



European Space Policy Institute

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Space Security through the Transatlantic Partnership: Conference Report and Analysis

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ESPI's Executive Summary and Analysis

This report reflects the major findings and recommendations of a one and a half day conference that was convened in Prague in June 2011 entitled "Space Security through the Transatlantic Partnership", co-sponsored by the European Space Policy Institute (ESPI) and the Prague Security Studies Institute (PSSI). The conference was dedicated to discussing the space security implications of the evolving space environment as well as assessing the current status of, and outlook for, trilateral cooperation among Europe, the U.S. and Japan in advancing the future sustainability of space activities. It was the first non-governmental transatlantic conference of its kind with the participation of over one hundred senior space policy officials and high-level representatives of governments, multilateral institutions, NGOs, academia, and industry from these countries.

The principal rationale for organizing the conference was to contribute to the somewhat uneven space security dialogue among the transatlantic partners and Japan and assess both converging and diverging views on the multifaceted space security portfolio. It likewise sought to launch an on-going "Track II" non-governmental process designed to help craft a future architecture for the management of this key dimension of space policy on a trilateral, and eventually global, basis.

The conference panels discussed the definition of space security, challenges and opportunities associated with a trilateral approach to cooperation, the governance of space activities, Space Situational Awareness (SSA), and the role of space crisis management (with an emphasis on crisis prevention). The proper structuring of the space security dialogue and implementation modalities were likewise treated, as well as post-conference follow-up.

This conference report and analysis seeks to enrich the debate on this topic, as well as identify solution sets that will serve these allies as well as the global space community. It also aspires to expand the deliberations on space security issues from a specialized community of space policy experts to a broader audience of security and foreign policy decision-makers.

The presentations and subsequent discussions revealed that there exist various inter-

pretations of the term "space security" based on national interests, past space activities, and more immediate foreign policy goals. In discussing space security, the conference participants focused on two distinctly different concepts that can be summarized by the phrases "security for space" and "space for security". Many speakers emphasized that without the ability to safeguard space-based systems and assets there can be no sustainable use of space to contribute to security on Earth. With new actors, technologies, and dependencies on space-derived applications and services, space security decision-making in the 21st century must take into account the ever-changing strategic space environment.

Just as defining space security is somewhat challenging, identifying a common approach to international space security cooperation among the U.S., Europe and Japan is also not straightforward. The partnering countries will need to coordinate their respective national space policies, different military cultures (to help facilitate technical interoperability), and joint operations and information-sharing. There are likewise marked differences between the way space security is described in the doctrines of European countries and those of the U.S. The threats delineated on the U.S. side often involve offensive actions by other space-faring actors, whereas Europe primarily focuses on the threats posed by space debris, satellite collisions and other such phenomena. Europe has to deal with an additional layer of difficulty in transcending individual national interests with regard to cooperation on military space issues. Japan has opted for an exclusively defence-oriented space policy (i.e. the use of space for information gathering, warning and surveillance in the proximity of Japan, and communication for the Japan Self Defense Force). Development of upgraded space capabilities to address Japan's security concerns is under active deliberation.

Space Situational Awareness (SSA) repeatedly emerged as a key area for mutual collaboration. SSA is one of the most important elements of ensuring safety and security for all functioning satellites and spacecraft and enabling the monitoring and understanding of a constantly changing space environment. Moreover, timely warnings of potential collisions, or troublesome developments, in

space, facilitated by SSA, constitute a vital, “big picture” transparency measure. From a national perspective, the protection of a country’s territory and population, as well as the readiness of the military to defend national sovereignty, will inevitably take priority. SSA sharing needs to be conducted in a way that complements nations’ operational capacity without relinquishing sovereign control of their respective national systems. The U.S. currently views cooperation on SSA as a building-block enterprise. In Europe, SSA is likewise viewed as a fundamental element, technically and politically, with regard to most future European space security and defence initiatives. SSA could also represent a constructive European contribution to transatlantic, as well as trilateral, cooperation.

Any collaboration needs to be grounded in realistic expectations. This involves, in part, better integrating pressing space challenges into broader security policy-making deliberations in the respective nations. Accordingly, any discussions on cooperation should include steps that would advance the development of practical measures that can make collective space security architecture workable. Such practical measures include: the critical evaluation of capabilities that can be shared; applying the positive lessons from past models of cooperation; and balancing cooperation with individual national interests (e.g. preserving critical industrial capabilities, protecting sources and methods associated with information-sharing, adopting acceptable burden-sharing arrangements, etc.).

The shared interests of Europe, the U.S. and Japan can also be expressed by pursuing governance of space activities in a manner that enables continued exploration and exploitation of space for peaceful purposes. Good space governance requires clear guidance, informed decision-making, comprehensive management, consistent policies, and logical processes, whilst recognising the basic free-use principle laid down in the Outer Space Treaty. Space governance, like most other human endeavours, is presently conducted by nations that bear the bulk of the responsibilities. There are a number of available mechanisms and venues to organize space governance and these are managed under existing international law. Governance will continue to evolve as space is increasingly used to address global terrestrial challenges, as well as a tool for strengthened partnership among nations. The trilateral U.S., Europe, Japan partnership can go a long way toward advancing this overarching goal.

With regard to successful space crisis management, it must be grounded in a well-understood vision of the space environment, and a strategic framework with which to contextualize and respond to challenges in that environment. Moreover, there are increasingly space-related implications stemming from the interface between the space and terrestrial environments where, for example, damage to a space-based asset could trigger various civilian or military crises on the ground.

Prospects for achieving crisis prevention can be advanced by the responsible, peaceful, and safe use of space and the active discouragement of destabilizing behaviour. With the development of counterspace capabilities by some countries, the concept of deterrence has increasingly gained traction in the debate on space crisis management. Transparency and confidence-building measures (TCBM), including the sharing of data and information relevant for conjunction analysis, pre-notification of launches, building international partnerships and creating a common understanding of what constitutes “responsible behaviour”, are important components of crisis prevention.

Contingency planning, should preventive measures fail, is fundamental to effective management of a space crisis. Such planning needs to involve practical operational procedures to understand how institutions and technologies will interact in a crisis that requires quick decision-making and possible interaction of groups that have not worked together before. In short, space crisis management is underpinned by diplomatic efforts aimed at preventing crises in space, an operational ability to manage such a crisis already underway, and the availability of the technologies needed to facilitate crisis management.

Although nations will differ in what is viewed as an appropriate response to an incident or conflict in space, there is a need to forge a common understanding of space security “red lines” of acceptable behaviour. Positive incentives will necessarily have to be accompanied by sufficient levels of deterrence and penalties for infractions. Perhaps most importantly, active engagement of all three partners in international fora supporting common objectives would prove especially helpful in formulating and enforcing such norms.

To conclude, the conference confirmed that the transatlantic and trilateral partnerships hold the promise of positioning space security as a defined field that should be integrated fully into broader foreign and security policy decision-making. Conference participants



generally expressed support for continuing to develop this new “Track II” NGO initiative. Immediate next steps included the co-sponsors preparing conference reports (with this being ESPI’s contribution) that summarize the most relevant areas of space security discussed at the conference which could benefit from further dialogue, research and trilateral exchanges. Some of the recommendations put forward by the participants were:

- Integrate space security more fulsomely into broader foreign policy and international security deliberations
- Exploit the EU-U.S. dialogue on civil space cooperation as an important platform for space security discussions, reinforced by NGO expert groups
- Involve commercial operators in space policy debates on major issues, including regulatory compliance; access to space; SSA and collision avoidance; and cyber security
- Identify guidelines, based on common understandings, which define responsible behaviour in space
- Seek a better understanding of the connectivity among SSA, TCBMs and space crisis management
- Continue to engage governments in forging a clear understanding of the draft Code of Conduct for Outer Space Activities
- Identify several concrete activities for initial practical collaboration
- Explore establishment of a combined space operations centre as a vehicle for closer cooperation, including the sharing of information on the space environment, objects, and interference
- Examine the prospects for more robust multilateral coordination concerning incidents or threats via joint exercises between governments and private operators (beyond the Schriever Wargames) to establish a crisis response roadmaps
- Assess the potential of joint U.S.-EU-NATO exercises on different contingencies associated with transatlantic space crisis management
- Involve Japan’s space security stakeholders as full partners in transatlantic space security deliberations
- Understand the potential consequences of space-related disruptions for terrestrial crisis management

1. Introduction

Space security is rapidly emerging as a crucial dimension of national and international space policies as space systems are vital to many terrestrial endeavours. Space permeates foreign policy, national security, and global economic interests. Among the terrestrial security challenges that can, and do, benefit from space are: international crisis management; responses to natural disasters; counter-terrorist operations; curtailing the proliferation of weapons of mass destruction; avoiding, containing and managing environmental hazards; monitoring failing and failed states; and addressing humanitarian crises. Without the ability to protect the space environment and space assets, however, there can be no sustainable space-derived benefits for Earth.

Collaboration among the U.S., Europe and Japan has the potential to go a long way in advancing the future sustainability of space activities. All three partners have been seeking new modalities to improve collaboration with allies. Accordingly, the conference was designed to upgrade the collective understandings of Europe, Japan and the U.S. in this rapidly emerging field and identify solu-

tions that will inure to the benefit of these allies as well as the rest of the global space community.

Given this framework, this report seeks to explore how the shared interests of Europe, the U.S. and Japan in strengthening space security can also advance the pressing need to preserve a stable and safe space environment (including the protection of space-based assets) and ensure responsible behaviour in space. The report is occasioned by a conference on space security, co-sponsored by the European Space Policy Institute (ESPI) and the Prague Security Studies Institute (PSSI), held in June 2011. The Prague conference brought together, on a trilateral basis, relevant experts to discuss the security implications of an increasingly “complex, congested and competitive” space domain to complement and reinforce ongoing dialogues on a number of these topics at various workshops and other events sponsored by NGOs, governments, industry, and academia. It also seeks to broaden the debate on space security issues from a specialized community of space policy experts to a broader audience of security and foreign policy decision-makers.



2. Conference Overview



On 12–14 June 2011, the conference “Space Security through the Transatlantic Partnership”, co-sponsored by the European Space Policy Institute (ESPI) and the Prague Security Studies Institute (PSSI) was convened in Prague. It was the first non-governmental

transatlantic conference of its kind dedicated to this topic with the participation of over one hundred senior space policy officials and high-level representatives of multilateral institutions, NGOs, academia, and industry from Europe, the U.S., and Japan. They included: the U.S. Departments of State and Defense, the U.S. Strategic Command; the European Space Agency (ESA); the European Council; the European Commission (EC); the European External Action Service (EEAS); the European Defence Agency (EDA); the European Union Satellite Centre (EUSC); the Japanese Ministry of Defense; Japan Aerospace Exploration Agency (JAXA); and the Strategic Headquarters for Space Policy in the Cabinet Office of the Prime Minister of Japan.



2.1 Background and Rationale

The topic of space security is of growing significance to Europe, the U.S., as well as Japan. Space systems have become critical national infrastructures. The benefits of the free use of space permeate every facet of people's daily lives from aircraft and ship navigation to weather forecasting, from natural resource management to disaster relief, and from global communications to search and rescue. Space activities have boosted the global economy, enhanced international security, strengthened foreign relations, and advanced scientific understanding. Space capabilities provide the world with unprecedented advantages in national decision-making as they facilitate rapid information flows addressing global challenges. They are vital for monitoring strategic and military developments as well as supporting treaty compliance and arms control verification. They also enable speedy responses to natural and man-made disasters, and the ability to chart environmental trends. Space systems allow people and the governments around the world to "see with clarity, to communicate with certainty, to navigate with accuracy and to operate with assurance"¹.

In Europe, space is now considered a strategic priority and increasingly an essential component of policy planning and decision-making. The topic of space security has gained momentum through such developments as the European Space Policy of May 2007 and the Lisbon Treaty², which gave the European Union an explicit mandate to be involved in space matters, as a competence shared with Member States. The main European-level institutions dealing with space-related issues are the EU and the European Space Agency (ESA). ESA is increasingly involved in defence and security matters. Concerning defence-related issues, it is important to note that the Common Security and Defence Policy (CSDP) remains an intergovernmental policy under the Lisbon Treaty. Accordingly, any meaningful space security cooperation needs to involve close coordination between individual European countries.

¹ From remarks of U.S. Ambassador to the Czech Republic Norman L. Eisen at the conference's Opening Reception. 12 June 2011.

² "Treaty of Lisbon." 13 December 2007. Official Journal of the European Union 10 Oct. 2011 <<http://www.consilium.europa.eu/uedocs/cmsUpload/cg00014.en07.pdf>>.

The High Representative for Foreign Affairs and Security Policy, who is also a Vice-President of the European Commission and President of the Foreign Affairs Council, is supported by the European External Action Service (EEAS) and supervises two institutions important for space: the European Union Satellite Centre (EUSC) and the European Defence Agency (EDA). EUMETSAT is likewise important as it provides its members and cooperating states with weather-related Earth observation data and services, a major portion of which is destined for defence-related institutions. As it expands its international role, the EU is seeking to develop a comprehensive approach to space-related areas, including space security.

In the U.S., the Obama Administration has set forth a number of reinforcing objectives in its 2010 U.S. National Space Policy (NSP). It emphasized that "the sustainability, stability, and free access to, and use of, space" is "vital to [U.S.] national interests" and "space operations should be conducted in ways that emphasize openness and transparency..."³ The NSP also states that "the United States will employ a variety of measures to help assure the use of space for all responsible parties, and, consistent with the inherent right of self-defense, deter others from interference and attack, defend [U.S.] space systems and contribute to the defense of allied space systems, and, if deterrence fails, defeat efforts to attack them."⁴

The U.S. National Security Strategy (NSSS), released in May 2010, made clear that America's relationships with its European allies "remain the cornerstone for U.S. engagement with the world, and a catalyst for international action."⁵ Specific to space, this document states: "To promote security and stability in space, we will pursue activities consistent with the inherent right of self-defense, deepen cooperation with allies and friends, and work with all nations toward the responsible and peaceful use of space."⁶ Finally, the

³ "National Space Policy of the United States of America" 28 June 2010. The White House President Barack Obama 10 Oct. 2011 <http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf>.

⁴ "National Space Policy of the United States of America" 28 June 2010. The White House President Barack Obama 10 Oct. 2011 <http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf>.

⁵ "National Security Strategy" May 2010. The White House President Barack Obama 10 Oct. 2011 <http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf>.

⁶ "National Security Strategy" May 2010. The White House President Barack Obama 10 Oct. 2011 <http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf>.



NSSS pointed out that space is “becoming increasingly congested, contested, and competitive”⁷ and emphasized measures that strengthen the security and stability of space and encourage international cooperation for these purposes. From the U.S. perspective, maintaining the benefits of space for the U.S. and its allies are vital for national security. That said, the evolving environment increasingly diminishes U.S. space primacy.

With regard to Japan, it enacted a new “Basic Law on Space” in 2008 that had as one of its central provisions a recognition that often space systems and activities are inherently “dual use” in nature, involving both civilian and military applications. Subsequently, the Strategic Headquarters for Space Policy was established at Cabinet level, with the Prime Minister as the Chairman. The Strategic Headquarters released in June 2009 the Basic Plan for Space Policy (a five-year programme) with the overarching goal of seeking to implement a comprehensive strategy for space.⁸ This positive development came at a time when a number of nations are upgrading their space programmes and safeguards. Japan’s unswerving dedication to the peaceful use of space has translated into its desire to enhance cooperation with other space-faring nations, hence the appropriateness of Japanese participation in the otherwise transatlantic gathering.

