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Stefano Silvestri, Rapporteur

Space and security policy in Europe

Executive summary

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Institute for Security Studies
43 avenue
du Président Wilson
F-75775 Paris cedex 16
phone: + 33 (0) 1 56 89 19 30
fax: + 33 (0) 1 56 89 19 31
e-mail: institute@iss-eu.org
www.iss-eu.org

Institute for Security Studies
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Executive summary

Research Group
Stefano Silvestri, *Rapporteur* (IAI, Rome)
Klaus Becher (EUISS, Paris)
Jean-Pierre Darnis (IAI, Rome)
Giovanni Gasparini (IAI, Rome)
Daniel Keohane (CER, London)
Michel Liégeois (ULV, Louvain)
Michele Nones (IAI, Rome)
Xavier Pasco (FRS, Paris)
Niklas Reinke (DGAP, Berlin)
Henning Riecke (DGAP, Berlin)
Burkard Schmitt (EUISS, Paris)
Isabelle Sourbes-Verger (FRS, CNRS, Paris)
Jost Vielhaber (DGAP, Berlin)

With contributions by
Angela Garrigos de la Uz
Mike Winerstig (FOI, Stockholm)

This study was funded by the European Space Agency (ESA)
ESA Technical Officer: Simonetta Cheli

Contents

Foreword

Space is a strategic asset, and its importance both in terms of technology and security cannot be overestimated. Firstly, space technology is at the cutting-edge, acting as a catalyst for technological progress and generating applications that are crucial for the functioning of modern societies. Secondly, it is the example par excellence *of a dual-use technology. Its applications are normally multi-purpose, and space operations can be seen as a continuum, including civil and military as well as security and defence functions. In consequence, space assets represent key instruments for a comprehensive approach to security.*

However, Europe still has difficulties responding to the importance of space in general and its security implications in particular. Granted, recent initiatives like Galileo and GMES are encouraging, but they cannot hide that important structural deficiencies persist. Europe's space sector is facing not only a lack of funding, but also political and institutional fragmentation that makes efficient and effective solutions difficult to achieve. In this context, the clear distinction between military and civil space activities is particularly important, since it is increasingly in contradiction with technological and security evolutions.

Having this in mind, the IAI in Rome brought together an international consortium of Think Tanks to finalise a research program for the European Space Agency (ESA) on the perspectives of space in the European security and defence policy. The research team consisted of six European research institutes, including the EUISS. Its task was to analyze how the various actors in Europe deal with space and how to promote convergence towards a European space security policy.

To achieve this objective, the consortium chose a two-step-approach: It investigated the political, institutional and economic aspects of the various national and European space policies. This assessment is particularly important, since there is not only an unbalanced distribution of space activities and funding in Europe, but also a sharp division between civil European programs and national military programs. Then, based on this 'inventory', the research team evaluated the perspectives for a common European space security policy and developed concrete proposals for political action.

The consortium presented its findings in early December 2003 at an international conference in Rome. The full report with all contributions on the various national policies is available on-line via the IAI website (http://www.iai.it).

This Occasional Paper *contains the Executive Summary and the Conclusions of the report. Given the significance of the issue and its implication for CFSP/ ESDP, the EUISS felt it important to publish them and make them available to a wider public.*

Burkard Schmitt, EUISS,
Paris, December 2003

Outlook

The evolution of a European space policy is encouraged by the recent EU decision to develop the Galileo project. This decision confirms the willingness to pursue a policy in the space technologies that goes beyond the national level, even if national visions are still predominant. A new security concept is emerging. The evolution of the foreign, security and defense policy (CFSP, ESDP) and the protection of population requires an integrated approach.

Security needs are connected to the technological progress. Space assets must be used to protect populations, resources and territories, but also to maintain the integrity and the capabilities of the technological base. Space systems are a fundamental aspect of "technological security": they offer extremely versatile solutions in a global, international dimension.

This research analyses how the different EU actors deal with these topics and how to promote convergence towards a European Space Security Policy.

1. Space is a strategic asset. Europe has always maintained an important presence in space. The development of dual-use technologies calls for a "European" approach to space security, linking the present national defence programs with mainly civilian European programs. The functions and means of security and defence uses of space overlap considerably. In fact, space operations can be seen as a continuum, including civilian and military functions as well as security and defence operations.

2. The emergence of the EU in European space policymaking has been characterised by an increasing interest in more "strategic" programs. Future European decisions and performance in the security and defence applications of space are likely to impact on the transatlantic relationship as well as help to define Europe's role in the world (and the future of Europe's defence-industrial base). Therefore, thinking in this area can no longer be kept on the margins of the European political process, but requires far-reaching political choices.

3. Space tools are necessary for our collective security, but there is no "European awareness" of the benefits of common space systems. A security and defence space user community still has to be created both among national defence establishments and at the level of the general European public.

4. The supply side is structurally inadequate. The globalisation of the market underlines the weakness of the European industrial base vis-à-vis American competitors. Further rationalisation is needed and will probably imply a growing level of industrial concentration. This process will have to be guided to avoid excessive distortion of the market. A principle informing this policy should be continuity in techniques, industries and functions in space activities whether scientific, commercial security or defence.

5. Three functions are needed in any future, improved, space policy framework:
   a. targeted R&D for advanced space applications;
   b. increased involvement of those responsible for security and defence in space policy decision-making;
   c. increased institutionalised political visibility and effectiveness of security-related space activities.

6. There is no structure in place today in Europe that can cross-reference all space-related activities and provide an overarching approach for generating the needed assets and capabilities, also with recourse to commercial or public dual-use opportunities and public-private partnership solutions. Instead of continuing to rely on national approaches or possibly setting up a second European space agency for security and defence, there is the potentially attractive option of the European Space Agency (ESA) taking full advantage of the dual-use nature of space through a cooperative arrangement with the EU.

7. European governments and institutions should act to preserve some competition on the European market, at least in those sectors in which market dimensions and technological and industrial characteristics allow it, while opening up to concentration in other areas, such as launchers. The rise of a security and defence demand will have important positive effects on the competitiveness of the European market, making room for at least two different competitors in each sector.

8. It might be counterproductive to aim for the complete rationalisation and unification of European space policies in the short term as national governments logics and choices still are and will continue to be determinant. It is possible, however, to plan a European policy (under either a collective or an enhanced cooperation framework) that links all the European components and choices in space to some strategic primary objectives that could provide Europe with the knowledge and functions it still lacks today and make its presence in space more coherent and complete.

9. The European authorities should draw up some overarching industrial policy objectives to maintain full autonomy in basic space capabilities (in terms of satellites, launchers, ground segments, technologies and services) to guarantee access to and the optimal utilisation of space in accordance with a European policy. This does not exclude the possibility of agreements with other space powers nor does it call for parity with the US. It is merely a sufficient objective with minimal technological assets. In order to develop scientific and technological know-how, European authorities should also strive to maintain a lively, competitive and diversified European industrial and technological basis. This means guaranteeing a volume of production in the long run, and some public investment in science and technology that can have an anti-cyclical function with respect to commercial demand.

