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A European Approach to Space Security

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Introduction

Since the end of the Cold War and U.S.-Soviet military competition, the space sector has experienced a new dynamic resulting from two major changes.

First, the "space club" countries, especially the United States, have come to see space activity as a powerful tool that can provide political, economic, and military benefits in this new geopolitical environment. In particular, a number of information technology applications have rapidly appeared and become key assets in the transformation of space into a new strategic arena. The multiplication of commercial programs, especially in telecommunications, and the liberalization of formerly government-controlled activities in earth observation and satellite navigation have radically altered the space landscape. Greater governmental use and integration of these techniques for civilian and military purposes has increased the strategic value of these systems. This has enlarged potentially competitive national interests in space, leading to new debates at the national and international levels. In short, space activity has gained strength as a component of state power, as it provides bonuses *par excellence* to nations that are technologically developed, economically and industrially powerful, and politically influential on the world scene.

The interest raised by this evolution is the second change that has led smaller and emerging countries to invest in space applications for a wide range of economic, military, and political reasons. Although it remains difficult for newcomers to invest in the space domain, the diffusion of new space technologies worldwide, including improved equipment and training for their use, is an enduring trend. A number of emerging countries are planning to increase their investment in space technologies and make them an important element of their national development.

Space now has many more players and vested interests than it did in the Cold War, resulting in a variety of positions regarding the future of space activity. These positions depend both on the experience and capabilities of each country and on the very different national projects that underlie their space investments. Although attention is currently focused on the rapidly

expanding U.S. military space program, on recent Chinese accomplishments in manned space flight, and on the growing interest in space among developing countries, the European space program may in fact be one of the most significant efforts to construct a space policy that is suited to the post-Cold war era.

While still modest in size, the European space program is striving to expand its mandate in ways that will both benefit from, and adhere to, the particular rules of an unprecedented multinational political construction process. The program is embedded in a political outlook that places collective security at the centre of the European project at home and abroad. Europe is moving beyond the scientific experiments that paved the way for its early space program, and is now engaging in more strategic and security-oriented space programs, which may be a sign of a nascent political conception of its collective welfare and security. Key decisions have now been accepted that will lead the European Union to play a greater role in defence and security policy alongside the traditional Atlantic Alliance (i.e. NATO-European countries) relationships.

This article first surveys the trends that are shaping global space activity and the global security environment. It then discusses the approach that Europe can take with respect to space development and use, given its expertise and political constraints. The main argument is that Europe's current integration efforts in the field of security are a good model for efforts to address the larger security challenges in space at the global level. The article concludes by indicating some possible paths towards improving collective security in space, as seen from a European point of view.

I. The Changing Space Landscape

For more than 30 years, civilian and military space programs were developed mainly by the United States and the Soviet Union in the context of their respective political and strategic projects and policies. At a time when ballistic nuclear arsenals were under development, the two nations wanted to watch their construction from afar (observation), to detect and announce their use by the enemy (early warning), and to find storage and preparation sites so that missiles could be counted for arms control purposes (verification). Neither country wanted an arms race or a nuclear war in space, so they engaged in some legal regulation, highlighted most prominently by the 1967 Outer Space Treaty. Although both countries

experimented with anti-satellite weapons, neither deployed a significant ASAT capability or any space-to-earth weapons. In short, early uses of space for military support activities were very clearly defined and designed to stabilize deterrence, which explains why these types of military applications in space have been largely supported in the two countries for more than 45 years, though numerous governments and changing national and international priorities.

Intelligence assets in space were less vulnerable to attacks or counter-measures than surveillance aircraft or other common technologies. France judged that this characteristic was sufficient to justify building such capabilities in the 1980s, albeit on a much more modest scale than that undertaken by the two superpowers. The limited level of French military reliance on these modest space capabilities (i.e. the essentially political nature of the programme), as well as the principle that space can be used freely for peaceful purposes, as stated in the 1967 Outer Space Treaty, meant that the efforts encountered little opposition domestically. From a political standpoint, the ability of France to show independence in this area is similar to the decision to create its own deterrence force. The construction of independent launchers to access space (ultimately the *Ariane* family of space launchers) was viewed as a complementary and necessary guarantee of this independence.[1] In this respect, the French military observation satellites (the Helios series) have primarily been considered as a strategic and a political tool instead of a tactical system.

With the end of the Cold War, the "threat" is no longer a massive attack by a nuclear-equipped Soviet Union and the targets aren't only missile silos anymore. Instead, countries must be prepared to address a wide variety of different types of security problems that might arise with almost no warning, in a much less predictable way than before. Developing adaptive and flexible reaction capabilities, including at the lower end of the combat operation spectrum (i.e., for peace making, peace keeping, or humanitarian operations[2]), requires much more versatile and relevant intelligence and information capabilities for each operation. Addressing these new security challenges requires complete and "intelligent" information, which shifts the focus of today's space technologies toward an investment in data processing and information technology.

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[1] The controversy over conditions placed by the U.S. in 1973 on its launch of two European Telecommunication satellites, Symphony I and II, was at least symbolically, at the root of this decision.

[2] The so-called "Petersberg Tasks." See below.

The United States and Europe agree on the importance of developing new space-based information systems to help manage these new security challenges, but they differ both in terms of the types of space assets that they would like to develop and the amount of resources that they plan to invest in new capabilities. While the United States military is dramatically increasing its reliance on space, European space-faring countries still want to keep their military space investments at a minimum level, reflecting both limited resources and political and military restraints.

Under the "Battlefield Awareness" concept used by U.S. strategists, more and more information from space will be transmitted directly to soldiers on the field, who will be equipped with sophisticated and efficient personal communications devices. The strategic bet is that better knowledge brought by "value added" information[3] and increased ability to apply precision military force from a great distance will compensate for the difficulties of engaging forces in a poorly defined environment.[4] Space is increasingly being viewed as a "strategic enabler"[5] evolving from the status of sophisticated armament programs used for specific tasks to becoming the "nerve centre" for all military operations. For example, the troops sent to Afghanistan used seven times more satellite communication bandwidth than the Allied armed forces used during the Gulf War.[6] As one high ranking U.S. military officer put it, the United States has made a major strategic choice: space-based information and communication systems are now integral to military operations, not "a fringe operation supporting purely strategic or national objectives."[7]

Using space to achieve comprehensive battlespace awareness requires continuity of information flow. This would be particularly challenging and crucial in a coalition-led war, in which the partners have to share the data coming from their own system and have to make their IT systems in general, and telecommunications in particular, fully interoperable. The

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[3] Implied by the frequently used expression "*transparent battlefield*."

[4] See for example Colonel Robert C. Owens, "Aerospace Power and Land Power in Peace Operations, Towards a New Synergy ," *Airpower Journal*, fall 1999, p. 4-22.

[5] Idem.

[6] *Aviation Week and Space Technology*, 5 April 2002. Space represents only one facet of the increasing dependency of the United States armed forces vis-à-vis the telecommunications in general.

[7] Lieutenant General Donald G. Cook, Vice Commander, U.S.AF Space Command, "Congreve's Red Glare … Reflections of the Past, Visions of the Future," *RU.S.I Journal*, October 1999, p.38

strategic nature of the information provided by the space system corresponds to obvious political needs and would tend to increase mutual political understanding and trust in such a coalition context.

A lack of clear vision for Europe's military space presence has plagued most transatlantic attempts to cooperate in the military space field. For example, while it became clear on both sides of the Atlantic during the 1990s that military space telecommunications assets should be made interoperable, it was impossible to agree on a common architecture due to different strategic, military, and political doctrines and views. Sharing early warning capabilities or even military intelligence space assets would require a framework agreement based on convergent strategic and political views. The need for high-level political agreement can easily transform any technical discussion or concept into a highly contentious issue as it would directly impact European Security and Defence Policy, i.e., become an intergovernmental issue requiring adherence to the European Union rules.[8] Given its undecided military and security situation, Europe won't be able to cope with such highly strategic military discussions as a united entity for some years, especially as these discussions have traditionally been conducted under the NATO umbrella in a multilateral manner.

These general performance and capacity improvements will also require an increasing integration of military space applications with their civilian counterparts. The greater versatility of data-collection systems naturally implies the use of increasingly high-performing and flexible civilian sensors for various missions, such as high-resolution imagery and multispectral capabilities for numerous needs, including agriculture, fishing, environment, etc. In the telecommunications field, several projects of civilian low-orbit wide band satellites for mobile or multimedia users perfectly fit the military telecommunication architectures.[9]

Europe does have extensive experience with multi-use satellite systems through its longstanding scientific and experimental programs in the field of Earth observation. A large

[8] The so-called *Revolution in Military Affairs*, the *Joint vision 2010 and 2020* (often presented on the U.S. side as potential repositories for better interoperable architectures) or even the current DoD *Transformation* concept have continuously been the subject of internal debates in Europe to assess their relevance as federative strategic and military concepts for the European case. These discussions have not prevented the pursuit of some military cooperative work to as demonstrated for example by the on-going *Multinational Interoperability Council* (or MIC). As of today, the MIC effort is partnering with Australia, Canada, Germany, France and Great-Britain.

[9] It must be noted that, while the commercial demand for such systems has been less than expected, the military has decided to purchase the Motorola 66 satellite system, Iridium, now mainly devoted to military communications.

number of scientific satellites have now been launched by the European Space Agency (ESA), covering the whole range of the Earth observation techniques, and these will be increasingly useful for security purposes. One of the latest and most important space developments was undertaken in Europe with the satellite Envisat equipped with multispectral sensors[10] and other new technical payloads for studying atmospheric composition, which makes it an efficient space laboratory for a large array of customers dealing with new security issues. A number of other experimental projects undertaken in the scientific program of ESA also show the excellence of European knowledge and know-how.[11]

These trends are clearly creating new tensions in space. The expected multiplication of space actors and operators, both States and the private sector, demands a collective reflection on a new set of rules that will guarantee an equitable development of space activities consistent with the notion of the "common good" in order to gain widespread adherence.