Against this background, the conference panels discussed the multi-faceted field of space security, including how to define space security, challenges and opportunities associated with a transatlantic approach to international space security cooperation, the governance of space operations and activities (with special attention to the draft Code of Conduct for Outer Space Activities proposed by the EU⁹), enhancing space security via Space Situational Awareness (SSA), and space crisis management (including the importance of crisis prevention). The proper structuring of the associated space security dialogue and implementation modalities among the transatlantic partners and Japan were discussed in the final panel, as well as possible post-

conference next steps concerning this vital issue area.

The main aim of the conference was to promote the responsible use of space, to intensify bilateral, regional, and international cooperation, as well as solicit and assess both converging and diverging views on the multi-faceted subject of space security. Moreover, it sought to establish an on-going “Track II” non-governmental process designed to assist with the crafting of a future architecture for the management of this key dimension of space policy on a trilateral, and possibly global, basis.

2.2 Panel Discussions

The conference was comprised of five panels covering the following topics:

- Defining space security for the 21st century
- Transatlantic approaches to international space security cooperation
- Governance of space activities
- Security policy dimensions of Space Situational Awareness
- Transatlantic space crisis management for the future

2.2.1 Defining Space Security for the 21st Century

The presentations and subsequent discussions of the first panel revealed that there exist various interpretations of the term “space security”. They are based on national interests, past space activities, and immediate foreign policy goals. With new actors, technologies, and greater dependence on space-derived applications and services, space security challenges in the 21st century cannot be merely extrapolated from, for example, the Cold War experience, but need to take into account the new, unprecedented geostrategic environment. There are two other major issues affecting space security decision-making. First, space policy cuts across many other policy portfolios (e.g. environment, transport, agriculture, science, etc.) and, as a result, is more difficult to coordinate. Second, space security is most often driven by regional interests, despite its global coverage.

In seeking to define space security, the conference participants generally defined two distinct concepts. The first was preserving the environment of outer space, in particular Earth orbits, as a safe and secure area for conducting space activities, as well as protecting civilian, military, and commercial space assets from natural and man-made

⁷ “National Security Strategy” May 2010. The White House President Barack Obama 10 Oct. 2011 <http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf>.

⁸ “Wisdom of Japan Moves Space” June 2009. Secretariat of Strategic Headquarters for Space Policy, Tokyo 10 Oct. 2011 <http://www.kantei.go.jp/jp/singi/utyuu/keikaku/pamph_en.pdf>.

⁹ “Council conclusions and draft Code of Conduct for outer space activities” 17 December 2008. Council of the European Union 10 Oct. 2011 <<http://register.consilium.europa.eu/pdf/en/08/st17/st17175.en08.pdf>>.

threats (including ground-based infrastructure). The second concept involves the use of space to advance terrestrial security (e.g. the use of communications, navigation and positioning, and earth observation for disaster and crisis management, maritime security, border control, etc.).

These two concepts can be summarized as “safeguarding safety and security in space” and “space for security on Earth”, respectively. Europe has labelled these as “security of space” and “space for security”.¹⁰ Over the past few years, the concept of space sustainability, or preserving the space environment for future generations, is also gradually appearing on space security-related agendas. Many speakers emphasized, however, that without the ability to safeguard space-based systems and assets, there can be no sustainable use of space to contribute to security on Earth. Of these two distinct concepts it was ‘security of space’ which was the topic of the conference.

The U.S., based on its National Space Policy (NSP) of June 2010, the 1967 Outer Space Treaty and other international legal understandings, associates space security with the pursuit of those activities that ensure the sustainability, and free access to, and use of, outer space to support vital national interests. The NSP stipulates that it is in the shared interest of all nations to “help prevent mishaps, misperceptions, and mistrust”.¹¹ The “peaceful” use of space represents conduct in accordance with international law, including the right to use space for national security activities, and the right of passage through, and conduct of operations in, space without interference.

The U.S. views space as increasingly contested (i.e. confronted by a range of natural and man-made threats that could potentially deny, degrade, deceive, disrupt, or destroy space assets and their supporting infrastructure) with threats to space systems on the rise from an increasing number of state and non-state actors which have developed, or are configuring, counterspace capabilities. The U.S. underscores that due to the physical nature of space environment and the world’s growing dependence on space assets, irresponsible behaviour in space can damage not only the U.S. but also other space-faring na-

tions. Accordingly, the U.S. emphasizes the requirement that all nations which exercise the right to use and explore space conduct space activities prudently and responsibly.

The EU also recognizes the need to protect space infrastructure and derived applications and services. Space situational awareness (SSA) at a Europe-wide level is seen as an essential capability for ensuring the security of Europe’s space-based infrastructure. The discussion is ongoing concerning what such a European SSA system should look like, how it can make best use of relevant capacities of the Member States and how these various actors can cooperate with one another (i.e. the EU, ESA, and other European actors in this domain).

The EU acknowledges that space security is a global issue and cooperation with the U.S. and other partners constitutes a vital building block of the EU’s space strategy. The EU-U.S. dialogue on civil space cooperation, launched in March 2006, is viewed as a key venue for strengthening the Europe – U.S. space partnership. These discussions are chaired by the European Commission (EC) and the U.S. Department of State (DOS) and bring together various institutions, departments and agencies, including ESA, the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the National Aeronautics and Space Administration (NASA), the National Ocean and Atmospheric Administration (NOAA), and the U.S. Geological Survey (USGS).¹² During the fifth EU-U.S. civil space cooperation dialogue, which took place in June 2011, space security occupied almost half the meeting’s agenda.

The EU is a relatively new space actor in Europe and began to focus on space security only in the past few years. Its cooperation with ESA, a well-established intergovernmental institution, on space policy was formalized in a 2004 Framework Agreement and was followed by a formulation of a joint European Space Policy (ESP). The first ESP was introduced in April 2007 as a Joint Communication from the European Commission to the European Council and Parliament and as a proposal from the ESA Director General to the ESA Council. It was formalised on 22 May 2007 in a Resolution on European Space Policy adopted at the EU-ESA Fourth Space Council. It is considered an important milestone for Europe as it includes, for the first time, the EU in space policy deliberations and decision-making. A paper entitled “Prelimi-

¹⁰ “Space for security” 22 July 2011. European Commission 11 Oct 2011
<http://ec.europa.eu/enterprise/policies/space/esp/security/index_en.htm>.

¹¹ “National Space Policy of the United States”. 28 June 2010. The White House President Barack Obama. 11 Oct 2011
<http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf>.

¹² “International cooperation with the USA” 07 Feb. 2011. European Commission 11 Oct 2011
<http://ec.europa.eu/enterprise/policies/space/esp/international-cooperation/usa/index_en.htm>.



nary Elements for a European Space Programme”, prepared in cooperation with the High-Level Space Policy Group (HSPG)¹³, accompanied the ESP and outlined programmatic guidelines for Europe’s future activities in space.¹⁴

The original focus of the EU was entirely on the development of space applications to support EU space policy objectives. The EU gained a stronger role and competence in space with the ratification of the Lisbon Treaty in 2009. It likewise gained the ability to strengthen its international engagement in security and defence matters. A concrete manifestation of this new competence was the establishment of the European External Action Service (EEAS) and the position of the High Representative for Foreign Affairs and Security Policy.

The EU plans to employ its two flagship programmes, Galileo and the Global Monitoring for Environment and Security (GMES), as systems that can support both civil and military applications and policies, especially with regard to the EU’s Common Security and Defence Policy (CSDP). Given the constrained budget environment, the EC has called for exploiting synergies between civil and military operations. Specifically, to advance more effective operational capability of the EU’s Conflict Prevention and Crisis Management operations, the EU launched, in 2010, a process to identify and promote synergies in civil and military development planning. In this context, the EC, together with the Member States (MS), the EEAS, and ESA, is seeking ways of integrating space into this planning process. Identifying and establishing research programs for the development of critical space technologies needed to ensure Europe’s non-dependence is part of the coordination effort of Europe’s space actors. The EU is also seeking to persuade the MS, who are the primary decision-makers on military and defence issues, to bring together, whenever possible, their existing space capabilities for service at a European level.

The European Commission (EC), the EU’s executive arm, has the right to stimulate policy initiatives or propose new policies and regulations, and has provided proposals concerning the EU’s direction on space policy,

including space security. An EC Communication of April 2011 laid out the EU’s concept of security which included using space for broader security policy objectives (‘space for security’) and ensuring security and protection of Europe’s space infrastructure, applications and services (‘security of space’).

Over the past several years, ESA has engaged in the development of space-based applications for security and dual-use purposes. Although ESA receives most of its funding from civilian sources, ESA builds its programmes according to its Constitution for peaceful (i.e. non-aggressive) purposes. ESA’s SSA Preparatory Program, the first truly dual-use effort on the part of ESA, demonstrates its preparedness to engage actively in meeting space security-related challenges. ESA’s SSA Program is described in more detail in Chapter 3.2.4.

Against this backdrop, the transatlantic partnership is central to Europe’s space security-related efforts, not only due to longstanding cooperation in various civilian space programs, but also because of shared values and objectives. Both sides cooperate extremely well in the space science and exploration and there also exists, for example, common ground regarding navigation, and cooperation on SSA. Well-established cooperation in space can not only promote joint standards, but also provide instruments for safeguarding international security and the respective security interests of the partners involved. In this regard, progress on the structured dialogue on security among European actors is essential to tackle intra-European challenges such as the synergies between civilian and military assets or employment of national assets for broader European goals.

2.2.2 Transatlantic Approaches to International Space Security Cooperation

Just as defining space security is somewhat challenging, identifying a common approach to international space security cooperation among the U.S., Europe and Japan is also not straightforward. The U.S. is an established space power with comprehensive space capabilities. In Europe, major space-faring nations operate national space systems. Transatlantic military space cooperation is primarily conducted on a bilateral basis between Washington and the various European capitals. NATO is also looking into enlarging its modest role in this area. For its part, the European Union (EU) is seeking to establish a presence in European security, including that associated with space. The European Space Agency (ESA) is also increasingly involved in space security and security-related pro-

¹³ The High Level Space Policy Group (HLSPG) consists of representatives of the 29 ESA and/or EU member states, but not on Ministerial level. It seeks to address issues concerning the practical implementation of the ESP and programme. The group also prepares the meetings of the Space Council. (The European Space Policy. Belgian High Representation for Space Policy. http://www.bhrs.be/eu_en.stm.)

¹⁴ Schrogl, Kai-Uwe, at al. eds. Yearbook on Space Policy 2006/2007. Vienna: Springer WienNewYork (2008): 23.

grammes. The substantial capability gap between the U.S., Europe, and Japan has to be taken into account in trying to forge a sensible, enduring partnership.

Naturally, the partnering countries will have to coordinate their respective national space security policies, different military cultures (to help facilitate technical interoperability), operations and information-sharing. There are marked differences between the way space security is described in the doctrines of European countries and those of the U.S. The threats delineated on the U.S. side often involve offensive actions by other space-faring actors, whereas Europe primarily focuses on the threats posed by space debris, satellite collisions and other such phenomena. Europe has to deal with an additional layer of difficulties in transcending individual national interests with regard to cooperation on military space issues. Japan has opted for an exclusively defence-oriented space policy (i.e. the use of space for information gathering, warning and surveillance in the proximity of Japan, and communication for the Japan Self Defense Force). Development of upgraded space capabilities to address Japan's security concerns is currently being actively deliberated.

There was, however, a great deal of overall optimism on the part of conference participants. It was mentioned that there already exists a firm foundation for mutual collaboration of the three partners based on shared values and security interests. Space Situational Awareness (SSA) emerged repeatedly as a key area for mutual collaboration. ESA is pursuing an SSA system architecture that can accommodate defence-related requirements. Generally, an overall joint strategic approach to space security is not presently in place among the three countries. Although panelists commonly used a number of terms, including "transatlantic approaches", "collective security", or "alliance strategy", the goal remains to flesh-out the underlying substance of these phrases and operationalise them.

In the way of positive developments, the Lisbon Treaty, as referenced in the previous panel, was an important crossroads for European space policy, Europe's "space identity" and for cooperation with the U.S. and other partners. Although the European space policy is not just summarized in one document, the ESP progress has been made in the past decade on establishing the concept more firmly. The Treaty also set forth a broad direction for the conduct of EU foreign policy. The position of the High Representative for Foreign Affairs and Security Policy was established in 1999. The High Representative, who heads a recently established European External Action

Service (EEAS), is now also the Vice President of the EC and chairs the Council of EU foreign ministers. Accordingly, it is her responsibility to ensure coherence and consistency of the EU's foreign policy, including coordination of relevant EC services. The High Representative represents the EU in political exchanges with third parties, including the U.S. and Japan.

The structure of the new EEAS, as well as its approach to diplomacy, is often confusing for foreign partners, at least at this early stage, as it adds a new layer of diplomatic complexity beyond traditional government-to-government relations. It does not help that the competencies within the EEAS are still not clearly established. At the same time, the EEAS can influence many aspects of the ESP, and especially space security for the reasons that the EEAS is supposed to be a central entry point for all partners to discuss space-related issues with foreign and security policy implications; the EEAS is a user of space services (e.g. Earth observation services for its crisis management structures); and the High Representative heads the European Defence Agency (EDA). Accordingly, it will be essential that the EEAS is involved in the configuration of a comprehensive space security strategy for the transatlantic partnership and Japan.

Conference participants noted that it is squarely in the interest of the U.S. to encourage the EU and the relevant European institutions and Member States to pursue a global agenda and role, especially in the area of space security. Common values, interests and threat environments all contribute to the logic of this approach.

When discussing transatlantic cooperation, it is useful to recall that the resources dedicated to space security systems and applications are quite different. Indeed, Europe is more similar to Japan in this regard.

Commercial operators are often experienced and sophisticated space actors. Accordingly, such operators are confident that they can make a valuable contribution to government space security policies and strategies. With regard to telecommunications, for example, four commercial companies basically account for 70–80% of the total capacity around the world. Interestingly, none of them are currently U.S.-based or U.S. owned. All companies that provide fixed services, for the most part, are based in Europe.

Avoiding interference, one of the key problems for commercial space operators, can be a subject of public-private cooperation. The commercial sector is justifiably concerned over the increasingly congested radiofre-



quency spectrum. Eutelsat, for example, deals with approximately 150 interference cases per month most of which do not involve jamming, but still affect service reliability. At times, it is merely reckless behaviour on the part of some operators. For example, although operators are required to use a carrier-id system in order to facilitate tracking down the interferer, many of them do not comply with this obligation. As a result, the operators exert unnecessary effort to geolocalize the source of interference. Intentional jamming is more in the purview of governments to deal with, as well as regulatory compliance and enforcement of the ITU regulations.

Commercial operators also view Space Situational Awareness (SSA), and especially collision avoidance, of critical importance. In search of a reliable service, they established the Space Data Association (SDA), an automated data-base that provides space location information to its members (discussed later in Section 3.2.4.) There are other groups, including the Satellite Users Interference Reduction Group, which is the global industry organisation, whose mission it is to combat and mitigate radio frequency interference (RFI).¹⁵ Combining the services of these groups with government sources is a challenging, but potentially very beneficial undertaking for the transatlantic partners and Japan.