10. The most recent EU developments might play a positive role. The EU itself could be better placed to identify and articulate demand in terms of space assets, taking in the perceptions and choices of various European states (or more precisely a group of states, following an enhanced cooperation logic) and establishing criteria for the burden sharing and management of the systems.

11. In practical terms, "space security" committees can be set up in parallel in the ESA and the EU Council, in charge of thinking, programming, implementing and managing such a program, as well as providing an institutional link between the two institutions. To avoid creating too many institutional bodies, the composition of the committees could be the same.

12. One of the best ways to elevate Europe's space, security and defence capabilities-building efforts to a new level could be the launching, preferably by the European Union, of a European Security and Defence Advanced Projects Agency with a small, non-permanent staff and flexible, mission-based activity. Like DARPA in the US, this would provide a framework for pursuing a strategic approach to applied technologies of the future, combining a well-defined vision with highly responsive structures and methods.

13. These and other changes will not come easily. Thus the European Council will have to make a head start in this direction by establishing an independent space committee, composed of European experts and bringing together assessments from space industry, potential civilian and defence space users in the foreign, security and defence spheres. Such a committee should determine the optimal level for European ambitions in space with regards to demand and the evolution of needs. Apart from its function of advising the European Council, such a committee could do very important public work, contributing to the much needed identification and building of a European space constituency.

1

Space, a decisive asset for European security policy

Space technology is linked to collective security, with the term "security" referring to the protection of European citizens from potential risks of both military and non-military origin. The European Commission Green Paper on "European Space Policy" included a statement on how security can be enhanced through space technologies. Space assets are fundamental for many common European endeavours, such as developing a "knowledge-based economy" or more integrated transport policies (single sky for example). At the same time, the development of a Common Foreign and Security Policy and a European Security and Defence Policy requires many new military capabilities. The increasing use of information technology is linked to these efforts to increase European capabilities, especially to meet data transmission and information requirements. The ECAP (European Capacities Action Plan) calls for concrete actions to increase asset availability.

The Thessalonica European Council launched the concept of an EU Security Strategy. This was an important step towards a better definition of the political basis of future space applications for security. Also, the decision to create an intergovernmental agency in the field of defence capacities development, research, acquisition and armament by 2004 represents a cornerstone for the development of security technologies, and thus for space activities, in the EU. In the United States, space technology is "military oriented" due to a military strategy increasingly based on the concept of "information dominance". European space technology is more "civilian oriented"; in fact, it is dual-use.

This duality has been established politically. The preamble of the ESA Convention defines its mission as one of "peaceful purposes". The development of European security policy, which deals with how to "help secure peace and defend stability", confirms the compatibility of this political orientation with the "non aggressive" use of technology.

The European space framework is exclusively civilian. Major defence/security programs have been developed on a national basis, and sometimes through bilateral or trilateral cooperation in data exchange. The development of dual-use programs calls for a "European" approach to space security, able to link national defence and European civilian approaches.

Civilian spin-offs of space-based technologies, backed by a strong "broad security policy" coming from EU authorities, establish some important points:

- The "security of citizens" is the basis of the growing use of space technologies. This security concept deals with both civil and military security.
- In some cases, applications for the security of citizens are only civilian, such as space-based crop monitoring or water management networks.
- In most cases, the space-based security applications provide sensitive information that have to be gathered and delivered by means of a clear procedure.
- There is the need for a strong political/juridical framework that can also facilitate the development of a defence, police and justice administration users community.
- The development of CFSP/ESDP calls for a number of space-based assets and applications to be matched by a significant operational capability.
- There is no link between intelligence users of space; better coordination of space at the European level could guarantee greater effectiveness.

The concept of "space security" involves different elements:

- The security applications provided by space technologies are a linchpin of European policy.
- The development of space is the concrete translation of a common democratic European political project. Space security applications are directly linked to the role of Europe in the world. The negotiations between the US and the EU on the Galileo system clearly confirm this.
- The space sector helps to define a "security concept" for Europe and a common strategic culture, not only where applications improve the security of the citizens, but also for the technological capacity in itself. End-user and industrial needs contribute to a comprehensive technological security.
- Space security includes defence and other security applications but is mainly civilian-driven, based on a very specific dual-use approach developed among multilateral and national European institutions.

Moreover, the European Convention on the Future of Europe included "European Space Policy" and a "European Space Program" in its draft Constitutional Treaty: a strong commitment shaping a high-tech sector and confirming its strategic importance. The draft Constitutional Treaty also calls for an important institutional and operational effort to foster such a security concept.

Aspects of intergovernmental cooperation in Europe

Space developments have been independent of the general process of European integration. In addition, different civilian and military bodies, either exclusively national or acting through various partnerships, have contributed to defining space policy and developing industrial activities. The European Space Agency has become the main authority in the European space industry. However, the growing role of the European Union, the development of military space activities, and changes in the industrial sector are new features that have to be taken into account along with the internal evolution of the national space sectors in individual European member countries.

Today, the main contributions to space in Europe are made by the European Space Agency, the European Union and intergovernmental programs.

European space programs as a whole are characterised by:

- a strong Research and Development orientation leading to experimental programs and acquisition of competence in high-tech domains;
- collective operational and strategic objectives;
- national goals.

For two of the major European space projects, Galileo and GMES, R&D aspects are managed by ESA while strategic issues are handled by the EU. In these cases, the involvement of national governments provides an additional layer of cooperation. The national authorities responsible for space matters can be either agencies devoted more or less exclusively to space, ministries (for example, research and technology, industry or foreign trade) or "inter-ministerial" entities. For the military space sector, defence ministries are responsible for those activities unrelated to civilian activities.

One of ESA's missions was to coordinate the European space programme and national programmes with a view to gradually "Europeanising" the latter. In practice, European space programmes have not supplanted purely national activities and both attitudes towards and the degree of involvement in them are far from uniform across Europe.

The tasks of the space agencies are now being reappraised in all countries. This reflects the gradually changing relations between the various protagonists and a certain maturity in the sector after more than thirty-five years of practice.

ESA has proven its ability both in managing major programmes and in carrying out original space science. However, new factors concerning the evolution of technology, changes in national space preferences and developments in the general framework of the European community all require a redefinition of objectives and ambitions for the future European space policy. In this context, ESA intends to enlarge its role to contribute to the implementation of European space policy as shown by the strategic work it has carried out with the EU (Green Paper exercise). While ESA remains the principle forum for any intergovernmental cooperation, with its own mechanisms for discussion and negotiation, current trends are towards a more visible role for the EU in intergovernmental relationships.