So far, though, the increasing desire by new actors to use space for civilian and military purposes has stirred up defensive military postures from existing space powers that tend to focus on new dangers that would result from these developments. In particular, it has led the United States to engage in a new military space doctrine that promotes the right to develop anti-satellite weapons in order to protect its space assets, defend against any space-based attack, and deny other countries the ability to use space to enhance their own military power. Over the last few years, this Space Control doctrine has begun to stir up debate in international fora such as the Disarmament Conference in Geneva and the U.N. Committee on the Peaceful Use of Outer Space (COPUOS). These debates remain centred largely around a few countries, namely the United States, China, and Russia, which tend to disagree on the legal latitude afforded by the existing treaties vis-à-vis the deployment of orbital weapons.

Unfortunately, Europe is not yet part of the discussions surrounding security issues in space. Without any military space program comparable to those in the US or Russia, European countries, individually or collectively, cannot approach the issue from an exclusively military

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[10] For example the Envisat payload "MERIS" with its 15 spectral channel sensitivity makes such an experiment naturally well-adapted to the detection or characterization of a wide range of phenomena, either natural or human made.

[11] It is also worth quoting a number of currently on-orbit or planned scientific space experiments undertaken in the framework of the GMES program using such new techniques known as LIDAR (for *Light Detection and Ranging*) or other sensing techniques devoted to a better characterization of the atmospheric environment and dynamics.

angle. Still, Europe has recently become more sensitive to these debates as space applications are increasingly mentioned as a necessary step for enhancing European security,[12] whether in the military sense or as a way to increase the safety of populations confronted with natural disasters or catastrophes.

II. The European View on Space and Security

Compared with the United States, there are fewer military space programs on this side of the Atlantic, and their focus is similar to the early US military space programs— information collection for strategic purposes— rather than new tactical applications. This fundamental space capability is likely to remain a priority for Europe. For example, Helios, the French-led military reconnaissance program whose first satellite was launched in July 1995 is intended to provide continuous information at the strategic level for the management of nuclear deterrence and for improved awareness of possible major events affecting French policy in nearby zones of interest.[13] So far, however, Helios data remains modest in volume and is used primarily for strategic purposes. The Helios II Series marks a clear evolution toward possibly making more use of space data for purely military purposes because broader user capabilities better adapted to theatre requirements would enable quicker and more efficient information collection process for the military.[14]

This evolution towards tactical uses is only a first step towards a better integration of space assets in the forces. Such improvements must not be overstated and can hardly be judged as being precursors in Europe of so-called "Network Centric Capabilities". At first, due to a chronically constrained financial situation, the amount of budget necessary to build up critical capabilities in this area would mean giving up more traditional jet fighters, submarines or armoured tank-like programmes that remain very much supported by the armed forces. Also, Europe is at an early stage in the integration of its collective space programs that does not permit such an evolution yet. Neither the European space-faring nations, nor Europe as a

[12] Such as in the case of Galileo or GMES (Global Monitoring for Environment and Security), two widely supported "pilot-programs" for Europe.

[13] A second Helios 1 (1B) was launched in 1999, while as a new series of improved satellite (Helios 2) has been inaugurated in 2004. See below.

[14] Better storage capabilities allow for more frequently refreshed information. Collecting information day and night has also been a prerequisite for the second Helios series.

whole, have been eager or able to choose space as the new centre of gravity for their Defence and security policy. Nevertheless, the desire for greater European integration may benefit space programs because they could be a powerful catalyst for the still nascent "European Security and Defense Policy."

European states' combined capabilities can be relevant for building the core of a basic integrated European strategic capability, especially considering that the U.S.-Russia military monopoly over space is diminishing with the growing number of national or commercial programs. Europe, as a wealthy and willing political entity, couldn't stand by while other countries or regions were becoming active in such fields as environment monitoring. Furthermore, European successes in space have created an increasing self-confidence in home-grown space technology, leading European institutions to gradually consider striving for autonomy in several strategic areas. The "Global Monitoring for Environment and Security" (GMES) program, as well as the Galileo satellite navigation programme, clearly reflect this new political posture. Progressively basing its security policy on a collectively responsive network of assets rather than on exclusive national military capacity, Europe will have a distinct perspective for achieving a common goal to secure space.

The European political construction process

The European construction process is the key to understanding the European perspective regarding security debates. Motivated by the desire to avoid the conflicts that had dominated the European scene from the end of the 19th to the first half of the 20th century, the European community was structured around the need to find new common ground and the desire to share certain national resources. The economic common ground appeared rapidly as the preferred playground[15], where no "hard" political decisions would be removed from the nation-states' prerogative. The economic, social, and scientific life of European citizens would be handled by the European commission (within certain limits), which is why monetary policy has progressed to the point of a single European currency. Defence policies, considered the heart of national sovereignty, have remained controlled by more traditional intergovernmental processes; they are legally outside of the mandate of the European

[15] This began with the creation of the European Coal and Steel Community and then the Common Market.

Commission and are managed by the European Council of Member States which is dominated by national governments.

The European decision-making process for space is unique in that some issues are handled through intergovernmental processes while other issues are addressed through the so-called "communitary" processes, i.e. run by the European Commission and distinct from the intergovernmental process since the Maastricht Treaty signed in 1991.[16] Because of this political construction, no real European Security and Defence Policy (ESDP) or even a Common Foreign and Security Policy (CFSP) has emerged that would subsume national defence and security policies. By design, and given the diverse political views among the now 25 European countries, such a stand-alone policy cannot be foreseen in the near future. These premises remain at work today and contribute to the image of Europe as an unfinished political project.

European space as a symbol of the dominant "Communitary" model

By and large, space policies in Europe have followed an evolution that reflects their dominant scientific nature, as represented by the European Space Agency (ESA). In contrast to the two superpowers, space activity in Europe was created from purely scientific common endeavours in the satellite area, initially federated by the European Space Research Organization (ESRO), while the launcher domain was addressed by a civilian sister organization, the European Launcher Development Organization (ELDO). The merger of these two institutions confirmed this main orientation and led to the creation of the European Space Agency (ESA) in 1975. Composed of 13 states, including some such as Norway and Switzerland that are not members of the European Union, ESA is mandated to focus on "peaceful" activities. It has not been allowed to take the lead on any military-purpose space program, despite some efforts underway towards more flexibility, The only military-oriented European cooperative institution has been the formerly Western European Union (WEU)-affiliated satellite centre located near Madrid, which has been a military agency of the European Union since 2001.

[16] The Maastricht Treaty creates a Common Foreign and Security Policy (CFSP) and organizes the European Union around so-called three "pillars". The first pillar, the "communitary pillar", is organized through the European Commission which takes care of issues delegated by the Member States (such as the Common agricultural policy, the transports, the monetary and economic union, etc.). The second pillar is specifically devoted the European Security and Defense Policy and remain directly dependant on intergovernmental negotiations in the framework of the European Council. At last, the third pillar deals with the Justice and home affairs, meaning mainly European police cooperation as clarified by the subsequent Amsterdam Treaty in 1997.

Some national space programs have devoted part of their resources to military applications, although they are still far from reaching the levels of military activity deployed in both the U.S. and in the former USSR. France, which remains the leading European country for military space, has maintained very low expenditure levels, which are the subject of an enduring debate, and relatively limited first-order political involvement.

Up to now, no proper European substitute has been capable of coordinating nationally driven efforts. Attempts such as the Franco-German Helios-Horus[17] cooperation planned during the 1990s failed, mainly because of contradictory political and industrial interests in the two countries. [18] The same situation was repeated in the field of military communication satellites. Several initiatives started in the 1990s to integrate the British Skynet 5 program with the French Syracuse 3 and some U.S. satellites into an interoperable satcom architecture also failed, halted by Great Britain in 1998 for a range of national motivations and constraints. A commercial joint venture including the British satellite Skynet, the French Syracuse, and the Italian SICRAL was successfully established some years later for equipping NATO, but this initiative cannot be considered a deliberate European governmental initiative. The inability to compromise on such projects is often cited as an example of the enduring difficulties of thinking in European terms.

A new path towards the stars: space for security

Some recent developments show that Europe feels mature enough to contribute to its own security despite its intrinsic inability to build a unique ESDP. Several important texts have been approved over the last decade showing an increasing need to organize Europe in the fields of security and defence. One is the Western European Union declaration of June 1992, which set up the “Petersberg Tasks” permitting Europe to intervene militarily in low- and mid-intensity conflicts at its borders.[19] Another is the Helsinki European council, which in December 1999 issued the “headline goals” that led to the creation of a European military

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[17] Helios represented the optical component of a common military observation system, while Horus represented the radar counterpart expected to be developed by Germany

[18] In this particular case, the simultaneous U.S. decision.to commercialise high resolution satellite imagery added to the difficulties surrounding the discussions.

[19] These tasks involve humanitarian and rescue operations, peacekeeping, and possible peacemaking — i.e. tasks of combat forces during a crisis management period.

staff and, since 2003, a rapid reaction force. This paved the way towards the yet-to-be ratified European constitution, which calls for a European capacity for peacekeeping missions, conflict prevention, and strengthened security in accordance with the UN Charter. This new political stance has been fully endorsed both by the European Council of Heads of States and Governments in Brussels in December 2003[20] and by the European commission, which in 2004 launched a "Preparatory Action for Security Research" based on the recommendations of a "Group of Personalities"[21] with the goal of initiating more active R&D programs in the security field starting in 2007.[22] These developments show that the issue of security broadly defined can now be seen as a new "playground" for the European construction process, allowing the European Union to reinforce its political identity while leaving purely military aspects to be resolved by member states.

The recent European decisions to launch and support security-oriented programs, such as the European Galileo navigation satellite program and the future Global Monitoring for Environment and Security (GMES) program, must be interpreted in this context. Today, space programs appear as an important collective endeavour helping Europe to develop its expertise and industrial base. But they are also perfect symbols of this new security policy. This explains the original and sometimes misunderstood approach developed around these programs, which remain clearly under civilian and European control while dealing, at least partially, with security and even sometimes defence aspects.

The only way for Europe to take collective steps toward using space for security purposes is likely to be based on a broad definition of security and the development of dual-use programs and applications. If it wants to remain an independent actor in the space arena, Europe will also have to find ways to protect its civilian and dual-use space programs without relying heavily on military options that have never been attractive to its member states and that have been deliberately precluded at the communitary level.