The issue of cyber security also needs to be referenced, (although not directly treated in this conference) as the cyber space issues relate closely to the ground networks that support satellite systems. Satellites in geostationary orbits provide broadband connectivity to businesses and customers. Those satellites and their computer control ground stations present a viable, even attractive, target for offensive cyber actions. The growing dependence of the world on information systems for commerce, national security, social, and individual purposes make these systems tempting targets for disruption by criminal and terrorist organizations, state adversaries, as well as peer competitors. The technologies, software, and applications used for legitimate and disruptive purposes are advancing rapidly. Information technology and related software and their applications advance at such a withering pace that policies, legal frameworks, and military strategies will need to be flexible enough to respond to fast-changing conditions.¹⁶

¹⁵ For further information see also: <http://www.suirg.org/>

¹⁶ Sheldon, John B. "Deciphering Cyberpower" 31 May 2011. Gorge C. Marshall Institute 31 11 Oct 2011 <<http://www.au.af.mil/au/ssq/2011/summer/sheldon.pdf>>.

To conclude, there was a broad consensus that the transatlantic partnership, and relationship with Japan, needs to be grounded in realistic expectations. This involves, in part, better integrating pressing space challenges into broader security policy-making deliberations in the respective nations. Accordingly, any discussions on cooperation should include configuring steps that would advance the development of practical measures that can make a collective space security apparatus workable. Such practical measures include: the critical evaluation of capabilities that can be shared; applying the positive lessons from past models of cooperation; balancing cooperation with individual national interests (e.g. preserving critical industrial capabilities; protecting sources and methods associated with information-sharing; adopting acceptable burden-sharing arrangements, etc.).

2.2.3 Governance of Space Activities

Good space governance requires clear guidance, informed decision-making, comprehensive management, consistent policies, and logical processes. The world is already awash with existing rules and institutions concerned with the conduct of space activities. The legal core is embodied in five space treaties (i.e. the Outer Space Treaty (OST) of 1967, the Rescue Agreement of 1968, the Liability Convention of 1972, the Registry Convention of 1975, and the Moon Agreement of 1979) and five sets of legal principles adopted by the UN General Assembly. The latter principles address the conduct of space activities, broadcasting via satellites, remote satellite observations of Earth, and general standards for the safe use of nuclear power sources in space. There are a number of resolutions relating to outer space such as resolutions on registering space objects (UNGA Res. 1721 B (XVI) of Dec 1961 and UNGA Res. 62/101 of Dec 2007) or a resolution on the concept of "launching state" (UNGA Res. 59/115 of Dec 2004) and others. There are also various bilateral and multilateral practices and agreements that relate to SSA, the international draft Code of Conduct and other initiatives and mechanisms.

In terms of an international institutional framework, the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS) occupies an important position. Besides UNCOPUOS, coordination and cooperation exist in a number of areas. Radiofrequencies are managed by the International Telecommunication Union (ITU) and its World Radiocommunications Conference. This conference helps the ITU to review and, if necessary, revise the Radio Regulations, the international regulations governing the use of the

radiofrequency spectrum from geostationary- and non-geostationary-satellite orbits. The Committee on Earth Observation Satellites (CEOS) is the most prominent multilateral body engaged in coordination of remote sensing satellites, purely on a voluntary and non-binding basis. The World Meteorological Organization (WMO) helps govern the use of weather satellites. Both the CEOS and WMO contribute to the political exchanges taking place in the Group on Earth Observation (GEO).

Another mechanism, the International Charter Space and Disasters, has proved to be an effective entity. Coordination of the civil services from global and regional satellite navigation systems and GEO-stationary augmentation satellites takes place within the International Committee on GNSS (ICG). The ICG's membership includes nation state system providers, other interested UN member states and international organisations that represent major user groups (i.e. not just service providers, but also users). This group aims at providing compatible, interoperable, and transparent civil services, as well as promoting GNSS technology for use by developing countries. Unlike CEOS or the ICG, the Cospas-Sarsat for satellite search and rescue coordination involves a binding agreement among a smaller number of parties. But even CEOS and ICG have subgroups that aim at achieving consensus among system providers, if necessary. For exploration, there exists an International Space Exploration Group (ISEG). To promote cooperation with regard to International Space Station (ISS), there are several binding agreements under international law.

Given the variety of existing institutional and regulatory mechanisms at the international level, some conference participants held the view that there is no need for a new international governance regime to address space security-related challenges. The venue for discussing space debris is the Inter-Agency Debris Coordination Committee (IADC). Radiofrequency interference is handled by the ITU. It is important to note here, however, that the ITU's rules and procedures only become binding after they have been formally adopted by the participating states. Accordingly, they rely heavily on the coordination between operators and governments on a bilateral basis. Accordingly, even with the existence of international institutions established to address specific space-related issues, it is mostly the individual countries themselves that ultimately drive the solutions.

As the conference discussed transatlantic partnership and cooperation with Japan, it

was a good opportunity to highlight the long-standing benefits of bilateral consultations to supplement multilateral activities, such as the UNCOPUOS initiative on the long-term sustainability of outer space activities that is described in more detail below. The U.S., Europe, and Japan ought to seek, on a bilateral as well as trilateral basis, the most effective modalities to address concerns that pertain to operational or planned space programmes and then configure their approach in multilateral fora. The U.S., for example, is already engaged in a number of space policy dialogues, both civilian and security-related, with the EU, Japan, France, the UK, Italy and other countries.

The U.S. is unilaterally promoting what it calls "near-term, pragmatic, and constructive steps" to enhance space security, or TCBMs, to "prevent mishaps, misperceptions, and mistrust"¹⁷. The overall goal is to advance stability by reaching out to other countries. This is done through Space Security Dialogues, established after the collision of the Iridium-Cosmos satellites in February 2009.¹⁸ Moreover, the U.S. Strategic Command (USSTRATCOM) provides notification of potential orbital collision hazards to governmental and commercial entities. In the past year, for example, Russia received 252 notifications and China 147.¹⁹ Since May 2010, approximately 677 notifications have been provided to government and commercial owners/operators as a result of the Chinese ASAT debris alone.²⁰

Coordination of space activities in Europe involves routine intra-European collaboration, in addition to interaction with foreign partners. The governance of space activities, as described by one of the speakers, consists of three levels: the policy level (i.e. high-level policy decision-making set forth the overall objectives, general budgetary structure, and framework for international cooperation); the programmatic/project level (i.e. interaction with users to identify their needs and establish mission requirements, as well as tasking industry to build relevant technology); and the regulatory level (i.e. defining the legal environment in which space activities take

¹⁷ "National Space Policy of the United States of America." 28 June 2010. The White House President Barack Obama 11 Oct. 2011 <http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf>.

¹⁸ See also: <http://www.newscientist.com/article/dn16592-satellite-crash-prediction-is-plagued-with-uncertainty.html>
¹⁹ Rose, Frank A. "Defining Space Security for the 21st Century" 13 June 2011. U.S. Department of State 10 Oct. 2011 <<http://www.state.gov/t/avc/rls/165995.htm>>.

²⁰ Rose, Frank A. "Defining Space Security for the 21st Century" 13 June 2011. U.S. Department of State 11 Oct. 2011 <<http://www.state.gov/t/avc/rls/165995.htm>>.



place, both for institutional and private actors).

In Europe, space policy should be crafted jointly by the Member States, ESA and the EU. To this end, a joint ESA/EU Space Council was set up in a 2004 Framework Agreement between the EU and ESA. Depending on the agenda, this Council is comprised of European Affairs Ministers, Industry Ministers, Research Ministers, etc. of EU and ESA member states. In June 2011, ESA concluded an administrative arrangement with the European Defence Agency (EDA), which will primarily aim at exploring the added value and contribution of space assets to the development of European capabilities in the area of crisis management and the CSDP.

Internationally, the EU and its MS continue to encourage the evolution of a multilateral governance framework within the UN. In May 2011, the UN General Assembly passed a broad resolution (A/RES/65/276)²¹ on the participation of the EU in the work of the UN, including presenting proposals and amendments. Moreover, it also gives the EU representatives the right to make interventions during sessions; be invited to participate in the general debate of the General Assembly; and permits EU communications relating to the sessions and work of the Assembly to be circulated directly as documents of the Assembly. It is expected that the EU will utilize this new authority also in the space domain.

The fact that a number of national or regional coordination mechanisms exist does not imply that multilateral coordination is superfluous. The UNCOPUOS serves as an international platform for global space governance.

The core concentration of the UNCOPUOS is on "ways and means of maintaining outer space for peaceful purposes". In its initiative on "Long Term Sustainability of Outer Space Activities"²², introduced by France in February 2010, the Committee's Scientific and Technical Subcommittee (STSC) adopted a "soft law" approach in this respect. The Subcommittee set up a working group, the task of which is to identify areas of concern for the long-term sustainability of outer space activities and propose measures that could enhance space sustainability for the benefit of all countries. A report, currently scheduled for 2014, is to contain a comprehensive set of

practices, operating procedures, technical standards and policies to advance the long-term sustainability of outer space activities.²³ The goal is to offer guidelines for the safe and secure use of space to be adopted by states, international organizations, national non-governmental organizations and private entities. The guidelines are to be configured in a way that they also address equitable access to outer space and the resources and benefits associated with it.

During the STSC session of February 2011, the COPUOS adopted so-called "Terms of reference and methods of work of the Working Group (WG) on the Long-term sustainability of space activities", which specify objectives, outputs, scope, method of work and a proposed multi-year work plan. During its work, the WG will consult with not only member states of the UNCOPUOS, but also UN intergovernmental bodies (e.g. CD), a group of governmental experts on transparency and confidence-building measures (TCBM) in space activities to be established in 2012 in accordance with UN General Assembly resolution 65/68, the Commission on Sustainable Development, the International Civil Aviation Organization (ICAO), the ITU, the WMO, and relevant intergovernmental organizations, such as ESA, EUMETSAT, and the GEO. Also consulted are various international organizations and bodies (e.g. Consultative Committee for Space Data Systems (CCSDS), the Inter-Agency Space Debris Coordination Committee (IADC), the International Space Environment Service (ISES), and the International Organization for Standardization). Four expert groups were established under the WG to focus on the following areas: a) sustainable space utilization supporting sustainable development on Earth; b) space debris, space operations and tools to support collaborative space situational awareness; c) space weather; d) regulatory regimes and guidance for actors in the space arena.

As evident by its wide scope of work, the long-term sustainability project will require a focused and structured approach. A consolidated group of entities with common interests, such as Europe and the U.S in partnership with Japan, could generate momentum in the direction of codifying new norms in space for all stakeholders through UNCOPUOS.

UNCOPUOS is an essential platform with global reach to encourage prudent practices and broader governance involving private

²¹ For further information see: http://www.unbrussels.org/images/pdf/2011/A_RES_65_276.pdf.

²² "Long-term sustainability of outer space activities" 8 Feb. 2010. Committee on the Peaceful Uses of Outer Space 10 Oct. 2011 http://www.oosa.unvienna.org/pdf/limited/c1/AC105_C1_2010_CRP03E.pdf.

²³ For further information see: http://www.oosa.unvienna.org/pdf/reports/ac105/AC105_987E.pdf.

actors. Nonetheless, the complexities of current deliberations on space activities may well exceed the present competences of UNCOPUOS. Accordingly, it seems inevitable that initiatives such as that of a draft Code of Conduct for Outer Space Activities proposed by the EU, or establishment of the Space Data Association (SDA) by commercial telecommunications operators, will continue to emerge.

The draft Code of Conduct for Outer Space Activities was approved by the EU in December 2008. In February 2009, the Czech Republic introduced, on behalf of the EU, the draft Code of Conduct at the Conference on Disarmament (CD), noting that the draft text of the Code of Conduct includes transparency and confidence building measures and does not represent a legally binding document. It also does not seek to replace initiatives which work towards that goal. It recognizes that a comprehensive approach to safety and security in outer space should be guided by the following principles: freedom of access to space for all for peaceful purposes, preservation of the security and integrity of space objects in orbit, and due consideration to the legitimate defence interests of states.²⁴

The Code of Conduct, a new draft of which was released in September 2010, seeks to strengthen the safety, security and predictability of all space activities, including by limiting or minimizing harmful interference in conduct of space activities. It covers both current and future civil and military activities. With this initiative, the EU seeks to:

- strengthen the existing United Nations treaties, principles and other arrangements, as the subscribing parties would commit to comply with them, to make progress towards adherence to them, to implement them and to promote universality;
- complement them by codifying new best practices in space operations including measures of notifications and of consultation that would strengthen the confidence and transparency between space actors and contribute to developing good faith solutions that would permit the performance of space activities and access to space for all".²⁵

²⁴ "Council conclusions and draft Code of Conduct for outer space activities" 3 Dec. 2008. COUNCIL OF THE EUROPEAN UNION 11 Oct. 2011 <http://www.eu2008.fr/webdav/site/PFUE/shared/import/12_09_CAGRE_resultats/Code%20of%20Conduct%20for%20outer%20space%20activities_EN.pdf>.

²⁵ Lála, Petr. EU Project for a Code of Conduct for Outer Space Activities. Information Note, June 2009. Online

The U.S. is reviewing the EU's proposal for this non-binding code. The proposal is, in essence, consistent with the U.S. pursuit of TCBMs to encourage the more responsible use of space. The U.S. is already following many of the practices laid out in the current draft Code (e.g. notifications of orbital collision and high-risk re-entry hazards, the publication of the national security space policies and strategies, etc.). At the same time, a number of reservations concerning the Code's viability and usefulness have emerged in the U.S., especially in relation to discussions on space and national security. Perceived shortcomings of initiatives such as the Code of Conduct, or global-level governance generally, is that they are perhaps too loose and undefined in terms of an authority which can enforce the agreed rules and procedures. The truth is that there is no credible multilateral enforcement mechanism for space at this time.

The Code of Conduct seeks to prevent irresponsible or aggressive behaviour in space, but does not address the problem of potential conflict in space. There needs to be more discussion of this growing contingency. Even a well-established institution such as the UN Security Council, does not always agree on what constitutes a violation of rules, proper punishment for a rule violator and ensuring the effectiveness of the punishment selected.

There are some who are calling for a new consolidated Space Treaty that would reflect developments since the end of the Cold War. Such an initiative, albeit of questionable viability, could introduce norms also of relevance for space security.

Accordingly, it seemed to a number of conference participants that a more realistic approach to space security governance would be encouraging self-restraint, self-control, and self-discipline by demonstrating that these are in the self-interest of all space-faring nations. Best practices built on a system of incentives and disincentives were perceived by some as a better way forward. Part of the discussion on such practices would inevitably include practical debates on what policy options the transatlantic partners should choose when confronted with irresponsible acts/actors (e.g. limit cooperation, access to certain markets, etc.)

In conclusion, the shared interests of the U.S., Europe and Japan can be expressed by pursuing the governance of space activities in a manner that enables continued exploration and exploitation of space for peaceful pur-

available
<<http://www.ifri.org/files/Espace/PresentLALA.pdf>>.



poses that benefit the citizens of these countries (and all other countries). Space governance, like most other human endeavours, is presently organized by nations that bear the bulk of the responsibilities. There are a number of available mechanisms and venues to organize space governance and these can be managed under existing international law and be implemented at the national level. Governance will continue to evolve as space is increasingly used to address global terrestrial challenges, as well as a tool for strengthened partnership among nations. The trilateral U.S., Europe, Japan partnership can go a long way toward advancing this overarching goal.

