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THE EUROPEAN UNION AND SPACE: OPPORTUNITIES AND RISKS

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I. INTRODUCTION

Space has become an essential domain for strengthening the capacity of the European Union (EU) to advance domestic prosperity and gain international influence. Space policy and space-related cooperation have developed into an essential component of foreign and security policy-related planning and decision-making. Europe has joined a number of spacefaring states in the competition to derive greater civilian, societal, commercial and military benefits from its presence in space.

The EU now has a defined role in space-related endeavours. As Article 189 of the Treaty on the Functioning of the European Union (as amended by the 2007 Treaty of Lisbon) gave the EU, for the first time, explicit competence for space. As effective operations in space require cutting-edge technologies, large-scale funding, and multi-year support, the EU has been working with its member states, the European Space Agency (ESA) and its international partners to create a coherent EU space policy and a systematic programme for its implementation. This strengthened cooperation within the EU and beyond is founded on the principle of the peaceful uses of outer space and encourages greater transparency and trust among state and non-state actors in space.

In February 2013 the European Commission presented five main objectives for an EU space policy:

1. Establish a coherent and stable regulatory framework
2. Further develop a competitive, solid, efficient and balanced industrial base in Europe and support SME [small- and medium-sized enterprises] participation;

SUMMARY

Access to space is becoming increasingly important for both public (including military and civilian) and private users, including for the European Union (EU) and its member states. The different purposes for which space is being exploited make it a dynamic and rapidly growing domain. As the number of terrestrial activities that depend on the space environment increases, so too do the potential vulnerabilities to disruption. Regrettably, the system of governance needed to reduce risks associated with an increasingly complex, congested and competitive space environment is evolving more slowly.

The EU has made a significant investment of human, technical and financial capital to develop the relevant capacities to make use of the opportunities provided by space. This investment is likely to continue to grow. If it is not possible to manage the space environment effectively, these investments will not realize their full potential and might even be put at risk. The EU has likewise sought to contribute to the development of an effective governance system, including through the development, and further elaboration of, an international code of conduct for outer space activities.

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3. Support the global competitiveness of the EU space industry by encouraging the sector to become more cost-efficient along the value chain;
4. Develop markets for space applications and services;
5. Ensure technological non-dependence and an independent access to space.[1]

Many space systems are dual-use in nature (i.e. for both civilian and military applications). Accordingly, the EU Common Foreign and Security Policy (CFSP) and Common Security and Defence Policy (CSDP) should play important and appropriate roles in influencing the overarching framework or architecture for future space activities. As the CFSP is within the purview of the EU member states and the High Representative of the Union for Foreign Affairs and Security Policy (assisted by the European External Action Service, EEAS), it has important implications for the strategic nature of space assets and their contribution to the security and prosperity of the EU and its global standing. One indication of the important role of space assets from an EU perspective has been the sustained investment in developing three space programmes: the European global navigation satellite systems—European Geostationary Navigation Overlay Service (EGNOS) and Galileo—and the earth observation programme Copernicus.

As the EU has invested heavily in space systems, it is appropriately concerned with the need to strengthen space security, including through the adoption of a normative framework for space activities. The primary goal for the EU is to achieve a safe, stable and sustainable space environment that is embedded in a multilateral framework of space treaties, guidelines and principles that reflect and codify a multilateral consensus on what a broad architecture for space activities should include.

The EU has also underscored the need to acquire the necessary tools to protect space infrastructure, and at several Council meetings EU member states have called for the development of a space surveillance and tracking (SST) system.[2] In December 2011 the Council called for future operational capability at the EU level in the field of space situational awareness (SSA) with 3 segments: 'surveillance and tracking of orbiting objects, prediction and monitoring of the space weather phenomena and their effects in particular on critical infrastructure and Near Earth Objects (NEOs), within the definition of an SSA capability, founded on the approved aggregation between civil and military SSA user requirements'. To that end, the European Commission has proposed an organizational framework to establish and operate an SST system at a European level that combines the existing assets and expertise of EU member states with possibly new EU capabilities to be developed.

Today's more complex, congested and competitive space environment requires new approaches to the management of space, going beyond those envisioned even a few years ago. Given the ongoing dynamic changes in the space environment, the final design of an EU space policy, and the eventual global governance framework, must be agile enough to respond to a broad array of contingencies in near real time.

The EU takes into account initiatives put forward in international forums—including the United Nations Committee on the Peaceful Uses of Outer Space and the International Telecommunication Union (ITU), which is the UN's specialized agency for information and communication technologies—to address a number of pressing space-related issues. Such issues include dangerous orbital debris, avoidance of destructive collisions, the crowding of satellites in geostationary orbit, the growing saturation of the radio frequency spectrum, as well as threats posed by intentional human disruptions.