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[20] *A Safer Europe in a Better World, European Security Strategy*, Javier Solana, adopted by the Heads of States and Governments, 12 December 2003.

[21] *Research for a Secure Europe*, Group of Personalities in the Field of Security Research, European Communities, 2004

[22] So-called 7th Framework Program.

The illustrative case of Galileo

Galileo has been a perfect example of this path. Since its inception, this European endeavour has relied on a purely civilian-managed program that will have to take care of security issues. Launched in 1999 and confirmed in 2002, Galileo has rapidly emerged as a strategic program for Europe. It was realized years earlier that satellite navigation and time-synchronization programs would play a central role in modern societies. The first program, called European Global Navigation Overlay System (EGNOS), was intended to augment the performance of the GPS system by adding components on an Inmarsat satellite, which allowed control over data integrity and helped provide a more reliable service to sensitive users throughout Europe. The plan called for EGNOS eventually to include a dedicated space segment, GNSS 2 (later called Galileo) that would complete the global architecture by adding a European component to the U.S. one. Building an improved global system that would provide more elaborate services and possibly create new commercial markets was totally consistent with the traditional European approach. A number of studies were predicting that a potentially huge commercial market was at stake, and concerns about potentially degraded data coming from a unique system controlled solely by one country's ministry of defence could be a showstopper for any serious investment, even after the United States ended its "selective availability" policy on GPS signals.. In European eyes, the U.S. Global Positioning System would create a monopoly that was judged excessive given the then-expected spin-offs of such technologies.

When decided upon in 1999, Galileo was the first program of its kind to be dealt with at the "communitary" level without involving the usual security and defence national actors. The involvement of the E.C. Transportation Directorate, the other important contributor to Galileo besides the European Space Agency (ESA), demonstrated the capability of the European Union to manage a project of this strategic importance by itself. It was also symbolic of the progresses made by the EU in building its own political legitimacy while respecting national sovereignty in related domains. The need to raise funds from industry, as well as the challenge of involving wide European participation, were widely viewed as tasks that would prove the usefulness of European civilian institutions.

This also explains partly why the services provided by Galileo have been structured according to the quality of the service provided instead of being structured according to the nature of the user, civilian or military, as is the case for the GPS system. In particular, the Galileo Public Regulated Service (PRS) will provide data for users, mainly governmental, who require

service continuity and completely secure access. This does not mean that the service will be reserved only for military users, as this would contravene E.U. policy. By the same token, this does not preclude Galileo from being used in a military-controlled manner when necessary, even if it remains a civilian program.

The transatlantic controversy which culminated in 2001 helped make Europeans more aware of their security duties surrounding the uses of Galileo-provided services and reinforced their cohesiveness around Galileo. At that time, the United States was very sceptical about the ability of Galileo's civilian management structure to deal as seriously with security matters as the U.S. military did for GPS. U.S. pressure on Europe to establish some degree of military control over Galileo was viewed in Europe largely as an attempt to undermine the collective effort by linking Galileo to politically sensitive defence decisions that had been placed deliberately out of the European Commission's reach. In addressing what was also perceived as a legitimate concern, the EU tried to end nascent tensions by creating a structure to manage the European satellite radio-navigation programs. In July 2004, a Council Regulation created a special EU agency, the GNSS[23] Supervisory Authority, to take charge of all security issues related to program building and exploitation, and manage the relationship between the European public authority and the private concessionaire who will run the programme. A System Safety and Security Committee composed of national representatives [24] will "assist the Authority on all aspects relating to the system's safety and security,"[25] including protective measures to prevent any hostile of unauthorized use of Galileo.

The Galileo Supervisory Authority will have the responsibility to:

1. Define the security specifications of the system and its components, and the standards of security for information techniques;
2. Define the cryptography which requires governmental approval;
3. Ensure that the European GNSS Signal/Services are controlled in compliance with security criteria;

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[23] GNSS standing for Global Navigation Satellite Systems.

[24] It will succeed the current *Galileo Board for Security*, increasing the institutionalisation of the security issues at the EU level. This committee will include national representatives in charge with the security issues of Galileo in their respective countries.

[25] Council Regulation (EC) N° 1321/2004 of 12 July 2004.

4. Be the European GNSS security accreditation authority, initiate and monitor the implementation of security procedures and perform system security audits;

5. (…) Enforce and verify compliance by the concession holder with international rules and agreements (Wassenaar, Missile Technology Control Regime, International Agreements, …)

6. Implement the relevant provisions for the exchange, handling and storage of classified information;

7. Develop coordination and procedures on security-related matters with the Secretary –General of the Council of the European Union, High Representative for the Common Foreign and Security Policy (SG/HR)

8. Identify and inform the Council of possible measures that could be taken by the Council in the event of a threat to the security of the European Union or of a Member State arising from the operation or use of the system, or in the event of a threat to the operation of the system, in particular as the result of an international crisis;

9. Give advice on security policy issues in international agreements related to the European GNSS programs."[26]

With the establishment of the GSA, Galileo seems to have sealed its political legitimacy as a security-oriented program. The fact that all tasks related to the security of both the program and its services are entrusted to a European Union agency demonstrates a commitment to address a broad spectrum of military and security issues without prejudice to civilian users.

Confronted with more military-oriented space policies, Europe, with no such projects of its own, has no alternative but to help increase the security of the space environment to ensure the security of its proper programs. More convincing measures regarding the management structure of Galileo, as well as a compromise reached with GPS to prevent the systems from using the same frequencies, helped make the programme more acceptable in security terms for the United States.

Global Monitoring for Environment and Security: A further security step

Over time, the Global Monitoring for Environment and Security (GMES) project has also acquired a reputation as a strategic space element and a security-oriented tool for Europe. The

[26] Idem.

root of this federative idea can be traced to the European environmental protection policy that provides GMES with its political legitimacy. On May 19, 1998, reflecting environmental concerns expressed a year earlier in the Kyoto protocol, the European Commission published a "manifesto"[27] inviting Europe to organize a global Earth observation and environmental monitoring capability using all possible technical means, with a particular role given to satellites. The deeply federative character of GMES quickly gave it a political dimension beyond the traditional impact of classical infrastructure or information technology programs.

The underlying principles of GMES are to promote a convergence between the political (even the social) demand for and the supply of technology. This convergence had already been brought out in the most recent Earth Observation programs, such as the payloads "Vegetation" aboard the SPOT 4 and 5 satellites or the ESA Envisat satellite equipped with a significant array of sensors. GMES is also representative of a growing awareness of the importance of collectively carrying out some environmental monitoring. This idea was shaped within the international framework set up by the Committee on Earth Observation Satellite (CEOSS) and resulted in the Integrated Global Observation Strategy (IGOS) in 1995, transformed into a "Partnership" (IGOS-P) in 1998 with the goal of networking the relevant space assets. The Baveno "Manifesto" was shaped along these lines, taking advantage of both a strong political movement and a long-standing technical effort.

From "Environmental Security" to "Environment and Security"

The manifesto's title, *Global Monitoring for Environmental Security: a Manifesto for a New European Initiative*, at first referred to a notion of security that was radically oriented towards the monitoring and protection of the environment. One year later, this environment-only concept began to change. In a summer 1999 document submitted to the Space Advisory Group (SAG)[28] the program was renamed Global Monitoring for Environment and Security, the scope was expanded to all security-related issues, and the possibility was raised of linking GMES with the nascent European Security and Defence Policy (ESDP). The document underscored the environment-security link, stating that: "Environmental problems can lead to

[27] This "Baveno Manifesto" is named after the Italian city that hosted the discussions.

[28] *Global Monitoring for Environment and Security*, SAG/99/3, European Commission, July 12, 1999.

such serious difficulties that they may, firstly, endanger the security of both individuals and nations and, secondly, lead to international conflict."

GMES can also be seen as a symbol of a more mature and consistent "political Europe" in the aftermath of the 1990s conflicts in Central Europe and the Balkans. These conflicts sounded an alarm to many supporters of the European idea who couldn't help but realize how much Europe was proving impotent in the defence and security field even near its borders. The expanded GMES concept built on growing European awareness of its responsibilities in this field and gave it the chance to respond with existing and planned capabilities.

GMES is well suited to deal with a wide array of security aspects given its dual (i.e. civilian and military) character. By nature, many programs or techniques intended to monitor the environment, such as earth observation and meteorology, also have security-oriented applications. The dual-use capabilities of GMES have been taken into account in a number of documents produced by the European commission and the European Space Agency. For example, the Joint Task Force Report, which covers the whole array of European space policy, explicitly mentions the central role of the "Petersberg missions," described above. The document specifies that the "security and dual-use dimensions of GMES have not been adequately investigated so far" and recommends the "establish[ment of] an appropriate dialogue on security and dual use issues between the Directorate General of the Commission, the Secretariat of the European CFSP, ESA, and relevant authorities in Member States."[29]

Refined security concepts for GMES

A consensus appears to have been reached on mixing the traditionally well accepted civil security with support of the Common Foreign and Security Policy (CFSP). This consensus builds upon some level of ambiguity given that CFSP is still "under construction." Paradoxically, this low profile has allowed GMES to gradually tackle these supplementary issues more boldly. While the design of GMES was still under study, an *ad hoc* working group was created on October 18, 2002 by the representatives of 11 countries, to specifically address how GMES could carry out some security functions. Far from intending to define what kind of space security policy the council should adopt, the *ad hoc* group has chosen the reverse approach of establishing how GMES could, by construction, address some of the

[29] *Joint Task Force Report* (Draft Version 2.5, September 2001).

security policies envisioned in Europe. It identified four security domains: 1. Environmental and technological crisis prevention and rapid reaction; 2. Conflict prevention and treaty verification; 3. Petersberg mission support; and 4. European border surveillance.