2.2.4 Security Policy Dimensions of Space Situational Awareness (SSA)

The SSA panel participants agreed that the large amount of space debris, new and emerging space technologies, and an increasing number of actors in space complicate space surveillance and make comprehensive Space Situational Awareness (SSA) of space objects a challenging task. Orbiting satellites are operated by some 60 nations, governmental entities, and commercial and academic satellite operators. SSA is a prerequisite for safeguarding satellites and spacecraft as it enables the tracking of objects, timely warnings of potential collisions, avoidance of radiofrequency interference and real-time information about new developments in space. SSA-generated information is likewise necessary to detect irresponsible space behaviour, as well as monitor the actions of potential adversaries.

Congestion in space presents a particular challenge. Although there are only about 1100 active satellites, there are thousands of pieces of measurable debris and even more debris at a level that cannot be currently monitored. This poses a threat, both military and economic, to every space faring nation and any nation who intends to use space for strategic purposes. A collective solution to this challenge was widely viewed as the best way forward.

In the U.S., the latest National Space Policy (NSP) of June 2010 states that the sustainability and stability of space, as well as unfettered access to it, are a vital national interest. In this connection, the NSP emphasizes the responsible use of outer space and encourages international cooperation to achieve a more predictable environment, with minimal risks of accidents or purposeful interference. The U.S. Department of Defense (DOD) maintains America's SSA assets. The NSP designated the Secretary of Defense and the

Director of National Intelligence to "maintain and integrate space surveillance, intelligence, and other information to develop accurate and timely SSA" which "shall be used to support national and homeland security, civil space agencies, particularly human space flight activities, and commercial and foreign space operations".²⁶ The dissemination of SSA information is the sole responsibility of the Secretary of Defense who can, after consultation with the Director of National Intelligence, NASA, and other departments/agencies, "collaborate with industry and foreign nations to ... maintain and improve space object databases ... and provide services and disseminate orbital tracking information to commercial and international entities, including predictions of space object conjunction."²⁷

The U.S. Space Surveillance Network (SSN) operates the largest network of sensors and maintains the most complete catalogue of space objects globally. The SSN sensors include phased-array radars, conventional radars, electro-optical sensors, the Space-Based Space Surveillance (SBSS) satellite, and Ground-Based Electro-Optical Deep Space Surveillance sites.²⁸ The DOD tasked the U.S. Air Force (USAF) with serving as the "Executive Agent for Space". Accordingly, the U.S. government relies on the USAF to provide continuous SSA coverage. Space object observations gained from the SSN sensors are collected by the Joint Space Operations Center (JSpOC), located at Vandenberg Air Force Base in California. The JSpOC provides plans and executes the U.S. Strategic Command's (USSTRATCOM) Joint Functional Component Command for Space (JFCC SPACE) mission.²⁹ The U.S. Department of Defense (DOD) currently tracks approximately 22,000 man-made objects in orbit. About 1,150 of these are active satellites.³⁰ The JSpOC screens over 1,000 active payloads against the USG's space catalogue daily. Moreover, the US SSN performs 1.4 million sensor taskings per week with an average of 190 conjunction warnings and assis-

²⁶ "National Space Policy of the United States of America." 28 Jun. 2010. Seal of the President of the United States 3 Mar. 2011
<www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf>: 13-14.

²⁷ *Ibid.*: 8.

²⁸ "USSTRATCOM Space Control and Space Surveillance" Jul. 2010 United States Strategic Command 24 Mar. 2011
<http://www.stratcom.mil/factsheets/USSTRATCOM_Space_Control_and_Space_Surveillance/>.

²⁹ Joint Space Operations Center." Vandenberg Air Force Base 26 Mar. 2011
<<http://www.vandenberg.af.mil/library/factsheets/factsheet.asp?id=12579>>.

³⁰ William, J. Flynn. "Remarks on Space Policy." High Frontier February 2011: 3.

tance to an average of three satellite manoeuvres weekly.³¹

In the view of conference participants, the sharing of SSA data constitutes one of the most powerful globally-available space transparency measures. The U.S. has expressed a willingness to lead the effort to identify the most appropriate model for international SSA sharing. In its 2011 NSSS, the U.S. asserted, as a leader in SSA it “can use its knowledge to foster cooperative SSA relationships, support safe space operations, and protect U.S. and allied space capabilities and operations”.³² The partnerships are to be “consistent with U.S. policy and international commitments and consider cost, protection of sources and methods, and effects on the U.S. industrial base.”³³ The U.S. has shared SSA information since the late 1950s, through NASA’s Orbital Information Group (OIG). The U.S. now shares SSA data with organisations outside the U.S. government (USG), originally through a pilot program by the USAF Space Command, the Commercial and Foreign Entities (CFE) Pilot Program (launched in 2004), which is now a permanent SSA Sharing Program operated by the U.S. Strategic Command (USSTRATCOM).³⁴

The SSA Sharing Program, operated by the U.S. Strategic Command (USSTRATCOM), consists of basic, emergency, and advanced user levels. It provides conjunction assessment, launch support, de-orbit and re-entry support, collision avoidance data and other SSA services to its users and partners. Under the emergency service, when a close approach situation occurs (within one kilometre and less than 200 meters radial miss distance in LEO, or within five kilometres in GEO), the JSpOC issues emergency conjunction warnings to satellite owners and operators. The service provides so-called conjunction summary messages (CSM) and offers re-screenings using ephemeris data of the owner/operator.³⁵ The SSA Sharing Program partners, who have signed the USSTRATCOM SSA Sharing Agreement, receive the most advanced sharing and services from USSTRATCOM’s JFCC SPACE and its Joint Space Operations Center.

³¹ William, J. Flynn. “Remarks on Space Policy.” High Frontier February 2011: 41.

³² Department of Defense. National Security Space Strategy. January 2011: 6.

³³ Ibid.: 8.

³⁴ Robinson, Jana. “The Role of Transparency and Confidence-Building Measures in Advancing Space Security.” ESPI Report 28 27 Mar. 2011
<http://www.espi.or.at/images/stories/dokumente/studies/ESPI_Report_28_online.pdf>: 29-30.

³⁵ Ibid. 41.

The U.S. had, at the time of the conference, 24 standing agreements with commercial partners worldwide. The collaborative arrangements with commercial owners and operators have been very beneficial and collaborative arrangements have substantial potential for future improvement of SSA. A seemingly small matter of having a direct phone number to notify operation centres on a collision issue is of a great importance when considering the consequence of a collision for the space environment.

The agreements enable cooperation on day-to-day basis, not only in case of emergencies. They promote greater transparency and establish shared working relationships not only on satellite collision avoidance, but also on launch de-confliction for normal launches, anomaly resolutions, or working through electromagnetic interference. It likewise promotes a collective understanding of what is normal behaviour and common sense. It is envisioned that cooperative partnerships will also be launched with foreign governments. To have such relationships with national states and an increasing number of commercial entities would open the opportunity to establish broader TCBMs. The U.S. is in discussions with Europe on such issues as standards for interoperability and data protection policy.

Active SSA sharing with other governments, and establishment of a broader collective understanding of the space environment, involves a combined space operations concept which is under lively discussion. Issues such as common data format and standards (e.g. common definitions and ephemeris formats) across the entire user community are key to enabling “machine-to-machine” interaction across multiple operations centres. Improving SSA tools and the overall architecture is also a major challenge for the U.S. as a large part of its surveillance network is decades old. Upgrading SSA capabilities does not only mean modernization of the architecture, but adjusting it to the current and future needs.

With regard to Europe, the European Space Policy (ESP) clearly identifies space security as a priority, reflecting a reality that space assets have become essential for Europe’s overall security and economy. SSA is essential for the protection of critical European space infrastructure as well as for reliable and safe space-based operations and services. SSA capability is likewise viewed as an important element of Europe’s extensive efforts to promote the peaceful uses of outer space. Europe does not currently possess a comprehensive SSA capability, but certain MS operate space surveillance systems. France



and Germany are Europe's leaders in national space surveillance capabilities. The European Space Agency, and European countries more generally, are largely dependent on USSTRATCOM concerning space object location, tracking and other information. Europe possesses some radar and optical capabilities for space surveillance, often operated by different countries, and there are impediments to information exchanges due to national security considerations.

Some of the concerns about the adequacy of Europe's capability to monitor space and its assets and to identify potential man-made or natural threats to their security interests were formally introduced in the conclusions of a workshop on the EU's role in space security and arms control, convened in Berlin in June 2007.³⁶ Pursuant to that discussion, the Space Situational Awareness Programme was initiated by ESA. The Ministerial Council of ESA authorized an optional SSA Preparatory Programme (SSA-PP) in 2008 with thirteen ESA Member States (MS) currently participating. In November 2010, the 7th Space Council acknowledged the need for an SSA capability at the Europe-wide level and designated the European Commission and the European Council to propose a governance scheme and data policy.

The overarching objective is to develop independent, timely and accurate data and services regarding space, especially threats to Europe's infrastructure there and on the ground.³⁷ The EU Council Resolutions of 2008³⁸ and 2010³⁹ described the basic characteristics of the SSA. They recognized that a future European SSA, with both civilian and military applications (i.e. dual-use), will depend on the willingness of Europe's MS, as well as other nations, to cooperate in creating a network of existing assets, and agreeing on governance and data policy. The principal goal is to prevent duplication of capabilities and structures that already exist at the MS level as well as to protect the specific inter-

ests of the MS whilst contributing to the European cause.

Concerning the SSA system's architecture, Europe envisions integrating existing, as well as new, assets of private, national and inter-governmental entities. A network of ground- and space-based sensors would provide input data to a set of SSA Service Centres based on their main functions. The receiving of data from non-European sources will be based on mutually-agreed cooperation conditions. Consultations concerning a suitable governance model, and Customer Requirements related to Data Policy and Data Security of the future SSA system, have been ongoing among ESA, relevant EU institutions (i.e. European Commission, European Council, and EDA), and ESA MS participating in the SSA-PP. As the three SSA domains (i.e. space surveillance, space weather, and near-Earth objects) involve distinctive user communities, the Customer Requirements and System Requirements are to be performed in parallel. The overall SSA architectural design, however, is to establish a consolidated approach for the three domains to identify possible synergies.

There is an ongoing discussion, led by the European Commission (EC), concerning the future of SSA Operational Entities. It has been concluded in the EC's "Reflection Paper on Operating Entity/ies For a Future European SSA Capability" that, at least in the first phase, the distributed network architecture is the most realistic option.⁴⁰ The European Commission and European Council, with participation and support of ESA, MS, EDA, and the European Union Satellite Centre (EUSC), are in the process of identifying and selecting operational entities for Space Surveillance and Tracking (SSA-SST). The debate on the future of Space Weather (SSA-SWE) and Near-Earth Objects (SSA-NEO) operational entities has been mainly conducted by the ESA's SSA Participating States.

The role of the European Defence Agency (EDA) in this process is to facilitate consensus among Member States' defence communities and interaction with other European actors in order to explore civil-military synergies. EDA brought together defence SSA experts to flesh-out the European military SSA requirements, including the need to establish a Recognized Space Picture⁴¹, to apply appro-

³⁶ Edward O'Hara. "Recommendation on Space Situational Awareness. Report A/2035 on Behalf of the Technological and Aerospace Committee." Assembly of the WEU 4 Jun. 2009 <http://www.assembly-weu.org/en/documents/sessions_ordinaires/rpt/2009/2035.php#P258_35542>.

³⁷ "What is SSA?" ESA Website. 28 Mar. 2011 <http://www.esa.int/esaMI/SSA/SEMYTICKP6G_0.html>.

³⁸ "Taking forward the European Space Policy" 26 Sept. 2008. 5th Space Council – European Council Resolution, Brussels 18 Oct. 2011 <http://register.consilium.europa.eu/pdf/en/08/st13/st13569_en08.pdf>.

³⁹ "Global challenges: taking full benefit of European space systems" 25 Nov. 2010. 7th Space Council - European Council Resolution, Brussels 18 Oct. 2011 <http://register.consilium.europa.eu/pdf/en/10/st16/st16864_en10.pdf>.

⁴⁰ European Commission, Enterprise and Industry Directorate-General. Reflection paper on Operating Entity/ies for a Future European SSA Capability. 3 Aug. 2010 Brussels: European Union: 4.

⁴¹ A Recognized Space Picture (RSP) "brings together the positional data for each space object with other data sources in order to understand, and even predict, events occurring in the space environment." (Source: Royal Air-

appropriate data protection and security at a confidential level, and to involve appropriate defence actors in the governance of this future capability. EDA has been working closely with other European partners through the Structured Dialogue on Space and Security that includes the EC, the EEAS, ESA and EDA.

The EUSC, functionally integrated into the EEAS, is an operational CFSP agency. The EUSC has considerable expertise in analysis of satellite imagery and collateral data, as well as data/service handling at multilevel input/output within stringent security constraints. In the framework of the European SSA activities, the EUSC is contributing, through the "Support to Precursor SSA services" (SPA) FP7 project, to the technical definition of the European SSA Governance and Data Policy.

From a national perspective, the protection of a country's territory and population, as well as the readiness of the military to defend national sovereignty, will inevitably take priority. As part of its preparedness, Germany, for example, decided to establish a national SSA capability and designated the relevant responsibility to the German Space Situational Awareness Centre (GSSAC). The GSSAC serves as a hub for other branches of the German government. The German SSA programme has always been closely linked with that of France. The idea is to complement each other in an operational capacity without relinquishing sovereign control of their respective national systems. The Franco-German model of collaboration through the pooling of their independent capabilities, could serve as a model for the establishment of a broader European SSA.

It was also pointed out that no European SSA capacities can yet substitute for the long-established expertise and capabilities of the U.S. Accordingly, there are no questions about the benefits of transatlantic cooperation for Europe in this arena. The configuration of this cooperation will depend on the respective national security policies and the level of burden-sharing among the partners and allies. A pragmatic approach is the most viable which could start by building on already existing network of capabilities, thereby benefiting from the synergies while preserving sovereignty.

Naturally, Europe wants to succeed in assuring proper SSA governance and data security to demonstrate its credibility and reliability as an international partner, especially on sharing sensitive data. A number of technical work-

force :
http://www.raf.mod.uk/rafcms/mediafiles/CB2D1425_5056_A318_A805263A046FC8ED.pdf)

shops, bilateral contacts and various interactions between the European stakeholders and their U.S. counterparts have already taken place. The benefits of such exchanges are the creation of clearly established protocols as well as standardized and compatible data protection and security policies to facilitate SSA cooperation.

Japan, as stated in the 2008 Basic Space Law, attaches great importance to the use of space for national security, which is also manifested in Tokyo's desire to engage in SSA-related discussions and cooperation. The Basic Space Plan of 2009 mapped fundamental policy measures to be undertaken in the next five years. This Plan represents the first comprehensive space strategy for Japan, and has two essential components. First, it emphasizes space utilization, and aims at maximizing the development and use of space in various fields. Second, is the use of space for enhancing Japan's security interests. This allows Japan greater flexibility in the utilization of dual-use technologies/capabilities, such as SSA.