In addition to agreed rules, transparency and confidence-building measures (TCBMs) have been proposed as elements of a number of these proposals. Taken together, the proposals call for the serious involvement of all spacefaring and aspirant countries, as well as non-governmental and commercial entities, to advance a safer, more secure and sustainable outer space environment.

The EU has played a major role in these efforts, most notably with its proposed International Code of Conduct for Outer Space Activities. This initiative, launched in 2007, emphasizes that, in the absence of enhanced cooperation, shared responsibility,

[1] European Commission, 'EU space industrial policy: releasing the potential for economic growth in the space sector', Communication from to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2013) 108 final, Brussels, 28 Feb. 2013.

[2] See e.g. Council of the European Union, Resolution on 'Benefits of space for the security of European citizens', Internal Market, Industry, Research and Space Council meeting, Brussels, 6 Dec. 2011, <http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/intm/126591.pdf>.

visionary and voluntary governance measures, respect for international law and compliance with accepted behavioural norms, future activities in space will almost surely be more dangerous, chaotic and fragmented.

This paper first presents the overarching rationale for Europe's activities in space, followed by a description of the challenging features of today's space environment in which Europe and other spacefaring states must operate. It then reviews the development of Europe's space activities at the EU level and its leadership potential. The paper concludes with an assessment of how space—and the EU's stewardship of it—can advance central socio-economic goals for humankind as well as security worldwide.

II. A CHANGING OUTER SPACE ENVIRONMENT: CHALLENGE FOR THE EU

Space is, as stated in the space policy pronouncements of the United States, increasingly congested, contested and competitive and merely taking part or 'showing up' is now insufficient.[3] Unprecedented levels of cooperation and voluntary discipline by states and commercial entities will be required to keep space safe and secure. This will require rigor on the part of both state and commercial actors in space and the willingness to make compromises and assume some risks to maintain the operational viability of space.

It will be important for the EU to determine its distinct strengths in space and establish where it can effectively lead and demonstrate a high degree of competitiveness. Giovanni Grevi, director of the think tank Fride, has used the term 'interpolarity' to describe the conditions of 'multipolarity in the age of interdependence'.[4] This term can be applied when thinking about the special requirements for utilizing space safely and effectively. In the space domain, multipolarity and interdependence are both ascendant.

Like the open seas, space is an international common not under the jurisdiction of any one state. The 1967 Outer Space Treaty has provided the basis for a flexible and evolving international legal framework for the management of space activities. The current legal regime regulating outer space activities has its genesis in the cold war competition and national rivalry.

From the outset, the space age was marked by strategic competition between the Soviet Union and the USA. After the USSR accomplished major firsts in space—the first satellite to orbit the earth, the first human in space, the first woman in space and the first space walk—the USA landed a man on the moon, an achievement seen as outshining the USSR. Advanced space technology became a demonstration of economic and political might and a pillar of international power and status. The unmanned and manned space programmes of each country were accomplished in parallel with military space programmes.

Both superpowers had also come to understand the risks associated with certain types of space activity. The most prominent risks were related to anti-satellite (ASAT) capabilities, which have been developed and tested, in one form or another, by the USA and USSR since the launch of Sputnik in 1957. The use of nuclear explosions to disable satellites was considered and tested.[5] However, it was eventually rejected as the potential damage to untargeted systems through radiation and electromagnetic pulse was too devastating. Notably, the development of ASAT through other means has continued.

The Soviet–US space relationship led to a reasonably good understanding by each side of the intentions and policies of the other, which helped prevent conflict. It also included cooperative elements. Since the 1960s, 'negotiated approaches' have dominated the policy landscape and yielded key space treaties (e.g. the Outer Space Treaty, the 1967 Astronauts Rescue Agreement, the 1974 Registration Convention, the 1972 Space Liability Convention and the 1979 Moon Treaty). The 1963 Partial Test-Ban Treaty (PTBT) prohibited nuclear testing or any other nuclear explosion in space, constituting a major forward step towards reducing harmful behaviour in space. The 1967 Outer Space Treaty banned the placement of weapons of mass destruction (WMD) in space and the 1972 Anti-Ballistic Missile (ABM) Treaty banned the development, testing and deployment of sea-based, air-based, space-based or mobile land-based ABM systems or components. Together these treaties constitute important security agreements implicating space. According to some

[3] US Department of Defense (DOD) and Office of the Director of National Intelligence (ODNI), *National Security Space Strategy Unclassified Summary* (DOD/ODNI: Washington, DC, Jan. 2011).

[4] Grevi, G., *The Interpolar World: A New Scenario*, Occasional Paper no. 79 (European Union Institute for Security Studies: Paris, 2009).

