international partners.

Eisenhower Center Program Summaries

Space Situational Awareness Workshop

Summer Space Seminar

Asia, Space, and Strategy Workshop

Transatlantic Space Cooperation Workshop

Space Situational Awareness Workshop

The goal of the Space Situational Awareness workshops is to bring together stakeholders interested in space situational awareness (SSA). This includes practitioners, users of data, representatives of industry and the military, the scientific community, international organizations, and the satellite-tracking community. These stakeholders discussed 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 this workshop was published in *Space and Defense* 2: 1 (2008).

…frequency of conjunctions is likely greater than one can model or anticipate.

The summary provided here covers the third workshop 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. Areas of focus included: national and international perspectives on SSA; the challenges of the space environment; governance issues related to safe and responsible behavior in the space environment; the state of SSA data sharing and the U.S. Commercial and Foreign Entities (CFE) Program; concepts and capabilities for improved SSA data sharing; and new opportunities in SSA.

At the 2009 SSA workshop, consensus emerged among all participants on the principal of data sharing. In this regard, the workshop served as a useful forum for dialogue on SSA data sharing among military, industry, academic, and think-tank experts from the U.S., Europe, and Russia. Participants viewed the recent the Iridium-Cosmos collision of 10 February 2009[1] as a watershed event on the need for better data sharing. It was recognized at the workshop that orbital conjunctions risks are always present. Further, the fact that statistical analysis of possible conjunctions are based on a short historical time frame and on incomplete data suggests that the frequency of conjunctions is likely greater than one can model or anticipate.

The Iridium-Cosmos collision also pointed to one dilemma of mitigation based on maneuvering an active satellite. The point was made at the workshop that, given uncertainty in predicting an orbital conjunction, if one was to maneuver a space asset there remained the possibility, nonetheless, that a collision could

[1]On 10 February 2009, the Iridium 33 and Cosmos 2251 communications satellites collided over northern Siberia. The impact between the Iridium Satellite LLC-owned satellite and the 16-year-old satellite launched by the Russian government occurred at a closing speed of well over 15,000 mph at approximately 490 miles above the face of the Earth. The low Earth orbit location of the collision contains many other active satellites that could be at risk from the resulting orbital debris. See http://www.stk.com/corporate/mediaCenter/news/iridium-cosmos (accessed November 2009).

still take place. This, in turn, would likely establish fault for liability on the party that undertook the maneuvering – the Liability Convention established the principal of fault-based liability for damages in space. A number of issues in the context of the Iridium-Cosmos collision were discussed: at what point do you take action to maneuver a space asset from a possible conjunction; whose obligation is it to maneuver, especially when a commercial provider owns and operates the space asset; and what are the resultant liability issues?

In terms of SSA data sharing, two specific cases were discussed at the workshop. One case concerned the U.S. CFE program for SSA data sharing. It was noted that since the inception of CFE in 2004, the program evolved from a more conservative and controlling view on data sharing to a more liberal and open view on data sharing. Indicative of this evolution is the openness among U.S. military leaders for European cooperation and involvement in SSA data sharing as well as using European assets to augment SSA capabilities of the U.S. military. The second case of data sharing discussed at the workshop dealt with the efforts of commercial satellite providers to develop and establish SSA data sharing arrangements among key commercial telecommunication satellite operators. In addition to a discussion on some of the specifics of this data sharing arrangement, there was a discussion on ways to expand the sharing arrangement to include the U.S. military.

…openness among U.S. military leaders for European cooperation and involvement in SSA data sharing…

Summer Space Seminar

The Eisenhower Center for Space and Defense Studies organized the Summer Space Seminar since 2007 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 Summer Space 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 2009 Seminar combined site visits with moderated roundtable discussions that covered a number of topics.

- Security space, including space situational awareness, space launch, and space acquisition operations, satellite development, and science and technology research with site visits to: Vandenberg Air Force Base, Space and Missile Systems Center, Boeing, Northrop Grumman, and the Naval Research Laboratory.

- New space companies with a site visit to Space X facilities where the Falcon launch vehicles are developed.

- Military space doctrine and mission areas with a briefing at Air Force Space Command.

- Small satellite development program at the U.S. Air Force Academy.

- Commercial space sector programs in space launch and remote sensing with site visits to United Launch Alliance and Digital Globe facilities.

- Civil space science programs with site visits to the Jet Propulsion Laboratory, NASA's Goddard Space Flight Center, and the Johns Hopkins University's Applied Physics Laboratory.

- Space policy roundtable discussions on space weaponization, NATO space cooperation, the notion of space as a contested or a cooperative environment, export controls, international space cooperation, interagency processes, and national space policy formulation and implementation.

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.

For some in the group, the Seminar was their first exposure to the role and importance of space. For others in the group, it exposed them

to areas that affect space beyond technology and science, like policy, law, and economics.

The Seminar served as 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 took place among the participants that will serve 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 US, Canadian, and European experts and policy makers from the military, civilian government, universities, think-tanks, and the private sectors to discuss the implications of current and future Chinese space policy and investigate areas of possible Sino-U.S. cooperation and competition 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, which spacefaring countries of the Pacific Basin have in the creation of a stable, predictable, and mutually beneficial environment in space. Workshop topics 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 follows below. The earlier summaries of the National Space Forum 2009 in this issue of *Space and Defense*, especially the panel sessions on "Threat Assessments and the Space Domain" and "China's Role in Space," highlighted as well relevant aspects of the discussions at the 2009 Asia, Space, and Strategy Workshop.