Japan's Space Situational Awareness (SSA) is presently limited to surveillance of space debris. Japan has two surveillance facilities in the western part of the country. One is a ground-based optical telescope facility, and the other is a radar telescope. Both telescopes have the capability to track space debris the size of approximately one meter. The Japan Aerospace Exploration Agency (JAXA), the governmental body responsible for space research and development, operates the SSA assets and provides analysis and warning for space objects in the proximity of its 12 satellites. As JAXA does not have the capability to detect space debris of less than a meter, enhancement of its surveillance capabilities of space debris is a challenge that remains to be addressed.

At present, space surveillance is not a mission of the Ministry of Defense (MOD) or the Japan Self-Defense Force (JSDF). MOD has, however, twenty-eight radar sites for air defence, aircraft warning and control. Among them are four advanced radars, called the FPS-5 for warning and control of threats such as a stealth aircraft, high-speed and long range ASMs (air to surface missiles), cruise missiles flying at low altitude, and ballistic missiles. The FPS-5 radar, for example, detected the North Korean Taepodong 2 ICBM launched in April 2009. The FPS-5 radar has the capability to detect space objects in the area surrounding Japan.

Japan is currently examining budgetary, legal and other aspects of the radar's application for the SSA mission, as the ground-based



FPS-5 radar is a sophisticated system that could serve, in the future, as a Japanese contribution to international cooperation on SSA. These limited SSA-related assets within the MOD and the JSDF can facilitate an active dialogue on SSA cooperation with other institutions within Japan as well as with other countries. The conference served to bolster these efforts.

Beyond government efforts, commercial satellite operators are expressing their need for improved SSA information. A number of leading satellite communications companies established the Space Data Association (SDA). The SDA was founded to promote more effective coordination and communication among commercial operators. The SDA seeks to address the risks of collision and radiofrequency interference. More broadly, the SDA promotes the establishment of best practices for its members.

As of January 2011, the SDA provided conjunction assessment (CA) to 311 satellites of 20 different operators (197 satellites in GEO and 114 satellites in LEO). The SDA likewise made available its services to the U.S. government. Specifically, it offered to augment USG sensor data and improve the accuracy of conjunction monitoring. Longer-term, the SDA proposes to serve as a focal point for operators to share information and facilitate communication between these commercial entities and JFCC SPACE. A number of technical, security, and policy concerns need to be addressed, however, before such cooperation can be effectively established. Moreover, the wider issue of government - industry cooperation will need to be assessed.⁴²

To conclude, space situational awareness (SSA) is one of the most important elements of ensuring safety and security for all functioning satellites and spacecraft and enabling the monitoring and understanding of a constantly changing space environment. Moreover, timely warnings of potential collisions, or troublesome developments, in space, facilitated by SSA, constitute a vital, "big picture" transparency measure. The SSA portfolio has the potential to become one of the space security portfolios where governments can create genuine and sustainable cooperative ties. The U.S. currently views cooperation on SSA as a building-block enterprise. In Europe, SSA is likewise viewed as a fundamental element, technically and politically, with regard to most future European security and defence initiatives. SSA could also represent a constructive European contribution to transatlantic, as well as trilateral cooperation.

⁴² William, J. Flynn. "Remarks on Space Policy." High Frontier February 2011: 64.

2.2.5 Transatlantic Space Crisis Management for the Future

Management of a crisis in space is a complex endeavour. Successful crisis management must be grounded in a well-understood vision of the space environment, and a strategic approach with which to contextualize and respond to challenges in that environment. In the U.S., the Department of Defense (DOD) views the space environment as fundamentally changed and described by the so-called "three C's" (i.e. congested, contested and competitive). Space is increasingly congested due primarily to space debris; contested by a growing range of foreign counterspace capabilities; and competitive as more and more countries and companies operate in space. The EU, in its 2003 White Paper on the European Space Policy (ESP), included the affirmation that "space has a security dimension".

Accordingly, when seeking to configure transatlantic space crisis management, emphasis should be placed on what crises can be produced by threats to space assets, which was the topic of the panel. Moreover, there are increasingly space-related implications stemming from the interface between the space and terrestrial environments. For example, conference participants generally shared the view of the need to understand under what circumstances damage to a space-based asset could trigger various civilian or military crises on the ground. This is especially challenging as many satellites are of dual-use. In fact, a crisis in one area could more easily spark a crisis in another area.

The U.S., based on its 2011 National Security Space Strategy (NSSS), focuses on how the changing space environment can influence national security. Strengthening safety, stability and security in space is one of three broad objectives defined in the NSSS. Accordingly, crises could not only reduce the ability to protect the benefits that countries derive from space, but the stability of the domain itself could be adversely affected. Crisis prevention, a key component of crisis management, involves the ability to anticipate the actions and reactions of actors and promote the responsible use of space via building international partnerships and applying deterrence measures.

Advancing the responsible, peaceful, and safe use of space should be the foundation of a more cooperative, predictable environment which enhances national security and discourages destabilizing behaviour. Transparency is an important part of this effort. Some elements of transparency and confidence-building measures (TCBMs) were enumerated in previous panels, including the sharing of

data and information relevant for conjunction analysis, pre-notification of launches, building international partnerships and creating a common understanding of what constitutes “responsible behaviour”.

Another concept explored in this panel was incorporating the space systems of a number of countries into a network enabling additional redundancy and reduced motivation for an attack. An assessment of the non-military impact of losing important space capabilities, such as disaster management systems and meteorological satellites, are especially instructive. The loss of such capabilities could trigger or exacerbate humanitarian and economic crisis, hence such an exercise could serve as a useful tool in determining future vulnerabilities, and the ability to reconstitute capabilities in a manner relevant to civilian and military crisis management.

With the development of counterspace capabilities by some countries, the concept of deterrence has increasingly gained traction in the debates on space crisis management. The U.S. DOD includes the following four elements in its deterrence strategy: the development of norms of responsible behaviour; the establishment of international partnerships; increasing the resilience and capacity to operate in a degraded environment; and the readiness and capability to respond in self-defence. Additional analyses will be necessary to determine how a robust space posture can deter terrestrial conflict and, conversely, how vulnerabilities in space can cause instability in a terrestrial crisis.

Should preventive measures fail, the response to any particular crisis will depend on what type of space asset is involved and whether the crisis is man-made or natural. It will also be important to understand if the asset is part of an international partnership (or is supporting coalition activities), and whether the crisis is isolated or occurring among a number of assets. All of these factors will affect how a crisis is managed, by whom, and through what institutional mechanisms. Naturally, the dual-use nature of satellites, and the use of civilian and commercial assets for military operations (thus making them important for national security purposes) compounds the difficulty in configuring the right kind of response.

Not surprisingly, contingency planning is fundamental to effective management of a space crisis. As with responses to major natural disasters, terrestrial accidents (e.g. toxic spills, etc.) or terrorist incidents, allies will need to be able to react flexibly in space. Practicing reactions to military-based space crises tends to be somewhat more complex

as such exercises can be viewed as threatening to other space actors. Accordingly, incorporating transparency and confidence-building measures into the way the exercises are carried out is highly useful. The debate on rules of the road and codes of conduct referenced above is also necessary in interpreting intent.

Commercial and military operators deal regularly with space environment-related contingencies. Crisis management involves practical operational procedures. Such procedures are best developed when concentrating on realistic case scenarios. The U.S. has the Schriever Wargames, a specific set of wargames designed to propose different scenarios in space. For example, during the Schriever Wargames in 2009, the U.S. military’s top space professionals and a select group of invitees came together to evaluate responses to a scenario set in 2019 involving an attack using small, undetectable satellites on allied communications spacecraft in geosynchronous orbit combined with a commercial blocking manoeuvre aimed at preventing that nation from buying satellite communication capability on the open market⁴³. The goal is to understand how institutions and technologies will interact in a crisis that requires quick decision-making and possible interaction of groups that have not worked together before.

The so-called Combined Space Operations Centre, recommended by the U.S., and briefly discussed in the SSA section is, in part, designed to facilitate crisis management. It involves an operational centre where governments, at least allied governments and the commercial sector, would share basic information on space object location and potential interference to prevent, or manage, crises. Sharing information among government and commercial entities is, however, rather intricate, as governments are concerned about the inappropriate release of data. Accordingly, realizing a Combined Space Operations Centre is going to be challenging. The concept would involve expanding the mandate of the JSpoC, located at Vandenberg Air Force Base in California, to become a central hub for operational deployment of joint space capabilities.

The creation of the Space Data Association (SDA) by the large telecommunications operators was also driven by practical concerns. They included responsibility for a large fleet of satellites, and their constant movement, accompanied by the need to understand the space environment prior to manoeuvres.

⁴³ For further information see: http://www.airpower.au.af.mil/apjinternational/apj-c/2011/2011-3/2011_3_02_helms-E.pdf.



There is no “codebook” for the proper flying a satellite as most major commercial operators developed the technologies themselves and have different set of formats. This introduces the second issue, determining the right counterpart to check with prior to a manoeuvre. Accordingly, a standardised format has been adopted by the SDA. The data acquired from the U.S. governments is correct most of the time, but there is still the possibility of the incorrect identification of an object. For example, if there are seven satellites in the same orbital location, it can be difficult to identify one particular satellite.

Interference, also referenced in the previous panel, is another key issue. GEO-locating a signal can be extremely complicated. You need to locate the source of interference often in an area the size of hundreds or thousands of kilometres. Moreover, after detecting the source of interference, the operator is sometimes confronted with a policy challenge, such as the case of the jamming of a Eutelsat satellite by a source located on Iranian territory. In short, in space crisis management you have to combine the policy dynamics with the operational aspects. Political will is essential in accomplishing this task at an international level.

To conclude, space crisis management is underpinned by diplomatic efforts aimed at preventing crises, operational ability to manage a crisis already underway, and the availability of the technologies needed to facilitate crisis management. The transatlantic dialogue on space crisis management, and that with Japan, needs to encompass: methods of crisis prevention; rapid detection and reporting of a threat/attack; assessment of the threat; and most appropriate response scenarios.

2.2.6 Concluding Panel

“Space security” as a field implies that there are legitimate perceptions of threats and risks to space-based assets, activities and capabilities. For instance, challenges posed by the increasing amount of debris orbiting the Earth was discussed quite extensively during previous panels and is merely one illustration of the magnitude and urgency of a number of issues in this portfolio. Other dangers to space-based assets (e.g. cyber attack, jamming, interference, etc.) were also identified, as was the fact that the “space environment” is becoming more crowded. The increased risk of accidents and incidents (including those potentially stemming from counterspace activities) heighten possibilities of miscalculations, disconnects, or even conflict. Accordingly, there was a general con-

sensus that expanding cooperation among the trilateral partners is desirable. The irresponsible acts of one actor can have damaging consequences for all, supporting a joint interest in the stability and sustainability of the space environment. A number of panelists also pointed out the difficulties of finding productive approaches to collaboration, including determining the optimal areas for cooperation, which party should take the initiative and the financial and technical limitations facing each of the prospective partners.

Without the ability to safeguard space-based assets there can be no sustainable use of space to contribute to security on Earth. Although the speakers recognized global interdependence in space, the desire for national autonomy in conducting select space operations was evident.

The benefits and shortcomings of a number of global initiatives to improve space governance were described, including various transparency and confidence-building measures (TCBMs), the draft Code of Conduct for Outer Space Activities introduced by the EU, and the “long-term sustainability of outer space activities” initiative of the UNCOPUOS. Despite this array of initiatives on offer, conference participants, albeit expressing general support for a number of them, did not rally around a single initiative as the most important.

With regard to the space environment generally, the participants agreed that Space Situational Awareness (SSA) is relevant for all future efforts to advance the sustainable use of space. The need to improve standards for transferring data was stressed repeatedly. To bolster collaboration on SSA, some participants thought it important to first focus on achieving common situational awareness concerning space debris, space weather, cyber situations, etc. Debates on appropriate responses can then follow. In this connection, should an aggressive act occur in space, or an “infringement on sovereign rights”, there was little clarity concerning appropriate responses (e.g. based on Article 44 and 45 of the ITU, Article 9 of the OST, etc.).

There was general agreement that banning certain technologies would not improve space security significantly. It was viewed as more viable to concentrate on policies that focus on behavioural norms. Accordingly, accompanying SSA, there will be a need for guidelines and TCBMs that would encourage and foster “responsible” behaviour. The draft Code of Conduct represents an effort in this direction. By introducing the Code, the EU supports the notion that rules of the road, grounded in

“best practices” among space actors, offers the most promising approach to achieving space behavioural norms. At the same time the Code is not well-suited to resolving conflicts in space. TCBMs could usher in new opportunities for official and industry exchanges and incorporating the space domain into routine defence-related exercises, including in the areas of maritime security, counterterrorism, and large regional exercises. The importance of civil space cooperation with other countries (e.g. China) should not be underestimated either as it can help balance space security cooperation.

In discussing how to better organize the trilateral relationship, participants agreed that Japan’s space security stakeholders should be included as full partners in transatlantic space deliberations, where possible. In this connection, it would be beneficial for Europe and Japan to strengthen their interactions concerning space security. Moreover, both Europe and Japan, according to several panellists, should think creatively to better identify their common security interests. These trilateral efforts also need to involve the private sector. To achieve this type of integration, the partners need to exploit more fully the opportunities offered by bottom-up initiatives, as well as national unilateral and joint policy statements that could accelerate progress in this vital area.

Although nations will differ in what is viewed as an appropriate response to an incident or conflict in space, there is a need to forge a common understanding of space security “red lines” of acceptable behaviour. Positive incen-

tives will necessarily have to be accompanied by sufficient levels of deterrence and penalties for infractions. Perhaps most importantly, active engagement of all three partners in international fora supporting common objectives would go a long way toward building such norms.

With regard to space crisis management, should an event occur in space, a number of questions present themselves. They include: determining what kind of incident would qualify as a crisis; in what instance(s) would a transatlantic response be required; what past lessons and experiences should serve as guideposts for identifying appropriate responses; and what is required in the way of preparation for other unexpected events in space. Commercial operators have their own sets of issues to deal with when it comes to management of a crisis. After identifying the location of the object in question, they wish to understand which authority to inform and what process exists for them to provide information about a potentially damaging incident. As was summarized by one of the panellists, it gets down to three words: interoperability, coordination, and standards. So far, the private sector has not been considered as part of the solution established to address a crisis in space. Together with seeking to improve collaboration among the relevant entities in each of the countries, the trilateral partners should work out specific contingency plans for every level of potential intervention (national, multilateral etc.).



3. Conference Conclusion and Recommendations

The Prague conference was universally regarded among the participants as an important contribution to this rapidly emerging issue area and unique in its ambition to push the envelope of trilateral discussions on space security beyond the limited scope of current deliberations. Currently a sizable void exists in allied space security dialogue. During this “Track II” kick-off event, the door was opened on a range of less-acknowledged areas of space security, including: the robust counterspace activities of China; the implications of the dual-use nature of much of the space infrastructure of allies and adversaries; and the absence of many threat scenarios in the planning of influential managers of national space assets.