[5] The USA and the USSR conducted *c*. 20 nuclear tests in high altitudes or lower outer space between 1958 and 1962. CTBTO, 'Nuclear testing', <http://www.ctbto.org/nuclear-testing/history-of-nuclear-testing/world-overview/>.

experts, these developments were less attributable to successful arms control than it was pragmatic recognition on the part of the two space powers of the inherent incompatibility of nuclear testing with other uses of space (e.g. manned spaceflight, reconnaissance etc.). In short, it could be argued that the desire to prevent damage to passive military systems was stronger than the military objective of deterring the future use of weapons in space.[6]

The political and technological landscapes have changed drastically in the past 60 years. Orbiting satellites are now operated by about 60 government, corporate and academic entities. New actors are changing the geostrategic space environment and will shape global space policies of the 21st century. Russia and the USA continue to have the world's foremost military space capabilities, but other countries (particularly those in Asia) are making steady and important advances in their space capabilities. China, India and Japan have successfully demonstrated indigenous launch capabilities, and their engagement in multifaceted space programmes are an example of this regional trend. China's Shenzhou and Chang'e missions, India's Chandrayaan-1 lunar orbiter, Japan's Kaguya missions and Kibo space module for the International Space Station (ISS) are examples of civilian space projects that are as much about national pride and prestige as they are about scientific or other forms of commercial benefit.

The world today relies heavily on satellite communications; weather forecasting, environmental monitoring and navigation are but a few of the services provided by space systems. Space assets (including those that are ground-based) are, therefore, properly regarded as critical infrastructure and the disruption or damage of the services they provide would have far-reaching economic, political, and geostrategic consequences.

A growing amount of orbital space debris remains one of the key challenges for a safe space environment. China's destruction of an old weather satellite by an ASAT weapon in 2007, the 2009 collision of the Cosmos and Iridium satellites, and a number of recent uncontrolled satellite re-entries (e.g. ROSAT and Phobos-Grunt) underscored the urgency of this challenge to a broader world audience.

The US Space Surveillance Network (SSN)—which detects, tracks, catalogues and identifies artificial objects orbiting earth—monitors the orbit of approximately 22 000 man-made objects larger than 10 centimetres. About 1100 of these are active satellites. There are roughly 500 000 objects in orbit that are between 1–10 cm in size and at least 35 million smaller than 1 cm. Objects larger than 1 cm can cause catastrophic damage to satellites and spacecraft. The SSN performs over a million sensor tasks per week with an average of 190 conjunction warnings and assistance to an average of three satellite manoeuvres weekly. As of 2011, the basic space situational awareness (SSA) information about objects in the US space catalogue was shared with over 41 000 users from 141 countries.[7]

In addition to the perils of space debris, a growing number of spacefaring countries and satellite applications are increasing the demand for limited radio frequency spectrum and orbital slots. Radio frequencies and orbital slots are indispensable tools for space operations and securing them is a prerequisite for space operators in designing any new space mission.

The rise in demand also presents a challenge to space governance and a more coordinated and collaborative approach to the allocation of these scarce space resources. The ITU's international coordination and registration processes for space assets are required to ensure interference-free use of radio frequencies and orbits. The main purpose of the ITU's international regulatory regime for satellite communications is to avoid harmful interference and to ensure equitable access to radio frequencies and satellite orbital slots.

Despite the ITU regime, harmful interference is a rapidly growing problem. The deliberate disruption of radio and TV broadcasts through frequency jamming (an intentionally caused interference) in order to deny access to information is on the rise in several parts of the world. Unequivocal attribution is often difficult, and existing tools for neutralizing such interference are limited, if not non-existent. Moreover, the technical ease with which both intentional and unintentional frequency interference can occur will remain a significant space security concern for the foreseeable future.[8]

[6] Moltz, J. C. *The Politics of Space Security: Strategic Restraint and the Pursuit of National Interests* (Stanford University Press: Redwood City, CA, 2008), p. 12.

[7] Tok, J. S., 'USSTRATCOM Perspective on National Space Policy Implementation through Space Situational Awareness Sharing', *High Frontier: The Journal for Space and Cyberspace Professionals*, vol. 7, no. 2 (Feb. 2011), pp. 40–42.

[8] Robinson, J. and Silhan, V. 'Securing outer space: a major global challenge', *Science for Population Protection*, vol. 4 (Apr. 2012).

In short, space offers major strategic advantages and many countries are now competing to derive greater civilian, commercial and military benefits from their presence in space. This is accompanied by the quest for a workable space regime, which is appearing more often on the agendas of national and international security gatherings, as misconduct in space could have profound implications for terrestrial geopolitics. Overall, the outer space regime, consisting of the UN space treaties, five UN General Assembly principles and other General Assembly resolutions, is seen as increasingly inadequate and countries are exploring options for strengthening this architecture.