THE FIRST EU-ESA CO-MANAGEMENT PROGRAM : GALILEO

The Galileo program of satellite navigation and positioning can be considered the first "genuine" European Union-led space program.
The programme began at the European level, under a tripartite authority composed of the European Space Agency, the European Union, and the Eurocontrol organisation for the certification of air traffic. Largely supported by Brussels, the objective of establishing a completely independent European commercial system was initially embodied in a European directive, essentially civilian in character despite an obvious military dimension. One of the consequences of EU involvement in this initiative has been the creation of a new system of financing known as PPP (Public Private Partnership).
As shown by the Laeken "non decision" in 2001, some governments fear that developing the Galileo satellite capability could jeopardise national sovereignty in this field.
Aside from a strictly military analysis, Galileo's evolution has been plagued by some questioning about its relevance for national purposes and by government-to-government disputes about the political and industrial benefits (until recently involving Germany and Italy). It must be noted that the most recent intergovernmental discussions were settled without putting the principle of an EU-led Galileo program into question.

THE FIRST EUROPEAN "ENLARGED SECURITY " INITIATIVE : GMES

Originally strictly for monitoring the environment, the GMES has since been enlarged to the CFSP's security dimension with the notion of security incorporated into the title of the programme with the "S" of GMES. Apart from its commitments to programmes agreed upon in the civil domain by ESA, the European Commission favours an approach characterised by great caution in piloting a programme with acknowledged dual prospects, but which will be difficult to impose as an instrument of collective sovereignty, especially in the military field. It should, in theory, lead to the setting-up of an operational system for global monitoring of the environment by 2008.

MILITARY EXPERIENCE , THE WEU HERITAGE IN THE EU

In 1991, the Western European Union Satellite Centre for satellite data interpretation was set up in Torrejon, Spain, marking the conclusion of a long process of reflection. Five years later, the WEU's appraisal of activities at the Torrejon centre during its experimental stages showed that it had not yet achieved maximum efficiency. One of the main problems was genuine cooperation in sensitive areas like intelligence. More globally, the WEU had to deal with a basic lack of uniformity between member countries, in terms of financial resources as well as the political and strategic approach. However, the decision in May 1997 to support and strengthen activities at the Torrejon centre shows that the importance of space methods assets is officially recognised, at least at the political level, even though most current programmes are still being developed in the context of direct bilateral or multilateral cooperation between the relevant countries.
In 2001, the Centre was designated a permanent Agency reporting to the EU Council, demonstrating that it plays a recognised role and that its missions are indeed considered a part of the development of the common European Security and Defence Policy (ESDP).

2.1 General position of the EU with respect to international cooperation in space

The emergence of the EU in European space policymaking has been characterised by an increasing interest in more "strategic" programs. This interest has changed the conditions of transatlantic cooperation in a rather radical manner: the EU decision to consider programs such as Galileo and GMES has stirred up a lot of scepticism in the US.

The EU has a relatively active policy in the field of space cooperation. It has established contacts with Russia and with China, mainly because of a potential cooperation on the Galileo program in accordance with the opened EU position to multilateral partners.

Today, one of the main issues in the building of a European military competence is the harmonization of national programs. Other European countries are studying the development of their own capabilities (German Sar Lupe, Italian Cosmo Skymed, French Pléiades) with agreements for exchange of information with other countries (Belgium, Sweden, Spain and Austria).

The possible development of a European security and defence presence in space requires careful consideration:

- It is taking place in a changing European political context since the affirmation of the "Headline Goals" aimed at establishing a European Rapid Reaction Force (ERRF).
- Space technologies, like information technology, are undergoing profound changes based on constant improvements in the cost/performance ratio of electronic components and, in a correlated way, on improvements in systems architecture making it possible to combine distinct systems. Such systems enrich the information produced for all users, including the military. Moreover, given the flexibility of use which it permits, this technical opening up could respond, *a priori* and against all expectations, to the new security requirements that worry military headquarters today.
- For all military players, the harnessing and increased use of all kinds of information are necessary in all "modern" military operations. As seen by a professional army, the enemy is characterised by the lack of information possessed about him and the unpredictable actions which he might undertake. Military strategies therefore seek to compensate the lack of knowledge of the modern enemy by the reinforcement of their ability to see, to detect, to know.
- The convergence of these technical developments and new requirements appears to push to the fore the role of space as a primarily strategic defence tool.
- The European initiatives are obviously no exception. Yet, this is precisely where the problem lies. In effect, the magnitude of the consequences of the choices increases the difficulty in building a European military space presence. Thinking in this area can no longer be kept on the fringes of the European political process, but requires far-reaching political choices.

2.2 Re-thinking political and military sovereignty

Setting up military space activity on a European scale raises questions of political and military sovereignty. Questions of sovereignty are currently treated in the context of conventional multinational relations, as with the "common operational requirements" of the Helios military observation programme. Establishing European programmes moves the problem to a completely different level, on the one hand because of the structural problems and hence the question of responsibilities posed by their development, on the other because of the political and strategic value that is attached to them.

Two key European programmes – civilian, but of a strongly dual nature – can be taken as evidence of this turning-point: Galileo and GMES. They reveal the scope but also the great sensitivity of the choices that EU member states must make. The latter are aware that the credibility of a European political and military whole

EUROPEAN MILITARY SPACE: THE CHANGING FRAME OF REFERENCE

A rough estimate extrapolated from existing systems costs (without the exploitation costs) gives an order of magnitude of the global investment that a European collective space defence system could require.

Table 1 - Costs of a potential European military space capability

Application	*Programme Cost (Millions)*	*Programme Duration (years)*	*Annual Cost (Millions)*
Telecom	*3,140*	*15*	*209*
Observation	*2,283*	*10*	*228*
Galileo	*150*	*8*	*19*
SIGINT	*875*	*10*	*87*
Warning	*555*	*10*	*55*
Surveillance	*251*	*10*	*25*
Total	*7,254*		*623*

Source: *European Global Space Metasystem for Security and Defence, presentation by Major General D. Gavoty in the Workshop on "Security and Defence Aspects of Space: The challenges for the EU, Contribution to the Green Paper Consultation Process" organised by the Greek Presidency of the EU, Athens, 8-9 May 2003, http://europa.eu.int/comm/space/futur/consultation5_en.html*

depends on their involvement today. Yet, increasing examples of security-related, not to say military security-related applications of these programmes make it impossible for European states to restrict debates exclusively to economic, industrial or purely civil interests, and strengthen national reluctance to engage fully in their development.

2.3 Schemes for possible cooperation: multiplicity, complexity

The creation of a true European military space presence appears all the more delicate in that the way towards European integration is not unique, and multiple ways of cooperating are still open today. In this domain, cooperation has never gone beyond bilateral or multilateral relationships, with the exception of NATO Satcom assets. The latest arrangement, the Common Operational Requirement (COR) attempts to build on the cooperation inaugurated in the sensitive area of space intelligence gathering with the Helios-1A and Helios-1B satellites. The COR is a process of cooperation at the highest level, which may guarantee more permanent multilateral strategic agreements in future. The process involves finding simple funding agreements for a programme, but also defining operational objectives common to the different national systems, in the first instance those of Germany, Spain, France and Italy. This pooling of military requirements for optical, radar and

infra-red observation could compensate for the temporary character of common programming ventures.