This combination of missions creates a security missions' nebulae with direct links to the more defence-oriented aspects of security. From the European commission perspective, this reflects the extension of so-called "civil security" missions leading to an enlarged security concept, which is at the heart of the R&D budget preparation starting in 2007. The EC action supports this extension by accenting key areas such as the European citizen security, critical infrastructures, protection of supply chains (goods, energy, food), and civil security force cooperation[30] on consensual issues such as maritime pollutions, major disasters monitoring, and educational activities. Another use consistent with these priorities involves "risk mapping" — using GMES to document a wealth of geographical elements that are linked with natural events or human activities. This capability can be used for humanitarian aid in a crisis, as well as more continuous monitoring and detection applications. A September 2003 position paper notes that GMES would have supplementary missions related to the NBC threat "where military assets and expertise has its place alongside civilian and response mechanisms."[31] The paper summarized the security missions to which GMES should contribute directly:

[30] As decided in the Feira Council in June 2000.

[31] *The Security Dimension of GMES*, Position Paper on the GMES Working Group on Security, 29 September 2003, p.12.

SAMPLE IMAGERY REQUIREMENTS

Task	Main Sensor(s)	Resolution (m)	Revisit Time	Delivery Time	Specific Date Programmation	Supporting Data
Industrial plant analysis	Optical, Thermal Multispectral	0.5 - 2 2 - 10 1 - 4	Mthly, Qtly	Critical	Unlikely	Collateral
Airfield analysis	Optical	1 - 2	Possibly	Not critical	Unlikely	
Barracks analysis	Optical	1	Possibly	Not critical	Unlikely	
Port analysis	Optical	1 - 5	Possibly	Not critical	Unlikely	Collateral
Aircraft identification	Optical	1	Not necessary	Not critical	Unlikely	
Missile identification	Optical	0.7	Not necessary	Not critical	Unlikely	
Radar identification	Optical	0.4	Not necessary	Not critical	Unlikely	
Treaty verification	Optical, Multispectral	0.5 - 2 1 - 4	Possibly	Critical	Yes	Collateral, Maps
Crisis management	Optical, Radar	1 - 5 1 - 5	Frequent	Critical	Yes	Collateral, Maps
Flood analysis	Radar, Optical	2 - 15 2 - 10	Frequent	Critical	Yes	Maps, DEM
I&W monitoring	Optical, Radar	0.5 - 1 1 - 3	Frequent	Critical	Yes	Collateral
Camouflage detection	Multispectral	1 - 2	Not necessary	Not critical	Unlikely	
Terrain analysis	Optical, Multispectral	3 – 10 5 - 15	Not necessary	Not critical	Unlikely	Collateral, Maps
Coastal monitoring	Radar, Optical	2 - 15 2 - 10	Frequent	Critical	Yes	Maps
Route study	Optical	0.7 - 5	Not necessary	Not critical	Unlikely	Maps, DEM
Evacuation planning	Optical	0.7 - 5	Not necessary	Not critical	Unlikely	Collateral, Maps
Humanitarian intervention	Optical	1 - 5	Frequent	Critical	Yes	Collateral, Maps
Damage assessment	Optical, Multispectral	0.5 - 2 1 - 4	Frequent	Critical	Yes	Collateral
Oill spill monitoring	Radar Optical, Multispectral	2 - 15 2 - 10 2 - 10	Frequent	Critical	Yes	Collateral
Peace keeping	Optical, Radar	0.5 - 2 1 - 8	Frequent	Critical	Yes	Collateral, Maps
Peace enforcing	Optical, Radar	0.5 - 1 1 - 8	Very frequent	Critical	Yes	Collateral, Maps
Point Location DGI	Optical	0.7 - 1	Not necessary	Not critical	Not necessary	Maps
Local DGI	Optical	1 - 2	Not necessary	Not critical	Not necessary	Maps, DEM
Regional DGI	Optical	5 – 10	Not necessary	Not critical	Not necessary	Maps, DEM
Wide Area DGI	Optical	10 – 30	Not necessary	Not critical	Not necessary	Maps, DEM
Technical intelligence	Optical Hyperspectral	0.10 – 0.30 1 - 3	Required	Not critical	Unlikely	Collateral

Source: *The Security Dimension of GMES*, Position Paper on the GMES Working Group on Security, 29 September 2003, p. 25.

"Besoin Opérationnel Commun": Towards a "dual-use" space security concept for Europe?

This rapid evolution of proposed GMES services reflects the simultaneous emergence of dual-purpose earth observation space systems in Europe, independently from the GMES project

itself. The Franco-Italian program Pléiades-Cosmo, which will combine optical and radar satellites for Earth observation, is a significant example of a dual-use European space system.

According to the European commission in November 2003, this program could complement a new effort among six countries' ministries of defence. [32] Known by its French acronym, BOC, for *Besoin Opérationnel Commun*, or Common Operational Requirement, this effort has resulted from a first Franco-German initiative. Its ambition is to start, even if only in the limited field of earth observation, a high-level cooperation process aiming at solidifying, and possibly guaranteeing, longer-term multilateral military space cooperation. The goal is to go beyond simple cooperative financing agreements to setting common objectives and operational requirements prior to determining any technical developments for next-generation satellites. This kind of effort reflects some hard lessons learned by the European countries about difficult past joint ventures in the field[33] and could be a first building block of a rather new "bottom-up" kind of approach for Europe.[34] Although such an effort cannot guarantee a better use or interoperability of existing or currently planned systems such as the French Helios-II, the German military radar satellite SAR Lupe, or even the French Italian Pleiades-Cosmo dual-use observation system, it prepares the ground for common planning regarding next generation systems, e.g. after 2015.

The BOC and GMES have a significant intersection, from both a multilateral cooperative point of view, as well as from a more technical point of view. The technical capabilities of the platforms could be used at least partially in a complementary manner to satisfy the needs of either community of end-users. Because GMES covers a wide range of missions that have something to do with low-level military missions as defined in Petersberg, for example, it can undoubtedly serve some functions envisaged by the BOC. Still, a number of difficulties must be overcome. For example, any system of military interest must be able to provide imagery in near real-time and in a totally protected and discreet fashion, yet the GMES promoters usually

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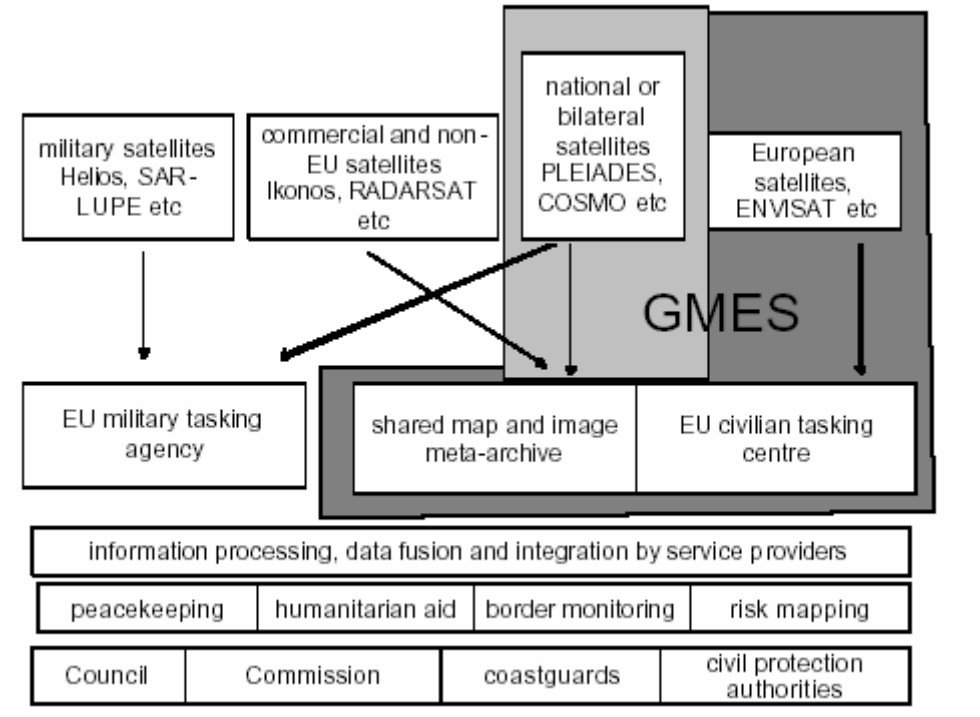
[32] The six are Belgium, France, Germany, Greece, Italy, and Spain.

[33] Especially as the previous Franco-German attempt to co-develop the French Helios optical satellites and the German Horus radar satellite rapidly proved impossible.

[34] This initial effort has been at the heart of the new "European Capabilities Action Plan" group for space established in Helsinki in 1999, which has heavily influenced recent common works led by the European Commission such as the SPASEC report produced for the European commission by a group of experts on space and defence. (See below).

plead for a multiplication of widely disseminated products and services to meet the needs of non-military users as well.

Two experts from the European Union Satellite Center[35] in Madrid have described three requirements for any BOC system: 1) protection from hostile access; 2) confidentiality surrounding the programming of the system; and 3) confidentiality surrounding the performance of the system.[36] If the two first requirements apply to both military and civilian systems like GMES, the third one clearly creates a problem for the military because dual-use systems usually multiply the levels of authorized users, making a complete dual-use structure extremely difficult to manage, especially at the ground-system level. As the authors depicted in the scheme below, GMES, as a global system for Earth observation, environment and security monitoring, and data dissemination, involves activities that will be destined to coexist with the proper military activities without totally replacing them, either today or tomorrow.



Although GMES has the potential for uses that go much beyond the initial environmental monitoring objectives, multiple communities of users have not yet expressed clear requirements for such a system. Still, this program shows how Europe is starting to invent its

[35] This is sometimes also called the Torrejon Center.

[36] Shepherd (I.), Routledge (B.), *GMES and the BOC*, JRC, EU Satellite Center, 13 November 2003.

own path towards more security-oriented space applications without confronting the usual difficulties related to the building of a genuine collective defence and military policy. This "security-oriented" evolution does not reflect a rational political decision-making process at the level of the European governments. Such a classical Weberian "ideal type" view can already be questioned at the level of any nation-state for "techno-policy" oriented decisions, and it would be even harder to defend this socio-political model in the case of a multi-headed Europe. Rather, GMES is the perfect example of a slow but logical process that is constrained by a number of national and collective rules, and that must stay within the agreed conception of "security" if it wants to keep moving forward.