A partial analogy for the necessary transformation required of the outer space governance regime can be drawn from international maritime law, which is continuing to evolve from a set of rules designed to avoid naval warfare towards a new global framework designed to facilitate maritime security cooperation. The 1982 UN Convention on the Law of the Sea (UNCLOS) was developed mainly by codifying existing customary and normative behaviours of seafaring states. The nature of sea power has been configured by forging agreements that unite efforts to enhance global shipping and combat maritime piracy, terrorism, proliferation of WMDs and narcotics trafficking. Indeed, international law now effectively supports maritime security on a global basis by broadening maritime partnerships and developing norms.[9] Such a regime is also desirable for space.

Stable international environment, enabled by sound foreign policy embedded in security, is required for economic prosperity worldwide. The nature of contemporary conflict reveals a good deal about the post-cold war evolution of actors and the circumstances that comprise today's challenges. For example, asymmetric war-fighting strategies, together with economic and financial globalization, have given rise to heightened proliferation concerns involving both state and non-state actors.

Space has become a critical enabler for security- and defence-related missions. Moreover, it is a key criterion of power projection capability. Taken together, the civilian, commercial, defence and intelligence uses of space provide a vast and often interconnected matrix of essential capabilities. Space is both a separate domain that needs to be protected and a tool for other areas—it possesses the ability to multiply the benefits of economic development, scientific achievement, international security and other earthly pursuits.

III. SPACE: AN OPPORTUNITY FOR THE EU

Given the accelerating pace of external influences on the EU and its member states resulting from the information revolution, the EU is seeking to become more institutionally agile and responsive to the often rapid decision-making requirements of the 21st century. Space represents a powerful enabler and 'multiplier' to meet these evolving requirements with respect to increasingly real-time responses to cascading events like that witnessed in Egypt, Libya, Syria and elsewhere in the Middle East and North Africa.

The EU has managed its space activities through coordination among individual EU member states, the EU and ESA. Following various European Commission communications, the first EU space policy was formalized in May 2007 and adopted at the EU–ESA Fourth Space Council.[10] Among key publications and events that preceded this development were the publishing of a European Commission green paper and a subsequent white paper, both in 2003; the signing of an Commission–ESA framework agreement in 2004; the establishment of the Space Council; and consultations among the EU, ESA and private stakeholders. Through these and other mechanisms, the EU assumed explicit competence for space policy (embedded in Article 189 of the Treaty on the Functioning of the European Union) previously developed and implemented by European countries individually or together through ESA.

The Space Council's 2007 Resolution on the European Space Policy establishes a political framework for the EU's development and exploitation of space and embodies strategic elements, including priorities and key actions to be taken. The responsibilities assigned to ESA were consistent with its existing activities at the time and included developing space technologies and systems, exploring space, pursuing space science and guaranteeing access to space. ESA was also to provide the research and

[9] Kraska, J., 'Grasping "the influence of law on sea power"', *Naval War College Review*, vol. 62, no. 3 (summer 2009) pp. 113–15.

[10] The Space Council is a concomitant meeting of the Councils of the EU and ESA, prepared by member states representatives in the High-level Space Policy Group (HSPG). It coordinates the joint activities of these 2 organizations.

development capabilities needed to implement space programmes financed by the EU.

The 2007 resolution was based on the proposition that the EU should be the leader in shaping Europe's future collective ambitions in space. The argument was that space offers important contributions to a number of fields, such as transport, environment, communications, industry, foreign policy and security. In other words, space under the supervision of the EU, in cooperation with the EU member states and ESA, would lead to its more effective use in pursuit of European interests. An emphasis was made on the direct connection between space capabilities and the EU's ability to exercise influence regionally.[11] Thus, space systems were recognized as strategic asset for any country, or group of countries, with global ambitions.

This resolution paid some attention to the use of space capabilities for security and defence. This has been changing, however, with an increased understanding that the level of dependency on space systems with respect to key economic, societal and security objectives is accompanied by vulnerabilities connected to interference with the use of these enabling systems. The EU space systems Galileo and Copernicus are seen as strategic tools needed to keep abreast of the information revolution, internal and external security challenges, economic competitiveness and sustainable development requirements.[12] With the EU's access to, and ownership and operation of, these space systems, greater emphasis has also been placed on their protection from both natural and man-made threats.