Efforts nevertheless have to be made to translate such a document into a European reality. What is, for the moment, only an initiative for some member states could become the embryo of a decision for action taken at the European level. In this sense, the COR could be a pertinent "bottom-up" type mechanism to advance European integration, even though this does not necessarily mean greater technical cooperation any more than it implies greater interoperability *a priori*.

3

European institutions and space policy for security and defence

In pooling Europe's resources for space activities, a separate integration track was created in the form of the European Space Agency.

While ESA stands outside the community approach, its statute qualifies it, like the EU, as more than simply an intergovernmental cooperation structure – it has an obligatory programme and its own common infrastructure.

Yet, the EU First Pillar, the European Community Treaty, still stipulates that the defence sector is largely outside the scope of the community authority and remains under the control of national governments. Policy areas where the European Commission is authorised to address security aspects openly and spend funds on them are still rare. It is clear at this time, though, that internal security as well as defence in the EU will remain intergovernmental for the foreseeable future, and any active role of the EU and the European Commission will be geared at facilitating member states' efforts.

Today, the European Commission sees its space role in conducting joint research and development, drafting regulatory conditions and gathering broad support for projects of Europe-wide interest such as Galileo. In the last decade, space activities have moved beyond their earlier focus on technology development and begun to deliver mature applications, in particular in communications and earth observation, including weather and climate change monitoring. Some of these applications have assumed important roles in various sectors of life and economic activity and are also relevant for security and defence.

The fragmentation of European space efforts – the split between civil and military activities and between national agencies and ESA, with the growing role of the EU – finally gave rise to calls for new institutional solutions.

In 2003, the Commission presented its Green Paper on European Space Policy, prepared in cooperation with ESA. It elaborates the fundamental notion that the benefits of space must be put more at the service of Europe and its citizens. Among the key areas where strong benefits could be expected are sustainable development, including global monitoring for stricter control of environmental regulations and capacities for managing environmental crises, as well as the security of citizens through CFSP and ESDP. The intensive public debate about the Green Paper that unfolded in the first half of 2003 provides a good basis for the White Paper.

As far as security is concerned, the Green Paper embraces the space aspects of the full spectrum of Petersberg tasks, both civil and military, that are covered by CFSP and ESDP. It rightly reflects the ECAP finding that "to a certain extent, the critical shortcomings of current crisis management are directly linked to a space technology capability".

Given the limited nature of EU defence integration, however, with the common defence remaining within the remit of member states, most of them coordinated by NATO, the Commission's Green Paper necessarily stops short of offering a truly integrated vision of a European space policy that includes strictly military and intelligence space capabilities. Therefore, the answer to the Commission's call for a more efficient and ambitious approach to space that binds efforts of the EU, ESA and member states together, will have to go beyond the Green Paper debate.

The first goal, as the Green Paper specifies, "is to ensure Member States discover added value" in a common, coherent EU space policy that also addresses security and defence. In practical terms, at least in the beginning, this

challenge translates into the prospect of mobilising additional funds through European cooperation for security and defence-related space activities led by those members states that have active policies in this field.

This could be achieved in three ways:

- exploiting more effectively research and technology development funds for dual-use purposes on the national and European levels;
- increasing space funds for security applications;
- generating increased political support for additional appropriations to security-related space programmes by raising awareness and enabling accelerated success. The Commission estimates that total annual spending on space in the EU will have to be doubled to 12 billion euros to support the programmes seen as necessary components of a future coherent European space policy.

The functions needed in any future improved policy framework would thus be:

- targeted R&D for advanced space applications;
- increased involvement of those responsible for security and defence in space-policy decision-making;
- increased, institutionalised political visibility and effectiveness of security-related space activities.

These three points can serve as criteria for evaluating various possible future institutional approaches to space and security between EU, ESA, other related agencies and national institutions.

3.1 The EU as the hub of European security policy

The political and military lessons of the Balkans wars of the 1990s led to the decision to equip the EU with a set of military and civilian police tools for crisis reaction, permitting the launch of the ESDP Headline Goal initiative in 1999. Interpretations of the "Petersberg tasks" on which this effort is based have been somewhat at variance in different member states from the beginning. There is increasing acceptance today that a broader spectrum of defence tasks, such as conflict prevention, joint disarmament operations, military advice and assistance, post-conflict stabilisation and combating terrorism (cf. Morillon Report to the European Parliament, March 2003), should be explicitly included. For planning purposes, it would be advisable to build on the most robust assumptions regarding the possible nature and scope of future EU operations. This applies even more in the strategic environment after 11 September 2001.

The draft strategy paper "A Secure Europe in a Better World" presented by Javier Solana in Thessalonica in June 2003 provides an overview of the challenges, including international terrorism, proliferation of Weapons of Mass Destruction (WMD) and the collapse of effective state institutions in many parts of the world, and makes the case for a "more active, more coherent and more capable" European Union in response to these challenges, working with partners.

For the additional defence and intelligence capabilities required, space is going to be crucial as a field that offers cutting-edge technology advantages, covers the increasing global reach of European responsibilities and in effect favours the cost-effective use of scarce funds by providing force-multiplying components and capabilities. The same is true not only for the ESDP's Petersberg tasks but also for other shared European security tasks that do not normally fall under ESDP, such as border and coastal security.

Given the severe deficiencies in Europe, for both military and non-military missions, in certain key areas such as command and control of operations, global secure communications, strategic intelligence (monitoring, early warning, situation assessment), mapping, navigation and positioning, operational surveillance, tactical situation awareness, force protection and effective engagement capacity (all with a space dimension), the main focus of implementation

efforts in ESDP has been the process of capability-building. European Capabilities Action Plan (ECAP), set up 19 working groups to examine the most significant shortcomings. None of them dealt specifically with space. However, a number of space-related capabilities have been included in the list of shortfalls, i.e. strategic satellite imagery, signal intelligence, early warning and support for UAVs.

There is today no structure in place in Europe that could cross-reference such space-related elements and provide an overarching approach for generating the required assets and capabilities, also with recourse to commercial or public dual-use opportunities and public-private partnership solutions. The overlapping of required space-related capabilities for defence purposes and for non-defence security purposes (such as border police, coast guard and emergency response) must be recognised and exploited on the national as well as European level.

A significant contribution could come from the creation of a European security and defence capabilities agency tasked not just with running procurement programmes, but also overseeing and targeting R&D, monitoring national efforts and assisting in the identification of requirements. Key member states of the EU are backing the creation of such an Agency, building on existing structures such as OCCAR, and the draft Constitution produced by the Convention calls for its establishment (cf. Burkard Schmitt, *The European Union and Armaments*, EU-ISS Chaillot Paper n. 63, Paris).