III. European Security Efforts under Construction

Joint space-related projects such as Galileo and GMES have stirred the interest of all European institutions involved with promoting a more proactive European commission policy in the security arena. Both the 2003 white paper[37] and the nascent European Security Research Policy (ESRP) started in 2004 by the Commission (to develop a security and space budget line in the R&D Framework Programme of 2007) give good indications of a larger effort to link space, security, and the European construction process. The European commission also initiated "Space and Security," the *Report of the Panel of Experts on Space and Security* (or SPASEC Report) published in March 2005. It "strongly recommends that the security applications of space should be given a high relevance in the forthcoming European Space Program" and that "this programme should be fully harmonised with other national and commercial programmes so as to obtain maximum synergy and affordability offering an enhanced capability for all aspects of security."[38]

The European Space Agency authorities have paid close attention to these security developments. There has been a dramatic rapprochement with the EC through the joint creation of an ESA-EC Space Council (with the mandate to give a wider political perspective to the space program in Europe and also to deepen its security aspects). ESA is reforming

[37] http://europe.eu.int/comm/space/whitepaper/pdf/whitepaper_en.pdf

[38] European Commission, *Report of the Panel of Experts on Space and Security*, March 2005, Brussels, P.41. See http:/europa.eu.int/comm./space/news/article_2262.pdf

itself to address space security issues more boldly. As the European Defence Agency (EDA) is being created, ESA is trying to reassert itself in a rapidly evolving landscape.

Behind possible institutional turf battles, real strategic issues are at stake for Europe where the sharing of responsibility for security programs in space is now openly discussed. Many practitioners recognize that the only workable political direction for a 25-nation Europe consists in dealing with a broad and generic security concept, rather than a more classical military one, with a possible major contribution from dual-use, high-technology space applications. Indeed, space information systems are perceived as important contributors — some may say "security enablers" — as they find their roots in well entrenched industrial know-how in Europe and may prove to be one important high-technology investment for future economic and industrial well-being.[39]

The European investment trend in generic security in space differs notably from the more military-oriented choices made by the United States. This has a number of direct and indirect consequences. It results in the absence in Europe of a real strategic shift towards space. If space is perceived as an important asset for Europe, it hasn't reached the status of being considered a "vital national interest" as it is in the United States.[40] There is a different mindset on the two sides of the Atlantic when it comes to considering the relative importance of space assets in the military apparatus or in the doctrines themselves. Even if some avenues for cooperation have been followed — notably through NATO with the recent decisions concerning a common military satellite architecture — the different levels of investment, as well as the different roles devoted to the space segment in military operations, have made transatlantic cooperation prospects in the military space field more complex.

More indirectly, these relative divergences of views about the military value attached to the space segment have brought about some transatlantic differences in conceptions of security in space. The security-oriented European decision to hold back on dedicated militarisation is in contrast with a more proactive posture adopted by the United States some time ago. Thus, these two different positions will likely be here to stay for some time. More importantly, these two distinct positions will also define two distinct security strategies.

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[39] Arguably, this has been presented after all as one of the main motivations underlying the setting up of the satellite navigation Galileo program.

[40] Secretary of Defence William Cohen, *Defence Space Policy Directive*, #3100-10, 9 July 1999.

Europe: moving closer to "cooperative security" in space?

Given the increasing European interests in space, it is now undisputed on this side of the Atlantic that it is legitimate for any space faring nation to look for more security in space. The issue is what type of security. As far as Europe is concerned, security has not been a prime issue in the space debate, so one would hardly find a "European" position or even national opinions expressed on the subject. Acceptance of the Outer Space Treaty principles remains the basic diplomatic posture of any European country regarding these issues. This subject has not been part of the most recent work done by the EC on the defence and security aspects of space, as these works and communications have insisted on internal European coherence, both politically and institutionally, to try to start common security space programs.[41] Still, Europe cannot ignore the debate, given the communication efforts made by the United States about its "weaponization of space" perspectives and the reactions it triggered especially from China in the Conference on Disarmament.

Europe has been more active in another forum, the United Nations Committee for the Peaceful Uses of Outer space (UN COPUOS) in Vienna, Austria. Europe currently feels more comfortable talking about collective security in space rather than negotiating in a forum oriented to military policy or even disarmament. Considering the perceived need for protection of its space assets, Europe has ample room to discuss security matters without approaching the issues of weaponization, which are considered premature as long as several immediate collective security challenges are not properly addressed. Several specialists in Europe have suggested that it would not make sense to address the issue of armaments in space whatsoever. At a minimum, discussing security and weaponization issues in a transatlantic fashion couldn't be disconnected from wider perspectives on future general changes in space. The effects on security of armaments in space would then be considered as a sub-issue regarding the whole perspective about a collective security architecture for future space activities. The space landscape will change dramatically over the next few years and will thus create new conditions for security. Addressing first these impending changes, fixing glaring security problems, and creating the conditions for a realistic security management in

[41] It is significant to note the absence of this issue from the newly released SPASEC Report which concentrates on the possibilities for Europe to acquire and build a first European security capability in space. Only the space surveillance issue is mentioned as a potentially critical area where a definitive gap would damage any idea of a serious and autonomous European security capability in space. "*Report of the Group of Expert …*" Rep. Cit., p. 36.

space may well be the European response to divergent security strategies, notably the one at work in the U.S., before having any dialog about what further level of security or insecurity anti-satellite weapons could bring. One can bet that putting the issue of weaponization of space in such an enlarged perspective would then allow it to be dealt with in a more comprehensive manner with higher chances to see this particular problem solved altogether.

What near-term security problems in space should be fixed before any military response is worth considering? A number of experts have already mentioned them and these issues in themselves could be part of active European policies.[42]

Cooperative space security as a way toward stabilization: a possible European challenge?

As seen from Europe today, the "space security" debate is centred around a few axiomatic positions that must be taken into account if one hopes to devise broadly acceptable proposals. As already noted, the current space security debate involves only a few countries (namely the United States, China, and to a lesser extent Russia) that link their position in this domain to their larger strategic positions and relationships. The issue of an agreement on Prevention of an Arms Race in Outer Space (PAROS) in the Conference on Disarmament (CD) is also affected by the difficulties encountered by the disarmament policies and institutions in the new strategic context.

Space security talks have made little progress since 1999, when China revived the idea of negotiating measures to prevent an arm race in space. This PAROS initiative has encountered two types of obstacles: one related to the strategic and military importance placed on space systems by the United States in the post-Cold War era, and the other deriving from the current diplomatic reluctance, mainly by the United States, to accept new legal constraints on its military activities. While the United States wants to stick with the general terms of the 1967 Outer Space Treaty, which allows some military activities in space, China and Russia have tried, with their joint working paper of June 2002 and several times since, to develop more

[42] See for example *Europe and Space Debris*, 10th International Colloquium on Aerospace Security, National Academy of Air and Space, Toulouse, France, November 27-28, 2002, See also Space for Defense, A European Vision, Académie Nationalde l'Air et de l'Espace, Association Aéronautique et Astronautique de France, Paris, Avril 2005. See also, De Montluc (Bertrand), "Space Security, a non U.S. point of view" in Logsdon (John), Shaffer (Audrey), Edts, *Perspectives on Space Security*, Space Policy Institute, The George Washington University, Washington D.C., December 2005.

explicit prohibitions on space weapons.[43] China claimed that the U.S. wants to achieve space dominance by expanding its military uses of space, accelerating space weapon research and development, and developing doctrinal theories.[44] The United States, however, merely reiterated that it "didn't see the need for a new treaty."[45] Discussions in the CD remain deadlocked, with no agreement on a work program, let alone PAROS discussions.

There have been a number of attempts since 2003-2004 to break this deadlock and give new dynamism to the CD debates by broadening the debate and finding more flexible methods. This reflected a realization that the space security discussion had to be considered more seriously by "external" actors in order to find new rationales that could stir up new discussions. In January 2004, the French representative in Geneva noted that "the dominating thinking in Geneva was very much the result of the Cold War with predictable and heavy international verification systems apparatus, legally binding treaty commitment that come from very formal and codified negotiations." He cautioned the CD not to ignore "the new forms of action in the disarmament domain, with politically binding agreements based on more flexible and informal working procedures …."[46]

A proposal presented by five ambassadors in January 2003 showed this political will to help reach agreement on a work plan for the CD by de-linking three strategic issues— negotiations on a treaty to end fissile material production and discussions about nuclear disarmament and about space security. This proposal[47] led for the first time in May 2004 to an informal plenary session allowing a first "exchange of views". The President of this session remarked that the importance of both commercial and military space activities would make any interruption of these services catastrophic. After he stressed the necessity to "secure" activities in space, several other participants underscored the inadequacy of existing legal rules and the urgency of addressing this issue before space weapons become an international fact of life. Sponsors proposed assembling experts, users, and other interested non governmental organizations to help forge a common understanding of the PAROS debates.

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[43] Disarmament Conference Document, CD/1679.

[44] Disarmament Conference, PV.933, 31 July 2003.

[45] Javits, E.M. « Remarks to the Conference on future Security in Space », 29 may 2002, www.us-mission.ch.

[46] A/RES/58/36, « Prévention d'une course aux armements dans l'espace », January 8, 2004.

[47] DC Doc. 1693, January 23, 2003.

This initiative helped persuade some of the most intractable nations to adopt new positions. China and Russia showed some flexibility in two "non-papers" distributed in August 2004, which, while reiterating that the ultimate goal was to negotiate a new agreement, affirmed that these countries were ready to start with more informal discussions in a special space committee proposed during the session. Other countries such as Canada also reiterated their opposition to space weaponization and recognized the need for action. In March 2004, Canada co-organized, in collaboration with UNIDIR and a number of NGOs, an international working group on "security in space," forwarding the message that there was a need for a coordinated and global approach to guaranteeing security in space. On October 5, 2004, Russia pledged that it would not be the first country to deploy arms in space, inviting other space-faring countries to follow this path.