The European Commission's April 2011 communication 'Toward a space strategy of the European Union that benefits its citizens' offered elements of an EU space strategy and acknowledged that space infrastructure is both 'an instrument' which can advance the EU's security and defence needs (e.g. Copernicus) and 'an asset' requiring safeguarding.[13] Such a perspective was also reflected in an earlier space-related Council resolution of November 2010 under the headings of 'space for security' and 'security for space'.[14] The resolution also acknowledged a role for the then newly established European External Action Service in managing the use of space for crisis management. As evidenced by the content of these documents, there is a growing recognition of the EU's increased reliance on space-based systems as well as the proliferation of threats to these systems.

A requirement for a sound European space policy

The EU's ability to optimize space is associated with the development of a European space policy that integrates space into two key areas: socio-economic benefits and security and defence. In the first area, space enables economic growth for social benefits and global competitiveness. It has also become a viable economic sector itself, especially in the area of applications. In the second area, space is treated in relation to security policy, defence policy and the foreign and security dimensions of space diplomacy. There is now some urgency attached to ensuring that these elements are being properly coordinated and managed.

Space for socio-economic benefits

According to Space Foundation, the size of the global space industry was estimated to be $304.31 billion in 2012 (i.e. commercial space revenues and government space spending) and experienced growth of 37 per cent in the past five years.[15] Unlike many other sectors, governments are indispensable in major portions of space activities and play a key role in the development of space products and services. Accordingly, the space business is influenced significantly by governments and

[11] Logsdon, J., 'The new European space policy as seen from across the Atlantic', eds K.-U. Schrogl, C. Mathieu and N. Peter, *Yearbook on Space Policy 2006/2007: New Impetus for Europe* (Springer: Vienna, 2008), p. 169.

[12] Copernicus was formerly known as the Global Monitoring for Environment and Security (GMES) system. In this connection, it is important to note that there is no unanimity of views concerning Europe's specific investments in its space future. E.g. there are those that argue that Galileo basically replicates the functioning US GPS system and the quest for an independent European SSA capability would replicate that already provided by the USA. Rather than seeing a risk of the USA withholding such critical services in a time of crisis, some contend that the opposite would likely prove true, namely that the USA would be more inclined to bolster European space capabilities in emergency circumstances. These subjects will continue to garner rather heated debate.

[13] European Commission, 'Towards a space strategy of the European Union that benefits its citizens', Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2011) 152 final, Brussels, 4 Apr. 2011, p. 5.

[14] Council of the European Union, Council Resolution 'Global challenges: taking full benefit of European space systems', 16864/10, Brussels, 26 Nov. 2010.

[15] *The Space Report 2013* (Space Foundation: Colorado Springs, CO, 2013), p. 27.

other institutional actors. Over 80 per cent of global space activities involve public institutions as investors and operators. Governments also control the bulk of market access and space technology transfers.[16]

The USA continues to spend the most in space (i.e. with a space budget nearly 10 times the size of EU institutional spending). The USA's export control regime—comprising the International Traffic in Arms Regulations (ITAR) and the Export Administration Regulations, which also applies to commercial products—has, however, been proven to be having an adverse impact on the US industrial base. The fact that export controls constitute one of the foremost obstacles to foreign space markets for US companies (particularly for smaller firms) remains a vexing question with no immediate resolution on the horizon. At the same time, as US Governmental space activities are closed to non-US suppliers, it has a competitive advantage. Technology developed for US military programmes has often spun off to commercial applications (e.g. the Global Positioning System, GPS). During the cold war, the US Government primarily operated satellites to serve its own needs. Gradually, it started to offer services directly to the public (e.g. remote sensing products and services). Free public access stimulated the development of valuable associated commercial markets.[17] The opposite has been generally true for Europe.[18]

Combined, the member states of the EU maintain the world's second-largest aerospace industry. EU-based companies—mainly Thales Alenia Space, Airbus Group (formerly EADS), Astrium and, more recently, German OHB—together with US companies like Space Systems/Loral, Lockheed Martin, Boeing and Orbital Sciences, constitute the largest satellite manufacturing firms.

The European Commission's budgets operate as annual funding commitments within multi-year funding periods (i.e. funds must be spent within a certain time frame or be returned to the Commission's general treasury). Programmes are given funding appropriation within a defined seven-year planning period. The 2012 Commission budget included €537.07 million for space-related programmes, representing 0.36 per cent of the EU's €147.2 billion 2012 budget and an 8.1 per cent increase from the 2011 space budget of €496.98 million. Most of the Commission's space budget is executed in cooperation with ESA. In 2012, €386.7 million in Commission space funding was transferred to ESA, representing 72.0 per cent of the year's Commission space budget. ESA itself had a 2012 budget of €4.020 billion.[19] These numbers place Europe in the second place, after the USA, in terms of government spending on space programmes (the US Government's 2012 space budget was $47 billion, 57 per cent of which was dedicated to defence-related space activities).[20]

A large portion of the EU space budgets are earmarked for the funding of two flagship satellite programmes: Galileo and Copernicus.[21] In the EU's multi-year financial framework for 2014–20, €7 billion was dedicated to Galileo (and EGNOS, an already operational separate system which improves the precision of GPS satellite navigation signals). This amount is in addition to €5 billion already invested by the EU in Galileo to ensure the development of infrastructures, technological validation and the launch of satellites. The €7 billion will assist the completion of the deployment phase of Galileo, cover its operation costs (i.e. ground management, certification procedures, offer of services, replacement of satellites etc.) and fund the operation of the EGNOS system. This amount does not cover expenses related to the development of Galileo-related applications.