There is no guarantee, however, that such an agency would focus sufficiently on space. There may thus be the need to provide a separate framework and impetus on the European level specifically for the security and defence dimensions of space. One such proposal, even more narrowly designed for the military dimension, has been offered by the French General Gavoty in the form of an "Eumilsat" agency that would also be in charge of controlling the operational systems, including Galileo. What should be avoided is a further deepening of the existing civil/military divide because this would further undermine hopes for a more intelligent and effective use of limited resources.

To ensure that a European security and defence space agency would be able to draw on the technical expertise of ESA and its European network, a considerable degree of integration within ESA would probably be of advantage. Such an approach could also facilitate the involvement of defence and security ministers from national governments in the political guidance of the agency; for the foreseeable future, defence ministers will continue to be able to meet only informally in the EU context, whereas the ESA Convention would provide the flexibility for member states to be represented not only by research ministries, especially under optional programmes (where the EU can also be a participant).

A security and defence authority created by member states within ESA, with EU participation, would also be a good place for developing and implementing European policies for security-relevant regulations on space, such as shutter control for imaging devices in times of crisis.

Given the fact that within Europe there is a strong asymmetry of military space efforts, with France spending more than twice as much as all others combined, the French experience and expectations are certainly going to be a major factor in the future institutional development. If others want to motivate France and other countries into less traditional approaches for their military space efforts, they will at least have to put attractive levels of additional funds on the table.

One complicating, but at the same time helpful element is the fact that the European capabilities-building efforts in ESDP are closely coordinated with NATO, since most members belong to both organisations and must make sure that their forces are geared to the requirements of both. This applies even more after the decision in NATO to establish an allied Response Force (NRF) and push for the adoption of network-centric, transformational approaches to defence among European allies.

Future European decisions and performance in security and defence applications of space are likely to impact not just on the quality of transatlantic consultation and cooperation in international security affairs but also on other

aspects of strategic importance such as Europe's role in the world and the future of the European defence industrial base.

In space, the overwhelming US dominance is particularly striking since the vast majority of space expenditure and in particular of military space expenditure worldwide is in the US, leaving European firms at a severe disadvantage with respect to their US competitors in aerospace and defence.

The space sector is thus intricately linked to the question of defence market access and export control negotiations with the US and also to the themes recently addressed in the European Commission's communication "Towards an EU Defence Equipment Policy" (March 2003) with a view to creating a European defence equipment market.

In this context as well as in many other respects, the fact that space activities are relevant to a number of different directorates-general of the Commission needs to be taken into account when shaping a future organisational framework for a coherent EU space policy. A certain risk of rivalries, with adverse consequences, may arise between portfolios such as research, development, technology and innovation, enterprise, transport and trans-European networks, information society, environment and external relations in the pursuit of their respective tasks and policies.

The Commission, and the EU as a whole, are not yet sufficiently organised for an active, coherent space-policy role. This has also been visible in current space programmes with an EU role such as GMES and Galileo. It will be necessary in the future to find a suitable assignment of roles and lead responsibility within the EU.

3.2 ESA as a dual-use space agency

ESA can offer very attractive infrastructure for the whole range of space projects and has a successful track record. It has traditionally, though, been hindered from engaging in explicitly security-relevant activities by the reference to "exclusively peaceful purposes" in its statute.

Tacitly its achievements in providing autonomous access to space have of course also been motivated, as has been true for all other space powers, by the desire to gain access to the security and defence applications of space such as intelligence gathering from orbit.

The institutional separation of civil and military space activities was historically rooted (as with NASA and the US Department of Defence) and was originally based on valid political and legal considerations. However, it increasingly became outdated after the end of the Cold War. In 1993, ESA's International Relations Committee recommended an open mind towards a role in setting up a WEU satellite surveillance system. ESA has indeed shown flexibility. Not only were the Helios-1 satellites and several other military payloads launched with Ariane. Helios-1 was also tested as at ESTEC (European Space Research and Technology Center, ESA Noordwijk, Netherlands).

ESA's successful demonstration of an optical communications link between ESA's Artemis and Envisat may lead to a similar link between Artemis and Helios-2.

Recently, ESA officially decided to re-evaluate the legal meaning of its statute, concluding that the Convention does not restrict ESA's capacity to launch and implement space programmes for defence and security purposes or dual purposes or for national or international public bodies in charge of security and defence. It also installed a security clearance system.

There is the potentially attractive option to take full advantage of the dual-use nature of space in ESA itself, based on a future cooperative arrangement with the EU. Any such opportunity to avoid intra-European duplication should be welcome as a cost-reducing factor.

On the other hand, one must realistically assume that defence space systems are likely to remain national assets for some years to come. Even in the longer term, there may always be some defence applications that are deemed so sensitive that they are either not available at all to European cooperation or need to be dealt with in special ways.

Given the infant nature of European military space, it is too early to judge to which extent this

aspect is likely to undermine the vision of ESA as a single European space agency. In any case (as in the Helios programme) the facilities that ESA can draw on as a service provider – possibly augmented by a progressively consolidating network of currently national space facilities – should be available for specific tasks even in the context of such special programmes.

3.3 Other aspects of institutional development

In order to both gain cutting-edge capabilities and help sustain a capable and viable industrial base in Europe, it is urgent that efforts be made to strengthen dual-use aware, mission-oriented research and technology development in the EU in support of other community policies and to jump-start advanced R&D investment in the defence-space sector. Only by fostering the early pooling of European efforts at the research and technology level can the present situation, in which systems remain national and are only made mutually accessible (imagers, transponders) as a minimal form of European cooperation, be changed.

At the moment, the Western European Armaments Group (WEAG) is the only place where this is attempted to some degree. Satellite surveillance technology has been one of the Common European Priority Areas (CEPA) in this organisation since 1990. In 2000, this was widened to include military space technology as a whole.

One of the best ways to put Europe's space, security and defence capabilities-building efforts on a new footing would be the launching, preferably by the European Commission, of a European Security and Defence Advanced Projects Agency with a small, non-permanent staff and flexible, mission-based activity. Like DARPA in the US, this would provide a framework for pursuing a strategic approach to applied technologies of the future, combining a well-defined vision with highly responsive structures and methods.

A more active security and defence space user community is needed to interact constructively in the development of concepts and requirements, the acquisition process and joint exploitation of space systems for security and defence purposes in Europe. It would also be of great help in professional interaction with US space experts and in perceiving developments in US military space policy with more accuracy and timeliness.

Furthermore, a whole range of new institutional and regulatory decisions will have to be taken to deal with new tasks in the field of security and defence applications of space. Galileo and its security implications (cf. G. Gasparini, G. Lindström, *The Galileo satellite system and its security implications*, EU-ISS Occasional Paper no. 44, Paris) have already provided a wake-up call. Among other things, security-aware policies will have to be established for access to signals and for their denial, as well as precautions for system protection.