Although the United States has not been very receptive,[48] these initiatives have found some political resonance in a significant part of the international community. The proposal for an enlarged discussion in renewed forums has been endorsed by a number of countries. France is ready to support a separate mandate for the special committee. Sweden, which supports the proposal, also favors launching informal technical discussions in the Conference on Disarmament, with the possibility of inviting a wide array of space stakeholders from both the public and private arenas. According to the Swedish representative, the Geneva working process would directly benefit from interaction with a broader range of space-users since space applications being more and more dual-use by nature and conceptions of security are expanding in the post-Cold War era.

IV. Combining the Different Security Approaches in a New Comprehensive Framework

Any new consideration given to the security issues in the space debate should build on the following "facts of life" in space. On the one hand, the will of the U.S. to strengthen the defence of their space assets is now largely acknowledged. The use of ASAT systems to achieve such a goal has become the subject of a limited national debate, with some consequences at the international level. This debate is part and parcel of a larger strategic

[48] In September 2004, the U.S. Under Secretary of State John Bolton recalled that "we are not prepared to negotiate on the so-called arms race in space. We just don't see that as a worthwhile enterprise." See http://www.us-mission.ch/press2004/0910BoltonTrans.htm, September 10, 2004.

debate about the positioning of the United States as a political and military power on the word stage, with the relationship with China as one of the key variables in the equation. On the other hand, it must also be recognized that the future space landscape will change at an increasing pace in the coming years due to the emergence of new space-faring countries and new actors.[49] This will render the definition of the "threat" more and more complicated by making national motivations to enter the space arena more diverse, with a growing desire for emerging space countries to use the most advanced space techniques, i.e. those with inherent military applications, as tools for their economic and social development.

This means that the intensity and the multinational character of civilian space activities, particularly those conducted in low-earth orbit, will increase at the same time that the potential for military uses is on the rise. This simultaneity creates great challenges that warrant serious discussions on both the nature and efficiency of possible technical protective measures to be implemented and the political difficulties associated with them. Military-oriented technical-protection measures can address only part of the general security problems in space; a military approach to space security is intrinsically ill-equipped to mitigate the political consequences it can have on the international scene, which have the potential to erode the overall level of space insecurity. Moreover such "defensive assets" could increase tensions by becoming targets themselves.

The notion of comprehensive security in space being advanced by European representatives in the Conference on Disarmament and elsewhere can act as a bridge to connect the best security interests of all parties, covering both the security aspects and the promotion of space activities for developing countries.

Some room exists to tackle the different conceptions of space security using an approach that would be both comprehensive and efficient. The key elements of the U.S. space control doctrine, namely space surveillance, passive protection of space assets, and the more active aspects of space systems protection, should be considered in an orderly fashion leading to some acceptable international framework, with the ultimate goal of rendering the last of these items unnecessary. Given that any serious space-faring country would be willing to recognize the existence of present and short-term security threats in space, a gradual approach could be

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[49] See for example Collard-Wexler (S.), Cowan-Sharp (J.), Estabrooks (S.), Graham (T.), Marshall (W.), *Space Security Index 2004*, Space Security.org, p.43-46.

envisioned, starting from addressing these immediate or very short-term technical concerns, then creating a spill-over effect leading ultimately to a better mutual political understanding and trust. Such an approach could be summarized in a three step sequence, as outlined below.

First step: identifying problems that require cooperation

Several issues contribute directly to the changing space landscape and call for minimal agreements between nations because they pose serious security challenges even though they do not involve deliberate attacks on space assets.

The issue of orbital debris management

The security of the space environment already faces two physical challenges: the pollution by space debris of some orbital zones, especially in LEO; and the management of satellites' end-of-life cycle, possibly leading to a shortage of orbital slots and/or frequencies in orbit, whether LEO or GEO, with potentially harmful and wide-ranging consequences.

More than 9,000 identified pieces of debris orbit the Earth at various altitudes, with more than two-thirds distributed at altitudes between 300 and 1,500 km and the rest in GEO. This includes only the detected objects in orbit (typically with a size greater than 10 cm in LEO and greater than one meter in GEO). Some experts estimate that currently undetectable pieces could bring those figures into the hundreds of thousands. Even these very small pieces of debris could damage or destroy the solar panels or instrumentation of satellites. Launches and on-orbit disposal operations have produced much of this orbiting debris due to the metal particles used in solid propellants and the break-up of the liquid upper-stage once in orbit. Spacecraft explosions and malfunctions in orbit have also contributed to debris production.

In the 1970s, the main space–faring nations began to recognize the debris problem. They have adopted debris mitigation measures that reduce debris associated with the launching phases, with spacecraft accidents, and with the normal mechanical procedures that exist during the satellite life-cycle. Cooperatives measures have been implemented by the main space agencies to lower the debris-production ratio during the in-orbit life cycle, to diminish the probability of an accidental explosion, and to improve debris monitoring so as to minimize collision risk. The Inter Agency Debris Committee (IADC) was created in 1993 under the auspices of the United Nations and comprises the main national space agencies and the European Space

Agency. Since 2001, the IADC has been engaged in a more proactive posture that would ultimately lead to the adoption of guidelines at the UN level. At the European level, a cooperative effort is underway to propose preventive and protective measures for activities in LEO and in GEO. These efforts to propose an international norm are coordinated in the framework of the IADC with the goal of support at the UN COPUOS level. Although some technical difficulties must be solved to reach consensus on the altitudes to be considered for any spacecraft to be properly de-orbited in a given timeframe (25 years is commonly agreed), some chance exists that an agreement could be reached before long.[50]

Such efforts demonstrate the possibility of technical negotiations that can progress without too much political and legal conflict. This relatively long-standing cooperation also shows that a collective view of common concerns may lay the groundwork for future technical cooperation, as demonstrated in the case of European integrated efforts to get a better collective surveillance system.

Orbital traffic and electro-magnetic spectrum management issues

Another sensitive issue that must be addressed in the near term involves the collective management rules for dealing with orbital slots and the satellite's end-of-life. This is particularly true for telecommunications satellites, typically positioned in GEO where the commercially exploitable resources of slot positions and frequencies have become somewhat rare and precious. Interference problems and traffic management issues arise from the growing use of this orbit. In this domain, the type of service provided by the satellite operator and the traffic management issues are closely interrelated, as both geographical positions and frequency specifications can simultaneously be the object of fierce competition to ensure commercially viable activity. Also, managing the end of life of commercial and publicly owned satellites poses a difficult question because the operational lifespan of a satellite can make the difference between commercial success and failure, especially given the price of more and more complex satellites. Moreover, in the case of satellites developed for military purposes, even governments will be hard pressed to deliberately stop exploiting them in order to execute disposal procedures. Considering the increasing military dependence on the space

[50] See also the good overview of these issues provided in Hitchens (Theresa), *Future Security in Space, Charting a Cooperative Course*, Center for Defense Information, Washington D.C., September 2004.

assets, one could expect such a situation to get worse if the military becomes more inclined to fight to extend the life of their on-orbit systems.

In recent years, the ITU has recommended that a "graveyard" orbit some 200-300 km beyond GEO be used to dispose of satellites when they still have enough fuel left to de-orbit and reach this new position. This would free up scarce orbital slots. Although little progress has been made in this direction,[51] in 2004 the US Federal Communications Commission did make it mandatory for commercial satellite operators to follow the IADC guidelines, which will provide some pressure on other nations to follow suit.[52]

The exploitation of GEO may be one of the most contentious international space issues, pitting current space-faring countries against emerging ones. Recently, some countries such as Iran, with an increasing interest in using those resources, have filed requests to the ITU to change some rules inherited from a time when only a few dominating space-faring nations were sharing the geostationary resource. This move is calling into question the traditional international balance underlying those rules and signalling the will to open a political debate on these issues. In particular, demands for non-permanently attributed slots are growing and have become a key issue at the ITU level, obligating the institution to clarify its position on the subject.[53] More generally, it has been necessary to regulate the number and the minimal distance (0.05° at 36,000 km) separating satellites in order to avoid conflicts in orbit and allow up to seven satellites in the same orbital slot.

All of these issues will continue to evolve with the increasing number of operators in orbit and will get more complicated as space becomes a field of more intense commercial[54] and governmental competition. Space nations will have to find creative political and technical ways to cope with this growth that, in itself, already presents some global collective

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[51] See Hitchens (Theresa), *Future Security in Space*, op. cit., p.36.

[52] Peter de Selding, "FCC Enters Orbital Debris Debate," Space News, June 28, 2004. Online: http://www.space.com/spacenews/businessmonday_040628.html.

[53] See Jakhu (Ram), "Legal Issues Relating to the Global Public Interest in Outer Space", Center for International and Security Studies, Maryland University, October 2005, PP. 39-41. http://www.cissm.umd.edu/documents/Ram_Jakhu2005.pdf

[54] Even if this problem has been tackled for some years by the ITU, one can also mention the issue of so-called « paper satellites », consisting of nations overfilling for slot approvals in order to reserve orbital space, without actually developing something more concrete than a virtual satellite project, thus creating large backlogs in the normal filing process at the ITU.

challenges. While it does not involve direct hostile uses of space and cannot be mitigated by military responses, this situation is one of the most serious issues on the collective security agenda. Without careful collective examination, these difficult issues could potentially degrade the space environment and spark national confrontation. Using new technologies to place multiple satellites on the same orbital slots will make the management of these platforms more delicate and will require increased transparency through commonly accepted rules. Establishing rules for behaviour in space that are acceptable to every country will be one key security challenge for the years to come.