To put this resource issue into perspective, the global market for applications related to positioning and timing was estimated to be roughly €250 billion in 2020. Today, it is estimated that 6–7 per cent of the EU's GDP already relies on positioning and timing services (e.g. banking, electricity networks, road systems etc.).[22] Satellite applications represent a sector of European industry that has grown significantly over the past 20 years.[23] They are also of strategic importance as they support a wide variety of 'terrestrial' space policy objectives. Moreover, the dual-use nature of space systems (i.e. for both civilian and military purposes) makes them critically important to security

[16] Hayward, K., 'The structure and dynamics of the European space industry base', European Space Policy Institute (ESPI), ESPI Perspectives no. 55, Dec. 2011), p. 2.

[17] *The Space Report 2011* (Space Foundation: Colorado Springs, CO, 2011), pp. 28–30.

[18] *The Space Report 2011* (note 17), pp. 28–30.

[19] *The Space Report 2013* (note 17), pp. 37–47.

[20] *The Space Report 2013* (note 17), p. 37.

[21] The Copernicus programme will run from 2014 to 2020 with a budget of €3.7 billion (at 2011 prices).

[22] Thielmann, E., 'Galileo: the European GPS', Public lecture, Australian National University Centre for European Studies, Canberra, 27 June 2013.

[23] *2011 European Space Directory*, 26th edn (ESD Partners: Paris, 2011), pp. 30–31.

and defence. Thus, due to the high cost and long-development cycles of space technologies, governments will probably continue to play a central role in the space sector, accompanied by an increasingly capable and indispensable commercial sector (especially in downstream requirements).

Many of the future opportunities for the EU reside in exploiting the dual-use nature of numerous space assets and technologies to advance Europe's global competitiveness. The goal would be to develop greater synergies that will, in turn, make more efficient use of space infrastructure. The EU is well-positioned to encourage improved coordination and integration of existing and future civil and military space systems, especially when the member states cannot afford to individually develop and maintain the technological excellence and capabilities required in an increasingly competitive space environment. A sound space strategy that reinforces common foreign and security policy goals will go a long way towards realizing this opportunity.

Security and defence dimensions of space

The October 2013 final report by the High Representative prepared for the December 2013 European Council on Security and Defence delineated the security and CFSP dimensions of European space policy.[24]

With respect to satellite navigation, the EU is developing the Galileo system (under the auspices of the European Commission with EEAS shouldering responsibility for several important security-related aspects) to enable Europe's non-dependence on the US GPS. Galileo services will include a public regulated service (PRS) reserved for the EU, its member states, and possibly to duly authorized EU agencies, third countries and international organizations. The PRS sensitive applications, which require a high level of service continuity, will involve important security and foreign policy dimensions.[25] As the use of PRS is a CSDP matter, the EEAS is involved in discussions with non-EU states concerning their possible future use of the signal. In the longer term, the EEAS is also envisioned to be a PRS user.

Earth observation is a key capability for the EU and its member states. The EU's Copernicus programme seeks to establish a European capacity in this area. Several services for different applications are envisioned, the first of which (the 'emergency service') has reached operational status. Another, 'security service', is to be established to support the external action of the EU. The EEAS will have operational control once this service becomes available.

In addition, EU member states operate high-resolution reconnaissance and surveillance satellites dedicated to military earth observation as well as other dual-use systems. These systems also support the CFSP and CSDP as they enable advance planning, early warning, accurate decision-making, and improved crisis management and response times. The EU is seeking to combine these civilian and military member states' capabilities to gain access to high-resolution imagery for CFSP and CSDP missions. The EU Satellite Centre (EU SatCen) plays an important role as it is the only agency of the EU capable of creating the EU's indigenous intelligence capability. It analyses satellite imagery and collateral data, including aerial imagery and related services.

Satellite communications (SATCOM) is likewise a pivotal capability for civilian security and military missions. Commercial SATCOM has been, to date, the most affordable and flexible service. For defence-related needs, some EU member states own dedicated military SATCOM (MILSATCOM). The European Commission has proposed addressing the fragmentation of demand for security-related SATCOM by encouraging the pooling of European military and security commercial SATCOM demand; exploring ways to facilitate member states' efforts to deploy government telecommunications payloads on board satellites (including commercial); and the development of the next generation MILSATCOM capability at the EU level.