Finally, once the operational systems are in place, European command structures in charge of space systems will have to be developed. They may have to satisfy full military requirements as well and the specific European desire to exploit the dual-use nature of many space systems for a broad range of security applications. In some cases, parallel user structures will be unavoidable because core security and defence tasks often require a different approach than would a wider notion of security, e.g. environmental monitoring.

4

Space and security in Europe: a crossroad between policy and industry

Development of the European Security and Defence Policy requires space assets. Therefore, Europe needs to maintain a technological and industrial base or it will lack the autonomy required for strategic decision. Specific policies must increase its efficiency and competitiveness, overcoming European imperfections on both the supply and the demand side of the space market.

The main problems in the area of space and security are:

- The lack of significant funds devoted to security and defence in Europe. This reality emerges dramatically from a simple comparison of European and American expenditures: the ratio is 1 to 2.6 in the commercial market; 1 to 3 in meteorology; 1 to 4 in civil institutional demand; 1 to 30 in the military area. This limited demand impacts negatively on the European industrial base in a number of ways.
- The overall production of European industry will remain lower than US production and this will have a negative impact on competitiveness since non recurrent and fixed costs, such as research and development, must be borne almost entirely by civil production. The dependence on the commercial market amplifies the effects of economic crisis, as recently occurred, since the military sector is not big enough to develop significant anti- cyclical demand.
- From the technological point of view, the dual nature of space requires full exploitation of all possible applications, civil and military.
- The lack of institutional demand for launch services implies that the European launcher, Arianespace, is less competitive.
- The commercial attractiveness of European products is limited to non-security sectors.

One problem is the absence of a common European strategy that guarantees the convergence of the present and future national, international and European efforts. It can only be solved by adopting a European space policy that includes both civil and military aspects. In the meantime, closer coordination between national and European dimensions, as well as between civil and military activities must be developed. This will avoid duplications and the dispersion of scarce resources and will gradually bring about the pooling of technological, industrial and operational capabilities.

The supply side is also structurally inadequate. The globalisation of the market underlines the weakness of the European industrial base *vis-à-vis* American competitors.

Further rationalisation is needed and will probably involve greater industrial concentration. This process must be guided to avoid excessive distortion of the market, of which some is almost inevitable. The European governments and institutions should act to preserve some competition on the European market, at least in those sectors in which the market dimensions and technological and industrial characteristics allow, while opening up to concentration in other areas, such as launchers.

The introduction of a security and defence demand will have important positive effects on the competitiveness of the European market,

making room for at least two different competitors for each sector.

Some conclusions can be drawn from a comparison of US and European experiences:

- The experience of the American space sector underlines the anti-cyclical role of institutional spending (in particular from the Department of Defence).
- The institutional support of the R&D in this particular sector is critical for any success, given the high level of uncertainty and the long-term prospective of the investments.
- It is important to offer the supply side a common set of regulations and unified demand, providing a stable, predictable and rich counterpart.
- The presence of strong demand organised around a single actor is a key asset; the segmentation of demand into different agencies specialised by mission should be avoided.
- Strong political backing for the supply-side reform and concentration process should provide the necessary incentives to cut costs.

Table 2 - Analysis by Mission

Missions	Assets	Industrial players	Main Institutional players	Security aspect	Problems	Policy
Access to space	Launchers. Shuttle (?) Human flight (?)	Missile producers, rocket engines, launch facilities	ESA, EU Commission	Relevant, dual	Costs, subsidy, low institutional demand	Maintain all-spectrum capability, develop new technology, savings
Communications	Satellites constellations (GEO, MEO, LEO, DRS)	Satellite producers, ground segment, transponders, receivers, services providers	ESA, Nations (F, G, I, S, UK), NATO	Relevant, dual	Lack of institutional demand, distortion of competition, security of data, lack of wideband capability	Coordinate national efforts and civil/mil assets, plan for integrated future expansion
Navigation	GNSS	Services providers, atomic clock producers, receivers	ESA, EU Commission, EU Council, NATO	Relevant, dual	Control over signal, integration with GPS and Glonass, improper use	Clarify chain of command, bilateral agreements with US and Russia
Meteorology	Observation satellites	Satellite producers, ground segment, services providers	Eumetsat, ESA	Relevant, dual	Protection of information	Strengthen existing institutional links
Monitoring	Radar, IR, optic constellations	Satellite producers, ground segment, sensors	ESA, EU Council, Torrejon, Nations (F, I, G, S)	Relevant, dual	Costs, lack of coordination, security of data, legal framework for exploitation	Coordinate national efforts and civil/mil assets, plan for integrated future expansion
Treaty enforcement	Observation satellites	Satellite producers, ground segment, services providers	EU Council, ESA (technology)	Military, preventive diplomacy	Costs, political mandate	Exploit monitoring assets better, provide dedicated ones
Targeting	Observation satellites, GNSS	Satellite producers, ground segment, transponders, receivers, services providers	EU Council, Torrejon, NATO, ESA (technology), Nations	Military only	Lack of interoperability, few dedicated assets, unclear political framework	Coordinate national assets, develop common constellations, procedures, enhance Torrejon
Intelligence (Elint, Comint)	Satellite constellations	Satellite producers, Crypto software, sensors	EU Council, NATO, Nations	Military mainly	Sovereignty issue, lack of coordination, no dedicated assets	Establish political and institutional framework, common assets, exchange information
Early Warning	Observation satellites	Satellite producers, sensors	EU Council, NATO, Nations (F, UK)	Military, preventive diplomacy	No assets available, costs, feasibility	Deploy EU system (additional payloads)
Attack hostile assets in space	ASAT, killer satellites	Rockets, missile, EKV, satellites	ESA (technology), NATO (?), Nations (?)	Military only	No assets available. Costs, feasibility, impact on stability	Study technology
Missile defense in space		Laser, EKV, satellites	ESA (technology), NATO (?), Nations (?)	Military only	No asset available, unreliable technology. Costs, feasibility, impact on stability	Study technology

(?) = Possible, foreseen
Nations in brackets as main players

Table 3 - Main Players and Policies

Phase	Demand	Supply	Problems	Policy
Research	Nations, ESA, EU Commission, industry	ESA, Universities, Research centers, laboratories	Lack of public and private funds, no coordination	Develop common institutional framework, increase funding, exploit economy of scale
Technological development	Nations, ESA, EU Commission, industry, NATO, private sector	ESA, laboratories	Lack of public and private funds, no coordination	Develop common institutional framework, increase funding, exploit economy of scale
Requirements	Nations, ESA, ESDP institutions, NATO	ESA, industry	No common requirements, lack of interoperability	Establish common Agency, pool present capabilities, stimulate competition
Procurement, maintenance	Nations, ESA, ESDP institutions, NATO, private sector	Industry	Lack of institutional demand	Establish common Agency, pool present capabilities, increase funding
Services, applications	Nations, ESA, EU Council, EU Commission, NATO	Industry, service providers	Limited private and public demand	Stimulate private sector, unify or coordinate institutional demand
Legal framework	EU Council, EU Commission, Nations		Fragmentation	Establish a common set of rules
Political authority	EU Council, EU Commission, NATO, Nations		Fragmentation	Determine who is in charge of what, clarify links between institutions