Traffic management issues and related responsibilities

Except in the case of geostationary orbit, where the ITU is the main regulatory body, orbital activities have not been given widely applicable and applied rules. A recent presentation of a study done for the International Astronautics Academy (IAA) underscored the relative paucity of United Nations legal texts related to the regulation of behaviour in orbit.[55] In particular, the diversity of the legal status involved at the operator's level makes it more and more difficult to clearly indicate the responsibilities in case of collision or interference with orbital operations. The study points to potential difficulties in a context where the parties are more numerous and use constantly improved techniques and services in orbit — such as extended manoeuvrability, orbital changes, formation flying, constellations management techniques, and re-entry capabilities. Among the most noteworthy are:

- An increase in the danger of manoeuvres in geostationary slots;
- The inadequacy of the precision and level of reliability of existing orbital data in the face of increasing space traffic;
- The lack of right of priority rules for orbital manoeuvres;
- The lack of obligation to communicate in advance about space activities;
- The lack of precise regulations for LEO comparable to ITU rules for GEO;

[55] Contant (Corinne), Lala (Petr), Schrogl (Kai-Uwe), *IAA Cosmic Study, Space Traffic Management, ,* International Academy of Astronautics, September 18, 2005 (See http://iaaweb.org/iaa/Other Publications/spacetraffic.pdf)

- The complications for collective debris management related to re-entry operations;
- The same difficulties in relation to the selection of descent corridors and impact zones on scarcely populated areas.

These problems are complicated by the ambiguity surrounding such notions as "launching state" and space vehicle "registration." The notion of "launching state" implies legal responsibility should a problem occur during the launching phase. The very notion of "launching state" remains ill-defined, as it could be any state that actually launches or orders the launch, as well as any state whose territory and facilities are actually used for the launch. The diversity of the possible situations has led to cases in which several states are legally responsible for the same launch, which would increase ambiguity should any difficulty occur[56]. In this context, private operators of launch systems tend to limit their responsibility very precisely. For example, the European launching firm Arianespace limits by contract its responsibility to the rocket propulsion stages, with the customer being obliged to take all necessary measures to register its satellite and give its own state legal responsibility for the satellite thereafter.[57]

In theory, only one state of registry can exist for any satellite. But in reality, the multiplication of actors in space and their often multinational status have complicated these registry issues. Again, several episodes have already shown how much this difficulty is inherent in today's space activities, leading *de facto* to a number of unregistered operational satellites. Since these developments may have a direct impact on the security of space activities, better regulations would create a net improvement in the collective space security framework, making it both more difficult to create inadvertent interferences between nations or, in a worst case scenario, even to exploit these breaches in a potentially hostile or aggressive way.

[56] See Kerrest (Armel), La notion d'Etat de lancement à la lumière des evolutions de l'activité spatiale, COPUOS, Legal Sub-committee, 39th Session, April 2000 (http://fraise.univ-brest.fr/~kerrest/IDEI/Copuos_SCJ_00_Fr_def.pdf)

[57] One can easily imagine how much this delimitation may be the subject of commercial negotiation between the launching provider and its customer, further complicating the registry issues.

Second step: Getting agreement on relevant projects as candidates for cooperation

Some technical programs relevant to collective space security can be considered good candidates for cooperation. The European experience, based on its particular approach to collective multinational security, can be inspirational. Because a few European states have already developed equipment for space surveillance, ESA has emerged as a regional leader in federating existing national capabilities from different backgrounds.

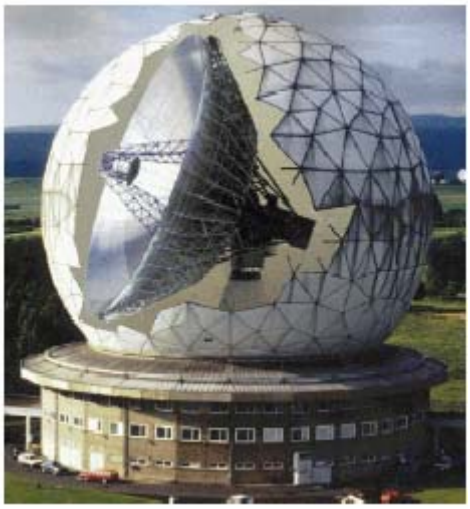
These systems can be as different as France's initially defence-oriented bi-static radar GRAVES[58] or the ballistic missile Test Armor Radar equipping the tracking ship Monge — respectively managed by the French National Aeronautics Studies and Research Office (ONERA) and by the DGA (Délégation Générale à l'Armement) — and Germany's radar FGAN-TIRA belonging to the Research Establishment for Applied Science, or Britain's Chibolton radar owned by the Rutherford Appleton Laboratory. As shown by one specialist from ESA, some optical capabilities can also be derived from national efforts.[59]

[58] Grand Réseau Adapté à la Veille Spatiale

[59] See Klinkrard (Heine), *Monitoring efforts — Efforts made by the European Countries*, ESA/ESOC, presentation made during the 10th International colloquium on aerospace security held in Toulouse, November 27-28, 2002 (hosted by the French National Air and Space Academy). From the same colloquium material, see also Crowther (Richard) –Qinetiq-, *The Current Situation Regarding Space Debris and Future Problems* and Michal (Thierry) –ONERA- *Les perspectives d'avenir pour les équipements-sols* for a discussion about GRAVES functioning and perspectives.

National Space Surveillance elements in Europe

The GRAVES transmitter and receiver in Dijon and Apt (France) — Source –ANAE colloquium, 27-28 November 2002



The FGAN Tracking and Imaging Radar (TIRA) at Watchberg (Germany) — Source –ANAE colloquium, 27-28 November 2002

The Tracking Ship *Monges* (France) equipped with its two ARMOR radars — Source –ANAE colloquium, 27-28 November 2002

One example of optical capabilities (SPOC program, France) — Source –ANAE colloquium, 27-28 November 2002

These elements, among others in Europe, have formed the basis for a renewed reflection about a Europe-wide space surveillance network that, even with modest initial capabilities, could help inform common policies in Europe while allowing ESA to be part of wider exchanges with the U.S. The GRAVES Radar in particular has been undergoing a complete renewal and has been fully operational since 2005[60]. The main improvements have affected the emitting system (doubling the system allows a 180° azimuth cover with an observation of all detected satellites at least twice a day), the signal processing system for the new data, and new orbital data processing tools to construct and maintain a catalogue of orbital parameters.

[60] Its control has been transferred from ONERA to the French Air Force.

Put together, GRAVES and SPOC data can already provide sufficient information for first order measurements, and thus provide the basis of a monitoring and trajectory system.[61]

Further cooperative endeavours are under way to federate the European monitoring and tracking assets into a standardized system. ESA has taken a leading role in coordinating these efforts by commissioning a 2002 study about the design of a European Space Surveillance System based on past national experiences. An initial proposal suggests pooling resources and technologies to build improved space surveillance systems in LEO and GEO.[62] The main challenge will be to maintain a catalogue of orbital objects providing a genuine analytical capability and allowing, for example, links to be formed between detected debris and their common origin (e.g., a given satellite that exploded in orbit).

Given the increased space activity expected in years to come, here lies one of the main applications of a cooperative system, both on the regional scale as well as on a global scale, once monitoring assets and cataloguing capabilities are fully operational. As far as the proposed European strategy is concerned, this issue is considered a driver for cooperative undertakings. In particular, any GEO survey and cataloguing strategy requires repeated and updated observation of space objects to secure correct orbital data, to better identify un-catalogued objects and to task observation for catalogue maintenance and manoeuvre identifications.[63] Cooperative technical solutions or strategies would pay off very quickly here by offering participating states improved data collection, which in turn can provide better space management capabilities and better security assessments. Improving space surveillance capabilities has been recognized by the main space countries as an investment of choice if their space activity is to be developed. Not pooling such capabilities at the international level once they are in place, and foregoing the possibility of an upgraded collective system, would be a missed opportunity.

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[61]Michal (Thierry), art. cit.

[62] This study, led by the French ONERA with expertise from Germany and from the United Kingdom, was presented in a 2005 technical paper A first system envisioned for 2010 with some upgrade made in 2015 would reach 1700 km range and bring some 98% LEO coverage while the GEO strategy, based on the use of three sites distributed globally, would offer a 95% Geo coverage at the 2015 horizon. [Donath (T.), Brousse (P.), Laycock (J.), Michal (T.), Ameline (P.), Leushacke (L.), *Proposal for a European Space Surveillance System*, presented in ESTEC, 2005]

[63] Idem, p.4.

Very practical technical measures such as improved registration mechanisms may also help the international community deal with the projected increase in the number of space objects and actors. In the case of launch debris mitigation, it will be necessary to persuade countries that pursue autonomous launching efforts to comply with collective security rules by granting them access to launch-related debris mitigation techniques.[64] Although such mechanisms have successfully been applied as a norm among the main space-faring countries, new space countries might see such policies as too intrusive and as interfering with their own right to access to space. Still, given the expected increase in the use of space by new countries, the international community will have to develop an equitable debris mitigation policy.

International discussions about debris mitigation have made some progress only because they are not intended to build a legally binding framework and because they are dealing with immediate concerns. In the case of launch debris mitigation, given the existing international regulatory agreements such as the Missile Technology Control Regime (MTCR) which reflects a shared view of collective security interests, Europe and the United States should be able to find common ground for a coordinated policy using flexible negotiating schemes.

Considering that the technologies to passivate orbiting rockets stages or satellites ending their operational life remain costly and have been utilized by only a few nations, both the U.S. and Europe should help other countries to develop their own capabilities. Pooling technical and diplomatic skills and resources at the international level would make clear to third parties that launch and end-of-life regulations are not meant to thwart their national space development efforts, while also fostering the openness of such efforts. By reducing the chances for increased tensions and by promoting a somewhat win-win regulated situation, such international openings may result in consolidating, even if indirectly, the national security interests of the main space faring countries.

[64]The main space agencies have worked together in the Interagency Space Debris coordinating committee to promote sophisticated techniques allowing to "passivate" the launch vehicles orbital stages, i.e. prevent their explosion in space which has been one of the major source of space debris. These techniques to minimize the amount of remaining propellant in the used stages require elaborate technical skills and capabilities not accessible to any one country.

Third Step: using successful experiences as a base for more ambitious forms of cooperation

This overview of some of the most commonly noted difficulties in the utilization of space demonstrates how the relationships among diverse users are at the heart of the most immediate security concern for the international community. Coordinating national and commercial behaviours by creating a regulatory framework acceptable to all parties would be an efficient way to address the most probable near-term dangers in space. Encouraging collective transparency would help if connected to a properly designed regulatory framework to define, and hopefully detect, any suspect or uncontrolled activity in space. Ultimately, one could hope that a collective approach to space security would prove pragmatic and efficient enough to drastically diminish any space-faring nation's interest in pursuing contentious activities in space.