Conference Recommendations

The conference participants expressed support for continuing to develop this new “Track II” NGO initiative. Immediate next steps include the co-sponsors preparing conference reports (with this being ESPI’s contribution) that summarizes the most relevant areas of space security discussed at the conference that could benefit from further dialogue, research and trilateral exchanges. Some of the recommendations put forward by the participants were:

- Integrate space security more fulsomely into broader foreign policy and international security deliberations
- Exploit the EU-U.S. dialogue on civil space cooperation as an important platform for space security discussions, reinforced by NGO expert groups
- Involve commercial operators in space policy debates on major issues, including regulatory compliance; access to space; SSA and collision avoidance; and cyber security
- Identify guidelines, based on common understandings, which define responsible behaviour in space
- Seek a better understanding of the connectivity among SSA, TCBMs and space crisis management
- Continue to engage governments in forging a clear understanding of the draft Code of Conduct for Outer Space Activities
- Identify several concrete activities for initial practical collaboration
- Explore establishment of a combined space operations centre as a vehicle for closer cooperation, including the sharing of information on the space environment, objects, and interference
- Examine the prospects for more robust multilateral coordination concerning incidents or threats via joint exercises between governments and private operators (beyond the Schriever Wargames) to establish a crisis response roadmaps
- Assess the potential of joint U.S.-EU-NATO exercises on different contingencies associated with transatlantic space crisis management
- Involve Japan’s space security stakeholders as full partners in transatlantic space security deliberations
- Understand the potential consequences of space-related disruptions for terrestrial crisis management

List of Acronyms

Acronym	Explanation
A	
ASAT	Anti-satellite weapon
C	
CCSDS	Consultative Committee for Space Data Systems
CD	Conference on Disarmament
CEOS	The Committee on Earth Observation Satellites
CFE	Commercial and Foreign Entities
CFSP	Common Foreign and Security Policy
COPUOS	Committee on the Peaceful Uses of Outer Space
CSDP	EU's Common Security and Defence Policy
CSM	Conjunction Summary Messages
CSR	Committee on Space Research
D	
DNI	Director of National Intelligence
DOD	The U.S. Department of Defense
E	
EC	The European Commission
EDA	European Defence Agency
EDRS	European Data Relay System
EEAS	European External Action Service
EMI	Electromagnetic Interference
ESA	European Space Agency
ESP	European Space Policy
EU	The European Union
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
EUSC	The European Union Satellite Centre
G	
GEO	Group on Earth Observation
GEO	Geosynchronous Orbit
GMES	Global Monitoring for Environment and Security
GNSS	Global Navigation Satellite System
GSSAC	German Space Situational Awareness Centre
I	
IADC	Inter-Agency Debris Coordination Committee



Acronym	Explanation
ICAO	International Civil Aviation Organization
ICG	International Committee on GNSS
ISEG	International Space Exploration Group
ISES	International Space Environment Service
ISS	International Space Station
ITU	The International Telecommunication Union
J	
JAXA	Japan Aerospace Exploration Agency
JFCC SPACE	U.S. Joint Functional Component Command for Space
JSDF	Japan Self-Defense Force
JSpOC	Joint Space Operations Center
L	
LEO	Low Earth Orbit
M	
MINURCAT	The United Nations Mission in the Central African Republic and Chad
MOD	Ministry of Defense
MS	Member State(s)
MTG	Meteosat Third Generation
N	
NASA	The National Aeronautics and Space Administration
NATO	The North Atlantic Treaty Organization
NEO	Near-Earth object
NSP	U.S. National Space Policy
NSSS	National Security Space Strategy
O	
OIG	NASA's Orbital Information Group
OSCE	Organization for Security and Co-operation in Europe
OST	Outer Space Treaty
P	
PPWT	Draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects
PTBT	Partial Test Ban Treaty
R	
RFI	Radiofrequency Interference
S	
SBSS	Space-Based Space Surveillance
SDA	Space Data Association
SecDef	Secretary of Defense
SSA	Space Situational Awareness
SSA-NEO	SSA Near-Earth Objects

Acronym	Explanation
SSA-PP	SSA Preparatory Programme
SSA-SST	SSA Space Surveillance and Tracking
SSA-SWE	SSA Space Weather
T	
TCBMs	Transparency and Confidence-Building Measures
U	
UN	United Nations
UNCOPUOS	UN Committee on the Peaceful Uses of Outer Space
UNCOPUS STSC	UNCOPUS Scientific and Technical Subcommittee
UNGA	The United Nations General Assembly
US SSN	U.S. Space Surveillance Network
USAF	U.S. Air Force
USG	United States Government
USSR	Union of Soviet Socialist Republics
USSTRATCOM	United States Strategic Command
W	
WG	Working Group
WMO	The World Meteorological Organization



Summary of the Keynote Speeches

Summary of the Keynote Speech by Admiral Dennis C. Blair, former U.S. Director of National Intelligence and Commander-in-Chief of the U.S. Pacific Command:



- » The transatlantic partnership in space needs to set its sights on the global space enterprise, and to find ways to bring China into that enterprise to play a transparent, realistic and productive role.

Admiral Blair underscored in his keynote address that China's growing space capabilities are an important factor in most of the topics covered on the conference agenda, including governance, the security policy dimensions of space, and space crisis management. To the extent that Europe and the United States can agree on a common approach to dealing with China's rise in space, the benefits from the global use of space would be multiplied and the dangers reduced. Adm. Blair observed that China is building worldwide navigation, communications and intelligence collection systems, with relay satellites to pass on information gathered on the other side of the world back to China. Accordingly, international discussions concerning space security need to involve realistic understandings of Chinese space-related developments.

Adm. Blair explained that there are basically two competing camps concerning China's future. Those that "hope for the best" and wish to continue business as usual with China, and those that are concerned by China's unpredictability and episodic belligerence and wish to be prepared for a more troubled future. He recommended a more activist and positive, multilateral approach toward Beijing that finds a proper balance, or middle ground, between these alternative outcomes. Admiral Blair commented that the

best prospect for the successful engagement of China in space would be to offer it the opportunity to participate, proactively and responsibly, in space endeavors and even help shape their course, beginning with space exploration and scientific research and moving, over time, to commercial and military systems (e.g. transparency and confidence-building measures, behavioral norms etc.). Cooperation of this type would likely build greater trust between China and other space-faring nations, something that is in short supply today. Adm. Blair added that China's participation in these ventures would also provide a clearer sense of its true intentions as it pursues a robust and ambitious civilian and military space program.

He concluded his remarks by indicating that the decision to utilize space systems in a cooperative manner - for such activities as disaster relief, scientific research, commercial joint ventures and peacekeeping operations - must be made by China itself. That said, he indicated that it will be the responsibility of other space faring nations, including Europe, the U.S. and Japan, to provide China with workable opportunities to participate in the resolution of emerging challenges in the field of space security as well as the immense benefits to mankind stemming from the peaceful uses of space.

Summary of the Keynote Speech by Hirofumi Katase, Deputy Secretary-General of the Strategic Headquarters for Space Policy, Cabinet Secretariat, Japan:



- » We should work together to involve developing countries into an actual international cooperation that will give them the true benefit of space utilization.

Mr. Katase began his remarks by expressing his appreciation that, for the first time, space policy decision-makers, academics, NGO experts and industry representatives from Europe, the U.S. and Japan, which share common values, were gathered to help shape the architecture of future space security. He acknowledged that this is an especially relevant topic as the number of countries operating in space has dramatically increased in the past twenty years from thirty to sixty. The larger number of space-faring nations and growing intensity of space activities is primarily a result of the globalization.

Japan's Basic Space Law of 2008 and the Japan Basic Plan for Space, approved in 2009, underline the importance of international cooperation and security in space.

Mr. Katase observed that Japan and the U.S. have already begun discussions, at an official level, concerning collaboration on space security issues as a part of their foreign and defense policy cooperation and coordination. The success of the working relationships of three partners (i.e. Japan, the U.S., and Europe) will largely depend on how such collaboration is organized. Accordingly, Mr. Katase believes we need to understand those characteristics that differentiate space security from other areas related to globalization. First, he pointed out that space security is a relatively new field that is developing faster than the norms and rules governing areas such as trade. At the same time, space security has become essential for sustained terrestrial economic development. Second is the asymmetric nature of space, where even a small satellite off course or a misconduct of small countries can cause considerable damage. Finally, security in space is directly related to the ability to preserve the security of individual nations.

Mr. Katase stated his view that global governance has the best hope of ensuring space security and countries should utilize multi-track approaches to advance better governance, including via the international Code of Conduct for Outer Space Activities proposed by the EU. He also advised that the international community should take care not to establish legally-binding rules too quickly and that Japan should work together with Europe and the U.S. to encourage emerging space-faring nations to comply with international rules and norms. In this connection, he stated that cooperation on space situational awareness (SSA) would be of great importance. Japan possesses some SSA capabilities and the Basic Plan for Space establishes SSA as a high priority area.

At the same time, he observed, in order to gain a global understanding of the importance of space utilization and what is required to protect space-based assets, it will be essential to promote effective cooperation in space. A good example involving the developing countries is the international cooperation on display with regard to a Japan-led "Sentinel Asia Project" with the participation of Asia-Pacific space agencies, which provides modalities for sharing critical satellite-based information on natural disasters (e.g. earthquakes).

Summary of the Keynote Speech by Pierre-Louis Lempereur, Chairman of the Council Working Party on Disarmament and Space, European Union External Action Service:



» The purpose of this Code is to enhance the security, safety and sustainability of all outer space activities.

Mr. Lempereur, representing the European Union External Action Service, outlined the major European effort underway in the field of space diplomacy, the international Draft Code of Conduct for Outer Space Activities. He also informed the audience about the status and future plans connected with the Code of Conduct as well as an explanation concerning why the EU embarked on this endeavour and the value it brings to the global space community.

He made clear that the EU understands that space activities are expanding rapidly and that space is a crucial resource for all countries in the world, including those that have not, as yet, joined the space club. Accordingly, the EU deemed it necessary to help ensure greater security in outer space. The Code represents a pragmatic and incremental process which can assist in achieving enhanced safety and security in outer space through, in part, transparency and confidence-building measures (TCBMs). The Code is basically a response to the United Nations General Assembly Resolution 61/75 of Sep-



tember 2007 and the EU supports the notion that voluntary rules of the road, grounded in “best practices” among space actors, offers the most promising approach to achieving the above-mentioned objectives.

The first draft of the Code was introduced in December 2008. After extensive consultations with key space-faring nations, the EU produced a revised draft in September 2010 and the EU Council gave a mandate to the EU High Representative to carry out wider consultations. Mr. Lempereur observed that the EU recognizes that there are two main areas where the Code provides added value. First, the scope of the Code is all-encompassing, covering all dimensions of space operations and applies to both civilian and military activities in space. It also offers procedures to reduce the possibility of incidents in space, including collisions between space objects, or

any other forms of interference with other states’ rights. Second, the Code has a preventive focus, emphasizing that activities undertaken in space should be involve a high degree of care, due diligence, and transparency with the aim of building confidence among space actors.

In closing, Mr. Lempereur informed the audience that the Code had been presented to various events and discussed bilaterally with a number of space-faring nations. The EU now plans to discuss this text multilaterally and will organise a multilateral experts meeting(s), open to all States, the first of which is to take place by the end of 2011. These meetings will serve to prepare an ad hoc Diplomatic Conference, open to all States on a voluntary basis, at which the Code will be open to signature.

Conference Agenda



SPACE SECURITY THROUGH THE TRANSATLANTIC PARTNERSHIP

International Conference | June 12-14, 2011 Prague, Czech Republic

CONFERENCE PROGRAM

The conference is held under the auspices of Minister of Foreign Affairs, Karel Schwarzenberg, Minister of Defence, Alexandr Vondra, Minister of Transport, Radek Šmerda, and Lord Mayor of Prague, Bohuslav Svoboda.

SUNDAY, 12 JUNE 2011

Venue: Residence of the Lord Mayor of the City of Prague, Mariánské nám. 1

18:00–20:00 **OPENING RECEPTION** (by special invitation only)

Welcome Remarks:

Bohuslav Svoboda, Lord Mayor of Prague

Alexandr Vondra, Minister of Defence, Czech Republic

Norman L. Eisen, Ambassador of the United States to the Czech Republic

Kai-Uwe Schrogl, Director, European Space Policy Institute

Oldřich Černý, Executive Director, Prague Security Studies Institute

MONDAY, 13 JUNE 2011

Venue: The Ministry of Foreign Affairs, Czernin Palace, Loretánské nám. 5

8:30–9:00 **COFFEE AND REGISTRATION**

9:00–9:30 **OPENING SESSION**

Moderator: Oldřich Černý, Executive Director, Prague Security Studies Institute

Welcome Remarks: Jiří Schneider, First Deputy Minister of Foreign Affairs, Czech Republic

Opening Remarks: Kai-Uwe Schrogl, Director, European Space Policy Institute

9:30–10:45 **PANEL 1: "DEFINING SPACE SECURITY FOR THE 21- CENTURY"**

Moderator: Scott Pace, Director, Space Policy Institute, George Washington University

Panelists:

Michel Bourbonniere, Legal Counsel, Canadian Space Agency,
and Professor, Royal Military College of Canada

Sylvia Kainz-Huber, Deputy Head, Space Policy & Coordination, Directorate
General Enterprise and Industry, European Commission

Giuseppe Morsillo, Director of Policies, Planning and Control, European Space Agency

Frank A. Rose, Deputy Assistant Secretary for Space and Defence Policy, Bureau
of Arms Control, Verification and Compliance, US Department of State

10:45–11:00 **COFFEE BREAK**

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11:00–12:30 **PANEL 2: "TRANSATLANTIC APPROACHES TO INTERNATIONAL SPACE SECURITY COOPERATION"**

Moderator: Jeff Kueter, President, George C. Marshall Institute

Panelists:

Frank Asbeck, Principal Advisor, Security and Space Policy, European External Action Service, European Commission

David Bair, Chief Technical Officer, Eutelsat

Michael Sheehan, Professor, International Security and Politics of Space, Swansea University

Maj. Phillip Verroco, Chief of Space Policy, Joint NATO Strategist, Joint Airpower Competence Centre

12:30 **BUFFET LUNCHEON**

Keynote Speech: Hirofumi Katase, Deputy Secretary-General, Strategic Headquarters for Space Policy, Cabinet Secretariat, Japan

Introduced by: Brian T. Kennedy, President, Claremont Institute

14:00–15:30 **PANEL 3: "GOVERNANCE OF SPACE ACTIVITIES"**

Moderator: Xavier Pasco, Senior Research Fellow, Foundation for Strategic Research

Panelists:

Geraldine Naja, Head of the Coordination with EU Institutions, European Space Agency

Dumitru-Dorin Prunariu, Chairman, United Nations Committee on the Peaceful Uses of Outer Space

Eric R. Sterner, Fellow, George C. Marshall Institute

David A. Turner, Deputy Director for the Office of Space and Advanced Technology in the Bureau of Oceans, Environment and Science, US Department of State

15:30–15:45 **COFFEE BREAK**

15:45 – 17:30 **PANEL 4: "SECURITY POLICY DIMENSIONS OF SPACE SITUATIONAL AWARENESS (SSA)"**

Moderator: Jana Robinson, Resident Fellow, European Space Policy Institute

Panelists:

Christian Bréant, Director for Research and Technology, European Defence Agency

Col. Carsten Breuer, Chief of the Strategy & Policy Branch, Ministry of Defence, Germany

Lt. Gen. Susan Helms, Commander, Joint Function Component Command for Space, US Strategic Command

Tomaž Lovrenčič, Director, European Union Satellite Centre

Atsuo Suzuki, Director, Defense Policy Division, Bureau of Defense Policy, Ministry of Defence, Japan