Conclusions

The European Union (EU) cannot ignore space nor remain out of it. This is well understood by the member countries that have a significant space policy. The creation of the European Space Agency (ESA) and the importance of its activities in terms of science, technological and commercial programs illustrates this political concern. At the same time, more "space oriented" European countries have developed an autonomous space activity, with some defence and security space assets. Also the EU, through European Commission initiatives, has became a space policy maker, starting with transportation and environment monitoring fields: the Galileo and GMES programs, both developed by the European Union and ESA, clearly show this trend.

Meanwhile, the EU has further strengthened its attempt to define a Common European Foreign and Security Policy (CFSP) and a European Security and Defence Policy (ESDP) and has started acting as an international security player (in Bosnia Herzegovina, Kosovo, the FYROM and Congo).

The EU Intergovernmental Conference will evaluate a number of proposals made by the European Convention, including the strengthening of European solidarity in the security field (in particular against terrorism) and the modification of some procedures and institutions to improve the efficiency of the European foreign, security and defence policy.

Space, and the role of space in the future of Europe, has to be included in that framework. That could overcome one of the main constraints on efficiency in European space policy: the fragmentation of players and strategies. This is obvious today in the telecommunication field where Europe has produced three different military projects (Syracuse, Skynet and Sicral). In the defence field some cooperation programs involving small group of countries recall the extensions of national logic.

Europe is already a very significant space actor, both collectively and thanks to the national space policies of some of its member states. Today European space policy is led by different bodies, depending on the applications: national space authorities, national defence authorities, ESA and some EU Commission Directorates.

The current relationship with the US, the world's only space power, can also lead to fragmentation. Only important civilian scientific programs are multilaterally managed by ESA with a direct partnership link with NASA, but there is no parity between Europeans and Americans.

In the commercial field, and even more so in the defence field, there is no such multilateral framework and each country has a direct bilateral relation with the US, with the exception of some general agreements (service agreements) managed by NATO. It may not be easy to overcome those multiple factors of fragmentation. This has been the framework for operations for decades.

To break away from these strategies and unbalanced policies calls for a redefinition of strong strategic, institutional and organisational patterns.

For example, financing European space activities with a unified community budget could be counterproductive: today those activities (including ESA multilateral activities) are financed through individual national budgets based on the national demand, which can vary appreciably from one country to another. ESA responds to that demand with an adequate offer. The same logic is all the more necessary for

defence budgets. Instead EU budget contributions follows an objective logic based on parameters (GNP and population): it is dubious that such "objective" criteria can increase the space budget.

Enhanced cooperation is a different case: if a group of countries decides to undertake a project in a certain sector with some key objectives, there is a clear interest on the part of the participating countries to finance the achievement of the project, even in a non-proportional way. In the end this means that it is not very likely (and might be dangerous too) to pursue a complete rationalisation and unification of European space policies in the short term, and that national government logic and choices are and will continue to be determinant.

This is also true for the space programs linked to security and defence policy. In the defence sector, space expenses are included in the very tight and shrinking framework of national defence budgets. National defence budgets define and maintain different priorities, and are not able to promote a competitive critical level of technological capacities. This makes it impossible for them to fully benefit from the enormous operational potential offered by space technologies. In other words, no individual European country can finance alone the space program needed to modernise its security forces.

Obviously this situation deepens the gap between Europe and the US in terms of space technologies. In fact, in that sector the expense ratio between the EU and the US is 1:2.6 in the commercial market, 1:3 in the meteorological sector, and 1:30 in the defence sector. This has a huge impact on European industry's competitiveness and technological capacity. Thus, three related problems have to be addressed in a European logic:

- the insufficient level of European space expenditure;
- the lack of convergence between different initiatives;
- the structure of supply (to maintain the competitive capacity).

On the political and strategic side, Europe requires space assets to achieve its objectives in security and defence policy but also to be able to maintain its role as a global space policy player.

One principle behind this policy must be continuity in techniques, industries and functions in space activities whether scientific, commercial security or defence. This would make it possible to work out a closely linked framework for budgeting, planning, implementation and management of programs.

The term security is comprehensive of both civilian and military activities. After the end of the Cold War and in the absence of a dominant military threat against the Western world, the perception of new threats, risks and vulnerabilities has gained importance.

Terrorism, organised crime, risks stemming from forced or illegal mass migrations, security of supplies and of main trade routes, availability of strategic resources, protection of the environment and the like, have become the main source of worry. Those new threats cannot be dealt with by military force only, but require a combination of different means, both civilian and military, better encompassed by the term security.

Moreover, while high-intensity, purely military confrontation is still possible, military operations and priorities are shifting away from what was traditionally defined as "defence policy" (defending borders, defending the nation against well identified and "symmetric" enemies, planning confrontation between easily identifiable armies, with a high level of legitimacy, etc.) towards crisis management intervention (of a dual – civilian and military – nature), preventive engagement, counter-proliferation and counter-terrorism, support of civilian security operations, peace- and state-building. These operations are a significant element of any comprehensive "security and defence policy".

There is considerable overlapping of functions and means between the security and defence uses of space. In fact, space operations can be seen as a continuum, including civilian and military functions as well as security and defence operations. Specific military requirements (such as continuous availability, greater reliability, interoperability, protection, miniaturisation, speed, redundancy, etc.) increase the performance of space systems and provide a positive push towards technological developments that can further increase their utility and competitiveness for civilian and security uses.

The general tendency seems to be going in the direction of an increasing internationalisation of security policies (in the EU and globally), which goes hand in hand with the globalisation of the economy and of all kind of services. The fight against international terrorism has accelerated this development, already present in crisis management and peace operations, arms control and disarmament policies, the fight against organised crime, etc. Yet these considerations contrast sharply with the present segmentation of European space policies into civilian and military activities, as well as among scientific research, economic and other activities, including security and defence, and between nations.

Transatlantic problems also increase the difficulty in identifying an overall, coherent European space policy. The scientific cooperation between ESA and NASA contrasts with Europe's military dependence on the United States; however, transatlantic differences emerge when Europe launches strategic programs such as Galileo; communication satellites are conceived with different technologies, creating problems of interoperability; and intelligence satellites become a bone of contention, as well as triggering the prospect of so-called "network-centric" warfare. There is the need to identify basic elements of a transatlantic cooperation policy coherent with the development of a European Security and Defence Policy and with the various new requirements stemming from the operations in which European forces are involved.