A gradual approach can help states reach agreement about what the current problems actually are and can help them understand how much a continuation of current activities could worsen the situation by degrading the space environment at a time when discussions about security in space are almost stalled. Many authors are advocating for a new "Code of Conduct" or even additional treaties.[65] Any legal approach to better-codified collective security in space will have to consider some basic facts of today's and tomorrow's international space environment to be efficient and acceptable. These include:

1. the existence of competing interests between space-faring countries, emerging space countries, and non-space countries;
2. the existence of potentially competing positions and strategies between public and private actors; and
3. the diffusion of new space technologies which will irrevocably change our common future space environment.

Europe is well positioned to be an "honest broker" both as a space-faring entity with strong interests in preserving space as a strategic investment area and as a political "outsider" *vis-a-*

[65] Notably Krepon (Michael), Heller (Michael), A Model Code of Conduct for the Prevention of Incidents and Dangerous Military Practices in Outer Space, Henry L. Stimson Center, (also published in Disarmament Diplomacy, N°77, June 2004, http://www.acronym.org.uk/dd/dd77/77mkmh.htm); Garwin (Richard), Gottfried (Kurt) and Meeker (Len), A Draft Treaty Limiting Anti-Satellite Weapons, proposed in 1983 and republished by the Union of Concerned Scientists at (http://www.ucsusa.org/global_security.space_weapons/page.cfm?pageID=1153); and work by Theresa Hitchens quoted above.

vis the most active participants in the PAROS standoff. Basing its own view of security on the preservation of a balanced use of space without massive investments in the military field today, Europe is well placed to promote a renewed effort to reach agreement on collective rules of the game. A broader range of perspectives could fruitfully inform new discussions about both the implications of some military uses of space under development by some nations, namely the U.S. and also possibly China in the mid term, and the evolution of civilian space techniques similar to some military techniques.

Any effort in this direction will first have to deal with the technical aspects that will help reinforce the collective security of the space environment. As already mentioned, Europe might find itself particularly well placed, given its nascent effort to build the first cooperative space surveillance system. Setting up a genuine European space surveillance network involving a number of EU member states may help Europe reach the technical and political critical mass needed to start discussions at the international level, notably with the U.S., for a global network with increased performance. Today, any discussion surrounding these issues can only be limited to technical exchanges, in which Europe's contribution can only be marginal compared to the U.S.'s large investments and experience.

At the European level, such internal technical cooperation could pave the way for a more proactive European "security in space" policy on the international scene by giving the member states a better common awareness of the security issues associated with the development of space activities. Adopting such a proactive policy would mean giving Europe sufficient autonomy to make its investment in space more credible and in line with the security orientations announced in recent documents (such as the EC white paper and the report of the panel of space experts, already mentioned). The resulting increase in the performance of space surveillance systems would also offer the possibility of new talks promoting better sharing of data. In particular, the development of a world data base may allow better data processing to monitor debris in a context where the volume of data to process is huge and where the monitoring relies on relative modelling inaccuracy and would benefit from the addition of detection facilities to multiply the data collected for a same object and get quicker orbital measurements.[66]

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[66] All this will rely on technical advances in the field of "intelligent" software developing able to take into account all the exceptional or unpredictable events of the space activity (such as multiple launches, more and more frequent orbital manoeuvres, orbital explosion tracking, etc.) As noted by one expert, such software

Obviously, such technical cooperative advances can occur only if the political aspects of cooperation for space security are simultaneously addressed. To be acceptable by all parties, such cooperative advances will have to define "win-win" rather than "zero-sum" situations, where these collective advances could be judged by all space-faring nations as being highly beneficial to their national interest. Important work must then be carried out to precisely define in a realistic fashion when and how security and defence in space of any nation, the U.S. included, would be technically and legally better guaranteed in the mid and long term by a collective security system than by the pursuit of national interests only. The ultimate goal of the international community would be to implement new "rules of the road" that could reduce the perceived need for accelerated military options while promoting an important collective effort to convince the more reluctant countries to take part in some kind of new space regime. The heart of this diplomatic effort would at last consist in demonstrating how such a "space regime," often easily discarded as too unrealistic, could indeed perfectly fit in with very pragmatic security policies.

Reflecting on a collectively acceptable space security framework

The role of such a framework would be to set the scene for renewed international cooperation in space. As has been the case (and still is) for European security and defence construction, such a collective undertaking can only build on a gradual, mutually acknowledged approach as described earlier. Such a cooperative framework must appear equitable (it has to allow the entrance of newcomers without any perceived discrimination) and rigorous (new entrants must comply with technical and legal rules, the goal of which is to make sure that the new activity won't create either military or security challenges). Possibly forming the basis for a genuine new international regime, this general understanding would be a decisive step for reinforcing the regulation of the conditions under which new actors access the space scene.

Europe should identify potentially cooperative domains where it could make its own contribution (such as collaborative space surveillance) and develop active diplomacy in these domains. The goal here would be to prepare a future international exchange forum, either under a dedicated or an existing institutional structure, which would focus on the security of

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developments are currently well underway (at ONERA for example with the Software S3) that would be capable of sophisticated identification and monitoring simulations. Communication by Thierry Michal, *Les perspectives d'avenir pour les équipements au sol*, ONERA, Colloquium cited, Toulouse, 27-28 November 2002.

space activities within a definition of collective monitoring capabilities acceptable to a wide range of countries. Such an approach should include political incentives for participation, but not start with legally binding constraints that would immediately lead a number of countries to refrain from adhering to them. Drawing on the discussion above, several specific domains present attractive opportunities for cooperation.

1. Collective rules for debris prevention and mitigation, and for spectrum management

The current debris mitigation procedures as promoted under the auspices of the IADC should be extended to form the basis for a cooperative international framework that would regulate each delicate step of space flight (launch phase, disposal on orbit, management, end of satellite life, and possibly re-entry issues). Although the IADC guidelines are not legally binding, they can create normative obligations for parties who wish to access and use space in a responsible manner. Such normative guidelines aim to diminish the risks inherent in increased space activity without creating obligations that are so technologically demanding as to exclude emerging space countries *de facto* from the benefits of national space activities. De facto discrimination should be avoided to keep the win-win principle at the heart of this collective undertaking. Of course, sensitive industrial practices and knowledge can be at stake and will require common and creative thinking to protect. All parties would also have to reach agreement on jurisdiction over private operators involved in space applications management.

This framework could also create the conditions for acceptable short-term regulatory measures addressing the spectrum management issues listed above. Keeping in mind the goal of improving political incentives for all countries to adhere to voluntary rules, near-term objectives could be to suggest techniques to diminish the risk of electromagnetic interference, to better share orbital and frequency resources (especially for newcomers in space), and to ensure that private operators respect geostationary orbit management procedures.

2. Reinforcing legal responsibilities

Reinforcing legal rules in space will contribute significantly to the reduction of uncertainty and thus may curb the associated threats. Legal liability should be clear for any functional objects in space. It would follow the lines of more detailed registry procedures, taking into account new technical features such as increased manoeuvrability or the existence of new energy sources, as well as a more complete description of the vehicles. Again, the goal would be to give a better collective awareness of space traffic at a time when it is clearly expected to

grow, thus avoiding any misunderstandings between nations resulting from poor information. Given the sensitivity of this information, careful discussion between nations would be needed to set rules that both protect legitimate national and commercial interests and advance collective security, the latter remaining the key objective.

It may be possible to handle this issue in a very pragmatic fashion. Regulations for better transparency and more responsible behaviour by all actors and stakeholders should address, for example, registration issues, pre-notifications of manoeuvres in space, satellite end-of-life management procedures, right of priorities, and respect of protected zones in orbit according to the density of space vehicles in these zones. Once these initial security measures have been accepted and applied by all parties, it should be easier to consider and relevant limits on offensive military activities, such as no first deployment of ASATs.

3. Create the political framework to develop international cooperation for space surveillance beyond first technical steps

A principle should be adopted ensuring all countries' right of access to space traffic and surveillance data.[67] The principle of a functional and accessible international database could be proposed to include both registry information (including, for example, forecasted orbital data of any launched objects and linked to registry procedures) and real space object data, possibly produced by an "international space surveillance network." This kind of effort, produced on a voluntary basis, would find its legitimacy as a means of implementing the "code of conduct" or the rules of the game briefly mentioned earlier.

V. The Need for Better Awareness of the Strategic Character of Space

This possible legal evolution reflects the fact that the multiplication of actors and objects in space in the near future will result in a sizable security risk that is not being handled by the current collective agreements and that will not be avoided by purely military solutions. As such, a number of the issues mentioned here present a collective security challenge that may make the existing situation worse, both technically and legally, and in the very short term may put at risk any space asset, civilian or military. Thus, even from a purely defensive

[67] After all, such a principle would essentially mirror the United Nations Principles relating to the Remote Sensing of the Earth form Outer Space (Resolution 41/65 of December 3, 1886).

perspective, it can be argued that such confidence-building measures, far from being illusory, can prove more effective in the short and mid term than an enhanced national military posture would be. As a consequence, while it will be based initially on voluntary political acceptance by all nations, the new collective rules will have to be conceived in such a way that potentially hostile or aggressive behaviors in space are rendered more difficult, more easily identifiable, and collectively reproved and sanctioned. Combining concrete technical and behavior regulation with more long term transparency and political agreements may open new possibilities for space regulation.

Europe may be ready to play a more active role in supporting this evolution because of its experience of being a regional collective political and institutional construction with sometimes difficult but steady discussions on the balance between national interests and collective ones. Moreover, its approach to space security may also demonstrate a common basis, or a middle ground, to stimulate and help shape international debate on the subject. This capability will mainly depend on the ability to act collectively in space, as in other foreign policy and defense arenas. As the current debates on the Constitution show, considering Europe as a single political entity remains difficult. Hopefully, the progress of this political construction will eventually help make the “Old Continent” a dynamic and constructive party in a debate that will be crucial for building the peaceful and more secure international society we all dream of for the future years.