19:30 **GALA DINNER (BY SPECIAL INVITATION ONLY)**

Venue: Mlýnec Restaurant, Old Town

Keynote Speech: Admiral Dennis C. Blair, former US Director of National Intelligence and Commander-in-Chief of US Pacific Command

Introduced by: Roger W. Robinson Jr., Co-Founder, Prague Security Studies Institute, and former Senior Director of International Economic Affairs, US National Security Council

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**SPACE SECURITY THROUGH
THE TRANSATLANTIC PARTNERSHIP**
International Conference | June 12-14, 2011 Prague, Czech Republic

TUESDAY, 14 JUNE 2011

Venue: The Ministry of Foreign Affairs, Czernin Palace, Loretánské nám. 5

8:00-8:45 **COFFEE AND REGISTRATION**

9:00 **OPENING REMARKS**

Pierre-Louis Lempereur, Counsellor for Outer Space Issues, Office of the EU Representative for Non-Proliferation and Disarmament Issues

9:30 – 10:45 **PANEL 5: "TRANSATLANTIC SPACE CRISIS MANAGEMENT FOR THE FUTURE"**

Moderator: Aude-Emmanuelle Fleurant, Head, Armament and Defence Economy Research Group, French Military Academy Strategic Research Institute

Panelists:

Richard DalBello, Vice President of Government Relations, Intelsat General Corporation

James Finch, Director, Policy and Strategy Development Global Strategic Affairs, Space Policy Office of the Under Secretary of Defence for Policy, US Department of Defence

Kai-Uwe Schrogl, Director of the European Space Policy Institute

Col. Vladimír Šilhan, Defence Advisor, Permanent Representation of the Czech Republic to the EU

10:45 – 11:00 **COFFEE BREAK**

11:00 – 12:30 **PANEL 6: CONCLUDING PANEL WITH THE SESSION MODERATORS**

Moderator: Kai-Uwe Schrogl, Director, European Space Policy Institute

Panelists:

Aude-Emmanuelle Fleurant, Head, Armament and Defence Economy Research Group, French Military Academy Strategic Research Institute

Jeff Kueter, President, George C. Marshall Institute

Scott Pace, Director, Space Policy Institute, George Washington University

Xavier Pasco, Senior Research Fellow, Foundation for Strategic Research

Jana Robinson, Resident Fellow, European Space Policy Institute

12:30 **CLOSING LUNCHEON**

Keynote Speech: "Unlocking the Potential of Space Technologies for the Czech Republic"

Jiří Žák, Deputy Minister of Transport for Foreign Relations and Satellite Systems, Czech Republic

Introduced by: Oldřich Černý, Executive Director, Prague Security Studies Institute

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Speaker Biographies

Frank Asbeck

Frank Asbeck is the Principal Adviser for Space and Security Policy, European External Action Service, European Commission. Mr. Asbeck studied physics, law and political science in Germany and war studies in London. He started his professional career at the International Institute for Strategic Studies in London, dealing with military usage of space and arms control. He then joined the German public service to deal with arms control, CBRN proliferation and East-West technology transfer. Following his assignment to the German Embassy in Brussels, he became Deputy Director of the Western European Union Satellite Center in Torrejón, Spain. From 2001 onwards, Mr. Asbeck worked at the European Commission as Director of the newly created Security Directorate. In 2005, he moved back to Torrejón as the Director of the EU Satellite Centre. Since January 2010, he has been Principle Adviser for Security Policy, first in the Commission (Directorate General RELEX), and now in the European External Action Service, dealing with matters such as space policy and cyber security.

David Bair

David Bair is Chief Technical Officer of Eutelsat. Mr. Bair is a former Senior Vice President of Space Programs and Operations at EchoStar Satellite Services. Prior to EchoStar, Mr. Bair's track record in the satellite industry includes executive posts at Lockheed Martin Commercial Space Systems, where he was Vice President and Chief Engineer of commercial space programs, overseeing the integration of Lockheed's traditional manufacturing group with its new commercial telecommunications sector. He also held the position of Program Manager and Chief Engineer on several commercial programs at General Electric AstroSpace, and in various engineering and flight operations posts on the military/government side of General Electric's Space Systems Division. He began his career in the United States Navy working on nuclear submarine operations.

Admiral Dennis C. Blair

Admiral Dennis C. Blair served as the US Government's Director of National Intelli-

gence from January 2009 to May 2010, where he led sixteen national intelligence agencies and provided integrated intelligence support to the President, Congress and operations in the field. From 2003 to 2006, Admiral Blair was President and Chief Executive Officer of the Institute for Defense Analyses (IDA). Prior to retiring from the Navy in 2002, Admiral Blair served as Commander in Chief, US Pacific Command, the largest of the combatant commands. A graduate of the US Naval Academy, Admiral Blair earned a Master's degree in history and languages from Oxford University as a Rhodes scholar, and was a White House fellow at the Department of Housing and Urban Development.

Michel Bourbonniere

Michel Bourbonniere is Legal Counsel at the Canadian Space Agency. He has been Head of Delegation for Canada at the United Nations COPUOS legal subcommittee meetings. Mr. Bourbonniere is a member of the Department of Justice National Security Emergency Team. He is Adjunct Professor of Law at the Royal Military College of Canada, Course Director at the International Institute of Humanitarian Law in San Remo Italy, and lectures regularly in the ECSL summer course. Mr. Bourbonniere is widely published on space law and policy, air law, international law and national security law. He holds three law degrees.

Dr. Christian Bréant

Dr. Christian Bréant is the Research & Technology Director at the European Defence Agency. Dr. Bréant is a graduate of Ecole Polytechnique (1976) and PhD scientist in Laser Physics from Paris University. He completed post-doctoral work at JILA, Boulder, University of Colorado, USA. In 2000, Dr. Bréant was appointed Director of the Defence Analysis Centre (CAD). In February 2004, he was Deputy Director for Technology Strategy and R&T Director for Defence and Security of the DGA in the French Ministry of Defense. In March 2005, Dr. Bréant was elected as a member of the French Academy of Technologies.

Colonel Carsten Breuer

Colonel Carsten Breuer is Chief of the Strategy and Policy Branch at the Ministry of Defence, Germany. In this capacity, he oversees the German-French cooperation on Space Situational Awareness (SSA) as well as US-German space cooperation. Previously, Colonel Breuer was the Deputy Supreme Allied Commander transformation representative in Europe and Chief of Staff and branch head transformation at NATO. Colonel Breuer's extensive military experience also includes posts as Executive Officer to the Army Chief of Staff, Commander of both the Air Defense Battalion 12 and German National Element Multinational Brigade 8th Kosovo Force Contingent in Kosovo, as well as Chief of Staff, Mechanized Infantry Brigade 41, Torgelow.

Oldřich Černý

Oldřich Černý is Executive Director and Co-Founder of the Prague Security Studies Institute. Prior to 1989, Oldřich Černý, who holds advanced degrees in both English and Czech, was employed as a translator of foreign literature into Czech and a producer for the dubbing of foreign films into Czech. In the spring 1990, Mr. Černý was appointed National Security Advisor to the President of Czechoslovakia. Following the split of Czechoslovakia in January of 1993, Mr. Černý was appointed the first Director General of the Czech Foreign Intelligence Service, a post he held until his resignation in 1998. Since 1999, Mr. Černý has served as Executive Director of the Forum 2000 Foundation.

Richard DalBello

Richard DalBello is Vice President of Legal and Government Affairs at Intelsat General's legal team, its government relations and public policy efforts, as well as representing Intelsat General before numerous US and international policy bodies. He served previously as President of the Satellite Broadcasting and Communications Association, including more than three years as the President of the Satellite Industry Association. Earlier, Mr. DalBello was General Counsel for Spotcast Communications Inc., and Vice President of Government Affairs, North America, for ICO Global Communications, a provider of mobile satellite communications services. He also served for four years as the Assistant Director for Aeronautics and Space in the White House's Office of Science and Technology Policy.

Norman L. Eisen

Norman L. Eisen was sworn in as US Ambassador to the Czech Republic on January 14,

2011 and presented his credentials to the Czech President Vaclav Klaus on January 28, 2011. From January 2009 to January 2011, he served in the White House as Special Counsel to the President for Ethics and Government Reform. Prior to that, he was the Deputy General Counsel to the Obama-Biden Presidential Transition.

Before entering the Administration, Ambassador Eisen was a partner in the Washington, D.C. law firm Zuckerman Spaeder. Ambassador Eisen is the Co-Founder of Citizens for Responsibility and Ethics in Washington (CREW), a government watchdog group. Between college and law school, the Ambassador served for three years as an Assistant Director of the Los Angeles office of the Anti-Defamation League, a national civil rights organization.

Ambassador Eisen received his Juris Doctor in 1991 from Harvard Law School and his Bachelor's from Brown University in 1985.

James Finch

James Finch is the Director for Space Policy and Strategy Development, Office of the Under Secretary of Defense for Policy. Mr. Finch is responsible for developing and advocating Department of Defense space policies and strategies that enable flexible, resilient, and dominant capabilities to advance US national interests. Mr. Finch was formerly the Deputy Chief of the Space and Cyberspace Division, Office of the Deputy Under Secretary of the Air Force, International Affairs. In this position, Mr. Finch built, sustained, and expanded international relationships enabling space and cyberspace cooperation through the development of international engagement strategies, specific cooperative concepts, and the negotiation of international agreements in support of national security objectives.

Dr. Aude-Emmanuelle Fleurant

Dr. Aude-Emmanuelle Fleurant is Head of the Armament and Defence Economy Research Group at the French Military Academy Strategic Research Institute (IRSEM). Dr. Fleurant's scientific interests are centered on the analysis of budgetary, industrial, technological and policy dimensions of defense and security and how they relate to and influence one another. Dr. Fleurant focuses on issues such as industrial transatlantic relations, armament and dual-use export controls and transfers, and R&D research efforts and projects.

Before joining IRSEM, Dr. Fleurant was Head of Market and Strategic Intelligence Office at Technopole Defense and Security, a Canadian non-profit organization that supports projects



within the Canadian defense and security community by bringing together stakeholders to work on common projects. Dr. Fleurant previously held the position of Senior Researcher at the Research Group on Military Industry and Security at the University of Quebec in Montreal.

General Susan J. Helms

General Susan J. Helms is Commander, 14th Air Force, US Air Force Space Command and Commander, Joint Functional Component Command for Space, US Strategic Command, Vandenberg Air Force Base, California, USA. General Helms was commissioned from the US Air Force Academy in 1980. Selected by NASA in January 1990, General Helms became an astronaut in July 1991. On January 13, 1993, then an Air Force major and a member of the space shuttle Endeavour crew, she became the first US military woman in space. A veteran of five space flights, General Helms has logged 211 days in space, including a spacewalk of eight hours and 56 minutes, a world record. General Helms commanded the 45th Space Wing at Patrick AFB, Florida, USA. General Helms holds a Bachelor's from the US Air Force Academy and a Master's from Stanford University.

Sylvia Kainz-Huber

Sylvia Kainz-Huber joined the European Commission in 1995. Since 2007, she is Deputy Head of Unit responsible for space policy and coordination at the Commission's Directorate-General for Enterprise and Industry. In this capacity, she is responsible for space and security issues. In previous positions, Ms. Kainz-Huber coordinated the Directorate-General's inter-institutional relations and worked on various industrial policy files.

Hirofumi Katase

Hirofumi Katase has served as Deputy Secretary-General at the Secretariat for Strategic Headquarters for Space Policy, Government of Japan since 2010. Before joining the Secretariat for Strategic Headquarters for Space Policy, Mr. Katase held numerous management positions concerning trade, energy and industrial policy in Ministry of Economy, Trade and Industry (METI), which he joined in 1982.

Brian T. Kennedy

Brian T. Kennedy is President of the Claremont Institute. Mr. Kennedy has been with the Institute since 1989. He became the fourth president of the Claremont Institute in 2002. During his tenure he has directed the

Institute's Golden State Center in Sacramento and also the Institute's National Security Project.

In addition to his duties as president, Mr. Kennedy serves as publisher of the Claremont Review of Books, is a member of the Independent Working Group on Missile Defense and is a co-author of *Shariah: The Threat to America*. His articles on national security affairs and public policy issues have appeared in The Wall Street Journal, National Review, and Investor's Business Daily. Mr. Kennedy is a graduate of Claremont McKenna College.

Michael Krepon

Michael Krepon is Co-Founder of Stimson, where he also serves as Director of the South Asia and Space Security programs. Mr. Krepon is the author or editor of thirteen books, including *Space Assurance or Space Dominance: The Case Against Weaponizing Space* (2003); *Open Skies, Arms Control and Cooperative Security* (1992); and *Commercial Observation Satellites and International Security* (1990). His most recent book is *Better Safe than Sorry, The Ironies of Living with the Bomb* and more than 350 articles. Prior to cofounding Stimson, he worked at the Carnegie Endowment for International Peace, the US Arms Control and Disarmament Agency during the Carter administration, and in the US House of Representatives, assisting Congressman Norm Dicks. Mr. Krepon's current research focus is on nuclear stability and crisis management in South Asia. His work on space security centers around the promotion of a code of conduct for responsible space-faring nations, which has subsequently been endorsed by the European Union and the Obama administration. Mr. Krepon received a Master's from the School of Advanced International Studies at Johns Hopkins University, and a Bachelor's from Franklin & Marshall College. He also studied Arabic at the American University in Cairo, Egypt.

Jeff Kueter

Jeff Kueter is President of the George C. Marshall Institute, a public policy institute focused on scientific issues with an impact on public policy. An expert on space security and missile defense, he has testified on both topics before the US Congress. He also serves as a contributor on strategic issues for the print and television media, and is the author of analytical pieces exploring aspects of the space security and missile defense debates. Mr. Kueter received his Bachelor's in Political Science and Economics at the University of Iowa, where he graduated with honors, and Master's degrees in Political Science and Security Policy Studies and Science & Technol-

ogy Studies, both from George Washington University. Pierre-Louis Lempereur Pierre-Louis Lempereur is the Chairman of the Council Working Party on Disarmament and Space and Counsellor in the Non-Proliferation and Disarmament Department of the European Union External Action Service (EEAS), Brussels, Belgium. Prior to his current position, he was Counsellor in the Office of the Personal Representative of the EU High Representative for Non-Proliferation Issues at the Council of the European Union. Mr. Lempereur previously served as First Secretary at the Office of the Council of the European Union to the United Nations, as well as advisory positions such as Assistant European Correspondent at the European Commission and Adviser to the Delegation of the European Commission. Mr. Lempereur holds degrees from the College of Europe, the Ruprecht-Karls-Universität, the Free University of Brussels, the Institut d'Études Politiques, the University of California, Los Angeles, and Georgetown University.

Tomaz Lovrenčič

Tomaz Lovrenčič was elected Director of the European Union Satellite Centre (EUSC) in 2010. From 2006 to 2009, he served as the EUSC's Deputy Director. In addition to his work within space security, Mr. Lovrenčič has held various diplomatic posts, including as Slovenia's Ambassador to Spain and Cuba from 2002 to 2006, as Diplomatic Advisor to Prime Minister Dr. Janez Drnovšek (1996-1999) and then as Deputy Director (1999) and Director (2000-2002) of the Slovenian Intelligence and Security Agency. In the latter period, he was also Secretary of Slovenia's National Security Council. Mr. Lovrenčič received his Bachelor's in International Affairs from Université Américaine de Paris, France, and studied in Cairo, Egypt. He obtained his Master's degree in Foreign Service from Georgetown University, Washington, D.C. He also did post-graduate studies in the field of international security at John F. Kennedy School of Government at Harvard University.