In general, the major space projects have been decided by the major users, and the US is prominent among them. France, Britain, and now also the EU and ESA, are trying to foster space activities, but the US is, and will remain, the main space actor (and Europe's major partner) for many years to come. But Europeans have only been able to accept or refuse participation in US-defined and US-led projects, never the other way round. Even good European ideas have sometimes been implemented as US-led projects, with subsequent European participation.

Moreover, the strong US tendency to consider space as an essential element of US military dominance and to make military operations increasingly dependent on space assets and technologies diminishes the possibility that the United States will generously share these same assets and technologies with its allies, except on an ad hoc and limited basis and in exchange for full compliance with US political, economic strategic and operational priorities.

Finally, differences are emerging between the US and Europe on the best way to use space assets in operations. The American concept of network-centric warfare, based on the use of wideband communication of a large amount of data to the lowest possible level of fighting unit (ideally, the individual soldier) requires a delegation of authority and an independence in decision-making that is generally refused by European military planners, who prefer a more centralised distribution of selected information (on a "need to know" basis) following a hierarchical line.

Europeans doubt that a complete technological restructuring of their operational units and their hardware can be useful and suggest that a better compromise would be for their forces to be "network enabled" or at best "network based", but not fully "network centred".

This debate is also fuelled by the different strategic perspectives of the EU and the US. While the latter maintains a truly global strategic outlook, based on its ability to project overwhelming force worldwide, Europe has more limited ambitions and requirements, focussing on relatively proximate threats and on what is needed to perform the missions defined by the Petersberg tasks. Such a regional vision does not exclude the possibility of worldwide force commitments, which are not seen as isolate European operations, however, but in support and

with the assistance of other allies, either local or, more likely, the Americans themselves.

Thus, while a high degree of interoperability is deemed essential to maintain the possibility of joint operations among allies, complete technological and operational identity is generally rejected. This may indeed reduce the possibility of conducting fully integrated, joint military operations and favour instead various forms of division of labour with a significant degree of separation, but it seems to be in line with the growing US tendency to downgrade the centrality of coalition warfare operations conducted by fully multinational headquarters. This increasing US independence underlines the importance of achieving greater European autonomy.

Considering the global spread of military and security crises and the degree of exploitation of existing space assets, the degree of redundancy that could be guaranteed by more and more effective European assets could increase the security of the network and perform a useful backup and decongestion function. The fact that US and EU security perceptions generally remain very similar, almost identical, favour this development.

Inter-agency problems complicate European decision-making on space. Respective functions and specialisations must be defined better to allow for more effective integration and policy coherence (and more efficient use of the limited resources available). While being the focus of European space policy, ESA cannot really "draw up" policies. It can only autonomously initiate the study or the proposal of new programmes, but still needs the approval of member states before it can implement or make budget allocations to them.

The European future in space has to be built on the existing reality. Present European space activities are generally carried out through various national agencies or ministries: national institutions are generally more capable than international ones at dribbling relevant budgetary decisions past institutional and political obstacles, lobbying for greater space budgets, gathering public support and identifying economic interests and technical capabilities.

The EU is a relatively new actor in space. It has the ability to initiate policies and fund them, but not to substitute all other actors. Its main asset is the possibility of combining overall security and industrial policies with space policy, thus allowing for more coherence and rationalisation. The first basic objective should be the stabilisation of the European presence in space in order to guarantee Europe's space capacity for the future, consistent with its political and economical weight and able to fulfil the needs of an articulated European security and defence policy.

This requires a number of minimum conditions:

- full autonomy in basic space capabilities (satellites, launchers, ground segments, technologies and services) in order to guarantee access to and the optimal utilisation of space in accordance to European policy. This does not exclude agreements with other space powers nor does it call for parity with the US; it is merely a sufficient objective with minimal technological assets.
- a lively, competitive and diversified European industrial and technological basis for the development of scientific and technological know-how. This means guaranteeing a volume of production in the long term, and some public investment programs in science and technology that can have an anti-cyclical function with respect to commercial demand.

It is important to identify what could be an essential and minimal European presence in space for security and defence purposes. Roughly, this would include a network of satellites to match requirements in terms of communication, observation, positioning, electronic intelligence and early warning: assets that go with adequate ground segments, and with space segment investment costs of around 8-9 billion euros over a period of 8 to 15 years, for a yearly investment below 800 million euros (with a part already allocated). These assets might not be affordable by a single European country but are highly compatible with a multilateral investment effort. Such a system would also provide CFSP, ESDP and the European rapid intervention forces with a higher degree of efficiency and autonomy. The details of such a space architecture are not new: they have long been known to European governments. The real problem is how to realise them.

The most recent EU developments could play a positive role. The EU may have to identify and articulate demand more precisely in terms of space assets, gathering the perceptions and choices from various European states (or more precisely a group of states, following an enhanced cooperation logic), and establish criteria for burden sharing and systems management. This would be the best way to guarantee equal fruition for users but also to establish the necessary link with the Atlantic Alliance and the US.

Within such a framework, ESA could act on the supply side, guaranteeing the necessary technical level and the system kick-off, linking up directly with the European industrial base and national authorities.

In practical terms, a "space security" committees could can be set up in parallel in the ESA context and in the EU Council of Ministers, in charge of designing, programming, implementing and managing programs, and providing an institutional link between the two institutions. Also, a European space security and defence sector could flank the future EU headquarters, but this need for a higher institutional profile for space security should not be limited to defence.

Again, European space is mainly civilian and a dual-use sector. This calls for a higher "dual-use space security" profile, which means that on the ESA side (ESA Council) European intergovernmental Councils would be specifically put in charge of space security, while on the EU side the European Council would give a precise mandate to develop coordination competence at the Coreper level, with a structure able to check and approve the security policy involvement of EU space projects.

In order to avoid too many institutional space security entities, such as one dedicated cooperation security council in ESA and another for space security in the EU Council, the composition of such a committee could be the same for both (space security being an "optional" program for some ESA countries and an "enhanced cooperation" for EU members), or the ESA and EU Councils could take a parallel decision to define a joint space security authority under the responsibility of the EU High Representative, with competence on the strategic and security aspects of space security.

As a starting point, the EU shall proceed for space in the same way that it progressively produced CFSP and ESDP: identification of objectives, problem analysis, solution hypotheses to be evaluated by European institutions and public opinion.

Such a task could be best done by a specialised Space Security Committee, composed of European experts bringing together assessments from space industry, potential civilian and defence space users in the foreign, security and defence spheres. Such a committee could help to determine the optimal level of European ambitions in space, with regards to both demand and the evolution of needs. This Space Security Committee would carry out very important policy work, useful for identifying and building up a much needed European space constituency.

In the end, this Committee would present its conclusions to the European Council to start a formal decision-making process in the community framework and with the involvement of interested institutions.

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