As mentioned above, the protection of space assets is critical to the implementation of the EU's security and defence strategy and is another key element of EU's overall space policy. An effort to address this issue is evidenced, for example, in the EU's plan to fund SST capability at the EU level as a component of SSA. The 2008 Space Council resolution, as well as subsequent resolutions, has emphasized the need for 'a European

[24] Preparing the Dec. 2013 European Council on Security and Defence, Final Report by the High Representative/Head of the EDA on the Common Security and Defence Policy, Brussels, 15 Oct. 2013.

[25] On the rules for access to the PRS see Decision no. 1104/2011/EU of the European Parliament and of the Council of 25 Oct 2011 on the rules for access to the public regulated service provided by the global navigation satellite system established under the Galileo programme, *Official Journal of the European Union*, L287, 4 Nov. 2011.

capability for the monitoring and surveillance of its space infrastructure and of space debris'.[26]

To develop a comprehensive SSA system, the EU looks to cooperation with its member states (the owners of such assets) and ESA as well as to the development of a proper governance and data policy to manage highly sensitive SSA data.[27] Important SSA assets are currently owned by France, Germany and ESA. The EU seeks to establish a cooperative framework to coordinate this capability at the EU level. Specifically, the European Commission tabled a proposal for an EU SST support programme in 2013. As this programme is a dual-use capability, the EEAS would be involved in the governance of this future service (e.g. relations with third parties, political steering, etc.).

At a multilateral level, the EU is seeking to enhance space security via forging an international code of conduct for outer space activities. This initiative, led by the EEAS, was launched in 2007 in response to the UN Secretary-General's call for concrete TCBMs for space.[28] The code seeks to strengthen existing UN treaties and principles on outer space. The subscribing parties would commit to comply with voluntary guidelines and promote their universal adherence. It also aims at reinforcing these principles and behavioural norms by introducing other innovative space TCBMs advancing the safety, security and sustainability of space activities.

To advance progress on the code, the EEAS held open-ended consultations in May 2013 in Kiev, Ukraine. UN member states were invited to these consultations to address various aspects of the draft code. Approximately 140 participants from 61 countries attended the consultations and provided their valuable comments and suggestions on the proposal. On the basis of these comments and suggestions, in September 2013 the EU released the current draft of the code. To maintain the momentum of the transparent and inclusive process established in Kiev, the EEAS co-hosted, with the Government of Thailand, more open-ended consultations in Bangkok in November 2013. Based on this second round of consultations, the EEAS is preparing a revised draft of the Code.

In sum, consolidation of a constantly evolving European space policy presents a considerable challenge. This includes the management and use of Galileo and Copernicus, the development of capabilities at the EU level to monitor space and its assets, the capacity to respond to the rapidly growing external (i.e. foreign) and security policy dimensions of space, and gaining wide international support for the EU's proposal for an international space code of conduct. Despite the difficulties ahead, including budgetary considerations, these activities and initiatives offer unprecedented opportunities to position the EU as one of the space powers of the 21st century.

IV. CONCLUSIONS

A key concern for the EU internationally is the need to keep pace with other major spacefaring powers and identify roles that differentiate it from them. This will probably require an ability to embrace the shift in space geopolitics, namely space as a highly strategic domain of growing global interest by new players, which serves as an effective 'force multiplier' for foreign and security policy. Much will depend on the EU's political will, beyond adequate financing, the number of trained space scientists and experts, and other tangible resources. The EU needs to avoid sitting back and watching its options diminish with respect to its future ability to access and utilize space and thereby help guarantee its security, both economically and militarily.

Should the EU, however, continue to pursue a more fragmented approach to this endeavour, it will be increasingly difficult to compete with ambitious, well-funded spacefaring nations, such as China. Over time, the EU would run the risk of being relegated to a second-tier space power. Globalization is, by definition, not linked to a specific geographic area or region, but rather represents the capacity and capability to engage meaningfully in critically important worldwide domains, including the safeguarding and continued development and viability of space as well as the assets that reside there. Fortunately, there is ample evidence that the EU's leading space policy makers understand this reality and are implementing programmes and projects—many of them cooperatively—that will probably lead to a net strengthening of the EU space footprint over time.

[26] Council of the European Union, 'Taking forward the European space policy—adoption', Council resolution, Brussels, 29 Sep. 2008, p. 13.

[27] Council of the European Union, 'Towards a Space Strategy for the European Union that benefits its citizens', Council Conclusions, Brussels, 31 May 2011.