Giuseppe Morsillo

Giuseppe Morsillo has been Director of Policies, Planning and Control (D/PPC) at the European Space Agency since April 2011. He has 27 years of experience in international environments, but is primarily focused on the space sector. In 2005, Mr. Morsillo joined ESA as Head of the Director General's Policy Office where he was in charge of coordination with member states and EU institutions, strategic planning and control, security strategy, and management of future studies and advanced concepts. In 2001, he held various

positions at the Italian Space Agency (ASI). He last served as Head of Strategy & National and International Relations while simultaneously working as the Chairman of ELV and Italian delegate to the ESA Council. Mr. Morsillo studied electrical engineering at the Polytechnic of Naples, Italy. From 1983 to 2000, he held several positions in various aerospace companies of Finmeccanica. In his most recent appointment, he served as the Head of Civil Marketing of the Alenia Aerospazio Space Division.

Géraldine Naja

Géraldine Naja is Head of Coordination with EU Institutions at the European Space Agency. Ms. Naja is a graduate of the French Ecole Polytechnique, after which she specialized in chemical engineering at the Ecole Nationale Supérieure de Techniques Avancées (ENSTA). Ms. Naja also holds a degree from the French Institute for Political Studies (Sciences Po). After conducting post-graduate research at ONERA, Ms. Naja joined ESA as a payload engineer in the Space Station Program. In 1997, Ms. Naja became responsible for European Policy in the Directorate of Strategy and External Relations, a post that she held until 2002. She was in charge of relations with European institutions, and she also elaborated together with CNES, the Charter for Space and Major Disasters. In 2003, Ms. Naja was seconded to the French Ministry of Research as a Strategy Advisor to the Minister, a position she held until 2004.

Dr. Xavier Pasco

Dr. Xavier Pasco has been a Senior Research Fellow at Fondation pour la Recherche Stratégique in Paris, France for more than 20 years. Dr. Pasco previously worked at CRESTEcole Polytechnique. He has specialized in international space policy and security related issues and been in charge of numerous studies and working groups about National and European space policies in the field of civilian and military activities.

In addition to authoring numerous books and articles, Dr. Pasco is also an Associate Fellow at the Space Policy Institute (George Washington University) and the European Editor of Space Policy since 2002.

Dumitru-Dorin Prunariu

Dumitru-Dorin Prunariu currently works for the Romanian Space Agency as an expert within the Airspace Consulting Association. In June, he was elected Chairman of COPUOS (United Nations Committee on the Peaceful Uses of Outer Space), a position he will hold until 2012. From 1993 to 2004, Mr. Prunariu



was the Permanent Representative of the ASE at COPUOS sessions. In 1996, he served as a member of the Executive Committee of ASE for two, three-year terms and in 2010 he was appointed President of the European Branch. In addition, Mr. Prunariu has held the position of Vice President of the International Institute for Risk, Security and Communication Management (EURISC), Bucharest since 1995. Mr. Prunariu was the President of the Romanian Space Agency from 1998 to 2004. In 2004 he was elected as the Chairman of the Scientific and Technical Subcommittee of COPUOS for a two year term. In 2004, Mr. Prunariu served as Ambassador to Russia. Mr. Prunariu also served as Director of the Romanian Office for Science and Technology (ROST) to the European Union in Brussels until 2008.

Jana Robinson

Jana Robinson has been a Resident Fellow at the European Space Policy Institute (ESPI) since December 2009. Prior to joining ESPI, she served as Development Director for the Prague Security Studies Institute (PSSI) from 2005–2009. She was likewise responsible for the corporate establishment of PSSI Washington, a non-profit organization in Washington, D.C., closely affiliated with PSSI Prague. Previously, she held positions consistent with her academic background in Asian Studies that made use of her Mandarin language skills. Mrs. Robinson is currently pursuing her PhD at Charles University focusing on space security. She holds an MA in Asian Studies from George Washington University's Elliott School of International Affairs, in Washington, D.C. specializing in Asia-Pacific security issues and space policy, and an MA in Asian Studies from Palacky University, Olomouc, Czech Republic. She received scholarships to attend the International Space University 2009 Space Studies Program, 2008 Summer Mandarin Training Course at the Mandarin Training Center of the National Taiwan Normal University in Taipei, and Shanghai University in 1999-2000.

Roger W. Robinson, Jr.

Roger W. Robinson, Jr. has served as President and CEO of RWR Advisory Group since its founding in 1985. In addition, Mr. Robinson is Co-Founder of the Prague Security Studies Institute. Between 2001 and 2009, Mr. Robinson served as President and CEO of Conflict Securities Advisory Group. He was previously Chairman and Vice Chairman of the Congressionally-mandated US-China Economic and Security Review Commission from 2001 to 2006.

Mr. Robinson worked at the White House from March 1982 to September 1985 as Senior Director of International Economic Affairs at the National Security Council (NSC). Between January 1984 and April 1985, Mr. Robinson was Executive Secretary of the Senior Interdepartmental Group-International Economic Policy, a Cabinet-level body that reported through the NSC to the President. Prior to joining the NSC staff, Mr. Robinson was a Vice President in the International Department of the Chase Manhattan Bank in New York City and he also served for some two and a half years as a personal assistant to former Chase Chairman David Rockefeller and earlier on assignment with the Chase branch in Tokyo.

Frank A. Rose

Frank A. Rose currently serves as the Deputy Assistant Secretary of State for Space and Defence Policy in the Bureau of Arms Control, Verification and Compliance. In this position, he is responsible for advising the Assistant Secretary and, as required, the Undersecretary for Arms Control and International Security, on key issues related to arms control and defence policy. Prior to joining the State Department June 2009, Mr. Rose held various national security staff positions in the US House of Representatives, including service as a Professional Staff Member on both the House Armed Services Committee and the House Permanent Select Committee on Intelligence, where he focused on missile defence, defence policy, and intelligence issues. Mr. Rose received his Bachelor's degree in History from American University in 1994 and a Master's degree in War Studies from Kings' College, University of London in 1999.

Jiří Schneider

Jiří Schneider is the First Deputy Minister, Ministry of Foreign Affairs of the Czech Republic. From 2005-2010, Mr. Schneider served as Program Director of the Prague Security Studies Institute. He was Head of the Policy Planning Department of the Czech Ministry of Foreign Affairs (1993-1994, 1999-2001, 2003) and Ambassador of the Czech Republic to Israel (1995-1998). Mr. Schneider was an International Policy Fellow at the Open Society Institute in Budapest (2002) and an MP of the Czechoslovak Federal Assembly (1990-1992). He also serves as a part-time lecturer at Charles University, New York University in Prague, and to PSSI's Robinson-Martin Security Scholars Program. He is a graduate of Charles University and University of Cambridge.

Dr. Kai-Uwe Schrogl

Dr. Kai-Uwe Schrogl has served as Director of the European Space Policy Institute (ESPI) in Vienna, Austria since 2007. Prior to this, he was the Head of the Corporate Development and External Relations Department in the German Aerospace Center (DLR). Previously, he also worked with the German Ministry for Post and Telecommunications and the German Space Agency (DARA). He has been chairman of various European and global committees (ESA International Relations Committee and two UNCOPUOS plenary working groups). He presented and respectively testified at hearings of the European Parliament and the US House of Representatives. Dr. Schrogl has written or co-edited 12 books and more than 130 articles, reports and papers in the fields of space policy and law as well as telecommunications policy. He is editor in chief of the Yearbook on Space Policy and the book series Studies in Space Policy. He holds a doctorate degree in political science and lectures on international relations at Tübingen University in Germany (as an Honorary Professor). Dr. Schrogl has been a regular lecturer at the International Space University (where he serves as Adjunct Faculty) and the European Centre for Space Law's Summer Courses.

Dr. Scott Pace

Dr. Scott Pace is the Director of the Space Policy Institute and a Professor of Practice in International Affairs at George Washington University's Elliott School of International Affairs. His research interests include civil, commercial, and national security space policy. From 2005-2008, he served as the Associate Administrator for Program Analysis and Evaluation at NASA. Prior to NASA, Dr. Pace was the Assistant Director for Space and Aeronautics in the White House Office of Science and Technology Policy (OSTP).

Michael Sheehan

Michael Sheehan is a Professor of International Security and Politics at Swansea University. He previously worked at the University of Aberdeen, where he was Director of the Scottish Centre for International Security, and at the International Institute for Strategic Studies in London. His current research focuses on the military use of outer space, particularly the strategic issues surrounding antisatellite systems, the rising space powers, and the military space policies of the European Union. He has published in numerous academic journals and is the author of twelve books, the most recent being *Securing Outer Space*.

Colonel Vladimír Šilhan

Colonel Vladimír Šilhan presently serves as Defence Advisor in the Permanent Representation of the Czech Republic to the EU. Colonel Šilhan is a retired Colonel from the Czech Armed Forces. He works within a broad range of EU capability based activities, including space related technologies, the GNSS Galileo, space situation awareness, satellite communication, intelligence, surveillance and reconnaissance project teams and workshops organized by the European Defence Agency. Additionally, he represents the Czech Republic on the EU Satellite Centre Board and has prior experience heading the Systems Analysis department at the MoD Czech Republic Defence Policy and Strategy Division.

Colonel Šilhan is a graduate of the Military Academy in Brno, Czech Republic and he completed his MSc from the UK Royal College of Science/School of Military Survey. His postgraduate studies focused on varying satellite navigation and remote sensing projects and activities.

Eric R. Sterner

Eric R. Sterner is a Fellow at the George C. Marshall Institute and a consultant in Washington, DC. He has held senior Congressional Staff positions, including the lead Professional Staff Member for defence policy on the House Armed Services Committee and Staff Director for the Subcommittee on Space and Aeronautics in the House Science Committee. In the Executive Branch, he served in the Office of the Secretary of Defence as Special Assistant to the Assistant Secretary of Defence for International Security Policy. At NASA, Mr. Sterner served as both Associate Deputy Administrator for Policy and Planning and Chief of Strategic Communications. In the private sector, Mr. Sterner served as Vice President for Federal Services at TerreStar Networks Inc. His work on national security, military history, and space issues has appeared in a range of security and international affairs publications. Mr. Sterner earned a Bachelor's in International Studies and USSR Area Studies from American University and separate Master's degrees in Political Science and Security Policy Studies at George Washington University.

Atsuo Suzuki

Atsuo Suzuki is Director of Defense Policy Division of Ministry of Defense in Tokyo, Japan. As Director of Defense Policy Division, Mr. Suzuki was in charge of the National Defense Program Guidelines released in December 2010, a capstone document of Japanese defense posture and capability development.



He received a Master's from Georgetown University and Bachelor's from Waseda University. Mr. Suzuki has extensive experience in defense policy and military operation, including Director of International Operations (2005-2007) and Director of Defense Intelligence Division (2007-2009). When Mr. Suzuki was Director of International Operations, he dealt with Iraq reconstruction operation by Japanese Self-Defense Force.

Dr. Bohuslav Svoboda

Dr. Bohuslav Svoboda is the 42nd Mayor of Prague. Dr. Svoboda is a graduate of the Faculty of Medicines, Charles University in Prague. Before assuming duties as the mayor of Prague, Dr. Svoboda enjoyed an extensive career as a practicing doctor, including as the Head of the Clinic of Gynecology and Obstetrics of the Third Faculty of Medicine of Charles University, and the Faculty Hospital Královské Vinohrady. Between 2003 and 2010, Dr. Svoboda served as the Dean of the Third Faculty of Medicine, Charles University; in 2010 he became a Vice-Dean. From 1992-1998, Dr. Svoboda worked as the President of the Medical Chamber.

David A. Turner

David A. Turner is currently the Deputy Director of the Office of Space and Advanced Technology, within the US State Department's Bureau of Oceans, Environment, and Science. Previously, Mr. Turner was an employee of the Aerospace Corporation, supporting the US Government on GPS policy and technology matters. He most recently served as Director of the Corporation's Center for Space Policy and Strategy, which conducts policy and strategy analyses for a number of customers in the national security and civil space community. Mr. Turner also served in the US Department of Commerce as the Executive Secretariat Director of the Interagency GPS Executive Board (IGEB). He was an active participant on the US State Department's Ad Hoc GPS/Galileo Interagency Working Group and was a member of the US Delegation that negotiated the June 2004 Agreement between the US and Europe on Cooperation Between the GPS and Galileo satellite navigation programs.

Major Phillip Verroco

Major Phillip Verroco is the Chief of Space Policy, Joint NATO Strategist at the Joint Air Power Competence Centre in Kalkar, Germany. Major Verroco entered the US Air

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Alexandr Vondra

Alexandr Vondra is presently the Minister of Defence of the Czech Republic. Previously, Dr. Vondra served as Deputy Prime Minister for European Affairs, Foreign Minister, and the Czech Ambassador to the US. Mr. Vondra has also served as a Foreign Policy Advisor to President Vaclav Havel and the First Deputy Minister of Foreign Affairs of the Czech Republic. Mr. Vondra is a former Transatlantic Fellow at the German Marshall Fund. In 1989, he was the spokesman for Charter 77 and co-founder of the Civic Forum in Czechoslovakia. Mr. Vondra earned a Doctorate of Natural Sciences (RNDr.) from Charles University in Prague.

Jiří Žák

Jiří Žák is Deputy Minister of Foreign Relations and Satellite Systems at the Czech Ministry of Transportation. Mr. Žák served as a Senator of the Parliament of the Czech Republic from 2004 to 2010, representing the Bruntál district. In the Upper Parliamentary Chamber, Mr. Žák acted as the Vice Chairman of the Constitutional and Judicial Committee, among other duties. Finishing his secondary education in Bruntál, Mr. Žák enrolled in the Technical University of Mining and Metallurgy in Ostrava. Before finishing he left to work at the nationally owned ČSAO company, he pursued private business interests, and joined LIAZ firm in 1997. At the end of the 1980s and into the 1990s, Mr. Žák participated as the driver and the navigator in the Paris-Dakar races. Mr. Žák first entered politics in 1989 through the Civic Forum party, a driving force in the 1989 Revolution. Since 1998, he has also been a member of the Municipal Council of the town of Bruntál.

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A.2 About the Prague Security Studies Institute (PSSI)

The Prague Security Studies Institute (PSSI) is a non-profit, non-governmental organization established in early 2002 to advance the building of a just, secure, democratic, free market society in the Czech Republic and other post-communist states.

PSSI's mission is to build an ever-growing group of informed and security-minded policy practitioners dedicated to the development of democratic institutions and values in the Czech Republic and its regional neighbors. PSSI offers programs that meet the critical requirements associated with equipping new generations of young leaders to manage the complex, security-related challenges of the 21st century.

To fulfil its mission, PSSI conducts a broad range of activities under its Security Scholars Program, Program of Atlantic Security Studies, Regional Outreach Program and Corporate Council Program. PSSI aims to identify and analyze foreign policy and security-related developments in transatlantic relations and other theaters of the world, and to propose sound, achievable policies to address these and other security challenges. Its foremost interest remains, however, preserving and expanding the hard-fought freedoms of the Czech Republic and other post-communist states.



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