There was agreement that the next stage of the workshop series should move toward the development of space lexicon between the U.S. and China as a basis for reaching common understandings. This is essential as it was reiterated at this workshop that differences do exist on important concepts, like deterrence, reassurance, and transparency. The Chinese tend to view deterrence more aggressively than the U.S. There is no corollary concept of deterrence in Chinese based on the U.S. view that deterrence contributes to stability and to reassure an adversary; and there is no concept of reassurance and transparency, as was noted in previous workshops. To add, transparency translates into "espionage" in Mandarin Chinese. Concomitantly, participants at the workshop expressed the view that differences on these concepts should not become issues between the U.S. and China. Dialogue on space cooperation can advance through developing for discussion symmetrical and equal cooperative arrangements.

…differences do exist on important concepts, like deterrence, reassurance, and transparency.

The Chinese present at the meeting primarily expressed views on space security, space economics, and international space cooperation. In the area of security, it was stated that China advances its own capacity in space and it reacts to what it sees as foreign interference from others, especially the United States. This led to an emboldened China in the military space arena. With regard to a military space role, China has a complicated attitude towards space deterrence. The Chinese military refers to deterrence more aggressively and as means to address threats, but political leaders tend to focus on self-defense and

retaliation. In the context of threats, Taiwan is the central issue.

The Chinese present at the workshop emphasized that China is focused on space as a global business. Commercial space is a means by which China cooperates with other states and is a vehicle for soft power projection, in particular with developing states in Africa. It was also remarked how China sees growing links, and mutual influence, between the commercial and military sectors of space. Albeit, the military has its own logic and own incentives, and the commercial sector is more open to the world, the Chinese expressed the view that military knowledge of international norms as to legitimate behavior in the space domain would be a good thing.

China is focused on space as a global business.

In the area of cooperation, China is interested to cooperate with NASA in civil space science and in commercial space launch with U.S. satellite manufacturers. The Chinese also suggested that China will seek to join the International Space Station (ISS) program. Lunar science and plans for future human missions to the Moon offer possible other areas of cooperation for the Chinese with the U.S. and other Asian space powers, such as Japan and India.

Discussed as well at the workshop were issues related to cooperation in standard setting for space technology. One participant that is involved in this area spoke of problems in cooperation as Chinese involvement takes place through a joint government-industry group that the U.S. sees a vehicle for technology transfer to military programs in China. This is an issue, yet U.S. non-participation will not prevent the creation of standards, only of a U.S. voice in setting those standards. To add to these problems, within China there is not enough discussion on this subject, especially in scientific and technical circles.

Lastly, in the session on space deterrence a number of issues were identified: (1) what is deterrence; (2) what is the nature of the conflict; (3) what is the focus; and (4) what is the nature of the adversary? These issues are further highlighted below as discussed during the workshop.

1. The purpose of deterrence is to make the other side change their actions. As such, one needs to know what the enemy is thinking, and how they think. Deterrence by denial was more protection oriented, compared with deterrence through punishment. But today, there are changes in emphasis. Deterrence through punishment was a key in the Cold War. It rested on credibility and will. But now, deterrence through denial is increasingly important, yet it makes deterrence more difficult.
2. The Cold War focused on nuclear arms, and specifically global nuclear war. The fear was of deterrence failure, especially in the shadow of all-out nuclear war. Today, there is an absence of these concerns. Space is seen as a case of extended deterrence. Ironically, the potential for failure of deterrence, however, may have risen.
3. The previous focus of the Cold War was on nuclear weapons. Now, space security issues are much more varied. The weapons and means are much broader, while the strategic context is very different. It is hard to deter through punishment, especially since there is not a symmetric deterrence relationship in space.
4. Punishment and credibility require defining expectations of adversary behavior. There were rational actor assumptions during the Cold War. Today,

there are multiple actors, more issues with denial, and more questions on means of deterrence. The shift from the Cold War, at least in the U.S., is towards general deterrence, rather than an adversary-specific deterrence posture.

Transatlantic Space Cooperation Workshop

In 2008, the Eisenhower Center for Space and Defense Studies established the Transatlantic Space Cooperation Workshop series. 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 the 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 in 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 the civil, security, and commercial space areas. 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; and future avenues for advancing transatlantic cooperation.

Within this context, workshop participants discussed approaches to transatlantic space cooperation based on establishing best practices for responsible spacefaring activities, such as practices of control and operations of space assets, and mitigating orbital debris. There were as well discussions on the common need for advancing data coordination and sharing in Earth observation programs. Participants expressed the view, in particular those form Europe, that the multilateral preferences of the United States Obama Administration offer an opportunity to re-examine ways to advance transatlantic space cooperation in terms of sharing information, data, and capabilities. In this regard, there was the realization among participants on both sides of the Atlantic that limited budgets for space activities in relation to demands on programs will facilitate greater cooperation between the U.S. and Europe across the different space sectors.[1]

…limited budgets for space activities in relation to demands on programs will facilitate greater cooperation between the U.S. and Europe...

[1]There was little focus during the 2009 workshop on military space cooperation between the U.S. and Europe. And, there was little attention to a possible role of NATO in this context. Europe is not well synchronized in the area of military space limiting military space cooperation with the U.S.

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.

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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.

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- Use percent rather than % except in figures and tables.
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- Make use of 21st style where appropriate.
- Keep capitalization to a minimum.
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- Avoid policy recommendations in the analysis part of paper; leave this, if applicable, for a separate section at the end of the paper.
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