[28] These calls for transparency and confidence-building measures in outer space activities were included in UN General Assembly Resolution 61/75, 6 Dec. 2006; and UN General Assembly Resolution 62/43, 5 Dec. 2007.

Europe is especially well positioned—given its rich history of discovery, codification of law and rules, technological innovation and deft diplomacy—to meet the challenges associated with a constantly evolving space environment and the urgent need for broadly accepted 'rules of the road' in space. This will involve the successful management and utilization of Galileo and Copernicus, the development of a capability at the EU level to monitor space and its assets and the capacity to respond to external threats to them, the management of security policy dimensions of space, and garnering broad international support for the EU's proposed international code of conduct for outer space activities.

It is safe to assume that Europe will continue to be one of the key space powers of the 21st century, despite budgetary and other constraints. This is primarily because European policymakers are already aware that a more efficient division of labour among its member states, intelligently pooled financial and technical resources, strengthened alliances with key external players (e.g. the USA, Japan etc.), an ever-expanding cadre of trained space policy and technical professionals, and an expanded presence in the global space security portfolio will deliver the promise of a Europe at the cutting edge of this ultimate new frontier.

ABBREVIATIONS

ABM	Anti-ballistic missile
ASAT	Anti-satellite
CFSP	Common Foreign and Security Policy
CSDP	Common Security and Defence Policy
EEAS	European External Action Service
EGNOS	European Geostationary Navigation Overlay Service
ESA	European Space Agency
EU	European Union
GPS	Global Positioning System
ITU	International Telecommunication Union
MILSATCOM	Military satellite communications
PRS	Public regulated service
SATCOM	Satellite communications
SSA	Space situational awareness
SSN	Space Surveillance Network
SST	Space surveillance and tracking
TCBM	Transparency and confidence-building measure
WMD	Weapons of mass destruction

EU Non-Proliferation Consortium

The European network of independent non-proliferation think tanks

A EUROPEAN NETWORK

In July 2010 the Council of the European Union decided to create a network bringing together foreign policy institutions and research centres from across the EU to encourage political and security-related dialogue and the long-term discussion of measures to combat the proliferation of weapons of mass destruction (WMD) and their delivery systems.

STRUCTURE

The EU Non-Proliferation Consortium is managed jointly by four institutes entrusted with the project, in close cooperation with the representative of the High Representative of the Union for Foreign Affairs and Security Policy. The four institutes are the Fondation pour la recherche stratégique (FRS) in Paris, the Peace Research Institute in Frankfurt (PRIF), the International Institute for Strategic Studies (IISS) in London, and Stockholm International Peace Research Institute (SIPRI). The Consortium began its work in January 2011 and forms the core of a wider network of European non-proliferation think tanks and research centres which will be closely associated with the activities of the Consortium.

MISSION

The main aim of the network of independent non-proliferation think tanks is to encourage discussion of measures to combat the proliferation of weapons of mass destruction and their delivery systems within civil society, particularly among experts, researchers and academics. The scope of activities shall also cover issues related to conventional weapons. The fruits of the network discussions can be submitted in the form of reports and recommendations to the responsible officials within the European Union.

It is expected that this network will support EU action to counter proliferation. To that end, the network can also establish cooperation with specialized institutions and research centres in third countries, in particular in those with which the EU is conducting specific non-proliferation dialogues.

http://www.nonproliferation.eu

FONDATION pour la RECHERCHE STRATÉGIQUE

FOUNDATION FOR STRATEGIC RESEARCH

FRS is an independent research centre and the leading French think tank on defence and security issues. Its team of experts in a variety of fields contributes to the strategic debate in France and abroad, and provides unique expertise across the board of defence and security studies.
http://www.frstrategie.org

PRIF Peace Research Institute Frankfurt — HSFK Hessische Stiftung Friedens- und Konfliktforschung

PEACE RESEARCH INSTITUTE IN FRANKFURT

PRIF is the largest as well as the oldest peace research institute in Germany. PRIF's work is directed towards carrying out research on peace and conflict, with a special emphasis on issues of arms control, non-proliferation and disarmament.
http://www.hsfk.de

IISS

INTERNATIONAL INSTITUTE FOR STRATEGIC STUDIES

IISS is an independent centre for research, information and debate on the problems of conflict, however caused, that have, or potentially have, an important military content. It aims to provide the best possible analysis on strategic trends and to facilitate contacts.
http://www.iiss.org/

sipri

STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE

SIPRI is an independent international institute dedicated to research into conflict, armaments, arms control and disarmament. Established in 1966, SIPRI provides data, analysis and recommendations, based on open sources, to policymakers, researchers, media and the interested public.
http://www.sipri.org/